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THE HISTORY AND ECONOMICS OF TRANSPORT

THE HISTORY AND ECONOMICS OF TRANSPORT

BY

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PREFACE

TRANSPORT problems are not of recent origin. In one form or another they have arisen ever since man had any goods to move from place to place, and as transport has become more completely organised they have provoked increasing controversy. Nor can it be said that their solution has never been attempted. In the railway period alone Parliament and traders have given much time to their elucidation. But it is only in recent years that they have been systematically studied. The new Universities and Schools of Economics having included the subject of transport in the curriculum for their commerce degrees, it has come to be treated as a branch of economics deserving of accurate, scientific inquiry and study. The aim of this volume is to assist this study, and consequently much that has been written is elementary. There is also much that, necessarily, is sketchy, because, with a subject so comprehensive, it has been found impossible to deal in detail with every branch ; to have done so would have required several volumes. There is much also that, inevitably, touches controversial ground. Where this is so an attempt has been made to present both sides of the question as fairly and as adequately as possible. But while the primary aim has been to produce a text-book for the student, the authors hope that it will be found interesting to the general reader, particularly to the business man whose daily affairs bring him into close contact with the problems of transport.

This volume was mainly written before the War, and was first published in 1915. The first edition having been exhausted, it was necessary to reprint, and advantage has been taken to add to the sections on Railways and Shipping, giving in both instances some account of what happened during the War period.

Some of the appendices have also been brought up to date.

These should prove useful both to the student and to the general reader.

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THE HISTORY AND ECONOMICS OF TRANSPORT

INTRODUCTION

METHODS OF TRANSPORT AND THEIR DEVELOPMENT

CHAPTER I

THE LAND OR THE WATER ROUTE

EVER since trade and commerce necessitated the transport of goods the same problem has confronted the trader. With improved methods and greater knowledge of forces giving increased power over physical conditions, the terms of the problem have been modified. But the primitive trader of many centuries ago debated the same questions as does the twentieth century merchant in the Midlands to-day: Shall I send my goods by land or by water? By the land road or the water road; by the wagon on the turnpike, or by the barge on the canal; by the railway, or by an improved canal method—these under different forms are practically the same question, which has demanded an answer from the trader of antiquity, the eighteenth century factor, and the captain of industry to-day.

Land and Water Route.

Nor is this question, which to the superficial observer appears so simple, easy to answer. The closer one looks into the subject the greater do its possibilities and complexities grow. When the primitive trader had a few goods to transport a few miles he might, or might not, have the choice of routes. If, however, he lived on the banks of a river, or lake, or by the sea, he enjoyed the advantage of the choice. If, for instance, one were to imagine a trader living on the side of a lake and having some goods to send to a settlement 10 miles distant, yet close

Nature of the Problem.

to the lake, will he send those goods by road or by water? It is frequently possible to get a clearer understanding of the problems of to-day, by going back to simpler times, and there view the problem shorn of the complications inherent in some modern methods. In the case now under consideration the trader knows that if the goods are sent by land there must be a roadway of some sort along which the beast of burden or the primitive vehicle can travel. If the shores of the lake are densely wooded, or marshy, it will be necessary first of all to make a road either by cutting a way through the trees and levelling a track, or by constructing a causeway through the marsh along which man or beast can safely travel. When this roadway is available it will next be necessary to decide how the goods shall be transported along it. If the roadway be level and smooth a simple sledge drawn by horse or ox may meet the case; or the trader may have been introduced to the wonders of the wheel, and by constructing a rough cart mounted on an axle with two wheels he may ease the labour for his horse or ox very considerably.

Modes and Means of Transport.

The point to note is that if he decide to transport the goods by land two questions have to be answered—is there a suitable road, and what shall convey the goods over the road? In other words, man has to provide both a road and a vehicle. But in the case under consideration the trader is living on the shores of a lake, and as the destination of the goods is near the lake there is an alternative route. Now this route differs in almost every respect from the other. In the first place the roadway is ready for use. There are no trees to cut down or a morass to be rendered traversable. Nature has freely provided a level, easily traversed roadway, and for the use of this, all that the trader need do is to construct some type of boat or craft that will float.

To primitive man living near river, lake or sea, the water road offered many considerable advantages over the land road. And it is fairly certain that, under the conditions stated, the invention of the coracle preceded the invention of the cart.

Throughout commercial history it is safe to say that, taken as a whole, water transport has been cheaper than land transport. Nor is the reason far to seek. Not only has the land road to be constructed, and this frequently entails great labour and expense,

but it has to be kept in a state of repair. An untended road sooner or later relapses into an impassable condition. Even the Roman roads, so solidly constructed that they could almost defy the ravages of Nature and of time, have, except where they have been continually in use and on the whole kept in a fair state of repair, disappeared from view under natural growths, the removal of which would be almost as costly as the construction of new roads. The water road of lake, river, or sea, with the natural modifications worked by time, changes but little during the history of a nation. There may be a certain amount of silting up or change of course, or modifications caused by erosion, but on the whole it may be said that the natural road enjoys a permanency quite foreign to any human attempts at road-making on land. The modern example of this fact can be illustrated by studying the capital outlay required for a railway company and a steamship company of the present time. The largest railway company of the United Kingdom is saddled with a capital of upwards of £200,000,000 sterling; but there is not a single British shipping company whose capital even approximates to £10,000,000. And the total value of the mercantile marine of the United Kingdom, which comprises no less than 18,250,000 tons of shipping, is only about £150,000,000.[1] Yet this shipping carries on somewhere about one-half of the ocean transport business of the whole world. If an analysis be made of the capital of a railway and steamship company, the cause of this great disproportionate need for capital very soon emerges. The cost of the rolling stock of the railway company is comparatively small. The items in the capital account, which have consumed the great mass of capital, are, in the first place, the survey of the route, then the Parliamentary expenses connected with getting the charter, and finally the purchase price of the land, and the making good of damage. In a word, it is the preliminary expenses in getting the scheme approved, the purchase of land, and the construction of the permanent way that have bulked in capital expenditure. Thus, while the capital of the railways in the United Kingdom now stands at something less than £1,400,000,000, about two-thirds of this vast sum has been spent in securing the roadway. It is not to be wondered, then, that there can be no comparison or equality between railway rates and steamship freights.

Comparative Cost of Water and Land Transport.

[1] These are pre-war figures.

The modern world has to sink large quantities of capital to secure a modern land road. The ancient world had to put forth great efforts to construct even a suitable track for the transport of weighty commodities. The amount of capital sunk in ancient roads was probably never either considered, estimated, or even approximately totalled up. The labour employed was forced or slave labour, and the materials were obtained by this labour from the nearest source of supply. What counted in those days was the effort or trouble entailed in procuring the facility afforded by a good road. Thus, if there was an alternative water route, mankind naturally gave its attention rather to the improvement of the water route vehicle than to the comparatively greater work of making a land road.

Cost of Roads.

The first water vehicle may have been a raft rudely constructed by fixing a number of tree trunks together. But this was a cumbrous machine, difficult to control and slow of speed. It would soon be superseded by the coracle. This craft, which played a considerable and useful part in the early history of these islands, was an ingenious invention. It was possibly suggested to some talented savage when he noted that the skins of animals would float. Eventually a craft was constructed by making a wicker framework and covering it with skins. The coracle is the earliest water-craft known in the history of the British Isles, and has survived almost in its original form down to the present day. On the Dee, and the Severn, these craft, the outer covering, perhaps, being tarred canvas instead of skins, can still be seen ; whilst in some parts of Ireland the type of craft used has scarcely changed since the days of St. Columba. In these slender craft long voyages were undertaken. There is on record a seven days' voyage by three Irish missionaries who travelled in a coracle from Ireland to Cornwall. Julius Caesar realised the convenience of these craft, which apparently he saw for the first time in Britain. He had some coracles constructed and gives an interesting description of their build. They had gunwales and keels of strong, light wood, and the framing between these was of wicker work. The result was a boat-shaped basket which was covered with the skins of horses or oxen. Such a craft was light, and so was easily portable ; it would stand a considerable amount of hard usage, and was very durable. Small coracles were

Early Water Vehicles.

covered with one skin, but larger craft were constructed, which required two, three or more skins to cover them. There is a curious and very interesting survival of the coracle in present-day ship-building technical terms. Where more than one skin was required to cover the wicker framework, there was a seam that had to be made water-tight. Thus, in the construction of these primitive craft there was the skin and the seam. These two terms have persisted right down to the present. The ocean liner also has a skin, *i.e.*, the outer plating, and where the plates are butted or riveted there are *seams* that have to be caulked to render them water-tight. The skin and seam of the early craft are thus commemorated, although few things could be less alike than the steel plating of a modern steamship and the hide covering of a coracle.

Evolution of the Boat.

When mankind produced more efficient tools, and was able to burn down or cut down a giant tree, the possibility of making the tree into a boat soon occurred to some quick-witted native. Probably fire was used to hollow out the tree, and form a bow and a stern. The wooden canoe became a practical fact and with this the adaptation of wood to ship or boat-building began. A canoe hollowed out of a tree was a cumbrous affair compared with a coracle. Thus, as soon as it was found possible to split trees into thin planks, the framework of the coracle was somewhat modified, and, in place of the hide covering, thin planks were used. But as yet there were no such things as nails or rivets, so the planks were sewn together as the edges of the hides had been. There was still, in the true sense of the word, a seam. Wooden boats with the seams sewn together, instead of being nailed, can still be seen in Northern Europe.

The Growth of the Ship.

With the introduction of wood as the material for shipbuilding very great possibilities opened out before the shipbuilder and trader. The dimensions of the ship could be enormously increased. This necessitated, however, many modifications, in form, construction, propelling force, and method of steering. But it was no great distance from the first clinker-built boat to the Viking ship—a craft prepared, under the conditions of water transport in those far-off days, to go anywhere and do anything. The long, swift Viking ship could not only cross to England or Ireland but could brave the crossing of the Bay of Biscay (or coast round it), and passing through the Straits

of Gibraltar it became a familiar object on the Mediterranean. Or to put it in another way, the improvement of the coracle to the Viking ship made international trading possible.

Widespread Evolution.

This evolution did not take place in one part of the world and then spread abroad. So far as can be gathered from survivals of early craft in different parts of the world, a very similar evolution took place in widely separate countries and continents. Both in the Far East and the Far West serviceable sea craft were produced, and as mankind settled down after having passed through the hunting and pastoral stages to the more civilised stage of agriculture, and had quantities of food-stuffs and raw materials of various kinds with which to traffic, the vehicle suitable for early trade was also available.

Thus trading began and continued to develop, a growing commerce requiring a larger vehicle which led to the oar first being supplemented, and finally displaced by the sail.

CHAPTER II

ENGLISH ROADS

In a very few pages the evolution of water craft over many centuries has been sketched. Meantime land transport had also made advances, and both road and vehicle had been subject to many improvements. It would be the rolling of a log that first suggested the possibility of easing the labour of haulage by using a roller or wheel. The facility thus gained would lead on to other attempts being made to assist the work of transport. The roller, whilst diminishing the heavy work of the haulier, was slow, because of the ever-recurring necessity of replacing the roller. This inconvenience doubtless led to the invention of the axle, and when once a freely rotating, yet fixed, roller or wheel was evolved the dimensions of the diameter of the wheel would soon increase. The original roller would be the trunk of a medium sized tree, and when once the principle of the action of the wheel had been grasped, sections of larger trees would be experimented with, until the solid built wheel would come into use.

The Wheeled Vehicle.

When Caesar invaded Britain in the year 55 B.C., he found the war-chariot in use. This was a two-wheeled car, of which the axles were prolonged, and fitted with scythes for the purpose of crippling the enemy when a charge was attempted. The wheels of these chariots would be constructed of solid wood, perhaps bound with metal; centuries were to elapse before the spoke-built wheel would come into general use, but drawings of the eleventh century show carts mounted on wheels of very similar appearance to those fitted to present-day country carts. It is evident, however, from Caesar's descriptions, that two-wheeled vehicles and hence roads of a more or less primitive type have been in use in this country, at any rate throughout the Christian era.

Antiquity of Wheeled Vehicles in Britain.

The coming of the Romans was to have an important effect on methods of transport, for the Romans were great road engineers. Road-making was an essential feature in their policy for maintaining their hold over the countries they conquered. Nor was an exception made in the case of Britain.

Roman Roads.

Throughout the Island—north, south, east, and west—wherever the Roman went he left an indelible mark in the form of roads. After 2,000 years of hard wear many hundreds of miles of these roads are still in use Other parts of the system have been overgrown or covered with wood, but even these could apparently be restored, for recently the suggestion has been made that the disused Roman roads should be opened out for motor traffic. The rough tracks of the primitive inhabitants had developed in some cases into broad clearings through the woods and forests, forming roadways which afforded a means of communication throughout the Island. It was this system of communication that the Romans, during their occupation of Britain, improved, straightened, constructed and developed. The main routes eventually were—

" 1. The Watling Street, leading to Ireland, and starting from Richborough by London and Worcester to Festiniog. Thence it had two branches—the left to Carnarvon, the right by Chester, Manchester and Corbridge to Cramond, Jedburgh, and the North.

" 2. The Ikenield Street, from the country of the Iceni (about the Wash and Yorkshire) by Newmarket and Dunstable to Streatley. Here it branched—the right by the Berkshire Ridgeway to Avebury ; the left by Newbury and Tangley to Old Sarum, Dorchester, Honiton, Exeter, Totnes, and the Land's End.

" 3. Akeman Street, from the eastern counties by Bedford, Buckingham, Alcester, Woodstock, Cirencester, Aust (where it crossed the Severn), Caerleon, Cardiff, Caermarthen, and St. David's.

" 4. Ryknield Street, from the Tyne by Bruchester, Boroughbridge, Aldborough, Ribston, Bolton, Chesterfield, Burton Wall, Birmingham, Tewkesbury, Gloucester, Chepstow, and so by Abergavenny and Caermarthen to St. David's.

" 5. Ermyn Street, from East Scotland by Berwick, Brampton, Corbridge to Catarick, where it divided ; the western branch along the Ryknield Way to Aldborough, Houghton, Doncaster, Southwell and Staveley, where it rejoined its own Eastern branch which had proceeded from Catarick by Northallerton, Stamford Bridge, South Cave, Lincoln, Ancaster, and near Witham.

" Thence the road ran to near Stamford, Chesterton, Royston, Ware Park, Enfield and Wood Green to London.

" Here it again divided—the western branch by Dorking and

Pullborough to Chichester ; the easterly by Bromley, Tunbridge, Wadhurst and Eastbourne to Pevensey.

"Two subordinate roads are also mentioned by Sir Richard Colt Hoare—

"6. The Fosse Way, from about Seaton by Ilchester, Bath, Cirencester, Northleach, Claychester, to Lincoln.

"7. The Via Julia, mentioned both by Antonine and Richard of Cirencester, from Bath, Bilton, Caerwent, Caerleon, Cowbridge, Neath, and Caermarthen to St. David's."[1]

Slow Development after Roman Period.

In the year 410 A.D. the Romans withdrew from Britain, and the British found themselves confronted with an enemy against whom they could make but a fitful and unsatisfactory resistance. Within half a century the Jutes and Saxons had established themselves in the south, and within another century the whole of the east and south-east coasts were in the hands of the Angles, Saxons, and Jutes. The British were driven steadily westward until finally the conquest was complete, and the various groups of invaders began to strive among themselves for the mastery. When this was decided other invaders entered upon the scene, nor was it until the Norman Conquest that the country enjoyed a cessation from serious outside attack.

All these centuries of strife and uncertainty were ill-calculated to assist in the development of either internal or external trade. Indeed, the roads for the most part were allowed to go to ruin, although the *Trinoda Necessitas* compelled freemen to maintain bridges—the three compulsory works being repair of bridges and fortifications and personal service in the fyrd or militia. Thus such transport as existed was carried on either by land or by water under the greatest difficulties.

Norman Period.

But with the coming of the Normans, and the constant going and coming of the conquerors between the Continental and English divisions of their kingdom, the routes to the more convenient seaports on the south coast were improved. Hence by the time the Plantagenets were on the throne the main roads connecting London with the seaports for the Continent were in fair condition. But northward and westward communication was difficult and remained so for some centuries.

[1] *Social England*, vol. i, pp. 49, 50.

Parts of the old *streets* were either still in use or had been repaired, but the main traffic of the country continued to be carried on by means of pack animals.

Thus the trading routes were *Holloways*. These had originally been tracks cleared of obstruction or made traversable where morass succeeded the generally prevailing wood. There was no attempt, however, at road construction, and as a consequence these tracks became more and more deeply worn—hence the name *Holloways*. In some places they were worn to such an extent that the pack animals going along them were barely visible to people on the level. In the winter time such tracts would fill with water, and, if the season was severe, would be frozen hard ; in either case the passage-way along them was obstructed. There are still survivals of these *Holloways* in many of our old towns. The place at which the *way* entered the town was the *Holloway* head, a name that still lingers ; in London it has given a name to a large district.

"Holloways."

The difficulty connected with the transport of goods under such conditions can be more easily imagined than described. But undoubtedly it was a great factor in stimulating the importation of foreign manufactured goods, which could be brought within reasonable distance of most market towns or fairs by the water road. Thus it is not to be wondered at that English manufactures stagnated, and that until the rise of the Mercantilists, whose policy it was to make the nation powerful and self-sufficing, England merely produced raw materials for continental craftsmen to manufacture.

Stimulus to Foreign Trade.

From the reign of Edward III, however, a new policy was gradually evolved. The Government became increasingly ambitious ; but an ambitious policy was found to be an expensive policy, and the old financial arrangements for supporting the King and administrative services were no longer adequate. In the words of the Chroniclers the King could no longer live of his own. The rents and services of the royal demesne were insufficient either to protect the old Norman possessions of the King of England on the Continent, or to enable Edward III to make good his fatuous claim to the Crown of France. Henry II had substituted money payments for personal service, and owing to this it became necessary to increase money taxes. For that

Expansion of Home Trade.

purpose a taxable fund had to be created, for it did not then exist. Thus King and Government looking round to discover where money was made saw that the manufacturing industries of Flanders were producing what appeared to them to be so necessary for the progress and well-being of England. It had previously been the experience of the Sheriffs that in collecting taxes, money was more easily extracted from townsmen than from agriculturalists; so now a new fiscal policy was introduced. The raw materials must be retained in the country and worked up at home. As English craftsmen were lacking, advantages were offered to foreign craftsmen, who, in return for bringing their skill and setting up their industries in England, were granted special concessions. This policy, which continued right on to late Tudor days, resulted in developing many valuable manufacturing industries in this country and with the introduction of each new industry the demands on the means of communication and transport increased. Thus it was that King and Government began to foster trade and commerce. Originally trade was to be the servant of the State, providing the sinews of war to support a spirited foreign policy. It is interesting to note that, as the centuries passed, this position became reversed, until in the middle of the eighteenth century, a British minister was to declare: "I am conquering Canada in the plains of Germany." Or in other words, trade from having been the servant of the military party had become its master. The Wars of the Plantagenets and Lancastrians were waged for the sake of chivalry and military display: the wars of modern England have been waged in the interests of trade, colonisation, and progress—three terms which are practically synonymous in their significance.

Improvement of Transport.

With increasing manufactures and trade it became necessary to improve transport methods. Thus roads, wagons, boats, and ships all began to feel the effects of growing demands on their services. Hence in the reign of Edward III commenced the system of charging tolls for the use of roads, the theory being that the toll collected should be sufficient to keep the road in repair, and even extend its length. Efforts had been made by statute to remedy the bad roads of the country, but the toll system was for a considerable period found to be the most efficacious method of providing the necessary funds for both their construction and their maintenance.

It was in the year 1346 that Parliament authorised the levying of the first toll on an English road. And when the road for which the special legislation was passed is known, a clear light is thrown over the condition of communication in this country. The road in question led from St. Giles-in-the-Fields to the village of Charing, now central London ; it continued from Charing to Temple Bar, and turning northward went along Perpoole, which gives the line now occupied by Grays Inn Road. According to the Act the footpath at Temple Bar was overgrown, and during spells of bad weather was impassable. We read in the ordinary history books long descriptions of Edward III and his chivalry ; the Act just cited reveals the less satisfactory side of the picture, for we learn that when Edward rode down to Parliament, such was the unevenness of the roads in Westminster that the ruts and holes had to be filled with faggots to make a passage for the Royal procession.

First Tolls.

If this was the state of the highways at the centre of Government, it can easily be imagined what the roads were like away from London. In fact, the further one went from London the greater were the difficulties of travel ; and this continued to be the case until well into the eighteenth century.

Much can be learned as to the means of communication about the country and the difficulties experienced by travellers and merchants by going through the proceedings of Parliament. During Tudor times some of the statutes are very interesting from this point of view. Even in parts of the country like Kent and Sussex, where one might have expected to find roads and tracks fairly good, owing to the extent of the intercourse between England and the Continent, there is evidence that they were deplorably bad. There are instances where Parliament was asked for permission to construct new tracks, the old ones having become so impassable that they were reported as being beyond repair, and the only course was to construct new roads.

Condition of Early Roads.

Trade and commerce were thriving during the sixteenth century. Englishmen were *finding* themselves, and taking their position at the head of those developments in trade and discovery which were to result in the building up of the Empire with which the twentieth century is

Highway Surveyors.

familiar. Its foundations were laid then, and it was then, too, that an energetic policy in several spheres began to reveal to the world a new force, the English gentleman-trader. If the activities of these men were to have full scope there must be greater ease in getting about the country. Goods carried in panniers from manufacturing centres to the coast were not a fit complement to the system of import and export trade at the ports. Unhappy as were the days of Queen Mary, the need to supply the country with roads fit for cart traffic forced itself upon the attention of people and Government. Thus, in the year 1555, Parliament passed a law to the effect that every parish should appoint two surveyors of the highways, whose duty it should be to maintain the roads in their district, and for this purpose they were empowered to employ compulsory labour.

Improved Roads.

The great interest in tracing out the gradual improvement in the road system of England is that it provides a clear and unmistakable illustration of the integration of industries; indeed, one might go further and say the integration of all that is best in the forces working for the material and the intellectual well-being of the community. To have mapped out the country during the sixteenth century with a system of first-class roads, and to have carried out the scheme, would not have been possible. The country was comparatively poor, and was only sparsely inhabited. Neither the population nor the accumulated wealth could have borne the strain entailed by the carrying through of a big scheme of road construction. As population and wealth increased, as trade and its needs developed, so one can trace small improvements in methods in various and differing spheres. These small advances tended to increase with an astonishing celerity as the decades passed, until when George Stephenson, by the invention of the forced draught, perfected the locomotive engine, all the other departments of human activity had developed up to the point at which it was necessary for them to be, if that invention was to be rightly applied and its benefits fully enjoyed. Thus population, manufacture, trade, capital, scientific knowledge, practical skill, and other necessary spheres had all evolved to an extent that enabled them to take advantage of the new possibility. George Stephenson and his inventions would have been before their time in the sixteenth century, but within three centuries the world

was ready for him, and his work completed the work of one epoch, and laid the foundation of another. Without the foundational work of Tudor and Stuart days the nineteenth century engineer and scientist would have been as "voices crying in the wilderness." Each age has its special work, nor is any part of that work unnecessary in the great scheme of evolution. A study of the history of civilisation convinces one not only of integration working in every great sphere of human activity, but of a more complete and far-reaching integration which links all spheres, and makes their evolution contingent on the steady advance of all.

CHAPTER III

THE INSUFFICIENCY OF THE TURNPIKE ROAD

FROM the general, however, one must return to the particular, and sketch out the development of the means of internal communication in this country from the seventeenth century. Nor is the narration of this of merely historical interest. One learns that each advance made in methods of travel—the coach, the train, the cycle, the motor—has often, in the first instance, been a luxury for the rich or a plaything for the venturesome. And that after many a test, and sometimes through much exaggeration (*e.g.*, the racing motor), it has become eventually the heritage of the poorest, giving means of enjoyment and pleasure, and the possibility of carrying on business and commerce under new conditions, and at a cost that brings its benefits within the reach of all.

Modern Development.

About the middle of the seventeenth century, the means of travelling in England were revolutionised. A stage-coach travelling at four miles an hour would raise a smile to-day, but when it was introduced into this country it was considered a great innovation. At first the stages were only in operation on the best roads in the vicinity of London. But in the year 1663 a stage-coach system was organised to as far north as Preston. The vehicle itself was only a superior kind of waggon with no springs, and travelling over roads of a corduroy description, the experiences of those making use of the service were anything but happy. Nor did the public welcome the advent of the coach. The Londoner, always apt in his descriptions, named these coaches " Hell Carts," and as a dangerous innovation likely to cause injury to the public at large, there was some demand that they should be prohibited.

The Stage Coach.

Coaching was not only a slow and tedious business, but was attended by some danger ; especially was this the case during bad weather, when the wretched roads along which they had to function were apt to suffer from flooding. The management apparently was conscious of the risks attending even moderate journeys, for the bills announcing the various

Risks of Coaching.

coaching services usually contained a sentence to the effect that the coach would start, "God willing," at a given time, or when the majority of passengers should decide. Nor is such a safeguard to be wondered at when one realises that, in the year 1700, the time required to journey by coach from London to York was a week. To-day a miserable railway service manages to effect the run between London and Tunbridge Wells in about an hour; then by coach it required two days. To get to Scotland then was more difficult than to go to India now. In the year 1763 it took no less than a fortnight to reach Edinburgh from London, and the coach only attempted that feat twelve times a year. What an undertaking a long coach journey was during the eighteenth century can be realised by the fact that tools and arms had to be carried, the former being necessary at times to clear a road, or repair a breakdown caused by the roughness of the way, the latter for the protection of life and goods against the depredations of highwaymen. When speed was an object people rode. Commercial travellers always went on horseback, and their samples were carried in bags, whence these necessary adjuncts of trade were called bagmen.

Transport of Heavy Goods.

When comparatively lightly loaded vehicles, *i.e.*, those for passenger traffic, experienced a difficulty in making their way along such roads as existed, what must have been the obstacles in the way of the transport of heavy goods? In actual practice it was found impossible to employ carts except in or near towns. Corn, wool, and even coal, were loaded into pannier baskets slung across the backs of horses or donkeys. The cost and tediousness of this method set a very practical limit to exchange. It is said to have cost £7 to transport a ton of goods from Birmingham to London less than two centuries ago. Business men, seeing how foreign manufacturers were able to get their goods to the English markets expeditiously and cheaply, thanks to the water routes, began to turn their attention to the improvement of rivers, and the linking up of river with river by means of canals. But the commercial men being a small minority, their schemes had to wait for a national awakening. That the state of the roads was occupying public attention is shown by the adoption of the turnpike system. The first Turnpike Act had been passed as early as the year 1663, but improvements worked slowly. It was not until the winter

Turnpike System.

of 1745, when the Government was nearly overthrown, mainly because of the bad state of communication between various parts of the country, that England really woke up. The work progressed with a hurry, that may be described as almost feverish, for no less than 452 separate Turnpike Acts were passed by Parliament during the fourteen years between 1760 and 1774. Such an amount of legislation on behalf of communication is only paralleled by the stress of work in Parliament during the early days of railways. These roads, however, useful as they might be for military, mail, and passenger purposes, were of but small advantage for the conveyance of goods, in the quantities that were being demanded by a rapidly increasing trade.

So far as speed in travelling was concerned, improvements began to take place. In the year 1754, Manchester, then almost cut off from civilisation, produced a flying coach, and inaugurated an improved service with London. As announced, this flying coach would, "although the statement may appear incredible, arrive in London (barring accidents) in four and a half days after leaving Manchester." In the year 1784 Palmer's mail coaches began to run, and the journey from Edinburgh to London was reduced to two days and three nights. The speed was thought to be excessive, and travellers were seriously warned of the ill effects likely to result from rushing through the air at such a speed for two or three consecutive days.

Flying Coach.

Arthur Young, in his Tours,[1] gives glowing accounts of the roads and their defects. In one place he mentions being more than ordinarily impressed by the bumping caused by ruts, and on getting down to measure the cause of the discomfort, actually found one rut having a depth of no less than four feet.

There was a deep-lying and unsuspected cause for the unsatisfactory state that continued to be the characteristic of English roads. The Romans had been great road engineers, but when they left the country, no one took up their *rôle* in this respect. The roads were bad, not only for want of funds to construct and repair them, or for the wish to have them (indeed, as commerce progressed, there were both the funds and the wish in evidence), but the real obstacle in the way of

Reason for Poor State of Roads.

[1] *Six Weeks' Tour Through the Southern Counties. A Six Months' Tour Through the North of England.*

obtaining good roads was that even when Parliament provided a way, the carrying out of the scheme was left in unskilful hands. What was required was the scientific training of real road engineers, men capable of constructing roads as good as those whose remains were a monument alike to their constructors and the period of Roman domination. Such engineers as existed considered road construction beneath their dignity, not realising that a good road goes very near towards immortalising its constructor. This state of affairs continued until John Metcalfe (1717-1810) appeared upon the scene ; the first great road engineer in England, for many centuries. Curiously, too, Metcalfe was blind. Yet this blind man was a genius, and in following his instinct, was a considerable factor in revolutionising road-making in this country.[1]

When once Metcalfe had shown the way others followed. Macadam (1756-1836) and Telford (1757-1834) continued his great work of putting the highroads of England in good order.

New Roads Planned.

Thus new routes were planned and constructed, and many places hitherto isolated from each other were linked up and became important points on the system of communication. The coach, too, was improved, and so with good roads and a good vehicle a service remarkable alike for its regularity and speed, was organised throughout the country. At its best, however, coach travelling was but slow, and it only met the requirements of passengers and mails. Had roads been the last word in improved methods of communication, the trade of the world would not have developed very greatly. To the transport of goods by wagon on an ordinary road there is an economic limit, which is very soon reached. For instance, it has been calculated that to transport wheat 2,000 miles in a wagon by road would cost 21s. a bushel. Compare with this what has been achieved by modern facilities, namely, that wheat can be carried a similar distance by rail at a cost of 1s. 1½d. a bushel. And this brings it about that wheat, carried long distances, can be sold in New York at 3s. 4d. a bushel. The harvests of the Far West of America would never have reached either the Eastern States or the European markets, had the transport eastward depended on horse-drawn wagons, though the roads might have been never so good.

[1] For a short sketch of Metcalfe's remarkable career *cf.* Smiles's *Lives of the Engineers*, vol. iii, pp. 74–93.

CHAPTER IV

THE BEGINNING OF THE ENGLISH CANAL SYSTEM

THE great inventions of the middle of the eighteenth century caused the upheaval in manufactures and commerce known as the Industrial Revolution. It is true that this was a peaceful revolution, but it caused so radical a change in the conditions of industrial life in all its spheres that some new means of transport had to be devised, or the new possibilities that were opening out before the manufacturer and trader would to a great extent have been rendered nugatory.

The Industrial Revolution.

It was at this moment that James Brindley and the Duke of Bridgewater introduced into Lancashire a development of water transport by constructing inland canals, which exactly met the needs of the time, and contributed in no small measure to make England the workshop of the world. Canal construction became almost a mania. Between the years 1760 and 1830, practically the whole of the extensive system of canals this country has enjoyed, with the exception of the Manchester Ship Canal and a few short lengths of ordinary barge canal, was constructed.

Water Transport.

When Brindley qualified himself as a canal engineer, canals were no new invention. In the far-off days of antiquity, canals along levels had been dug. A small canal had been constructed across the Isthmus of Suez many centuries before Ferdinand de Lesseps projected his great ship canal.

Brindley to Lesseps.

The advantages of an inland water route, as has already been seen, had been recognised from a very early date, and even when the rail had very considerably diminished the friction of the road, with slow-going traffic, the water road offered less resistance than the land road. "It is estimated that on a good wagon road a single horse power will drag about 3,000 lbs. at the rate of 3 ft. per second; on a railway about 30,000 at the same rate; in water up to as much as 200,000 lbs."[1]

Advantages of Water Routes.

[1] *Cf.* Chisholm's *Commercial Geography*, 4th edition, p. xxxix.

But when the locomotive gave great additional speed to rail-borne traffic, the railroad became manifestly superior to the canal; for extra speed on a canal is not only difficult to obtain but is likely to cause serious damage to banks and locks.

Canal Construction.

To cut a canal along a stretch of level country presented but few difficulties. An adequate labour force and the ability to construct a bottom that would not leak abnormally were the chief requisites. Unfortunately, outside low-lying countries like Holland, there are but few parts of the world where a canal can be cut through the level. It being impossible to make water run up a gradient, it was not until the lock system was invented that canals could be constructed in undulating or hilly countries. In England there had been, at any rate, two canals constructed during the Roman occupation, and one of these is still utilised. But both these were constructed through the low-lying parts of East Anglia. The Caer Dyke (40 miles long) and the Fosse Dyke (11 miles long) are both in Lincolnshire—the latter is still navigable.

Invention of Canal Lock.

The Italians and the Dutch dispute as to the credit for the invention of the canal lock. It may have been invented in Italy, where canals were introduced during the twelfth century, but there is no means of deciding the question. Holland has probably benefited by canals more than any other country. The great fact is that the lock was invented, and from that moment inland navigation throughout a hilly country like England became a possibility.

Aire and Calder Canal.

Brindley cannot claim the credit of being the first modern canal engineer in this country, although he was undoubtedly one of the greatest. The first modern canal with various levels to which barges passed through locks, was the Aire and Calder Navigation in Yorkshire. This, the first of our modern canals, has kept up its reputation by being equipped in the most up-to-date fashion at the present moment. This canal was opened before the dawn of the eighteenth century, full half a century before Brindley's activities commenced. But it was Brindley's work that led to important results affecting manufacturing England. Thus a short sketch of his work, and what inspired it, will make clear the origin and effect of the movement as a whole in this country.

So far as the Duke of Bridgewater is concerned, he had been watching the new possibilities connected with the lock canal, and having coal-bearing property in the vicinity of Manchester, then a town capable of developing manufactures if it could procure a good supply of cheap coal, he naturally began planning how to effect the latter by constructing a canal from his Worsley mines to Manchester.

Duke of Bridgewater.

Brindley had commenced his working life as a wheelwright. He had been interested in experimenting with steam, but about the year 1755 inland navigation claimed his attention. Earl Gower wished to bring Liverpool and Hull into communication by means of a Trent and Mersey canal, and Brindley was employed to survey the route. During this period the Duke of Bridgewater met him, and decided that Brindley was the man he required to plan and to execute his scheme at Manchester.

Early Days of Brindley.

Brindley quickly set to work, and the Duke was able to present his first canal bill to Parliament in the year 1759. In the bill the Duke bound himself to carry coal to Manchester at a maximum charge of 2s. 6d. a ton, and to sell coal at Manchester at a price not exceeding 4d. for a hundredweight ; about half the price then charged for coal in Manchester. Parliament consented to the scheme and, with some modifications, it was carried through. The scheme included what for the time was a great engineering feat, the bridging of the river Irwell at Barton. The aqueduct there was 200 yards long and 12 yards wide, and carried the canal over the river at a height of 39 ft. From the mines at Worsley to Manchester is 10¼ miles. At Worsley it was necessary to construct a head of navigation, *i.e.*, water space for barges to collect. At this point Brindley's-genius effected a further economy in working. The coal measure was in the side of a hill. If the coal were hoisted to the surface, it would then have had to be lowered from the hillside into the barges. Brindley saved this double handling by tunnelling into the side of the hill, and so taking the barges to the coal. The first barge load of coal passed along the canal on the 17th July, 1761. The Act of Parliament permitting the construction had only been passed in the session of 1760, so that the work was not only successful, but had been very expeditiously carried out. The immediate result was that

The Bridgewater Canal.

Manchester secured a regular and sufficient supply of coal at a price which on the average was 50 per cent. cheaper than the previous intermittent supply. The ultimate effects of Brindley's work can be realised by remembering that as a necessary complement to the Worsley Canal, Brindley and the Duke constructed another canal connecting Manchester with the Mersey, and thus giving continuous water transport between the manufacturing town and its natural seaport ; and then by comparing the Manchester and Liverpool of the middle of the eighteenth century with the Manchester and Liverpool of to-day. For not only had Manchester suffered from the lack of a cheap and sufficient coal supply, but the difficulties connected with getting raw materials from Liverpool, and transporting manufactured goods to the port for shipment, had they not been overcome, would have very considerably reduced the advantages gained by the construction of the canal which provided Manchester with cheaper fuel. The land road between Liverpool and Manchester at the middle of the eighteenth century did not deserve the name of a road. Its condition was so bad that it cost £2 a ton to transport goods along the forty miles. There was a water route of a kind—for the river Irwell connected Manchester with the Mersey—but the Irwell navigation was subject to both floods and droughts, and at times was not available. Hence, although the cost of transport by this route was only about 12s. 6d. a ton, it was of too uncertain a character to meet the requirements of a developing commerce. It would, nevertheless, be an exaggeration to attribute the whole of the progress made to the two local canals, but undoubtedly it was the impetus then given that revealed commercial and industrial potentialities hitherto beyond the realm of dreams.

Increase of Canal Construction.

For many years after the opening and success of the Bridgewater Canal the construction of artificial waterways was carried on with great vigour.[1] The commercial energy and engineering talent which was afterwards to go to the construction of railways threw itself into this line of operation. A writer whose work was published in the year 1795 says—

"The prodigious additions made within a few years to the system of inland navigation, now extended to almost every corner of the kingdom, cannot but impress the mind with magnificent ideas of the opulence, the spirit, and the enlarged views which characterise the commercial interest of this country. Nothing seems too bold for it to

[1] *Cf. Final Report of the Royal Commission on Canals*, 1909, p. 3.

undertake, too difficult for it to achieve, and should no external change produce a durable check to national prosperity its future progress is beyond the reach of calculation." [1]

The same writer points out that—

"At the beginning of this (eighteenth) century it was thought a most arduous task to make a high road practicable for carriages over the hills and moors which separate Yorkshire from Lancashire, and now they are pierced through by three navigable canals." [2]

Canals Constructed.

It is not necessary to detail all the canals constructed; suffice it to say that the Mersey, Thames, Severn, and Trent were all joined, and a network of canals was constructed in Birmingham and the South Staffordshire Black country. The following is a list of Brindley's canals taken from Smiles's *Lives of the Engineers*—

		M.	F.	Ch.
The Duke's Canals	Worsley to Manchester	10	2	0
	Longford Bridge to Runcorn	24	1	7
Grand Trunk (Wilden Ferry to Preston Brook)		88	7	9
Wolverhampton Canal		46	4	0
Coventry Canal		36	7	8
Birmingham Canal		24	2	0
Droitwich Canal		5	4	9
Oxford Canal		82	7	3
Chesterfield Canal		46	0	0

This list, of course, falls far short of exhausting the number of canals constructed. England became covered with a system of artificial waterways, which (though defective through lack of uniformity, as will be seen from the chapters dealing with canal economics) were immensely beneficial to the community. They gave to commerce easy means of transport in place of execrably bad roads, and thus not only cheapened the cost of transport but widened its area and stimulated it beyond the possibility of accurate estimate at this distance of time. And this occurred at the period of what has been aptly termed "the Industrial Revolution"; when James Watt had invented the steam-engine, and many other mechanical inventions were changing the character of the industries of the country—were converting them from small scale domestic industries to relatively large scale factory industries. All this was not done at once, of course. It was a gradual, evolutionary process; but the part which canals played in facilitating the revolution cannot be overestimated.

Advantages of Canals.

Cost of Road and Canal Carriage Compared.

[1] Aiken's *Lancashire*. [2] Aiken's *Lancashire*, p. 137.

Some idea of the reduction brought about in the cost of transport may be obtained from the following figures[1]—

COST OF GOODS TRANSPORT PER TON.

Between		By Road. £ s. d.	By Water. £ s. d.
Liverpool and	Etruria	2 10 0	13 4
,, ,,	Wolverhampton	5 0 0	1 5 0
,, ,,	Birmingham	5 0 0	1 5 0
Manchester ,,	Wolverhampton	4 13 4	1 5 0
,, ,,	Birmingham	4 0 0	1 10 0
,, ,,	Lichfield	4 0 0	1 0 0
,, ,,	Derby	3 0 0	1 10 0
,, ,,	Nottingham	4 0 0	2 0 0
,, ,,	Leicester	6 0 0	1 10 0
,, ,,	Gainsborough	3 10 0	1 10 0
,, ,,	Newark	5 6 8	2 0 0

In their book, *Our Waterways*, Forbes and Ashford state—

" Up to the close of the year 1838–39 there had, according to a calculation made by Rennie, been formed in Great Britain 2,236 miles of improved river navigation at a cost of £6,269,000, and 2,477 miles of canals at a cost of £24,406,389."

Canal Profits.

Naturally the canals were prosperous. The fourth and final Report of the last Royal Commission on Canals and Inland Navigation quotes from the *Gentleman's Magazine* for December, 1824, the following table of dividends paid on, and prices of, canal shares.

Canal.	Dividends. £ s. d.	Price of Shares. £
Trent and Mersey	75 0 0	2,200
Loughborough	197 0 0	4,600
Coventry	44 0 0	1,300
Oxford	32 0 0	850
Grand Junction	10 0 0	290
Swansea	11 0 0	250
Staffordshire and Worcestershire	40 0 0	960
Birmingham	12 10 0	350
Worcester and Birmingham	1 10 0	56
Shropshire	8 0 0	175
Rochdale	4 0 0	140
Lancaster	1 0 0	45
Kennet and Avon	1 0 0	29
Leeds and Liverpool	15 0 0	600

There are wide variations in the dividends and prices, and the inference is that some of the canals were not very profitable, but these appear to have been few in number, and the majority enjoyed great prosperity which was reflected in both dividends and prices.

Prior to this there had been the inevitable " mania " which

[1] Reproduced in E. A. Pratt's *History of Inland Transport and Communication in England*, from Barnes's *History of Liverpool*.

seems to be inseparably associated with every commercial development into which the public are allowed to come as shareholders.

Canal Speculation.

It occurred in the "South Sea Bubble," it occurred in connection with canals, it occurred in connection with railways, and many years later it occurred in connection with cycle companies, for instance. The canal mania occurred between 1791 and 1794, and it gave rise to a great deal of unwise speculation in the shares of the existing companies and to the flotation of projects which never had the semblance of a hope of success. Much money was lost ; many investors were ruined ; but that was the fault of the individuals : it in no way detracted from the importance or the usefulness of the service to the community which canals were performing and continued to perform for many years.

Canals prospered and became finally characterised by all the abuses inseparable from prosperous monopolies. Prosperity brought stereotyped rigidity and petrefaction. The owning companies were finally more concerned to maintain and increase their own profits than to meet the growing requirements of commerce, and from that period (the early part of the nineteenth century) dates their downfall. The coming of the railway in the thirties of the nineteenth century marks the end of the canal era. Some of them continued for a long time after to retain a large share of the transport industry of the country ; some of them in this twentieth century still continue to carry large volumes of traffic ; but in the main, inland navigations are barely profitable or absolutely unprofitable undertakings. Those which remain profitable are the canals whose management has continued enterprising and progressive, and has not hesitated to face the expenditure necessary to bring them up to date and keep them efficient. There have been one or two inland navigations, such as the Manchester Ship Canal, constructed during the second half of the nineteenth century, but for every mile of new canal there have been many miles that have either been allowed to become derelict, or have not been improved and maintained in that condition of efficiency necessary to meet the modern requirements of commerce. Their present defective condition, the reasons for it and the proposed remedies are subjects discussed in the chapters dealing with canal economics.

The Monopoly of Canals.

CHAPTER V

RAILROADS AND THE LOCOMOTIVE

IT was the desire to find a market for coal at Manchester that induced the Duke of Bridgewater to plan out his canals with Brindley.

Advent of the Railway.

It was the difficulty of dragging coal from the pit's mouth over bad roads to river or canal that led to the evolution of the railroad, and it was the great cost of horse feed during the last years of the eighteenth and the opening years of the nineteenth century, that led to the invention of the locomotive engine. This one commodity, *coal*, has been the mainspring in the working of our national industries and commerce. One advisedly mentions both industry and commerce, for, as will be seen in a later section of this book, when steam power was successfully applied to ocean voyaging, it was the transport of English coal to coaling stations on the main ocean routes that gave British shipping an advantage which has lasted down to the present moment.

Good as the ordinary roads had become during the last half of the eighteenth century, they were not intended for heavy traffic.

Coal Cartage.

Even though the coal-tracks had been macadamised, it is doubtful whether they would have met the requirements of the traffic. Moreover, such roads were expensive to construct, but for public traffic a good common road was a necessity. Where wagons were employed in carting coal from the pit's mouth to the barge or keel and had to return empty, all that was required was two tracks sufficient for the purpose of an up and down service. The slow and expensive method of slinging sacks or baskets of coal across a horse's back had been superseded by the two-wheeled cart, and this cart had, in some parts, given place to the four-wheeled wagon. But with increasing loads, the wear on the colliery tracks was found to add greatly to the friction, and hence to the cost of haulage. A double stone track, of a gauge to suit the distance between the wheels of the vehicles was found to lessen friction very considerably and so reduce the cost of cartage. Colliery proprietors adopted this method of road-making,

and at various collieries, long roads were constructed, with either stone or timber tramways laid on them. Arthur Young came across coal tracks constructed in this way, some of which were about 10 miles long, and he was interested in finding to what an extent they lessened the work of a horse, one animal being able to drag as much as 60 bushels of coal in a cart along a road of this description. This was really the germ of the railway track. Stone tracks were expensive to lay and keep in repair ; wooden tracks soon rotted or splintered. To prevent the latter, some enterprising colliery manager sheathed the timber with iron plates. These plates effected a further considerable saving of friction and increased the capacity of a horse, but the wood under the iron still rotted. This led to a trial of cast-iron rails. At a colliery near Sheffield there was a cast-iron track fixed to wooden sleepers as early as the year 1776. But as the loads of coal increased, the cast-iron rail was found to be too brittle, hence the introduction of the wrought-iron rail, the immediate progenitor of the steel rail now in use. In connection with colliery work, then, railroads capable of dealing with a maximum of weight at a minimum of effort were gradually perfected.

The Locomotive

The Locomotive.

For many decades before James Watt's successful experiments, the force of steam had attracted the attention of inventors, and no sooner had Watt shown how to utilise the force of steam by the invention of the stationary engine than, with renewed vigour, attempts were made to produce a self-propelled steam vehicle. At the South Kensington Museum there is to be seen a model of a steam carriage, which was tried in the streets of Paris as early as the year 1770. This engine had been invented by Cugnot in the year 1763. His object was to produce a steam carriage capable of transporting guns and military stores. The form the engine takes is a wooden framework supported on three wheels, the central wheel being acted upon by the piston rods of two cylinders. The boiler which supplied the steam to the cylinders was small ; indeed in practice it was found to be too small to keep a sufficient head of steam to make the engine a success. The difficulty in keeping the necessary pressure of steam resulted in the average speed of the carriage amounting to

about only 2½ miles an hour. When tried in Paris this engine overturned when negotiating a corner and was condemned as dangerous.

The Advance of the Locomotive.

In both America and in Great Britain several unsuccessful attempts at producing a steam locomotive were made during the last quarter of the eighteenth century. The attempt which most nearly succeeded was a model engine constructed by William Murdoch in Cornwall. This was in the year 1786. The machine ran well, but it was only a small model, and apparently Murdoch did not attempt to construct a full-sized engine for practical work. But his invention was not lost, for his pupil, Trevethick, constructed the first steam carriage to run in England. This carriage would travel well enough for a very short distance ; the difficulty that all the early engineers failed to overcome was the impossibility of keeping up the steam pressure necessary for continuous travelling. Trevethick attempted to create sufficient draught by using bellows, but his engine, though a great improvement on Cugnot's, was a failure owing to its intermittent working powers. But that Trevethick did not despair of finding a solution to this difficulty is proved by the fact that he described his engines as being capable of running either on ordinary roads or on rails. He very nearly happened upon the forced draught, which was George Stephenson's great contribution to the perfecting of the locomotive engine. For the exhaust steam from his steam carriages created a nuisance, and he attempted to prevent this by leading the exhaust pipe into the funnel. The engine which contained this innovation was employed in a colliery in South Wales and was able to draw 10 ton loads at a speed of 5 miles an hour. But the weight of the engine and load was too much for the *permanent* way, and the locomotive was converted into a stationary engine.

Experiments.

The experiments, becoming more and more successful, gradually made their way northward. The next interesting attempts were made at Leeds. There were other difficulties to be overcome besides those of keeping up steam and increasing the solidarity of the roadway. None of the early engineers could get away from the belief that a smooth wheel would not grip a smooth rail, and that thus, if locomotives were run on rails instead of on roads there must be specially constructed gearing in order to make the wheels grip the rails. Hence, up to

the year 1814, the wheels of locomotives were toothed and worked in a toothed rail. At Leeds Blenkinsop produced a rack-rail which connected with gearing on the engine. In constructing an engine to work on this principle, Blenkinsop adopted another Leeds invention, the double cylinder. An engine thus constructed worked fairly successfully at the Middleton Collieries, the speed averaging about 4 miles an hour. This experiment may be said to be the first successful application of the steam locomotive to commercial transport purposes. Several attempts were made to simplify the gearing between the rail and the engine, and finally, in the year 1814, Matthew Hedley demonstrated the fact that a smooth wheel not only can but will grip on a smooth rail. This very considerably cleared the air, and led to a series of experiments at the colliery at Wylam, near the Tyne. This colliery is four miles from the river. There was a track laid with timber, which ran from the pit's mouth to the keels lying in the Tyne ready to receive the coal. The coal was carried in carts containing about 25 cwt. each, and as a cart drawn by one horse could only make five single journeys in a day, the cost of cartage was very heavy. Borrowing Trevethick's drawings, Mr. Blackett of Wylam constructed a series of engines. The difficulties of the engineer were greatly increased by the fact that workmen, tools, and materials were by no means easy to obtain. Wheelwrights and blacksmiths had to be developed into fitters, and tools had to be contrived to meet the needs of each new operation. But it must have been the lack of suitable materials for constructing an engine that caused the main difficulty. Rolled wrought iron plates suitable for boiler construction had been available since 1786, but the early locomotive builders obstinately pinned their faith to cast-iron boilers. And these boilers frequently burst, doing more or less damage to life and property. At length Blackett constructed a locomotive with a wrought-iron boiler, and, although a clumsy-looking piece of machinery, it was capable for the work required, and worked regularly. The success of the locomotive engine was at hand. George Stephenson was engineer at Killingworth Colliery, and went over to Wylam to inspect the new engine. As a result of what he saw, he persuaded Lord Ravensworth to allow him to construct a locomotive for the Killingworth Colliery. It took the greater part of a year to complete the engine ; however, by the middle of

the year 1814 it was ready for trial and succeeded in dragging a load of 30 tons up a slight gradient at a speed of about four miles an hour. But would such traction be more economical than horses? For twelve months strict accounts were kept, with the result that it was proved that the locomotive and horses worked at the same cost—there was at present no economic advantage in employing the engine. But while the engine was at work Stephenson was watching it, confident that if he could overcome the difficulty in keeping up a sufficient head of steam, the speed and capacity of a locomotive would only be limited by the strength of the materials employed in its construction. Noticing that the exhaust steam left the exhaust pipe at a greater speed than did the smoke from the funnel, it occurred to Stephenson that increased draught might be produced by leading the exhaust into the furnace. This idea was acted upon and success was the result. Forced draught was invented. George Stephenson had perfected the locomotive. Since his day many have been the modifications made in the railway engine, but Stephenson's locomotive,[1] fitted with forced draught, in the year 1815, contained all the essentials of the twentieth century engine.

It is a remarkable fact that although Stephenson had succeeded where so many had failed, and the engines at Killingworth worked steadily and economically, it was some years before the outside world realised what had been achieved.

Stockton and Darlington Railway.

It was the construction of the Stockton and Darlington railway that made Stephenson's genius known to the world. While Stephenson was quietly perfecting the locomotive at Killingworth, Mr. Edward Pease was endeavouring to improve the means of transport so that the southern end of the Durham coalfield might be developed. To this end some means must be devised for conveying coal cheaply from the collieries to Stockton-on-Tees for shipment. There were rival schemes before the public for accomplishing this. One party wished to improve the channel of the river Tees, and to give communication by water, but Edward Pease was persuaded of the superiority of a railroad and refused to compromise. This led to the formation of the Stockton and Darlington Railway Company,

[1] Either models or originals of these pioneer locomotives can be seen in the South Kensington Museum, London.

Mr. Pease having succeeded in obtaining parliamentary sanction for his scheme in April, 1821.

George Stephenson soon heard of the Stockton and Darlington railway scheme, and determined to make himself and his locomotive known to the projector. In an interview he so interested Mr. Pease in the work his engines were doing at Killingworth Colliery that the latter visited Killingworth to see for himself the superiority of steam over horse traction. At first Mr. Pease does not appear to have been convinced that the locomotive would prove efficient on his railway, but he was so strongly impressed by Stephenson's personality and grasp of the technicalities of transport business, that he persuaded his fellow directors to appoint Stephenson engineer to the new company, with the privilege of carrying on independently an engineering works for the construction of locomotives. The directors, too, were persuaded to try the effect of steam traction on the new railway. This had not been contemplated when the Act was obtained, so Parliament was applied to again, and in August, 1823, the first Act of Parliament authorising the employment of locomotives for passenger traffic was passed. In the following year, 1824, the Stephenson works at Newcastle-on-Tyne were founded. The railway company placed an order for three locomotive engines with the Stephenson firm. As goods traffic was expected to be the main business of the line, the type of engine decided upon was suitable rather for heavy goods than passenger traffic. It weighed about 8 tons, and had an average speed of about 15 miles an hour.

Stephenson and Pease.

The work of constructing the permanent way and getting ready the necessary equipment was actively carried through, and on the 27th of September, 1825, the railway was publicly opened. The first train to travel from Darlington to Stockton consisted of an engine with thirty-four vehicles attached. Next to the engine there were six trucks, loaded with coal and flour, then a passenger coach (specially constructed for the service by Stephenson) containing the directors of the company; following this were twenty-one trucks in which, for this journey, seats had been placed so that between 500 and 600 people could enjoy the first orthodox railway journey ever made; the train was completed with six more trucks loaded with coal. The run was carried through with complete success, and the speed for the whole

The First Journey.

journey averaged 12 miles an hour. That about 600 people, together with twelve loaded trucks, could be safely and expeditiously transported at this speed proved to the world at large that Stephenson had indeed succeeded in producing a locomotive engine capable of rendering a service to mankind the benefits of which time alone could measure. Methods of transport, it is true, had been revolutionised by the modernising of the canal, but the invention of the steam locomotive closed one epoch and opened another. The age of steam, which commenced with Watt's invention of the stationary engine, attained a fresh significance and opened up new possibilities when George Stephenson ran his train from Darlington to Stockton on that memorable day in September, 1825.

PART I

THE RAILWAY IN THE UNITED KINGDOM AND ABROAD

CHAPTER I

A STANDARD GAUGE

WHEN George Stephenson demonstrated so successfully the merits of his locomotive, there were already a good many miles of *railroad* existing in this country. The advantages connected with the rail had been discovered at our collieries, and from assisting in the transport of heavy commodities like coal, the rail had been adopted, with some success, for passenger and other services. As early as the year 1799, there was a scheme for connecting London to Portsmouth by a railroad. One outcome of this was the construction of the railway from Wandsworth to Croydon, across Mitcham Common. Horse traction was employed and the weight that could be drawn by one horse along iron rails was a great surprise to Londoners. A number of Acts were passed by Parliament during the following twenty years, permitting the construction of railroads. It was not, however, till 1823 that an Act of Parliament sanctioned the construction of a railway on which steam locomotives were to be utilised. Most of the early railroads were absorbed in the railway systems which, with the success of the Stockton and Darlington Company, began to spring up all over the country. From 1825 to 1846 may be looked upon as the period of railway construction. The big company with a capital amounting to many millions of pounds would have been an anomaly early in the nineteenth century. Thus the first railway companies were comparatively small affairs. But when once the question of gauge had been settled by the Act of 1846, the period of consolidation of systems began—and these consolidations might, perhaps, with benefit, have been carried further than they were, had not Parliament decided that amalgamations of continuous lines might

Earlier Railroads.

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be safely allowed, but that an amalgamation of competing lines would be contrary to the interests of the community.

The Stockton and Darlington Railway taught railway managers many useful lessons; the two most important of these to railway practice and economics are well worth a little consideration.

A speed of 12 to 15 miles an hour was greater than a horse could maintain. But at first the intention was that a railway should be worked on the same lines as a canal, owners of vehicles being charged a toll for the privilege of using an improved road. No sooner, however, did the railways begin to function than it became evident that when vehicles ran on rails, the slowest vehicle set the pace to all those behind it. The Stockton and Darlington Railway had frequent sidings to meet this difficulty, but experience of the working of the line showed that a railway company was something quite distinct from either a turnpike authority or a canal company; and that to get the best results from both the rail and the locomotive, the management must not only own, control, and maintain the permanent way, but must have complete control over all the services functioning along the line. In other words a railway company must not only own a road, but also be a common carrier, and have responsibility for both the goods and passenger trains running on its system. This in itself brought about a great and indeed a very revolutionary change in the conception of how the transport of either goods or passengers should be conducted. It was evident, therefore, almost from the outset of railway enterprise, that the new method in transport would require many changes in the customs and methods of the travelling and trading public; and that new laws and regulations must be framed to meet this changed state of affairs.

Revolutionary Nature of Change in Mode of Transport.

The second great lesson taught to railway management by the first railway was that regular transport of large quantities of any commodity can be carried on at a very small rate, and yet be paying business. In other words, if you have regular traffic, which gives a through haul, full truck-loads, and but little handling, you get a maximum of economy at a minimum of expense. Thus railways, almost at the outset, showed their capability for dealing with large quantities of dead-weight, if the business was regular, at very low rates.

Volume and Economy.

The proprietors of the Stockton and Darlington Railway had expected to make their chief profit from the transport of coal. Their hopes that they would build up a great business in the shipment of coal from Stockton to London had, however, been considerably damped by an amendment which had been moved by Mr. Lambton, the member for Sunderland, when the Bill was before the House. This amendment had been carefully framed in the interests of Mr. Lambton's constituents, whose coal, to a great extent, supplied the London market at that time; and was to the effect that for the hauling of coal to Stockton-on-Tees, the maximum rate should be ½d. per ton per mile. This amendment was carried, although the company was allowed to charge a maximum of 4d. per ton per mile on coal carried along the line for local sale. Mr. Lambton and his friends had confidently expected that the ½d. rate would very effectually prevent any coal from passing along the line for shipment at Stockton. To the surprise of everybody, it was this traffic that in practice was found to be the dividend-earning business of the company, and ere long the quantity of coal carried for shipment each year averaged no less than 500,000 tons.

Railway Extension.

The desire for railway extension, when the first short services had shown their capabilities, is not to be wondered at. The turnpike roads had proved to be inefficient for the transport of goods, and canals had been constructed in various parts of the country specially to assist the industrial towns. But canals, although a great improvement on previous methods of transport, were found to be too uncertain under the conditions existing in some parts of the country. The canals themselves were efficient enough, but where the canal entered a river, the condition of the river governed the canal so far as through traffic was concerned. It was the uncertainty of getting the goods along the Tees that had caused Mr. Pease to plan the Stockton and Darlington railway. It was in much the same way the uncertainty of navigation on the upper waters of the river Thames that led to the formation of the Great Western Railway Company, which was originally to have been called the Bristol and London Railway Company. The transport of goods between London and Bristol had been by way of the Thames to Reading, then by canal to Bath, where the barges entered the Avon, and proceeded to Bristol. When times were normal all might be well, but times were

not always normal. Floods and droughts come and make a river an uncertain means of communication, unless that river be conserved for purposes of navigation. As a result, although the canals were safe and sure, goods and barges were frequently delayed in the Thames or the Avon. Delays of from three to six weeks might occur. Such irregularity of service was not calculated to help business. Hence a proposal was made about the year 1824 to lay a railroad from London to Reading and from Bath to Bristol. Goods would thus travel by truck from London to the canal, they would there be transferred from the truck to the barge, and on reaching Bath would require re-handling to transfer them to the truck for Bristol. This handling meant an added expense, but that was trifling compared to the annoyance and inconvenience so frequently caused by long delays on the river sections of the old route. To save the extra handling a proposal was made to construct a through railroad from London to Bristol. This, however, would have meant competition with the existing canal, and there were discussions as to the merits of the two schemes which deferred matters for a few years. Then the success of the Liverpool and Birmingham, and the Stockton and Darlington railways showed that further discussion was unnecessary ; the obvious necessity was a railway served by steam traction to connect the great commercial centres of the east and west. Hence, in the year 1832, what was destined to become the Great Western Railway took shape, and the following year Brunel was appointed engineer to the company.

Brunel and the Stephensons.

This period in railway history is most interesting, probably the most interesting of any part of the story : for the Stephensons were making themselves a power in the north, and now their great rival was to begin the system on which his broad gauge was to be adopted. The adoption of the 7 ft. gauge by the Great Western Company raised the question of the advisability of adopting a standard gauge for the whole country. Apparently, George Stephenson was the only *statesman* among railway engineers or proprietors. He was able to take broad views, and, looking well ahead, could foresee the ultimate extension of the railway over the whole country, and hence the necessity for keeping to one gauge for the track, in order that the rolling stock of all systems might function along any rails, wherever they might be laid. It was thus that, when Joseph Locke asked Stephenson

what gauge the railway he was constructing between Canterbury and Whitstable should be, the answer he received was, "Make it 4 ft. 8½ in., for though they be a long way apart now, depend upon it, they will be joined together some day." This was a broad statesmanlike view, although different from that uenced Brunel and his directors to lay the broad gauge for at Western system. Brunel undoubtedly believed in the sup of the broad over the narrow gauge, but he also, and his directors too, hoped that by adopting the 7 ft. gauge they would be able to maintain a monopoly over the west and south-west of England. Looking back now, one is apt to wonder why the projectors of each short length of railway hesitated as to the gauge, but as things were then, it required a man of Stephenson's faith in railways to foresee a network embracing every section of the country. And yet is not the same error being committed by the municipal authorities to-day? At no far-off date the tramway systems of this country may link up first of all neighbouring towns, and, by that means, eventually large areas, or even the whole country, may be made parts of one system; and yet there is no standard gauge. Some authorities for economy's sake have installed narrow gauge trams, others have more wisely adopted a broader system, yet both must eventually come into contact, indeed, in some cases, already do meet, necessitating a change of car for those passengers who need to travel beyond the break of gauge. But the justification for the policy is that trams are for passengers only; there is no need for expensive re-handling of goods. This, however, is rather an excuse than a justification—a uniform gauge would make for speed, convenience, and possibly for safety.

The Fight of the Gauges.

The position in the early thirties did not become pressing, but as the mileage of track increased, the work of construction became a big thing, and there was no longer any doubt that the whole country was to be covered with lines. Stephenson's contention came home to the minds of all thinking people, and it was determined to get Parliament to decide on a standard gauge for the whole country.

Necessity of Standard Gauge.

A gauge of 4 ft. 8½ in. looks somewhat unscientific. Why should it not have been 5 ft. or 4 ft. 6 in.? Stephenson, in constructing the Stockton and Darlington Railway, had adopted the colliery gauge. The coal carts, probably from

Which Gauge?

time immemorial, had been constructed to that gauge; at any rate when tracks were laid and then rails took the place of timber, the gauge adopted was 4 ft. 8½ in. to fit the carts. The gauge of the carts had probably been fixed by rule of thumb at the width at which it was most economical to cut the timber for their construction. However may be, in the north country collieries, the railroads had narrow gauge, and the early roads constructed by Stephenson were of the same gauge in order that the rolling stock of both colliery and railway might function along them.

Broad Gauge.

Brunel's broad gauge was an innovation, nor was it easy to find a justification for it. It has been said that Brunel adopted it for safety's sake, that he disliked the carriages and wagons projecting over small wheels, and so constructed a car for the Great Western system of the ordinary dimensions, but supported it on large wheels which projected. The directors of the company apparently disapproved of this coach as being uneconomical, and so ordered another to be built that should have the full width allowable on a 7 ft. gauge, which would enable two additional passengers to travel on each seat. If this be so, Brunel's innovation stood condemned from the beginning.

Narrow Gauge.

With Stephenson, business considerations always weighed. To him the narrow gauge was a business proposition, and even though greater speed might be attained on the rival system, the first necessity was for railways to be paying concerns, and thus attract the capital which would be required in such enormous amounts, if his dream was to be fulfilled. The Battle of the Gauges waxed hot, and finally Parliament appointed a Commission to consider the whole question. As a consequence a series of tests was arranged. The broad gauge was tested between Didcot and Paddington, the narrow gauge between York and Darlington. Rival trains with a load of 80 tons showed that Brunel's system could give a speed of 50 miles an hour, Stephenson's but 44. Nevertheless, looking at the question from every standpoint, especially as to capital, earnings, and goods traffic, it was decided that the advantage lay with the narrow gauge. Parliament, therefore, in the year 1846, passed the Act for Regulating the Gauge of Railways, by which the gauge for England, Scotland, and Wales was fixed at 4 ft. 8½ in.,

Triumph of the Narrow Gauge.

and that for Ireland was fixed at 5 ft. 3 in. The Great Western Company for a time persisted in their gauge policy, but eventually had to come into line with the rest of the railways. Finally, in the year 1892, the last of the old broad gauge disappeared, to the great advantage of the Great Western Company.

CHAPTER II

SOME INITIAL DIFFICULTIES

THE year 1846 fixed a standard gauge for English railways, and in doing so, opened the way towards a consolidation of many small railways into one big company. But, as has already been noticed, Parliament discouraged the amalgamation of the big companies. This policy has had both its advantages and its disadvantages.

Amalgamations.

Before, however, considering how amalgamations were effected between various companies, it is necessary to say something more concerning the early days when railway construction was a possibility, but railways had not as yet proved their capacity to pay dividends to shareholders.

The first railway projectors found their path strewn with difficulties, nor was it a light task to overcome the obstacles that impeded progress at every step. The railway was a new thing; especially was the idea of making use of a steam locomotive abhorrent to conservative people, who, arguing that as horses had proved themselves capable of satisfying the trading needs of the country during all known time, there was no need to fly in the face of Providence, and displace a noble animal by a machine that might burst and deal death and destruction to all around.

Prejudice against Railways.

The arguments then used against railways sound puerile indeed, but even to-day, equally silly objections continue to be made when a Parliamentary Committee is considering some scheme to improve means of transport. The canal, the railway, the motor-car, and the aeroplane, each in turn has to endure not only the ignorant criticism of those whose material interests may suffer by its adoption, but of people who are temperamentally opposed to any novelty. It must be admitted, however, that even captious opposition may do some good. It undoubtedly has the effect of causing projectors and inventors to make sure of their ground and produce their very best before

Natural Conservative Instincts.

attempting to get concessions from the community. But at the same time opposition can be carried too far, and become a policy of mere factious delay, or of an attempt to squeeze the greatest pecuniary return possible for a concession. It was so with the early railways, and railway capital has suffered right down to the present from the enormous sums that had to be paid to buy off opposition. A typical instance of this occurred when the London and Birmingham Railway Bill was before Parliament. The first Bill was thrown out by the House of Lords, and yet, when presented the following session, was carried without much difficulty. The explanation of this change of front would appear to be, that, whereas the original estimate of the price to be paid for the land on which the railway was to be constructed was £250,000, the price actually paid was no less than £750,000, or, to put the matter plainly, a bribe of £500,000 was required to beat down the opposition of interested parties. Methods like this did much unnaturally to inflate railway capital, and in this connection it may be noted that the capital of English railways was also increased by the fact that, in this country, most of the experiments for proving the efficacy of railways were tried. Experience generally has to be paid for ; in the case of railways the price of this very necessary experience was high. England paid the bill ; the world at large gained the advantage of this dearly bought knowledge, and other countries were able to plan out their railway systems in the light of ascertained facts. Yet another point as to the difficulty that the early railway projectors experienced in this country in raising capital, and which tended to swell the amount of capital on which dividends had to be paid. At first the investing public were shy, and in order to induce people to invest in railway stock in some cases it was issued, or at any rate was allotted, at a considerable discount ; sometimes this would be as much as 50 per cent. In a later section of this book the whole question of railway capital and the causes of artificial inflation have been treated.

Effects of Railway on Towns and Trade.

Not the least effect of canals and railways on our national life was that they caused the rise of new centres of industry and the decay of many a historical town. This was not altogether the fault of the new methods of transport, although it can be traced to both canal and railway. In fact, where towns have decayed since the

introduction of modern methods of transport, the fault can generally be traced to the towns themselves. Early canal projectors encountered the most unexpected opposition from towns through, or near, which the proposed canal would run. Carriers and others interested in carting and horses declared that their businesses would be ruined, and that horses would no longer be required. In some cases the opposition was so strong that the proposed line of the canal was altered, so as to pass three or four miles from a given town, in order that goods for that town would have to be carted by road.

Development of Northern Towns.

The convenience of being on a canal or railroad accounts for the origin and rapid development of many of our northern industrial towns. Business concentrates at convenient centres, and these are where facilities for communication and the transaction of business exist. The district or town that barred out facilities, or kept them at a *safe distance*, has inevitably suffered in that its development and progress have come to a standstill from the moment that it turned its back upon new methods. No lesson comes out more clearly in industrial history than this, that the nation, community or individual that neglects new opportunities and improved methods for carrying on business is soon out of the running and ceases to progress. Civilisation and commerce have invariably advanced hand in hand, and the neglect of the latter has always imperilled the former.

CHAPTER III

THE EVOLUTION OF TRUNK LINES

THE railway, like the canal, soon justified the optimism of its early projectors. Canal companies had paid good dividends, and for a long time were considered perfectly safe investments. Then the railway came. At first it had to prove its capability as a method of transport, and its ability to pay a regular dividend on the capital required for its construction and equipment. No sooner were these ascertained facts than railway stock as an investment began to take the place of that of the canals in the favour of the public. Unfortunately, too, just at this time, circumstances conspired to increase the popularity of railway stock until the investing public lost their heads, and the railway manias of 1836 and 1845 seemed for a time likely to bring the country to the brink of financial disaster.

Growth in Public Favour.

In spite, however, of speculation and, it must be confessed, the employment, in some cases, of vicious financial methods, very considerable progress was made with genuine railway construction. The proof of this can be grasped by noting the dates of the foundation of some of our leading railway companies. The London and Birmingham Railway, now the London and North Western, dates from the year 1833, but the 2,000 miles of track now managed from Euston represent the amalgamation of over 100 railway companies; nor was the London and Birmingham Railway the senior of these, although it may be looked upon as the main trunk to which all the others become naturally attached. The London and Southampton, now the London and South Western Railway, dates from the year 1834; the Great Western Railway, 1835; the South Eastern, 1836; the Eastern Counties (since 1862 known as the Great Eastern), 1836; the London, Brighton, and South Coast, 1837; and the Great Northern, 1846.

Dates of Early Systems.

It is from the last-named year (1846) that order really began to emerge from chaos, for from that date the chief systems of

this country gradually evolved. Parliament, after being congested with railway business to such an extent that a stoppage of the legislative machinery appeared to be highly probable, adopted a definite policy as to concessions, and passed the Railway Clauses Consolidation Act (1845), which by prescribing the form in which all railway Bills must be presented, limited the attention that need be given by the House to any one Bill, to the details of the scheme for which it had been framed. The policy as to concessions is of interest in that it shows how reckless competition may be prevented, and yet a practical monopoly may be robbed of most of its evil possibilities. Thus Parliament requires proof that a proposed railway is really needed. Where this requirement is fulfilled, there has been little difficulty in getting the necessary Act passed. Thus railway promotion has been remarkably untrammelled by Government interference in the United Kingdom.

Parliamentary Procedure Simplified.

Reference has already been made to the amalgamation of many small companies into one great system. This policy towards combination dates from the early forties. It is one thing to declare that the amalgamation of several small companies into one big one will benefit the community, but quite a different matter to bring such a policy to a successful issue. There are so many conflicting interests which have to be brought into harmony. The small undertakings probably have been organised under very different conditions as to management, capital, and working. In order to effect an amalgamation the services of many officials have to be dispensed with. Only one Board of Directors is necessary for the new and enlarged company ; only one staff for office and management work. Hence Directors' fees and officials' salaries are in jeopardy. Even after the interests of officials and shareholders have been considered and necessary points of friction connected with these have been adjusted, Parliament has to be faced, and when the Bill comes before the Parliamentary Committee local jealousies and petty animosities have their opportunity, nor are they slow to avail themselves of it.

Difficulties of Amalgamations.

A few striking points from the amalgamation which resulted in the formation of the Midland Railway Company will serve to

make the seriousness of some of these difficulties plain. There were three small railway companies—the North Midland, owning 73 miles of track; the Midland Counties, owning 58 miles; and the Birmingham and Derby Junction, owning about 50 miles. The North Midland Company ran from Derby to Leeds, the Midland Counties from Derby to Nottingham, and the third company commencing at Derby ran *via* Tamworth and Burton to join the Birmingham and London near Birmingham.

The Midland's Experience.

The three companies had been keen competitors for the business of the districts they served; indeed the competition had waxed so fierce that about the year 1842 all three were in a very shaky condition. They were charging rates that were quite unprofitable, their management expenses were excessive, and just at that moment there was the possibility of further competition that might prove more difficult to face than that which had existed, for the Great Western Railway was contemplating an extension of its system, and the Great Northern Company was "in the air." At a shareholders' meeting of one of the small companies, a Mr. Heyworth ventilated the discontent of the shareholders and urged the need for a searching enquiry. Directors' fees, he declared, cost the company £1,200 per annum. Twelve men could do the work more efficiently at half the cost. And from this beginning he stated a case which led the meeting to vote for the appointment of a committee to investigate and report on the state of the company. The outcome of the labours of the committee was a proposal of amalgamation between the three companies. There was a storm of opposition and the first scheme came to nothing. But the stalwarts persevered. After the failure to carry a scheme of combination, the competition became more intense than ever, and within a few months the financial situation was so serious that something drastic had to be done. The wiser heads connected with the companies called in George Hudson and Robert Stephenson to advise, and they reported in favour of an immediate amalgamation. A joint committee of the three companies was formed, and a bill was drafted for submission to Parliament. To arrive at this point had been sufficiently difficult, but the working out of the details of the amalgamation must have required an immense amount of both patience and tact. To take but one

difficulty: how should the respective values of the share capital in the companies be fixed?

Complicated Capital Problems.

The capital of the North Midland Company had been issued in the form of whole shares of £100 each, half shares at £40 each, and one-third shares at the curious figure of £21 13s. 4d. The Midland Counties Company's share capital was in the form of whole shares issued at £100, one quarter shares issued at £15, and one-fifth shares on which only £2 each had been paid. The Birmingham and Derby Company's capital consisted of whole shares of £100 fully paid, one-third shares issued at £25, and one-eighth shares issued at £3 18s. 5d. Here then was a Chinese puzzle of the first order. To bring about agreement among the shareholders must have been a work of genius. The details of the negotiations are not available, but that they would make interesting reading is evident from the final compromise effected. The shares of the first two companies were all (except the one-fifth shares in the Midland Counties Company), taken at the *nominal* value; the one-fifth shares were reckoned at the amount paid on them, namely, £2 each. The Birmingham and Derby Company's capital presented peculiar difficulties; finally, however, the holders of £100 shares in the old company were allotted £95 for each in the new company. The one-third shares, nominally £25 each, were taken at £31 13s. 4d. and the one-eighth shares at £6 14s. 9d. And, in order that the work of the dividend clerks might be rendered interesting, the shareholders in the Birmingham and Derby Company agreed to accept £1 7s. 6d. per annum less dividend than the shareholders of the other two companies. These figures tell their own tale. The original thirty-four directors of the three companies were replaced by fifteen for the new company. Thus nineteen directors and two sets of staff officials were dispensed with. On 10th May, 1844, the Midland Railway Company's Act received the Royal Assent. The capital of the company was £5,158,900, and the length of track operated extended to 179 miles. This was at the time the largest railway company in existence.

The amalgamation of the multitude of small companies was bound to proceed until a comprehensive system of great trunk lines was evolved. In no other way could the country become possessed of a railway service adequate to the ever-growing needs of

its industries and commerce. How important is this possession of long through routes under a single management, and capable of conveying goods and passengers (especially the former) one or two hundred miles without change of system, will be more adequately realised later when the chapters dealing with canal economics are read. But it may be briefly stated here, as an illustration of the point, that one of the reasons why the canals of this country have failed to move with the times and have, in the aggregate, taken no larger place in the transport industry than that which they occupied half to three-quarters of a century ago, is because they have remained small fragments, connected physically at various points ; but in the matter of management isolated, independent, even jealous of their own position, and often, apparently, incapable of working together for the development of the traffic of their systems. It is impossible to conceive the conditions that would have resulted had railways remained in this same fragmentary condition. There are still some small independent railways possessing but a few miles of track. The Harborne Railway running from Birmingham to the suburb called Harborne is an example of this. It has a paid-up capital of £115,000, and possesses about five or six miles of single track suburban line joining the London and North Western system just outside Birmingham. Its separate identity is maintained, but its line is managed and worked entirely by the North Western. And there are others in a similar position, as will be seen from a casual inspection of the annual blue-book of railway returns issued by the Board of Trade. They still serve a useful purpose but do not render inaccurate the general statement that from what, at this distance of time, appears a state of things greatly resembling chaos has been evolved a complete system of trunk lines.

Vital Necessity of Amalgamations.

The original amalgamations, however, did not give us the trunk system exactly as we now know them. For instance, the Midland Railway, when it first got through to London, had not acquired the St. Pancras terminus. It ran into the metropolis over the Great Northern line from Hitchin to King's Cross. Other companies obtained running powers over what may be called "foreign" lines into various important towns, and it is still a fairly common thing to find a

"Running Powers."

company running trains into the station of a rival company. The Midland runs into North Western stations at Wolverhampton and Walsall. The existence of these arrangements brings us to a brief consideration of the question of running powers, the creation of which marked an important step in railway history.

Object of Compulsory Running Powers.

"Running powers," *i.e.*, the power of one railway company to run a train over lines belonging to another company may be of two kinds: (1) compulsory, or (2) by friendly arrangement. It is the compulsory powers with which we are most concerned and which mark an important step in railway history. The period with which we are dealing, it should be remembered, is the first half of the nineteenth century. In this second decade of the twentieth century one of the common complaints against the railways is that they have entered into so many agreements and working arrangements that competition between them is dead. In the days when the amalgamations were carried out this amicable feeling did not prevail. Where a company possessed an advantage over a rival it was apt to retain its advantage if possible. In this and other ways attempts were made to "freeze" out smaller and less favoured companies. Parliament was concerned about this because one of the guiding principles on which it had acted in railway matters was that the possibility of monopolistic abuses should be prevented, not by regulation but by competition. Those were the days, of course, when belief in the infallibility of free competition shaped most of the legislation affecting trade and commerce. Naturally Parliament viewed with concern the evolution of large companies. It realised the advantages which would accrue from them, and also the disadvantages arising from the disappearance of competition; it realised, too, how drastic might be the consequences of the "freezing" process when carried out by large and powerful companies. Parliament considered the question, but did nothing until 1853, when a committee, the most important members of which were Gladstone and Cardwell, invented "compulsory running powers," which ultimately became embodied in the Railway and Canal Traffic Act of 1854. Parliament permitted specific clauses to be inserted in railway companies Acts giving power to them to run over other companies' lines where a connecting link was missing. The same Act required all railway and canal companies to "afford

all reasonable facilities" for dealing with traffic from all other companies. From this time any company could, subject to Parliamentary approval, obtain access for its trains to the system of any other company in cases where such access was desired, and of course the "freezing" process came to an end. The fact is not solely of historical, but also of economic, importance in that it contributed to the extension of transport facilities; to the opening up of more free and larger highways of traffic for the use of the rapidly expanding trade of the country.

Friendly Running Arrangements.

Friendly arrangements, *i.e.*, arrangements for which Parliamentary sanction was not sought, were not always dictated by a pure spirit of friendliness, as the name may suggest. Sometimes companies thought it desirable to grant running powers to rival companies for fear of the greater evil of increased independent competition. It was deemed to be better policy to let a rival into a town rather than to force that rival to obtain its own way in. In this way the permitting company would obtain some control over the other's traffic through handling it, and it could at least make this "foreign" traffic subservient to its own requirements. An instance of this is furnished in the history of the Midland Railway. The increase of traffic became so enormous between Hitchin and King's Cross where the two companies used the Great Northern line that the facilities for dealing with it were inadequate. Naturally, the Great Northern gave their own traffic the preference, and the Midland trains were so constantly delayed that in the end the Midland had to construct their own London terminus at St. Pancras, the Act for which was passed in 1863.

CHAPTER IV

THE RAILWAY AND CANAL AND LIGHT RAILWAYS COMMISSIONS

PARLIAMENT, though relying chiefly on the restraining influence of competition, appears to have felt all the time that the railway companies needed to be subjected to some kind of central supervision and control. At one time there was a recommendation, arising almost entirely from the absorption of its own time by railway legislation, that the Board of Trade should be given power to make a preliminary investigation of all railway schemes and to report on them. Had effective use been made of this idea possibly we should have obtained a better devised and cheaper trunk system than we now possess, but two things combined to defeat this idea—Parliament was jealous of the delegation of its own powers to a department of State and the railway interest was too hostile to the idea and sufficiently powerful to defeat it. Parliament, however, had another and equally important idea—it early saw the desirability of a specially constituted tribunal for dealing with railway questions. The obligations imposed by the Act of 1854, to which reference was made in the preceding chapter, especially those dealing with "reasonable facilities," required such a tribunal. The intention of the framers of the Act was to confer the necessary powers on the Board of Trade, but the "railway interest" was sufficiently powerful to prevent this from being carried out, and the court named in the Act was the Court of Common Pleas. This amendment stultified the Act because the judges declined to deal with purely technical questions.

Early Methods of Control.

The defect of the existing legislation continued to be recognised, but it was not until 1873 that another decisive step was taken in the appointment of Railway Commissioners, to whom were transferred the powers given to the Court of Common Pleas under the 1854 Act. The procedure and powers of the Commissioners were made more elastic than are those usually exercised by judges of the High Court. For instance, section 7 states that :—"When the Commissioners

First Railway Commissioners.

have received any complaint alleging the infringement by a railway company or canal company of the provisions of any enactment in respect of which the Commissioners have jurisdiction, they may, if they think fit, before requiring or permitting any formal proceedings to be taken on such complaint, communicate the same to the company against whom it is made so as to afford them an opportunity of making such observations thereon as they may think fit." The same Act gave the Commissioners power to hear and determine questions as to terminal charges where such charges were not fixed by Act of Parliament and to make orders requiring the companies to divide up particular charges so as to show the toll, the conveyance charge, and the terminal charge.

From time to time the powers of the Commission were increased as, for instance, under the Act of 1874 power was given to refer to them questions of difference required to be referred to the arbitration of the Board of Trade, or to arbitrators appointed by that Board. But the most important development took place under the Railway and Canal Traffic Act, 1888. This Act was an enormously important one, affecting railway rates and charges, as will be seen in the subsequent chapters in Part II of this book. Here we are only concerned with the Commission. The first part of the Act is entirely confined to the creation of a new Commission, called the Railway and Canal Commission (canals are brought into the title for the first time) and defining its duties and powers. This body was made permanent ; its predecessor had been appointed merely for a term of years. It was to consist of two appointed and three ex-officio members. The ex-officio members were and are required to be judges of the superior courts of England, Scotland and Ireland, and an ex-officio commissioner " shall not be required to attend out of the part of the United Kingdom for which he is nominated." The object, of course, was to secure that in whatever part of the United Kingdom the Commission might sit its presiding head should be a judge of the court having jurisdiction in that part, and, naturally, familiar with its special laws. The other two members were to be appointed on the recommendation of the Board of Trade, and " one of them shall be of experience in railway business."

Permanent Commission Created.

The powers of the newly constituted Commission were considerably enlarged by this Act of 1888 ; for example, it was given

jurisdiction to order traffic facilities, notwithstanding any agreements into which the companies concerned might have entered. The Commission remains in existence, and is, of course, the supreme authority for dealing with all questions as to rates and facilities. If, for example, a trader feels that he has a grievance against a particular company because it is charging excessively for services rendered, or is giving a competitor preferential treatment in the matter of rates; or if a body of traders think that a particular company is carrying imported foreign produce at rates which constitute an undue and unreasonable preference he, or they, may raise these points before the Railway and Canal Commission.

Its Defects.

Theoretically, the Commission is perfect, and there can be no doubt that it serves a useful purpose, but the business community is not entirely satisfied with it. Its judicial and technical ability are not questioned, but criticism turns on the cost of its proceedings. For some reason (possibly because the railway companies always brief most eminent counsel to represent them before the Commission and consequently traders feel that if their case is to be adequately expounded they must do the same), reference to the Commission has come to be regarded as beyond the means of most traders. As a rule, it is only large corporations, either municipal or commercial, that bring cases in the court of the Commission. For this reason the Associated Chambers of Commerce have, during recent years, maintained a fairly constant agitation in favour of the cheapening of the procedure for dealing with grievances against railway companies. The Association would appear to favour the abolition of the Commission; at any rate, the extension of the powers of the Board of Trade is advocated so that that body may deal cheaply but effectively with minor grievances.

Light Railways Commission.

Brief reference should also be made to an important departure from the Parliamentary custom which had been observed for at least sixty years in connection with railways—the appointment of a Light Railways Commission in 1896. Light railways, it was thought, would serve a useful purpose in extending efficient means of transport into parts of the country not effectively covered by the ordinary railways. Although the ordinary railway system was so comprehensive and widespread there yet remained parts of the

kingdom, and especially in Ireland, not adequately covered. Parliament thought the deficiencies might be made good if it encouraged capitalists to build the required lines by relieving them from some of the most arduous requirements that had always been insisted on in the case of the ordinary railways. The object was sought to be accomplished by the creation of a Light Railways Commission consisting of three members to which quite novel powers were delegated, by far the most important of which had relation to the compulsory acquisition of land. For the first time in its history Parliament surrendered to a subsidiary authority its powers of dealing with the rights of landowners. Schemes for the construction of light railways are enquired into by this Commission, and if passed are formally reported to the Board of Trade for its approval, and on this being given a scheme requires no further sanction. The proposed company can acquire the land required by means of compulsory purchase and can proceed with the construction of the light railway. Other departures from previous custom are that the Commission may, and does, hold enquiries into schemes in the localities affected which, of course, means the reduction of the expenses of the application because witnesses are on the spot and have not to be conveyed to and maintained in London during the time the enquiry lasts. The Act also provides for the co-operation of the State, the locality, and private enterprise for the provision of such lines, and, further, power is given to the Treasury to render financial asistance where it is satisfactorily proved that the localities proposed to be served are so poor that otherwise the scheme would be impossible. This Government assistance can be made in the shape of an out-and-out gift, or of a debenture loan bearing interest at 3½ per cent.

Of course, it follows that the schemes for which Treasury assistance was intended were those mainly promoted by local authorities. A private venture for profit could not claim to reap the benefit of such financial provisions. But as a matter of fact, light railways have been principally constructed by private enterprise. Populous urban localities have usually adhered to the more familiar street tramways; sparsely populated suburban and rural localities have usually been either too poor or too lacking in enterprise to take the initiative themselves. While making these special

Not a Conspicuous Success.

arrangements for simplifying procedure, and reducing costs of promotion and construction, Parliament took care to protect the ordinary railways from the competition of great lines of railway constructed under them, and the Commissioners have rejected attempts to use these facilities for the purpose of creating competition. The aim was to supplement the existing railways by covering the country with which they were not closely connected, and not to provide new trunk lines to compete with those already in existence. But it cannot be said that on the whole this departure from long established custom has been conspicuously successful. There has been some success in Ireland, but in England, at any rate, many of the schemes (the majority in fact) have amounted to little more than passenger-carrying tramways with their lines running along public roads. Ordinary limited companies promoted by private enterprise have found the provisions of the Light Railways Act a cheap and convenient method of obtaining sanction for suburban tramway schemes. They have taken powers to carry goods and merchandise as well as passengers, but, as a rule, the goods business transacted has been infinitesimal compared with their passenger business. Even in some sparsely populated districts, where so-called light railways have been constructed, the result has been much the same. The fact is that private enterprise is not attracted by benevolent schemes for rural development. In the slang expression of the day, it is "out for" business and profits; and the rural districts to which light railways should have been most useful have not, as a rule, the enterprise necessary to spur them on to such undertakings nor the ability to carry them through. Whatever else it may be, a railway whether "light" or "heavy," is not a philanthropic, but a business, undertaking.

CHAPTER V

THE SCOPE AND PURPOSE OF WORKING AGREEMENTS

ONE other important stage in the evolutionary process must be dealt with before leaving this brief historical sketch of British railways.

The Era of Fierce Competition.

It has already been pointed out that at the outset Parliament fostered competition by means of a multitude of small lines, and that the next stage of development was the evolution of the large companies controlling great trunk lines. This did not in the least diminish the competition which Parliament desired. Rather it fostered it by transferring it from small bodies to large, powerful, wealthy corporations capable of large undertakings and large policies. The period which followed saw the fiercest possible competition. In even these early days there was at least one instance of an alliance, but in the main it was the era of keen business antagonisms. The companies, it is true, all worked to one classification of merchandise and to maxima schedules imposed by Parliament, and occasionally they entered into agreements for the regulation of passenger fares, especially those for excursion traffic.

Beneath this apparent uniformity, however, there was much room for competition in the matter of facilities. Passenger services were duplicated, and the companies endeavoured to outvie each other in speed and comfort of travel. In the goods department all kinds of concessions were made in order to secure traffic. One of the most notorious methods concerned the generosity with which claims for damage, misdelivery, and delay were treated. If the company protested against a claim which was regarded as excessive the trader's invariable retort was: "Oh, very well. If you don't care to pay my claim the whole of my traffic will be transferred to your rivals." Such a method of squeezing the companies was singularly successful for years, until in fact the trader came almost to regard it as a legitimate means of securing what amounted to an indirect reduction of goods rates and charges. Another direction in which the influence of

Nature of the Competition.

competition was seen was in the laxness with which charges for warehousing goods or for the demurrage of trucks were enforced. The regulation free limits for warehousing or the detention of trucks were systematically exceeded. Again, the companies would carry goods at the reduced "owner's risk" rates, and in case of damage, loss, or misdelivery would not too strenuously resist a claim, although, in the strict letter of the law, the lower rate given was in consideration of the consignor himself undertaking these risks.

Companies Draw Closer Together.

Ultimately the companies became tired of this policy and began to act together to enforce warehouse and demurrage charges and to resist claims. It caused a great outcry because the effect of this change was to add to the traders' transport bill, and naturally this was vigorously resisted. The opposition was not conspicuously successful, and the companies, having thus drawn closer together than they had ever done before, began to draw even closer still, until the final outcome was the arrangement of several working agreements.

Early Working Agreements.

Working agreements were not, even at that time, entirely novel in the history of British railways. Parliament itself had sanctioned one in the case of the London, Chatham, and Dover and the South Eastern companies under which the management of these two railways was vested in a joint committee drawn from the two boards of directors. Thus, though the companies retained their separate identities their systems became as one. Their receipts were "pooled" (*i.e.*, paid into a common account), and their net profits divided on a proportional basis. From the sum which each company thus received from the joint managing committee, dividends were paid to stockholders. It is also interesting to find that as early as the "seventies" of the nineteenth century there was a working agreement (not sanctioned by Parliamentary authority and little known of generally) between the London and North Western and the Lancashire and Yorkshire railways. Under this the two companies "pooled" the receipts from certain traffic at "competitive points" (*i.e.*, the traffic arising in places which both companies served) and divided them on a fixed basis.

It was on these lines that the agreements of the first decade of the twentieth century were based. There were several in existence. For instance, the London and North Western,

the Midland, and the Lancashire and Yorkshire companies worked under such a system. This triple arrangement was not made all at once. That with the Lancashire and Yorkshire, as has been said, had been in existence for about a generation, and it had been extended in 1906 when more traffic was brought within its scope. The next step came in 1908 when the North Western and Midland came together, but for a time the arrangement was confined to these two; it did not extend to the Lancashire and Yorkshire. Within a very short period, however, the Midland came into full working arrangements with the other two companies. This tri-party combination only concerned "competitive traffic," the receipts from which were "pooled" and divided on a proportional basis. The exact details of the arrangement were not well known outside the offices of the companies concerned and even there only in those departments directly interested, but it appeared to be very wide-spread, covering all goods, parcels, and passenger traffic at points where the three companies were in competition.

A Railway Triple Alliance.

Some idea of its effect may be obtained from the following circular issued by two of the companies in districts where they alone are concerned. Had the third company been affected, of course its name would have been added—

LONDON AND NORTH WESTERN AND MIDLAND RAILWAYS

PARCELS TRAFFIC

WOLVERHAMPTON AND WALSALL

The London & North Western and Midland Railways beg to inform their Customers in Wolverhampton and Walsall that commencing Monday, October 12th, 1908, the collection and delivery of Passenger Train Parcels will be performed by joint vans, and that the parcels traffic of the two Companies will be under the control of their joint Agents, Mr. W. H. HICKMAN, at Wolverhampton, and Mr. A. PLANT, at Walsall, respectively, who will be responsible for the Collection of the Carriage Accounts of both Railways and to whom all applications relating to the parcels business of either Company should be addressed.

The traders may rely that their traffic will be as promptly and efficiently dealt with as it has been in the past.

FREDERICK HARRISON,
General Manager, L. & N.W. Rly.

W. GUY GRANET,
General Manager, Midland Rly.

Euston Station,
London, October 7th, 1908.

How passenger traffic was affected may be seen from the arrangements concerning "season" or "contract" tickets. A holder of a London and North Western season ticket between, say, Wolverhampton and Birmingham, or between Walsall and Birmingham, or between Sutton Coldfield and Birmingham might travel between the two terminal points covered by his ticket in the trains of either company. Similarly, of course, a Midland season ticket-holder might travel by North Western trains. The only restriction was that if travelling on the line which had not issued the season ticket the journey could not be broken at stations between the terminal points. Of course, on the issuing line the journey might be broken anywhere between the terminal points. In some respects the privileges applying to ordinary tickets were even greater than those applying to season tickets. In addition to this agreement there was a very close one between the Great Central, Great Eastern and Great Northern companies, and the last two had a working arrangement with the Great Western at certain points. The Great Western and the South Western had a working agreement, and so had the Scottish companies.

Effect on Passenger Traffic.

It will be seen, therefore, that the movement in the direction of eliminating competition had developed to a considerable extent. From the point of view of the companies, of course, such arrangements are all to the good. They mean an appreciable reduction of working expenditure through the abolition of duplicate services of all kinds. In some, if not all, cases, the number of passenger trains was reduced, and it is claimed that this was done without inconvenience to the public because the trains of the companies concerned were better arranged and better spread over the day. In connection with goods and merchandise traffic, of course, these alliances meant a reduction in the money formerly spent on "getting traffic" and on collecting parcels, for instance. The companies themselves stated that such economies had become desperately necessary. The circumstances of their development in the last decade or two of the nineteenth century had added enormously to their capital accounts and frequently the expenditure was upon enlargements, which, while imperatively necessary for the handling of traffic, did not result in an increase of earning power,

Benefits to the Companies.

or a decrease in working expenditure, proportionate to the capital expenditure. Further, there had been, they asserted, a steady increase in operating expenses arising from a variety of causes. These things were impairing, and threatened to do so still more, their ability to maintain their dividends, and, unless some counteracting move were made, would ultimately mean the diminution of dividends.

The Trader's Point of View.

From the point of view of traders, these arrangements appear, according to their published statements, to possess few advantages and many disadvantages. Of course, they put an end to the former astute policy of setting company against company ; that device was no longer available to the man in search of a concession. It was also stated that there had been an appreciable reduction in facilities, the real effect of which was equivalent to an increase in the charges for transport. Naturally, the trader argued that he was not any more able to meet such increases than were the railways to meet those directly affecting them. On the surface it does appear as though all the advantages accrue to the companies and none to the traders, but a superficial view of a matter of this sort is scarcely adequate. If the position of the railways which induced them to enter into such working arrangements was as has been stated by them, then it is obvious that it would not have been to the real and lasting advantage of the community that it should continue. The industry of transport cannot, any more than any other, be expected to deny itself a legitimate return on the capital it employs. If such denial is insisted upon, the industry must ultimately become unattractive to capital which will cease to become available to meet future requirements of the industry. The consequences of such a condition would inevitably be the stagnation, and following that the retrogression, of the industry. Whatever else the industries of this country may face, they cannot contemplate with equanimity a retrogressive or even stagnant transport system.

Close Supervision Necessary.

It may be, therefore, that the ultimate effect of these working arrangements is distinctly beneficial to the public. They certainly mean the elimination of waste, and the logical sequence to that should be, sooner or later, the provision of cheaper and better transport facilities. Both these might perhaps have been secured under the old

competitive system, but some students of the problem are firmly convinced that they could not. There is, of course, a danger of movement in quite the opposite direction. It is very easy for combinations such as these, or of any kind, to develop on undesirable lines and to become oppressive of, rather than beneficial to, the public. That is one of the dangers and problems which traders generally and Parliament in particular will need to watch, determined if ever the position arises to step in and end it unhesitatingly and ruthlessly.

CHAPTER VI

RAILWAYS OF THE UNITED STATES

IT is quite impossible to attempt a detailed description of the railways of the United States. Their extent is far too vast for such a task to be accomplished within the limits of a single chapter of a book designed to take a comprehensive view of the whole subject of transport. Quite a substantial book would be required to deal with the subject on such a scale. Some idea of the extent of the railways of the United States may be obtained from a comparison of figures. In 1911 there were 246,572 miles of road, against 39,916 in the United Kingdom (exclusive of sidings); the total capital was $19,346,784,000 (say roughly, £3,869,356,800) against £1,324,018,361 for the United Kingdom in the same year; the gross earnings were $2,840,870,000 (say £568,174,000) against £127,199,570 from all sources, and tons carried (1910) 1,849,900,101 against 523,577,178. In short, the system is the largest in the world. The whole of it has been created in less than a century, as, of course, have the systems of every country possessing railways. There are still untouched areas, large if stated in miles, though still relatively small; but on the whole it is not inaccurate to describe the country in the somewhat hackneyed phrase as covered with a network of railways. If it is desired to realise this it is only necessary to procure a "folder" from one of the shipping agents—Cooks, for instance. A "folder" is an American railway main line time table—called "folder" because it is arranged so as to be capable of being folded up for the pocket. Some of the companies supplement the time table with a railway map. Their own system is brought into prominence by means of a heavily emphasised line with the curves flattened out and the route made to look as direct as possible. While this is done, however, it is not unusual to find the whole railway system of the country lightly printed in. From such a source as this may be obtained a vague but useful idea of the national system as a whole. Merely to inspect a map of this kind is instructive.

Extent of U.S. Railways.

The history of the development of the railways of the United States is very different from that of this country. England was a settled country with a large population and many towns. Outside the towns the country was well developed agriculturally. These conditions possessed advantages and also disadvantages. Under the first of these descriptions have to be placed a number of facts. Agriculture, commerce, and industry, were more or less flourishing when estimated by the circumstances of their time. They were awaiting the stimulating influence of extended, improved and more rapid means of transport. Trade was ready for the railways and their main routes were settled for them. One of the first and most obvious tasks before the pioneers was to connect up centres such as Liverpool and Manchester, London and Birmingham, London and Bristol, and Liverpool and Birmingham. And, of course, there were other towns in the northern midlands and the north east for which similar facilities were required. The disadvantages may be summed up in the cost of construction arising from this settled, developed condition of the country. Land was being used and consequently expensive to acquire, apart from the manner in which costs were piled up because of antipathy and cupidity. The procedure necessary to acquire Parliamentary sanction for the various projected lines was another heavy item of expense.

A Contrast with England.

In complete contrast to this were the conditions prevailing in the United States. Except on the coast lines, or the banks of the great rivers, and the lakes, the country may be described without exaggeration as unsettled. One of the authors possesses an old school atlas dating from somewhere early in the nineteenth century which marks a great portion of what are now the States of Nevada and Utah as "desert." In the United States, therefore, railway construction, except in the eastern populated regions, was entirely pioneer work. The lines were constantly being pushed out westwards in advance of the population and then the pioneers set to work to obtain populations for the regions they had opened up. It was, therefore, a very different problem that confronted railway promoters in the United Kingdom and the United States. In the latter country they passed comparatively soon from the populous places, where

Opening Up New Regions.

their success was as certain as it could be, to regions where every yard of track laid was a purely speculative undertaking. The pioneers there, however, had every inducement given to them. There were no restrictions as to the kind of track which should be laid or of rolling stock which should be used ; and there were no landlords to be conciliated. In fact, the State was so anxious to get railways pushed out into the prairies that it commonly gave not only the land for the road-bed but considerable tracts on each side of the line, so that the companies might reap the full benefit of their enterprise. And the tracks laid in these pioneer days were far below the standard required in the United Kingdom even at the same time ; in fact, here they would have been regarded as most primitive and dangerous to the travelling public. The story of the development of these pioneer lines would make most interesting reading were there space to tell it. It was not always successful at the outset. Some lines came to grief financially because they were so far in advance of a paying population ; some were more or less wild cat schemes ; and the ultimate ending in such cases was liquidation. But as far as the country was concerned these failures were mere incidents in what may now be described as a history of almost uninterrupted progress. Companies that did the pioneer work may have failed ; but others took their places and carried on the work to success.

Construction and Consolidation.

It is difficult, if not impossible, to divide up the history into periods as can be done with English railways because development continued so long. Until quite recent years one of the chief tasks still before the railways was the opening up of new country. In the main, however, there were the two stages—(1) construction, (2) consolidation—just as there were here. The only difference is that the two stages overlapped, or ran side by side. Many prominent names in the financial and railway world have been conspicuous at various periods in the work of consolidation. Two only of the more recent ones need be mentioned—Hill and Harriman. Mr. Harriman was the central figure in the amalgamations which created the Union Pacific line and took it out west to the Pacific Ocean. Mr. Hill with Lord Mount Stephen and Lord Strathcona acquired the control of certain scattered railways and combined them to form the St. Paul, Minneapolis, and Manitoba Railway. In 1889 it

was decided to push on this system also to the Pacific, and the name was then changed to the Great Northern Railway.

Power of Railway Magnates.

The power and authority of railway magnates such as these were and are immense. How they acquired it is not easy to state in general terms because every transaction of the kind would have its points of difference. But one of the circumstances which frequently assisted this acquisition of one-man control may be found in the nature of the capitalisation of American railways. Frequently the common stock (which in this country would be called ordinary capital) was small in relation to what are called Bond issues—similar to British debentures and guaranteed stock. As with ordinary capital here the voting rights are mainly confined to common stock. Bondholders only have power of intervention and control through the appointment of a receiver when there is failure to pay the interest due to them and the particular railway is insolvent. Normally, therefore, control is in the hands of common stockholders, who appoint directors. To obtain control of a company, under such circumstances, the magnates had not to consider great bulks of capital. All they were concerned with was the common stock, and a bare majority of this (even a one-share majority) was sufficient to give them effective control of the company under which they could appoint themselves or any other nominees as directors, and thenceforward shape the whole policy of the company.

Advantages and Defects.

In this and similar ways one-man control was secured. Its influence cannot be unreservedly approved or condemned. On the one hand, it undoubtedly had its good features. It placed the control of huge developing organisations in the hands of strong men ; men of dominating personality, of imagination and enterprise ; men who conceived great schemes and carried them through in a way that probably would have been impossible under any other conditions. But while the system had advantages such as these it undoubtedly had counterbalancing defects arising from the manner in which it was abused. Much of the scandalous Stock Exchange manipulation of railway stocks, which time after time has brought ruin to thousands of small investors, may be traced to this source. And the State has found cause to interfere in these arrangements and

to exert its authority to quash them because of its conviction that they are antagonistic to the interests of the public.

Problems for the States.

Apart from the initial one of how to get a comprehensive system of railways, the problems which the United States have had to solve have been very similar to our own—the prevention of the abuses of monopoly and the regulation of rates. Competition as a regulating force keeping both these kinds of abuses in check is bound to have its weaknesses; to produce irregular and uneven results. The localities enjoying the advantage of being served by more than one system are bound to obtain great benefits from competition as long as it remains free and unrestricted by any form of working agreement. And of themselves such benefits are equally bound to have what may be called a reflex effect. The transport rates which some localities enjoy are so much lower than those available for others, where competition does not exist, that, inevitably, there must be an appearance of unfair discrimination in favour of one locality against the other. Apart from this condition, which may be described as natural or inevitable, it is also alleged against the railways of the United States that in their efforts to secure transport business they have deliberately discriminated in favour of the consignor who could hand them large tonnages at the expense of the smaller man. Into the merits of this particular phase of the dispute it is not necessary to enter; it is only mentioned as an indication of the kind of problems with which the legislatures of the Union and of the individual States have been constantly faced.

The "Granger" Movement.

The trouble began early in the second half of the nineteenth century. The expansion of agriculture fostered by railway development had been so rapid that wheat prices fell considerably, and with the existing railway rates farmers were unable to make a profit. From the point of view of the railways the reductions demanded would have meant disaster, but unwisely they did not rise to the necessity of doing something useful to help the settlers whom they had planted on the soil. Naturally in this crisis the indignation of the farmers became acute. In 1867 there had been formed a society known as "The Patrons of Husbandry," the object of which was the social improvement and industrial betterment of agriculturists, though those interested in other industries eventually joined.

The object was mainly educational. The meetings of the local branches were held in granges or barns, and so the lodges came to be known as granges and the whole movement as "the Granger movement." Naturally a body of this kind, formed on the lines of a secret society, and having the care of agriculture as its primary object, began to take a considerable interest in the position as between the railways and the farmers, until in the end, the society promoted laws against monopolies, which were primarily directed against the railways, and ultimately became known as the "Granger laws." These were passed in the States of Illinois, Iowa and Minnesota. There was in 1870 an unfruitful attempt in Ohio to regulate railway goods rates by law, and in the following year in Illinois a law was passed setting up a series of maximum charges. One of the judges declared this to be unconstitutional, and as the result failed to obtain reappointment. His defeat showed the true significance of the movement. The farmers were seeking what they believed to be their "rights" and the salvation of their industry; and naturally they were in no mood to tolerate technical points which might be raised to set aside the legislative expression of their convictions and intentions.

Bad Effect of Restrictive Laws.

The difficulty was overcome in an Act passed in 1873 which did not fix maximum rates but required them to be reasonable, and a Commission was appointed to settle what were reasonable rates. Minnesota and Iowa followed this example. Wisconsin went farther, and in the "Potter law" fixed rates on various goods at levels that were declared to be unremunerative. Of course the railways contested the validity of these laws, but in 1877 the Supreme Court pronounced them constitutional. Thus the "Grangers" were successful in enforcing their views, but their success proved to be short lived because experience soon showed that the restrictive laws so diminished the earning powers of the companies that they became unprofitable undertakings. In Wisconsin the general level of goods rates was reduced to those prevailing at competitive points, and in two years none of the railways was able to pay a dividend, and only four were able to meet the interest due on their issues of Bonds and other prior charges. The inevitable result followed —capital was not forthcoming for extensions which came to an end for the time being and the State ceased to develop. So

severe was the crisis provoked by the "Granger Laws" that even before the Supreme Court upheld them in 1877 they had come to be regarded as unwise, and it was realised that it would be bad policy to enforce the decision.

The Inter-State Commerce Commission.

Of course the breakdown of the "Granger Laws" did not mean the end of all attempts to control railway rates and policy. The necessity for such control had been made abundantly evident by the experiences which had spurred the traders on to action. But while the necessity was recognised, it was about ten years before an acceptable policy was agreed upon, and in all this decade there were frequent legislative attempts on the part of individuals and much wrangling over the merits of rival policies. One of these proposals was the enforcement of strictly equal mileage rates—an attractive scheme because of its superficial appearance of all-round equity, but one which in practice is incapable of strict application for reasons which will be seen later in the chapters dealing with the economics of transport. The ultimate solution of the difficulty was found in the creation of the Inter-State Commerce Commission in the year 1887. By this Act the regulation of railways became national rather than local. Their control was handed over to the Commission, "pooling" was prohibited, and there was a clause with reference to the relationship of "through" to local rates, the object being to give the Commission wide, if not very exact, powers of minimising the abuses which arose from the granting of exceptionally low through rates while local rates for the same commodities over part of the same route as the through rates covered were maintained at their high level. Great discretion in the matter of discriminatory rates and of the long and short haul charges was left to the Commission.

Its Powers and Duties.

That body appears to have tackled its work with vigour, so much so that for ten years, according to a paper read by Professor E. R. Dewsnup (University of Illinois) at a congress of the Royal Economic Society in London in 1912, it assumed the right to order the companies to fix reasonable maximum rates. It was inevitable, of course, that when such a policy was resisted in the courts it failed, and for eight years the Commission repeatedly sought such powers until they were granted in 1906. This power was further extended in 1910 when

authority was given to fix reasonable maximum rates even though no complaint might have been brought before the Commission. In the same Act the commissioners were authorised to postpone new rates proposed by companies, while enquiry was made as to their reasonableness and more complete control was given over long and short haul rates. But perhaps one of the most important enactments was that where a company reduced rates in competition with a water route it should not be allowed subsequently to increase those rates unless it could show changed circumstances other than the elimination of the water competition as the justification for its action.

Apart from this rate regulation, however, the Commission is endowed with a variety of powers. It is the authority for enforcing compliance with requirements as to equipment such as brakes and automatic coupling appliances; for regulating the carriage of explosives; for regulating the hours of the operating staff; for arbitrating in case of labour disputes on the railways, and for a variety of other things. And there is, apparently, an increasing tendency to seek its opinion on all kinds of subjects connected with the railways, while its power of control is extending indirectly from Inter-State matters to those which formerly were regarded as the sole concern of the States themselves. Obviously it must be so because if the Commission orders certain things with reference to Inter-State traffic its decision cannot be allowed to be invalidated or infringed by the fact that a State has not enforced similar laws within its own boundaries. Such an admission is merely logical.

Value of its Work.

It is difficult at a distance far removed from the sphere of the Commission's activities and without close personal acquaintance with it to pronounce an opinion as to the value of its work. It can hardly be doubted, however, that from many points of view it is an extremely useful department of State. It combines in one authority powers that in this country are scattered over two—the Railway and Canal Commission and the Board of Trade—and it has also the advantage of being endowed with more initiatory powers than are possessed by the regulating authorities in this country. Here the powers of the Board of Trade are almost entirely supervisory and those of the Railway and Canal Commission judicial. If there is a

grievance as to rates in this country it is for the dissatisfied consignor to set the law in motion and not for the Commission to do so, whereas the United States Commission may act of itself. It seems probable that this power of action is a distinct advantage. In this country, it is frequently alleged that the Railway and Canal Commission is not the useful body it might, and should be, mainly because aggrieved traders will seldom incur the expense arising from procedure before the court. For this reason grievances may continue for years without being submitted to that judicial investigation which would either end them, or, if they are not really legitimate grievances, would bring out the necessary information to explode them. Possibly the usefulness of the Commission would be greatly increased if the aggrieved trader's duty ended with the communication of the complaint ; if he were not required to conduct his case as he would have to do in an ordinary action at Common Law ; if the Railway and Canal Commission were provided with an adequate staff for the investigation of such complaints and the presenting of carefully sifted evidence.

Against the advantages of the American system, however, are to be set one or two disadvantages. At times there seems to be about its procedure a suggestion that it is a political rather than an administrative and judicial body ; that the public opinion of the day shapes its policy and decisions rather than the letter of its constitution. Another serious allegation against it is that it shows tendencies to become bureaucratic, afflicted with the worst faults of bureaucracies, arrogance, and rigidity ; a tendency to fix stereotyped rules of action and to interfere despotically with matters that are not strictly before it. But in all these things it is difficult to strike the happy mean between inefficiency and officiousness ; and it will always be so.

Political or Judicial ?

Before leaving the railways of the United States it seems desirable to add a few words as to their present stage of development. The system has already been described as the largest national system in the world. And anyone who has little more than a bowing acquaintance with its history, extent, and achievements will agree that from some points of view it is also one of the most efficient, best organised, and

Present Stage of Development.

cheapest systems in the world. It moves an immense volume of goods traffic and the average rate per ton per mile charged for the work it does is the lowest in the world. It has its defects, of course, and at times it has been made the instrument of grave abuses. All the advantages claimed for it are not always admitted by critics and rivals, but when allowance is made for all the defects criticised it still remains a wonderful system; one which has played a vastly important part in the development of a country of immense possibilities and is still ministering capably and efficiently to its further development, not merely internally, but externally, in the commerce of the world.

CHAPTER VII

THE EUROPEAN RAILWAYS

RAILWAY conditions in Europe are quite different from those of the countries already dealt with. The United Kingdom of Great Britain and the United States of America obtained their railways entirely as the result of private enterprise, although, as has been seen, relatively small but valuable assistance in the shape of land grants was given to the pioneer American railways. European countries have obtained their railways largely as the result of State enterprise. At the outset there was some measure of private enterprise, but for various reasons this was soon superseded either by complete State ownership or by a combination of partial ownership and financial assistance to companies operating under concessions. In no European country is there an instance of private enterprise constructing railways, amalgamating them, financing them, and generally developing them until they obtained the extent and importance of those of the United Kingdom and the United States.

Prevalence of State Ownership.

France was rather slow and hesitating in adopting the new method of locomotion. The French people at the beginning of the nineteenth century were in the enjoyment of an almost perfect system of roads radiating from Paris. Road construction had been systematically and scientifically studied at the École des Ponts and Chaussées. In addition the country had a serviceable system of inland waterways, both natural and artificial, which was being developed by the State on an organised plan when the railways made their appearance. France naturally hesitated to "scrap" her existing means of communication for something as yet untried and unproved, which might or might not be capable of being applied to the whole country on well arranged and comprehensive lines. Nor could she easily make up her mind as to whether she wanted private or State ownership. In 1838 the Government proposed to construct seven trunk lines, and that they should be operated by the State, but Parliament rejected the proposals, and in the

Hesitation in France.

end the first considerable railway possessed by the country was projected and financed by an Englishman, Edward Blount, and constructed by another Englishman, Thomas Brassey, who employed English labour to a large extent.

The State encouraged private enterprise, but the railway industry remained in a precarious condition until 1842. M. Thiers produced and carried a scheme under which (1) the State agreed to construct the road-bed and lease it to companies; (2) the companies were to supply the equipment and work the railways; (3) at the end of a specified period the whole system was to revert to the State. This, in general and subject to variations in detail, has been the underlying principle on which France has subsequently acted.

M. Thiers's Scheme.

This coming of the State into partnership with private enterprise gave the latter the necessary confidence, and from 1842 to the Revolution of 1848 construction was rapid, over thirty companies being formed to construct about 2,500 miles of line. Immediately after the Revolution came a period of stagnation, but in 1851 a new era began. Napoleon III and his Government stimulated activity again by extending the concessions, or charters, to 99 years. This extension, of course, improved the financial position of the companies and enabled them to undertake the consolidations and amalgamations which produced the six companies as we now know them—the Nord, the Est, the Ouest, the Paris-Lyon-Mediterranée, the Orleans, and the Midi. The systems of these companies radiated from Paris, and each had a complete monopoly of its own district, with the result that competition was lacking, local business was neglected, and necessary branch lines were not constructed. Monopoly ultimately had its usual result—stagnation and petrifaction.

By 1857 the country was again faced with the problem of making railway construction keep pace with its developing requirements. The difficulty was overcome by M. de Franqueville's scheme, the chief point in which was that the Government guaranteed 4 per cent. interest on the capital raised for extensions. The companies were not relieved of the obligation themselves to pay this 4 per cent., and as long as they did, they could pay what dividends they chose on their other capital. If, however, the Government was called upon for the 4 per cent.

Guarantees of Interest.

or any part of it the dividends were restricted to former averages. A further point was that power was taken by which the Government could nationalise the railways at the end of fifteen years on terms favourable to the shareholders. In 1877 there was a movement in favour of State ownership which resulted in the taking over of unprofitable lines in the South-west which had no connection with Paris and failed to get one. Two years later M. de Freycinet produced a scheme to provide 12,000 kilometres of new lines, and it was adopted ; but it was not a well-arranged scheme, and apparently political considerations influenced its execution. Ultimately it failed, and the Ministry fell.

In 1883–4 fresh arrangements were made under the following headings :—(1) State ownership was confined to the South-west ; (2) Lines owned by the Government elsewhere were leased to the great companies ; (3) The connection of the State railways with Paris was abandoned ; (4) New construction was to be undertaken by the existing companies in their respective districts, the money being found by the State by annual credits ; (5) The State guaranteed to the companies a minimum dividend equal to an average of a series of years and in return acquired the right to two-thirds of the profits above an agreed amount. The final development was the repurchase by the State in 1909 of the Western railway. The results of this undertaking are dealt with in the chapter on the nationalisation of railways.

It will have been gathered from this brief historical sketch that the railways have cost France considerable sums of money, and that each time the State has had to intervene the companies have been able to extort still greater advantages. The State, of course, has some counterbalancing advantages, one of which is a very close control over the working of the systems, especially of their charges, which cannot be varied without the express sanction of a Ministry of State. Another advantage is the ultimate reversion of the whole national system to itself. It has been estimated that the value of the lines exclusive of the part contributed by the State, is £640,000,000, so that, prior to the European War of 1914, it was hoped that when the concessions expired the value received by the State would be equivalent to the whole national debt

Costly to France.

There was no German Empire at the time of the birth of railways,

but a multiplicity of States, of which Prussia was the most important and powerful. It is difficult to picture the Germany of those days, but the land suffered from this disunity; from the survival of all kinds of antiquated customs, privileges and rivalries, none of which tended to progressive development. So it is not surprising to read that originally the idea of building railways was looked upon with suspicion; that they were regarded as financially and politically undesirable. The first start made in 1835 was a very unambitious one—four miles of line from Nürnberg to Fürth. Other small lines followed, and then when some idea of the possibilities of this new method of transport was demonstrated, the various States, and particularly Prussia, began to take an interest in them. Prussia began to give assistance in the shape of guarantees, or by subscribing for shares in the promoting companies. Some of the other States built their own lines; some left the initiative to private companies to which State assistance was given, though not invariably. Thus the railways of Germany began to be created in the disunited, piecemeal fashion characteristic of the whole social fabric of the land in those days. Later Prussia began to build railways herself, not merely because she conceived them to be commercially necessary, but also because they were strategically desirable to assist the maintenance of her independent nationality. Some of the lines built were in direct competition with those of private companies to which concessions had been granted.

Unambitious Start in Germany.

But the really interesting and important period did not begin until Bismarck acceded to office in 1861, although for some years later things were allowed to develop on their own mixed lines; partly private and partly State ownership. Bismarck's idea, however, was a consistent State system for the whole of what became the German Empire with all the private and small State managements eliminated and the whole placed under one control. This proved to be impossible of accomplishment owing to the hostility of some of the States, which had even gone to the length of acquiring their railways (when they did not already own them) to prevent them from falling under Prussian control. What Bismarck was unable to do for the

Bismarck's Work.

Empire, however, he proceeded to do for Prussia. In 1879 he began to buy out private companies, and in two years obtained possession of about 4,000 miles of line, and the policy was continued until the whole system became the property of the State. But Bismarck did not entirely confine himself to the railways of Prussia. Where private companies ran into other States he acquired those portions of the lines as well, until, finally, Prussia became the dominating power in the German railway world. Force of circumstances such as these compelled other States to come into line as far as operation and policy are concerned, although they may have retained their ownership.

Results of the System.

The Statistical Abstract for foreign countries shows that there were in the German Empire in 1910, 59,031 kilometres (approximately 36,658 miles) of railway, of which 55,353 kilometres (approximately 34,500 miles) were State-owned and the rest were "companies' railways," although of these privately-owned lines nearly 90 miles were worked by the State. It follows, of course, that the railways are managed by a department of the State, and the results obtained have been extolled and criticised by the supporters and the opponents respectively, of railway nationalisation. These aspects are dealt with later in the chapter on nationalisation. Here it is only necessary to say that from a purely financial point of view the German railways have been most successful. They have yielded substantial revenues to the State. From an economic point of view, also, they have been of enormous advantage to the Empire. Possession of the railways has enabled them to be used to forward national trade policy. Railway rates have been made to supplement the restrictive influence of import duties; or perhaps it would be more correct to say that the railways have been prevented from neutralising import duties by giving low rates, as might have been done had they been in the hands of private companies who arranged their rates solely from a business point of view. On the other hand, by providing exceptionally low export rates the State has been able to use them as an instrument to facilitate the growth of German trade in the markets of the world. There are defects and disadvantages, but these are more appropriately dealt with in the chapter already mentioned.

Belgian railway history is interesting because the conditions

existing at the outset approached more nearly to those of England. Both countries had arrived at what was, for the times, an advanced state of industrial development. Industrial centres were existing and were ready for the improved means of transport. There was one point of difference, however. Belgium being mostly a flat country, presented few engineering tasks, such as had to be overcome in England. Construction began in 1833, and from the first the Government had a clear idea of the necessity of taking a considerable part in the new industry. It constructed and retained for itself the great main lines of traffic, and allowed private companies to fill in the gaps, the private lines being thus more or less local in their character and serving largely as feeders for the Government trunk lines. This original work was well conceived, and well carried out ; and for about a quarter of a century the management is described as having been good. The methods of compiling reports and statistics at this time were ahead of those of the rest of the railway world. But the country seems to have become content with what had been done, and its railway methods became stereotyped and out of date. Government construction ceased in 1850, but the private companies continued to extend their systems, and presently began to amalgamate with each other until systems were created which from being feeders of, became strong competitors of, the Government system. This competition prevented railway affairs from stagnating, and there ensued a period of fierce rate wars during which rates fell to only a little over ½d. per ton per mile. The companies made a profit at these rates. The State was wakened from its lethargy and was forced to conduct its railway business on business lines.

State Ownership in Belgium.

Between 1870 and 1873 the State began to purchase the competing lines and to make working arrangements with those it could not acquire. By 1874 it owned half the railway mileage, and by 1880 two-thirds of it ; and there have since been further extensions of State ownership. The length of line in 1911 is returned as 4,720 kilometres (2,931 miles) of which 4,330 kilometres were worked by the State and 390 by companies. State ownership is therefore fairly complete, but it is alleged that once again the Belgian railway management has lost its up-to-date character, and that the proper functions of a railway system run on business

lines are being made subservient to political considerations to the great disadvantage of the railways. This, also, is a question referred to in the chapter on nationalisation.

There are various points of interest in the history of railways in other countries, but they must only be very briefly referred to.

State Ownership in Holland.

In Holland the task of building them up in face of the competition of the existing waterways seemed hopeless and the early railways were a serious financial drain on the resources of the Monarch (William I) and the State ; and in addition they were badly mismanaged. William II caused the uncompleted line, which was intended to run from Amsterdam to Arnheim and eventually to the German frontier, to be leased to a private company. From this sprang the Dutch-Rhenish company which did much reorganising and extending work, but remained unsuccessful until the development of the Westphalian coalfield gave it traffic. There were at the same time two other disconnected and unprofitable systems, but in 1860 the Government began to construct railways which were leased to an operating company. The Dutch-Rhenish Company was acquired by the State in 1890. The system remains a "mixed" one, partly State and partly company owned, but all the work of operation is done by two companies, each of which pays a rental, and, under certain conditions, a percentage of profits to the Government.

Denmark began with privately owned railways, but the companies only provided for the populous areas where a profit seemed probable,

State Ownership in Denmark.

and so the State had to provide for the less promising areas. The companies were ultimately unsuccessful and the State had to give them financial assistance, and finally to buy them up and extend the system itself. At first the railways were worked "for the benefit of the country," but ultimately a loss occurred and rates had to be raised to put them on a profitable basis, this object being attained. Their chief success has arisen not entirely from skilful management (it is not intended to criticise the management) but from the way in which the agriculturists in Denmark have co-operated to make up large consignments of produce and thus secure the most advantageous rates. Of course, the railway companies have also benefited from the co-operation, which gives them larger consignments to handle.

State Ownership in Italy.

Italy suffered at the beginning of the railway era from the same disadvantage as Germany—disunity—and got as a consequence a number of disjointed systems in the various States which, according to the critics, have never been satisfactorily combined now that national unity has been attained. In the course of their history the railways have been subject to various kinds of agreements with the Government—capital advances, subsidies, direct State management, and leases to companies. At one time a commission reported against State management and operation, and the lines were leased to two companies. This arrangement was ended and State control resumed; and since then it has been alleged that it has been impossible to run the railways on strict business lines because they have been made too frequently the instruments of political corruption.

PART II

RAILWAY AND CANAL ECONOMICS

I. RAILWAY ECONOMICS

CHAPTER I

RAILWAY CAPITAL

HITHERTO we have been dealing with the historical and physical features of railways; their origin, development, and practical working. It is now necessary to turn to their economic side and to obtain a broad, general view of their size and importance as business undertakings; as industries employing capital and labour, not for the purpose of production but to render most important services to mankind and (a point which is of equal importance) of earning dividends for the owners of the capital employed.

Railway Economics.

Concerning the nature of the services rendered to the community little need be said because everyone is more or less familiar with them. It will, however, help the realisation of the importance of the service to recall some of the conditions and costs of transport in the pre-railway and pre-canal days. It is difficult to imagine the then isolation of communities now within easy distance of each other by rail. The only means of communication was by road and the roads were mostly indifferent or altogether bad. Stage coaches, stage wagons, and pack-horses were the only vehicles by which commercial exchanges could be effected except in the case of towns which lay along the course of rivers such as the Thames, Severn, or Trent. Smiles, in his *Lives of Engineers*, says that though "Manchester and Liverpool were improving towns," their merchandise was distributed by chapmen with pack-horses. The roads were very neglected, and in winter "altogether impracticable for wagons." "It was more difficult to reach a village 20 miles away than it is now to journey from the cotton city to London. In the inland southern counties

Nature of Services.

the only coal used was carried on the backs of horses, while the food of London was principally brought from the surrounding country in panniers. . . It used to cost from £7 to £9 to convey a ton of merchandise from Birmingham to London." The same authority states: "In those pre-canal, pre-railway days the small quantity of Manchester goods exported was carried on horseback to Bewdley or Bridgenorth, and then floated down the Severn to Bristol." Bristol, then, was still the second city and the second seaport of England. Liverpool was a quite insignificant port.

Cost of Transport.

The cost of transport in these inconvenient days was naturally heavy. E. A. Pratt, in his *History of Inland Transport*, quotes the following figures from Baine's *History of Liverpool* as prevailing in 1777—

COST OF GOODS TRANSPORT PER TON.

Between—			*By Road.* £	s.	d.
Liverpool and	Etruria		2	10	0
,,	Wolverhampton		5	0	0
,,	Birmingham		5	0	0
Manchester and	Wolverhampton		4	13	4
,,	Birmingham		4	0	0
,,	Lichfield		4	0	0
,,	Derby		3	0	0
,,	Nottingham		4	0	0
,,	Leicester		6	0	0
,,	Gainsborough		3	10	0
,,	Newark		5	6	8

Compare these figures with the £1 1s. 0d. per ton which was the charge for carriage of hardware between Birmingham and Liverpool prior to the rates revisions in 1920. The time occupied in the process of transporting goods has also been reduced to a few hours in comparison with days required to do the same work in the first half of the eighteenth century.

Railway Capital.

The wonderful organisation, or rather group of organisations, to which we owe this remarkable transformation, had a "paid up" capital at 31st Dec., 1912,[1] amounting in round figures to £1,334,000,000. The realisation of this immense figure will be assisted by comparing it with the National Debt of the United Kingdom, which, in 1914, totalled £661,473 000, and the £720 640,000 of national income on which income tax was paid in the year 1911–2. Of course this huge capital has been of gradual growth. In 1851 it amounted to no more than £248,000,000

[1] The year 1912 is taken because the 1913 figures were not issued at the time of writing, and the war has made later comparisons difficult.

sterling, so that in about sixty years there has been an increase of no less than 437·9 per cent. It is interesting to review other growths that have taken place in the same period :—length of line open from 6,890 to 23,441 miles = 240 per cent ; number of passengers from 85,000,000 (including season-ticket holders) to 1,294,000,000 (excluding season-ticket holders) = 1,422 per cent. ; total traffic receipts from £14,000,000 sterling to £118,000,000 = 742 per cent.; total working expenses from £9,000,000 to £81,000,000 = 800 per cent. ; net receipts from £11,000,000 sterling to £47,000,000 = 327 per cent.

Division of Capital.

This £1,334,000,000 capital is divided into five main classes as follows :—Ordinary, £493,000,000 ; preferential, £356,000,000 ; guaranteed, £125,000,000 ; loans, £12,000,000 ; debenture stock, £384,000,000. Further, some companies subdivide their ordinary capital into preferred ordinary and deferred ordinary. The significance of these various classes of capital is largely a question of security, first of capital and secondly of interest or dividends. In this respect there is little difference as a rule between debentures and loans. Both are more or less in the same position as mortgages of land or houses. In the jargon of the exchanges they constitute a " first charge on the undertaking and assets " of the company that issues them. In other words, if one of our railways were to fall into bankruptcy the debenture-holders would be able to seize the assets, conduct the undertaking, and pay their own interest before considering the claims of other classes of capital holders. Guaranteed stock ranks next in importance in that before the preference or ordinary stockholders can receive any dividend the claims of those who hold guaranteed stock must be satisfied. When this is done then the preference shareholders have, as the name of their stock implies, preference over the ordinary stockholders in the division of whatever profits may remain available for distribution. Finally, the ordinary shareholders, assuming that the surplus profits are not exhausted by these prior charges, are entitled to dividend, and theirs is the only variable rate, depending for its amount on the comparative success or failure of the period to which the accounts of the company relate. The relative positions of the various classes of stock may be illustrated by the rates of interest or dividend attached to each in the balance sheet of the Midland

Railway Company as follows:—Debentures, £43,533,340, interest 2½ per cent. loans, nil; guaranteed stock, £18,089,560, dividend 2½ per cent.; preferential, £63,978,526, dividend 2½ per cent.; ordinary stock, viz., preferred converted ordinary, £39,172,975, dividend 2½ per cent.; deferred converted ordinary stock, £38,947,942, the rate of dividend depending on the result of the year's working.

Included in the £1,334,000,000 of capital are the following amounts which have been nominally added to the various classes—

Ordinary stock	£93,000,000 = 18·8%	of Ordinary.
Preferential ,,	£44,000,000 = 12·3	,, Preferential
Guaranteed ,,	£17,000,000 = 13·6	,, Guaranteed
Debenture ,,	£44,000,000 = 12·4	,, Debentures
Total	£198,000,000 = 14·8	,, Gross Capital.

Additions to Capital.

It may seem strange that undertakings, usually esteemed as sound as British railways are, should have merely nominal additions to their capital amounting to no less than £198,000,000; additions which exist merely on paper and represent no contribution of actual capital by the stockholders. Usually such a condition of things is condemned most severely under the stringent name of "watering."

There can be no possible doubt as to the unwisdom of "watered" capital. It has been the cause of the downfall of many a joint stock or limited liability undertaking that might have enjoyed a fairly prosperous, steady career had its capital been represented by solid assets or, in default (though even this latter quality does not necessarily give immunity from failure), by solid earning capacity. The company whose capital is "watered" finds it difficult in times of bad trade to pay the usual rate of dividend; its shareholders become dissatisfied, its shares depreciate; its credit is weakened; frequently, too, the final outcome is liquidation and an insufficiency of assets to meet the demands of the owners of its capital. Some of the capital "watering" of British railways comes within this category in every respect except that the railways themselves are of such apparent solidity, their assets are so visible and so tangible, that failure to supply a dividend on the "watered" stock has not resulted in such widespread depreciation and distrust as to destroy credit; and moreover, the "monopolistic" position occupied by the railways

"Watering."

has prevented that diversion of trade which inevitably follows depreciation and the destruction of confidence.

Legitimate Additions.

On the other hand, some of the nominal additions to capital have been quite legitimate; neither the company nor the stockholders have suffered; indeed, the company at any rate may be said to have been the ultimate gainer as the result of the policy which necessitated "watering." The position may be very simply explained. The tendency over a long period has been for the rate of interest on really first-class, well secured capital stock, such as debentures, to fall. Assume, for the sake of an easy illustration, that one of the railway companies years ago issued 6 per cent. debentures. Whatever may have been the case years ago, 6 per cent. became for many years a very high rate of interest for a first-class debenture secured on so important an undertaking as a railway. Naturally the directors of a company having debentures carrying such a rate of interest would want to bring their stock into conformity with modern conditions. They would no longer desire to borrow money at 6 per cent. Their idea, probably, is that under all the circumstances 4 per cent. is quite sufficiently high and they would seek to reduce the rate of interest accordingly.

Cause of Some Additions.

But the man who has invested £100 in these particular debentures has an inalienable right to his covenanted 6 per cent.; and that right can only be disturbed by paying him out or by compensating him for disturbance. To pay him out would be an undertaking not to be lightly faced. In the first place, it is probable that the market value of his £100 will have risen to £150, or even more; but this figure best serves to illustrate the point. This comes about because, on the assumption that the prevailing value of money lent on debentures is 4 per cent., then the more recent investor seeking employment for his surplus wealth is willing to pay £150 for a debenture of £100 yielding 6 per cent. Such a payment will give him exactly 4 per cent. The railway directors who desire to reduce the rate of interest on their debentures from 6 per cent. to 4 per cent. are therefore faced with the alternative of either buying out the 6 per cent. debenture-holder at the rate of £150 for every £100 of stock he holds, or of putting him in a position which shall be no worse than that he now occupies. Whichever course is adopted the ultimate result is the

same. If the directors choose the latter alternative they must continue to give the debenture-holder the equivalent of his 6 per cent., and to do this they must give him in exchange for every £100 of stock at 6 per cent. £150 of stock at 4 per cent. If they do this the stock is immediately watered to the extent of 50 per cent. The directors are not called upon to find an extra penny for payment of the interest on the debentures issued up to that time and in all subsequent issues they borrow at 4 per cent. and thus save 2 per cent. In the long run probably the company may be better off, although the original amount of debentures has been increased 50 per cent. ; while the original debenture-holder remains in enjoyment of precisely his original income. Thus " watering," a practice so liable to abuse and disaster, may be a harmless, and even a beneficial transaction.

Let us take the experience of the Midland Railway Company as an example. The total amounts of the various stocks of this company have already been given and need not be repeated.

The Midland Railway Company.

Included in those amounts are the following nominal additions :—Ordinary, £34,664,741 ; preferential, £19,765,891 ; guaranteed, £7,588,166 ; debentures, £11,769,422. In round figures these nominal additions amount to £73,790,000, and it is somewhat staggering to realise that of a total capital of £203,722,000 so large a proportion (over 36 per cent.) is " water." Originally the debenture stock, which it will be remembered now bears interest at 2½ per cent., carried a 4 per cent. rate. The reduction was made in two stages, first from 4 to 3 and second from 3 to 2½. In addition there were various rent charges, preferential and guaranteed stocks, bearing differing rates of interest, which were all consolidated into one kind of stock at a lower rate of interest. As has been seen, the nominal rate of interest on a stock cannot be reduced unless the holders are compensated, and, doubtless, these reductions were both economical and expedient, nor has the company suffered from the nominal additions to capital which they have entailed.

Alterations of Stock.

Whether the same " clean bill " can be given concerning the alteration of the ordinary stock is a matter of opinion. What happened was this. For each £100 of ordinary stock held at the time of the conversion the directors issued £100 of preferred converted ordinary stock,

bearing interest limited to the low rate of 2½ per cent., and £100 of deferred converted ordinary stock, which had no fixed rate of dividend but was entitled to take all the profits that remained to be divided after all the other stocks had received their fixed rate of interest or dividend. It might thus happen that in a lean year there was nothing left, after all the prior claims had been satisfied, to pay a dividend on the deferred ordinary stock ; or it might happen that, as in 1912, while the preferred ordinary received its 2½ per cent. the deferred ordinary received 3 per cent. From the point of view of the ordinary stockholder who retained his original holding as modified by the conversion the change meant that on the original value of his holding, say £100, he was assured of 2½ per cent., while on the nominal, or bonus, £100 he stood to gain a higher rate of interest, or a lower, as the experience of the company varied in any particular year. In the end he was no worse off. If the profits before division would have given him 5 per cent. he would receive 2½ per cent. on each of his £100 of preferred and deferred stocks. If the profits were only sufficient to pay 2½ per cent. on the original value of his stock then he would receive exactly that amount—2½ per cent. on his preferred ordinary stock. Similarly, from the point of view of the company, it made no difference to the total amount paid whether that total was paid as 5 per cent. on the original amount or 2½ per cent. each on two separate hundreds. If the profits justified 2½ per cent. only, then only 2½ per cent. was paid on the preferred ordinary stock, which it will be remembered was really, in effect, the original ordinary stock.

Conversion and Nominal Additions.

And so we have a perfect illustration of the position that, apart from the inherent objection to giving something for nothing in the shape of a 100 per cent. bonus on ordinary capital, neither the company nor the shareholder can be said to have suffered any disadvantage. Sometimes quite a useful purpose may have been served by these conversions entailing nominal additions ; at any rate, that was the argument advanced in their favour to induce Parliament to sanction them. In other cases it is probable that the " watering " deserves sterner criticism.

Effect on Dividends.

The wisdom or otherwise of these nominal additions to capital may be criticised from another point of view, its effect on the dividends paid. Set out on the next page are the actual rates paid on the various classes of capital in 1912 side

by side with the Board of Trade calculation of what the dividends could have been had there been no nominal additions to capital.

Class of Capital.	*Dividend actually paid.*	*What it might have been.*
	%	%
Ordinary	3·45	4·25
Preferential	3·52	4·01
Guaranteed	4·02	4·65
Loans	3·61	3·61
Debentures	3·42	3·92
All classes	3·52	4·13

In no case is the difference great, for, taking all classes together, it will be seen that had the companies been able to refrain from making these additions the amount of money distributed was sufficient to make the average rate 0·71 per cent. higher. The increase in the rate per cent., however, would have been the only difference; the total amount distributed would have been the same.

Effect of Watering Stock.

From the point of view of the trading and travelling public "watering" of stocks may be criticised on the ground that it has resulted in a large increase in the capital on which dividends are expected to be paid, and that as the capital, whether nominal or otherwise, exists, there must necessarily be a constant effort on the part of the directors to provide it with a reasonable rate of interest. This means the maintenance of profits and, it may reasonably be argued, constitutes an obstacle to the reduction of rates and fares which the public are incessantly demanding. Again, "watering" lends itself very readily to the criticisms of the Labour Party and to all the other advocates of the policy of nationalising railways.

How Capital is Represented.

What is this total capital of £1,300,000,000 represented by? Freehold land, track, buildings of all kinds, rolling stock, harbours and docks, steamships, hotels, and the thousand and one miscellaneous small things in the way of stores and equipment which go to make up a modern railway. It would be interesting if we could set out the apportioned value of all these things, but unfortunately the official returns do not give the necessary particulars. All, they tell us, that it is represented by are 23,441 miles of line—this, however, is not a really representative figure, for it takes no notice of double tracks, etc.

Of running track reduced to figures of single line there are 40,034 miles, and of sidings 14,875 miles, altogether 54,909 miles—22,998 locomotives, 52,888 passenger vehicles, 20,000 other vehicles attached to passenger trains, 757,884 wagons and 22,636 other goods vehicles. Rolling stock, apart from locomotives, thus totals 853,408 vehicles. These figures, however, must leave a huge amount of the capital unaccounted for. Mr. W. M. Acworth, dealing with 1905 when the total capital was £1,200,000,000, deducted £200,000,000 of nominal capital and accounted for the balance as follows:—Railway proper, £800,000,000; rolling stock, £150,000,000; miscellaneous property, £50,000,000. Of course they are now out of date, but these figures serve to give an idea of the relative values of the main descriptions of railway property as estimated by one who is an acknowledged authority possessing special "inside" information.

Growth of Capital.

This huge capital, of course, has been of very gradual growth, and each year sees its amount increased. It began to accumulate long before there was a single mile of rail or a single locomotive or vehicle of any kind in existence. Before any of these things came the preliminary surveys of the country proposed to be covered. Then the engineers having drawn up their scheme it became necessary to apply for Parliamentary sanction before its execution could be carried out. Parliamentary approval is a necessary but very expensive preliminary. It might be imagined that a company applying to Parliament for permission to construct a railway from which a large tract of territory would benefit, would be received with open arms. In the abstract, no doubt, it is welcomed, but when the scheme gets to the Parliamentary committee to whom the duty of investigating is committed, then begins the clash of individual interests. Every person affected, for instance a landowner, part of whose land is required, enters his objection, not because he has an insuperable objection to parting with his property, but because, as a matter of tactics, he knows that if he is to obtain the best possible terms and conditions he must fight for them. His sale is not a willing one, but a compulsory one, and he must be compensated for the compulsion employed and for the depreciation which, he claims, his land will suffer through having a railway taken across it. These fights before Parliamentary committees

date from the very beginning of railway enterprise. Was it not George Stephenson who, when before a Parliamentary committee, was asked what would happen if a cow strayed on to a railway line, and replied that it would be "bad for the cow"? The incident, whether true or not, is sufficiently good to illustrate the attitude which Parliament has always adopted towards these schemes. Every interest, no matter how small, must be protected if they were to be sanctioned. No wonder then that the necessity of acquiring Parliamentary sanction is an expensive one. How much it has cost no one can say, but preliminary expenses, which of course include Parliamentary sanction, have been estimated by a competent authority at £4,000 per mile. Obviously from first to last it has added millions to the capital of the companies.

How Capital is Swollen.

After sanction is obtained the engineers make their second survey to draw out their more detailed working plans; and then comes the work of construction. Neither of these advanced stages is inexpensive. In new and sparsely populated countries, such as the United States in the days of railway development, surveys and construction are much more simple matters. The railways and the population advance almost side by side, and the method of construction followed as a rule would be regarded in this country as extremely primitive. It has its advantages and disadvantages—cost of construction is relatively light, but as this generally implies lack of the stability usually regarded as essential in this country, the work of construction has practically to be done over again as the surrounding population increases and finds more and more work for the railway to do. Still, in the end, the cost of construction in these new countries is usually lower than here. In the United Kingdom, of course, we are familiar with virtual reconstructions. There is not an important railway company that has not had to duplicate its line in places, to rebuild its large terminal stations, to increase its siding accommodation by providing immense goods yards, to rebuild its warehouses for the accommodation of merchandise and to construct "short cuts" for the purpose of reducing its original mileage from point to point. But this is not reconstruction in the sense implied above. British railways have had to do very little of this sort of reconstruction because, for one thing, of the watchful eye which Parliament, through the Board of Trade, has kept on them. Parliament has

wisely insisted on a certain standard being maintained in this constructional work; track must be well laid; bridges well constructed; and even the rolling stock is subject to a certain amount of supervision and regulation. All this, of course, has added to the cost of construction and has helped to swell the capital accounts of the railway companies to their present proportions.

CHAPTER II

RAILWAY REVENUE AND EXPENDITURE

REVENUE

THE gross receipts of the railways of the United Kingdom in 1912 amounted to £128,553,417. By itself this is an impressive figure, but it requires to be reduced to its true proportions by means of comparisons. The total capital, we have seen, is £1,334,000,000; gross earnings therefore amount to 9·62 per cent. of the total capital. The net receipts for the same year were £47,329,074, and this amount is equal to 3·55 per cent. of the total capital. Both percentages, but especially the latter, seem astonishingly small. It may be suggested that they are so because the figures apply to the whole of the companies of the United Kingdom; the large and the small, the profitable and the unprofitable, the efficient and the inefficient. That is true, of course, but even so the figures do not appear to be really misleading when tested by the returns of individual companies. The proportion of net receipts to capital of the Great Western, London and North Western, Midland, and North Eastern in the order named is as follows:—5·4 per cent., 4·6 per cent., 2·5 per cent. and 4·8 per cent. On the whole, the percentage given for the whole country cannot be said to be unrepresentative to any serious extent of individual experience. The percentage of gross earnings to capital indicates that it takes the companies more than ten years to turn over their capital, which, general knowledge suggests, is a very much longer period than that occupied by the average industrial concern. It is impossible, of course, to get at the gross receipts of manufacturing companies, but in these days of limited liability concerns it is quite possible to compare their net profits with their capital. For this purpose half a dozen companies have been taken haphazard. Together they have a capital of £9,393,033, and their net earnings for their trading years ending in 1913 (all

Receipts of Railways of United Kingdom.

their years did not end at the same time) come to £1,061,895, which is equal to 11·3 per cent. It cannot be too strongly insisted upon that this is net profit, and that in the case of some of the companies it is a net profit after a large reserve has been made for depreciation. Taken individually, the net profit of the same half-dozen companies ranges from 10 per cent. to 26 per cent. The arithmetical average of the six companies is 14·3 per cent. The fact that there is this disparity between the net receipts of the British and Irish railways and of those of industrial companies seems to point to one of three things. Either the railways are (1) over capitalised; (2) badly and extravagantly managed, or (3) extremely efficient and rendering very cheap services to the public. These points are worth examination in some detail—

(1) Over capitalisation. It seems obvious, in view of what has been said already as to the cost of construction, that there is some degree, either small or great, of over capitalisation. And apart from the initial expense of construction and equipment there is reason to believe that capital accounts have been unduly swollen in comparison with what is the general business custom. In the average business, one of the things most suspiciously regarded and carefully guarded against is the increase of capital account. Of course there are plenty of cases in which capital has been increased. Growth of business involves larger works, extensions of plant, increases of stocks of raw materials and finished goods. Such experiences are quite common, but it is still more frequent to find that commercial and manufacturing concerns contrive to avoid additional capital expenditure by providing for normal extensions out of reserves. It is the usual thing for companies to set aside annually large sums for reserves, and these reserves in nine cases out of ten are "employed in the business." The meaning of this is that profits are not distributed "up to the hilt" but some portion is kept in hand as a reserve fund. This fund is mostly used to replace obsolete plant, to extend premises, or to increase stocks of raw and finished materials. Generally it helps to finance the business just as much as if it were subscribed capital. It is not often a definitely earmarked sum lodged at the bank or invested, because used in the business its earning powers are so much greater. It is an intangible balance sheet figure on the liabilities side which is balanced by

Over Capitalisation.

increased value of assets on the other side. No single asset reveals the presence of this reserve fund; it is spread over all of them. And the amount of nominal or paid up capital for which the directors are responsible to the shareholders remains unaltered.

Such reserves are not unknown in connection with the railway companies but they are relatively rare and insignificant. It will be realised, when expenditure comes to be considered, that it is the custom of the companies to provide for extensive repairs, renewals, and replacement of permanent way, rolling stock, and plant generally, and also for minor extensions, out of the annual revenue; but still experience shows that they have been too prone to borrow fresh capital for extensions while the ordinary limited liability companies contrive to provide for much more of their growth out of reserve funds. In recent years the companies have exercised more restraint under the compulsion exercised by the expressed opinions of their critics, many of whom have been shareholders, but previously their attitude in this matter was very well summed up in a remark made by Sir Richard Moon, a former chairman of the London and North Western Railway Company, who once said: "If the capital account were closed the company would never pay another dividend."

Reserves.

There is much truth in the remark. Possessing either insignificant reserve funds, or none at all, the companies, if they closed capital accounts, would be unable to undertake necessary developments on a large scale. They would have to carry on their work with the existing facilities, and failure to keep pace with growing requirements would soon mean congestion, delay, loss of traffic and diminished earning power. Alternatively developments would have to proceed more slowly and be paid for out of earnings; and as the margin of these beyond expenditure is so small relatively, dividends would be endangered, if they did not disappear. Sir Richard Moon's remark, therefore, is not to be accepted as an inviolable principle of railway economics, but rather as the outcome of a policy which some persons would not hesitate to call short-sighted and foolish, but one which now cannot be appreciably altered without the unfortunate results which he foretold. But while there is some truth in the remark there is also some

exaggeration, for in recent years capital additions have been restricted to the fullest possible extent.

(2) Bad or extravagant management. Whatever may be the case now there seems to be no question that not much longer than a decade ago such a charge was amply justified. In the passenger service there was such excessive duplication and competition, and, in the goods branch, trains, trucks and loads were so small, and mileage so great that there arose a considerable outcry from shareholders. At first these complaints were met with the reply that the character of business in this country was such that large trucks fully loaded made up into large trains (which would have meant a decrease in working expenses) were impossible; but the agitators persisted and forced their point. Possibly there is still room for improvement in this respect, but that something valuable resulted is seen from the Board of Trade Bluebook statement of total receipts per train mile. In 1903 (the first year dealt with in this particular section of the returns for 1912), the passenger receipts averaged 49·21d. per train mile, and in 1912 50·26d., an increase of 1·05d. —not a large one it is true, but the movement is in the right direction. The corresponding figures for goods are 82·55d. and 101·14d., an increase of 18·59d. per train mile. Taking the two services together the figures are 62·79d. and 68·83d., an increase of 6·04d. per train mile. What this means in the case of goods traffic may be seen from the fact that the goods train mileage in 1912 was 151,892,869, and the increased earning 1s. 6½d. per train mile. The change is also illustrated by the fact that in 1903 the goods train mileage was 159,743,146 miles, which is 7,850,277 miles more than the figure just given for 1912. Obviously it is impossible to resist the conclusion that management was bad even if it is not now.

Bad or Extravagant Management.

(3) That from the point of view of the services rendered to the public the railways are extremely efficient. This latter point need not be laboured. Everyone is familiar with the character of the services rendered to the travelling public. During the railway era the cost of transport both of individuals and of goods and merchandise has been immensely reduced, and at the same time the service has been improved. To realise this one has only to recall the miserable open

Efficiency of Railways.

carriages not much better than modern cattle-trucks originally provided for travellers and contrast them with the present corridor coach or dining car.

The result of the examination seems to be that the extremely small percentage of gross and net earnings to the capital employed is due to a combination of all these three causes.

Various Sources of Income.

The survey of the revenue of the companies may be completed by setting out the details of the various sources of income in 1912 as follows: From passenger traffic (including season tickets, carriages, horses, etc., and Post Office mails), £54,258,402; from goods traffic, £64,048,814; from miscellaneous sources (rents, tolls, navigation, steam boats, etc.), £10,246,201—total, £128,553,417. It will be seen that the largest portion of the income is derived from goods traffic, and this feature is constant throughout the latest return, which goes back to 1870. In 1912 revenue from passenger traffic amounted to 42·21 per cent. of the total receipts; from goods traffic it amounted to 49·82 per cent., and from miscellaneous sources to 7·97 per cent. There was little variation in these percentages in the preceeding ten years; that for passengers has fallen to 41·94 per cent. and risen to 43·27 per cent, and the range of that for goods has been between 49·12 per cent. and 50·35 per cent.

Expenditure

Working Expenditure of Railways.

There are, of course, two kinds of expenditure, capital or permanent, and working or recurring. The extent and growth of capital expenditure has already been dealt with. Working expenditure for 1912 amounted to £81,224,343, which was equal to 63 per cent. of the total receipts. Naturally there has been constant, and in recent years rather rapid, growth in the annual total of working expenditure. Such a characteristic of the returns is not surprising in view of the increase in population and industrial and commercial importance of the United Kingdom since the middle of the nineteenth century. The really significant thing, however, has been the constant growth in the proportion of working expenditure to total receipts and the corresponding diminution in the proportion of net receipts to the total of paid-up capital. It is interesting, therefore, to tabulate these figures in quinquennial periods since 1870—

	Working Expenditure.	*Proportion to Total Receipts.*	*Net Receipts.*	*Proportion to Total Paid-up Capital.*
	£	%	£	%
1870	21,715,000	48	23,362,000	4·41
1875	33,220,000	54	28,016,000	4·45
1880	33,601,000	51	31,890,000	4·38
1885	36,787,000	53	32,767,000	4·02
1890	43,188,000	54	36,760,000	4·10
1895	47,876,000	56	38,046,000	3·80
1900	64,743,000	62	40,058,000	3·41
1905	70,064,000	62	43,466,000	3·42
1910	76,569,000	62	47,355,000	3·59
1911	78,617,000	62	48,581,000	3·67
1912	81,224,000	63	47,329,000	3·55

"Diminishing Returns."

In the period of over forty years thus briefly reviewed, the proportion of working expenditure to total receipts has increased no less than 15 per cent.; and the increase appears to be constant and permanent. It looks like a condition akin to what, in economics, is known as the "law of diminishing returns." The railway companies have been putting into their undertakings more and more capital, and have been accomplishing more and more work without obtaining a proportionately increased return for their greater activity, and the greater facilities provided for carrying on their undertakings. This condition of things has not escaped the attention of shareholders and others interested. It has been a fairly constant source of comment at meetings of the companies during almost the last ten years; and apparently with good effect; for, with the exception of occasional fluctuations in intervening years, not shown in the brief table above, the rate of increase has at least been checked, though an actual decrease is not recorded. The point is one constantly before the attention of railway directors and managers, and efforts to bring about the desired alteration are unremitting. That they are not more apparent is due, no doubt, to the peculiar circumstances of the industry with which they are connected.

Difficulty of Reducing Working Expenses.

Notwithstanding the best intentions and the greatest determination, it is not always possible to reduce working expenses. A coal "boom," when the price of fuel is unduly inflated, may prevent the fruition of such efforts; and inflated fuel prices usually mean also inflation in the cost of all raw materials and finished articles used in working the railways. Some idea of this may be obtained from the experience of 1912. In that year it will be remembered there was a

coal strike causing scarcity and high prices of fuel, which interrupted the industries and dislocated the railway systems of the country. No doubt almost entirely as a result of the strike 31,980,000 fewer passengers were carried in 1912 as compared with 1911, and the train mileage (passengers and goods) decreased 16,000,000 miles. This, of course, should mean a considerable reduction in the consumption of fuel, and yet the Board of Trade report states that fifteen companies, whose working expenditure amounts to 84 per cent. of the total working expenditure of all the companies for that year, paid £540,000 more for their coal and coke than they did in 1911. The figures relate to only one item of working expenditure, but they serve admirably to illustrate the almost insuperable difficulties that have to be overcome in the attempt to reduce the ratio of working expenses.

Statutory Obligations as to Returns.

Parliament has placed on the companies the obligation not only to return the gross amount of their expenditure but also to analyse it under certain headings. Of the total for 1912 already given (£81,224,343), £4,443,277 is expenditure on steamboats, docks, harbours, and canals and may be ignored here. The balance is £76,781,066, which is analysed in the returns as follows—

	£	£
Maintenance of way, works, etc.		11,707,708
Locomotive power		21,804,616
Repairs and renewals of carriages and wagons		7,145,668
Traffic expenses		23,416,834
General charges		3,341,168
Rates and Taxes		5,136,203
Government duty		286,260
Subscriptions or donations		18,857
Compensation—To employés	£316,070	
,, injured passengers	136,334	
For damage, etc., to goods	573,524	
		1,025,928
Legal and Parliamentary expenses		279,076
Miscellaneous		2,541,378
Expenditure not allocated		77,370
Total		£76,781,066

Analysis Not Adequate.

On the face of it the analysis looks fairly comprehensive, but for some time it has been criticised as inadequate and out of date by the statistical experts, who have been urging an amendment of the form of the returns which Parliament requires to be made by the companies. The agitation was ultimately successful, and from 1st Jan., 1913, amended

returns have been required from railway companies. Unfortunately these were not available at the time of writing and the old returns have had to be taken. Further reference has been made in a later chapter to the nature and scope of the amendments. Here the agitation is only mentioned for the purpose of explaining that the critics have pointed out that the headings mix up the expenditure incurred in the different branches of the work. What they have asked for and now obtained is a more careful analysis of the figures under headings which would show distinctly the exact total cost of the maintenance and of the working of the railways. The point may seem a small one but when it comes to a question of criticising or defending the policy of the companies it has great importance. As an illustration of what is meant it may be pointed out that the item "locomotive power" includes not only the cost (1) of running the locomotives but also (2) of their repair and renewal and (3) of the materials thereby consumed. The expenditure under the first of these three headings should obviously be added to "traffic expenses," and that under the second and third to "repairs and renewals"; and that item should have included locomotives as well as carriages and wagons.

Suggested Alterations.

It is impossible to recast the table with real exactness because the returns do not enable this to be done, but certain alterations which may be made have been pointed out[1] and proceeding on these lines the table may be reproduced as shown on the next page.

Nature of Amendments.

To a very considerable extent the amendments made in the table are clear. The main object has been to bring together all the items directly relating to the actual work of transportation and those which may be described as chiefly administrative, or "dead charges." Even as rearranged it is not put forward as perfect. Doubtless if they could be analysed more closely the figures classed as "not allocated" and "miscellaneous" would be found to contain much that might be more appropriately attributed to maintenance and traffic expenses. As long as the defect is pointed out, however, it does not much matter (apart from the quality of exactness which should be the aim of every critic or statistician), because the inaccuracy is a

[1] W. M. Acworth: *The Elements of Railway Economics.*

comparatively small one; at the utmost it barely exceeds 4 per cent. of the £65,000,000 total to that half of the table.

Maintenance of way and works		£11,865,743
Maintenance of rolling stock—		
Carriages and wagons	£7,145,668	
Locomotives	5,041,387	
		12,187,055
Traffic expenses—		
As shown	23,416,834	
Balance of locomotive power	16,763,229	
Compensation to employees	158,035	
Do. goods and passengers	709,858	
		41,047,956
		65,100,754
General Charges—		
As shown	3,341,168	
Rates and Taxes	5,136,203	
Government duty	286,260	
Subscriptions or donations	18,857	
Legal and Parliamentary expenses	279,076	
Not allocated	77,370	
Miscellaneous	2,541,378	
		11,680,312
Total		£76,781,066

Maintenance of Way and Works.

Maintenance of way and works is the Bluebook figure plus £158,035, which is half the amount set out as compensation to employés. It cannot be doubted that some of the compensated persons were permanent-way men injured in the course of their work, or the relatives of such men whose injuries proved fatal. Compensation to the permanent-way staff is therefore an expense of maintaining way and works. Exactly how much this is no one can say from the returns; so, in default of a better way, the original sum has been equally divided between maintenance and traffic. It is far from perfect, of course, but it is the best that can be done with the material at command. Maintenance of rolling stock includes the Bluebook figure for carriages and wagons, and in addition £5,000,000 of expenditure there classed under the heading of locomotive power, but which, in another part of the official volume, is clearly shown to be an expense arising from the maintenance and renewal of engines. As it is the figure is not complete because it only relates to the returns of fifteen specified companies. All of them are important, but still the total falls short of what it undoubtedly

is. The item traffic expenses has been made to include, in addition to the original item, the balance of the amount remaining under locomotive power after making the deduction explained, the remaining half of the compensation paid to employés and the whole of the compensation paid to passengers for personal injuries and to traders for loss of, or damage to, their property. General charges do not require any explanation further than what has already been said with reference to the last two items included under the headings.

Divisions of Expenditure.

We have now divided the expenditure into two main items, £65,000,000 and £11,000,000, which correspond to the two main divisions of an ordinary business, *i.e.*, cost of actual manufacturing operations together with repairs and depreciation and cost of administration. The latter item (which, as has been seen, is probably heavier than it really should be) works out at 17·9 per cent. of the "manufacturing" costs, and may or may not be regarded as excessive according to the particular kind of industry with which the critic happens to be acquainted. Probably it may be regarded as quite an average ratio.

Relation of Expenditure to Traffic.

It has been said[1] that the great bulk of the traffic expenditure goes on whether the traffic to pay for it comes or not. Consideration of the amended table of expenditure will suggest that there is a great deal of it to which the remark may be applied; but it must not be pushed too far. It is obvious, for instance, that expenditure, whether directly attributable to traffic or not, cannot go on indefinitely if the traffic is not forthcoming to pay for it. The ultimate end of a policy which paid so little attention to the balance of income and expenditure would be bankruptcy. It might be pursued for a time, but no sane board of directors, nor the keen business men who usually are to be found amongst railway shareholders, would tolerate its long continuance. But, on the other hand, the volume of traffic might conceivably be largely increased without much, if any, increase occurring in some of the items in the table.

Take the general charges division of the table for instance. Under this heading there is roughly £5,500,000 of expenditure out of a total of just over £11,500,000 to which this latter remark would

[1] W. M. Acworth.

apply—rates and taxes, subscriptions and donations, and legal and Parliamentary expenditure. Volume of traffic, of course, must enter into the calculations of the rating authorities on which railway companies are assessed to local rates and taxes, but it is safe to assume that large variations in volume may occur without causing a halfpenny addition to or subtraction from the amount which the companies pay. It is an almost invariable rule that the increases in local rates (decreases are relatively so unique as to be ignored) are due not to the carriage of a few thousand extra tons of traffic but to the policy and financial needs of the local authority imposing them. Subscriptions and donations obviously have no sort of relationship to volume of traffic, and it is only in a general way that the relationship enters into legal and Parliamentary expenditure—the general way that if traffic did not increase, or if there were no prospect of creating an increase, there would be no need for the extensions which constitute the main cause of Parliamentary action and expenditure. General charges as originally shown include such things as directors' fees, head office expenditure, etc. Of course, the expenditure of the separate companies under this heading varies considerably with their size, and size ultimately may be resolved almost into a question of volume of traffic ; but the scale of directors' fees and head office expenditure once settled there might easily be a considerable fluctuation in traffic (though, of course, not a large permanent increase) without these payments being affected.

In the first half of the table, which has already been likened to the manufacturing costs of a business, the same tendency may be observed. Compensation, which, all told, amounts to over a million, depends upon accidents, the negligence of servants, and such like causes, and has no relation to traffic except that, by the general law of averages, the more the traffic the more the accidents, etc., for which compensation has to be paid. Expenditure upon maintenance of way and works arises partly from exposure to weather and that, of course, has no relationship to traffic ; and maintenance of rolling stock does not merely mean repairs of locomotives, carriages, and wagons. The item also includes replacements of all three kinds of vehicles. And in regard to these it has been pointed out that the effects of wear and tear of vehicles are not the only reasons why they require replacement ; vehicles get out of fashion; in other words, become inefficient and below the standard of up-to-date railway

requirements just as quickly as they wear out ; and there is no doubt that, whatever may have been the case in the past, this is the experience of the last decade and a half. As to traffic expenses proper—the sum put down in the original accounts as the cost of moving the traffic—it has been pointed out that it is not practicable to separate the expenses which relate to goods and those arising from passenger traffic. To a very large extent the staffs and appliances are used for both and the task of making an exact allocation would be too huge to be undertaken unless some very real benefit was certain to result from it ; and it is doubtful whether this latter condition would be fulfilled.

Main Points for Consideration.

The points which emerge, therefore, are (1) that a substantial portion of the expenditure of the railways of the United Kingdom has no direct relation to the volume of traffic ; (2) that the great bulk of the expenditure is incurred on behalf of traffic as a whole and cannot be allocated ; (3) that while expenses are bound to increase as traffic increases the rate of increase will not be in direct proportion to the growth of traffic. The significance of these points will be more fully realised later, when we come to deal with rates and fares.

CHAPTER III

THE EVOLUTION OF RAILWAY RATES AND FARES

British Railway Rates.

BRITISH railway rates are not the result of, nor are they based upon, any well thought-out, clearly defined system. Expediency rather than scientific theory has been the principle upon which their framers have worked. They have been evolved empirically as traffic has grown from year to year, and consequently there is much about them that, on the surface, may appear illogical, inconsistent, and, sometimes, even unjust. Originally the railways were provided solely for goods, or rather, mineral traffic. Roads were so bad that the Durham mine-owners found it difficult to get coal from their mines to the port of shipment, although the distance was usually comparatively short. The physical difficulties in their way were removed by the provision of "rail-roads"—tracks of iron-covered planks, quite different from modern rails, and laid level with the earth's surface—along which horse-drawn vehicles were taken. No doubt they served a most useful purpose, not only in easing the task, but also in reducing the cost of transporting coal from the mines to the place of shipment. It is not necessary to dwell again on the fact that the locomotive engine also owes its origin to this same necessity for expediting and cheapening the cost of transporting coal. Still later, the Manchester and Liverpool Railway was another outcome of the necessity for an improved means of conveying goods and merchandise between those cities. The requirements of expanding commerce had already driven merchandise from the roads to waterways, natural and artificial, and these had been eagerly welcomed and warmly extolled because of the enormous increase in the area within which commercial exchanges became possible, and because of the equally large reduction in the cost of transport which they provided. Apart from the primitive colliery lines, however, goods were ousted by passengers at the outset. For this reason and because the evolution of goods rates occupied so long a period it will be well to deal first with passenger fares.

Early Passenger Accommodation.

The original passenger accommodation was extremely primitive and the fares were high in comparison with those now charged. It was not until 1872 that the Midland Railway Company admitted third-class passengers to all their trains. For about a generation the third-class passenger had been a person of little account, admitted only to slow trains, and generally the fare was fractionally more than 1d. per mile. Fast trains were reserved for first and, sometimes, second-class passengers, who paid at the rate of 3d. and 2d. per mile respectively. Some trains were not available even at these charges. He who travelled in them had to pay "express" fares, which were still higher than the rates mentioned. True, Parliament had imposed on the companies the duty of running outward and return trains each day at a maximum third-class fare of 1d. per mile; the "Parliamentary trains," which the middle-aged man of to-day remembers from his early years. But they were tediously slow trains.

Midland Railway as Pioneers.

The Midland Railway departure was the beginning of a revolution in passenger travel. Other companies protested against the innovation; their protests were treated as impertinent interference, and eventually they found it expedient to follow the lead given them. To this may be traced the ordinary fares of to-day. Not only in charges did the Midland's enterprise cause a revolution. It was also the beginning of an immense change in the classification of passengers and the relative importance of the three sources of revenue. How great has been the change will be seen from the following comparative statement for England and Wales alone of the receipts from and the number of journeys made in each class—

Gross receipts from passengers—	1871.	1912.
First class . . .	£3,504,124	£3,106,023
Second class . .	4,596,317	993,759
Third class . .	6,692,971	29,726,651
Season tickets . .	687,861	4,519,131
Number of passenger journeys—	**1871.**	**1912.**
First class . . .	30,092,528	24,361,466
Second class . .	73,011,105	12,236,526
Third class . .	225,449,303	1,125,394,777

The third-class figures are really remarkable. In the forty-two years under review the receipts from that source have increased

over 344 per cent. and the number of journeys over 388 per cent., while concurrently first-class receipts have fallen 11·3 per cent. and journeys 19 per cent.; and second-class receipts and journeys 78·3 per cent. and 83·2 per cent. respectively. During the period there has been a reduction in the charges for all classes and the general rate, instead of the special or "Parliamentary" rate, for third class has become 1d. per mile.[1] This, however, is not the extent of the reduction. It would be interesting, if it were possible, to take account of the hundreds of thousands, perhaps millions, of excursionists and tourists who travelled at a rate which was substantially less even than 1d. per mile. A finer illustration of cheap supply creating abundant demand could scarcely be imagined. The question which now concerns railway managers is not whether it pays to carry third-class passengers in all their trains, but whether it pays to carry first and second-class passengers, and, from the point of view of the managers at any rate, the latter part of the problem seems to be conclusively answered by the continuous and increasing abolition of second-class accommodation. The question, as it concerns first class, arises not so much from the reduction of fares, but because of the comparatively small number of first-class passengers and the unoccupied seats in the compartments set apart for them. In these days when the necessity for full loads has been so persistently drummed into the ears of the managers it is not surprising that their attention is drawn to the excessive dead weight which often is hauled for each first-class passenger. Fully loaded first-class coaches cannot be expected to be the invariable rule, and it may be argued against the proposition that first-class accommodation does not pay, that as the third-class passengers pay working expenses and yield a profit the revenue that comes from first class is superior or additional profit. The question of loss is, of course, relative. The passenger traffic as a whole yields a profit, and the individual who travels first-class pays double the usual rate, but sometimes (on long journeys, at any rate) the accommodation provided is so poorly occupied that the amount of dead weight hauled for his convenience is excessive, with the result that, taken by himself, he is an unremunerative passenger.

Reduction of Passenger Rates.

The piecemeal, empirical development of goods and merchandise rates has already been referred to. The original idea of a railway

[1] Since the war, passenger fares have been raised (1920) by 75 per cent.

was that it would be a specialised sort of road along which traders would be allowed to haul their own vehicles, as they had done in the case of the existing canals, on payment of a toll.

Goods Rates.

It is stated that the first ordinary railway that carried a wagon load of coals was so afraid of the disapproval of passengers that the coal was covered by a tarpaulin. Whether true or not, the fact remains that the companies were originally intended to be merely the owners of the road bed and all other equipment for working which was thought necessary in those days; and even when Parliament granted powers to supply trucks and to haul them by steam locomotives it was still thought that traders would be able to acquire and use mechanical haulage side by side with that provided by the companies on payment of the statutory tolls. But the companies once having been authorised to act as carriers and to make a conveyance charge as well as the toll for the use of the railway it soon became demonstrated that the idea of a railway being merely a specialised road open to the use (on payment of toll, of course) of all who cared to be their own carriers was impracticable.

It now seems obvious that the haphazard methods of canal transport must become impossible as soon as the companies began to organise their undertakings on these larger lines, but we are able to look at the problem with generations of practical experience to enable us to arrive at an opinion on such a subject. When the early regulations affecting railways were laid down no one had any experience of their working (it was all pioneer work) and further no one seems to have been gifted with an imagination capable of foreseeing these developments. For example, although Parliament had specified the tolls to be charged to traders for the use of the road-bed it was not thought necessary to fix either locomotive tolls, or conveyance tolls, as they were then called, because it was believed that the competition of outside carriers and traders would keep both within reasonable limits. It was not until experience showed this theory to be impracticable, until in fact the theory broke down, that Parliament thought it necessary to fix these new tolls. When this was done (in 1845) the three tolls (for use of the road for locomotives, haulage, and for provision of trucks) were

Development of Transport.

consolidated and the total charge permitted was less than had been the aggregate of the three.

Influence of Parliament.

Thus early did Parliament begin not merely to exercise a restraining influence, but also to reduce charges. Without a break this policy remained continuous right down to 1912 when the companies, having previously, under Government pressure exerted to end a strike, granted concessions to their employés, were given compensation in an Act authorising them to raise their goods rates. This was the only instance in roughly three-quarters of a century in which the restraining hand of Parliament was relaxed.[1]

"Terminal Charges" Sanctioned.

Yet another charge, in addition to the tolls already mentioned, remained to be evolved. The fact that the companies became common carriers as well as toll collectors made it necessary for them to have their own staffs to deal with the merchandise received ; to load and to unload it, and to provide warehouse accommodation. Naturally they claimed to charge for these services, which are now known as "terminals," and just as naturally their claim was resisted by the traders. Parliament, however, authorised the companies to make terminal charges, but it also fixed the maxima which they were not to exceed, and it also required the "terminals" to be specified separately from the already authorised charges.

Classification of Goods.

During all this period there had been gradually evolving a "classification" of goods. In the pre-railway days the canal companies had roughly classified minerals, merchandise, etc., according to value, and had framed their tolls accordingly. The earliest railway tolls authorised by Parliament were based on the same principle. The following is an example afforded by the Manchester and Liverpool Railway[2]—

	Per Ton per Mile.
For all limestone	1d.
,, ,, coal, lime, dung, compost, manure and material for roads	1½d.
,, ,, coke, culm, charcoal, cinders, stone, sand, clay, building, paving, and pitching stones, flags, bricks, tiles, and slates	2d.
,, ,, sugar, corn, grain, flour, dyewoods, timber, staves, deals, lead, iron, and other metals	2½d.
,, ,, cotton and other wool, hides, drugs, manufactured goods, and all other wares, merchandise, matters and things	3d.

The above only represents the charges authorised for the use of the

[1] Since the war other increases have become necessary. *See* Chapter X.
[2] W. M. Acworth : *The Elements of Railway Economics.*

road bed when the user provided his own vehicles and traction. When the company acted as carriers they were authorised to charge as follows, the charge allowed including the above tolls[1]—

	Per Ton. s.	d.
For all lime, limestone, dung, compost, manure and materials for roads, stone, sand, clay, building, pitching, and paving stones, tiles, slates, timber, staves, and deals . .	8	0
,, ,, sugar, corn, grain, flour, dyewoods, lead, iron, and other metals	9	0
,, ,, cotton and other wools, hides, drugs, groceries, and manufactured goods	11	0
,, ,, wines, spirits, vitriol, glass, and other hazardous goods .	14	0

These charges, apparently, were for the whole distance of the railway, about 30 miles. Two things will be noticed from these examples, (1) the fact that the greater the value of the articles which passed over the railway the greater the charge authorised, and (2) the limited number of things specifically mentioned. The latter is the point of importance in the present connection.

Elaboration of Classification.

Very little consideration of the schedules will suggest that the time must soon come when the railway companies would require to supplement and elaborate this primitive classification. And, as a matter of fact, this is what did happen as the traffic grew. The companies did not long act independently in this matter. In 1842 they had established a Clearing House for the purpose of adjusting claims between the companies for services rendered to each other, such as those that were bound to arise in dealing with through traffic passing over more than one system. And, obviously, the business of clearing would be very arduous in the absence of uniformity of classification. The Clearing House produced a new, uniform, and much enlarged, classification comprising 300 commodities and its work evidently was continuous, for the following figures are given[2] as to the number of commodities included at the dates mentioned: 1852, 700; 1864, 1,300; 1889, 2,500. As usual with most of the doings of the railway companies, the making of this classification was brought within the purview of parliamentary authority, and in the end (1865) a Royal Commission recommended that the Clearing House classification should be approved and imposed on the companies in all subsequent railway Acts.

[1] Acworth.
[2] *Railways and Their Rates* : E. A. Pratt.

The Clearing House classification, however, does not deal directly with the rates to be charged. It does not say that commodities A, B, or C, shall be charged so much per ton. It merely sorts out the commodities into various classes and leaves the rate per ton to the companies themselves, in conformity with their parliamentary powers, of course. It will, therefore, be imagined that although the classification introduced a large measure of uniformity and went a long way towards simplifying charges, there still remained great confusion. Mr. Pratt, quoting from the House of Commons Select Committee of 1882, says: "There were 900 Acts [of Parliament] dealing with charging powers and in some cases reference must be had to more than fifty Acts [of Parliament] to determine the various rates the company is authorised to charge." The explanation of this multiplicity of Acts of Parliament is to be found, of course, in the number of small railway companies originally sanctioned. The great trunk lines with their many branches, as we know them to-day, are the result of the amalgamation of a multitude of small companies formed, and authorised, each by special Acts of Parliament, to work small sections of these trunk lines. For it must be remembered that in its inception the English railway system was miserably parochial in its scope; its founders (except George Stephenson) were men of limited vision and imagination, as were their predecessors who gave us our canals. At any rate, so it seems to-day when one contemplates the immense systems that have been built up out of the disconnected fragments for which they were responsible. Perhaps this criticism may seem a little harsh, and to deny them the credit for what, in their day, when the railway was an untried thing, must necessarily have been regarded as unusual enterprise. Allowance has to be made for the fact that to think in millions is now much more common than it then was to think in hundreds of thousands. No doubt they did their best, but circumstances soon proved it to be a limited, confused "best."

Clearing House Classification.

Obscurity and confusion of railway charges led to the appointment of the Select Committee already mentioned, and from that to the Railway and Canal Traffic Act of 1888. This Act required every railway company to "submit to the Board of Trade a revised classification of merchandise traffic and a revised schedule of maximum rates and

Legislation as to Charges.

charges applicable thereto " . . . and " fully state in such classification and schedule the nature and amounts of all terminal charges proposed to be authorised in respect of each class of traffic and the circumstances under which such terminal charges are proposed to be made." It was further enacted that " in the determination of the terminal charges of any railway company regard shall be had only to the expenditure reasonably necessary to provide the accommodation in respect of which such charges are made irrespective of the outlay which may have been actually incurred by the railway company in providing that accommodation."

The New Schedules.

The Act required the revised classification and schedules to be submitted to the Board of Trade within six months of its passing, and then the Board of Trade was to consider them and such objections as might be lodged against them. The next stage imposed was one of negotiation between the companies and the objectors. Failing agreement the Board of Trade was given power to fix both classifications and schedules. The task imposed on the Board proved to be immense. Thousands of objections were raised to the classifications and schedules submitted by the companies, and it became necessary to appoint Lord Balfour of Burleigh and Sir Courtenay Boyle to enquire into them. How great was the task of enquiry and revision may be seen from the fact that the schedules, etc., were lodged in February, 1889, and it was not until 1892 that the task was completed by the passing of the confirmatory Acts of Parliament. There were no fewer than thirty-five of these Rates and Charges Order Confirmation Acts, as they were called, passed in 1891 and 1892. The classification adopted was that of the Railway Clearing House, and it was divided into six sections, as follows : (1) goods and minerals ; (2) animals ; (3) carriages ; (4) exceptional articles ; (5) perishable articles carried by passenger train ; (6) small parcels carried by merchandise train. Class 1, goods and minerals, was subdivided into A, B and C. The Act also insisted on the division of all rates into two parts—(1) conveyance charges ; (2) terminal charges. But, perhaps, most important of all, it introduced what has come to be known as the " tapering rate." The original Acts of most of the companies permitted a charge of so much per mile for any distance beyond 6 miles. The 1891-92 Acts imposed a rate for the first 20 miles, a smaller rate for the next 30 miles, a

still smaller rate for the next 50 miles, and an even smaller rate for the remainder of the journey. The result, of course, is that the greater the distance carried the smaller the average rate per mile for the whole distance. The following are examples of the schedules, as *finally* approved, for terminals and conveyance.

MAXIMUM TERMINALS.

Class.	Station Terminal at each end.	Service Terminals.			
		Loading.	Unloading.	Covering.	Uncovering.
	Per Ton. s. d.	*Per Ton.* s. d.	*Per Ton.* s. d.	*Per Ton.* s. d.	*Per Ton.* s. d.
A.	3	—	—	—	—
B.	6	—	—	—	—
C.	1 0	3	3	1	1
1.	1 6	5	5	1.50	1.50
2.	1 6	8	8	2	2
3.	1 6	1 0	1 0	2	2
4.	1 6	1 4	1 4	3	3
5.	1 6	1 8	1 8	4	4

MAXIMUM RATES FOR CONVEYANCE.

Class.	For the next 20 miles or part thereof.	For the first 30 miles or part thereof.	For the next 50 miles or part thereof.	For the remainder of the distance.
	Per Ton per Mile.	*Per Ton per Mile.*	*Per Ton per Mile.*	*Per Ton per Mile.*
A.	0·95d.	0·85d.	0·5d.	0·4d.
B.	1·25d.	1·0d.	0·8d.	0·5d.
C.	1·8d.	1·5d.	1·2d.	0·7d.
1.	2·2d.	1·85d.	1·4d.	1·0d.
2.	2·65d.	2·3d.	1·8d.	1·5d.
3.	3·1d.	2·65d.	2·0d.	1·8d.
4.	3·6d.	3·15d.	2·5d.	2·2d.
5.	4·3d.	3·70d.	3·25d.	2·5d.

It will be seen that the classes differ from those previously given. The table gives the present lettering and numbering and the articles comprised in the classes include the following—

Present Classes.

Class A.—Ammoniacal liquor, basic slag (unground), carbonate of lime (waste for manure), chalk (rough for agricultural purposes), coal, clay in bulk, coal tar or gas tar, iron ore in bulk, manure, stone and undressed material for repair of roads.

Class B.—Alabaster stone in lumps, asphalte, basic slag, bars, billets, blooms and ingots of steel, cement, china clay, concrete slabs, distillers' or brewers' grains, drain pipes (common agricultural), ferro manganese, firebricks, granite, gravel, scrap iron, lime in bulk, rock salt, slate slabs (rough), sulphate of potash, tiles.

Class C.—Acetate of lime, antimony ore, bean sticks, bitumen, bone ash, copper ore, drain pipes (glazed), grain (such as wheat and barley), hay and straw, iron and steel (finished), oil cake, pig-lead, paper or wood pulp, wire ropes (old), spelter (ingots or plates), sulphur or brimstone, timber, vegetables, zinc (ingots or plates).

Class 1.—Apples, ale and porter, axe handles, axles and wheels, beds and cylinders of steam, gas and oil engines, blistered steel bolt and nut machines, borax, brattice cloth, broom handles, pit cages, candles and tapers, castings (light iron and steel), copper regulus, cotton (raw in press-packed bales), earthenware (not packed, S. to S.), fish (dried or cured), hydraulic machinery, malleable iron castings, paper, sheet lead and spelter, tinplates, wheels (iron or steel), yellow metal plates and sheathing.

Class 2.—Antifriction metals, brass axle-boxes, buckets and pails (iron), cheese, coal-cutting machines, coffee, copper, digging forks, electric accumulators, electric cable, files and rasps, flocks, gas engines, moulding machines, piston rods, and packing, preserved meat, shoddy, tin (blocks, cakes or ingots), wool (raw).

Class 3.—Aluminium bars, ingots, plates, rods and sheets, bicycle-fittings, boots and shoes, calicoes, cutlery, drapery (heavy), eggs, electric meters, fruit (ripe, not hothouse), German silver wire, groceries (mixed), guns (quick-firing and machine), hardware, india-rubber, lead pencils, merinos, morticing machines, motor bicycle engines, nickel, printers' ink, saddlery or harness, shirts, silk waste, silver ore, spirits (in casks or cases), typesetting machines.

Class 4.—Albumen, animals (live in packages), art tiles, asparagus, basket trunks, bells (large), billiard cues, carriage bodies, cigarettes, cobalt, copper boilers and cylinders, drapery (light), electric lamps, fancy goods, fresh fish, furniture (in vans), guns, lace, marble (carved decorative), meat (fresh), needle-wire, plated goods, skins (fine), spirits (in hampers, jars, or bottles), telephone apparatus, zinc tubes.

Class 5.—Amber, artificial flowers, bicycles, billiard tables, bird

cages, calculating machines, chloride of gold, clocks, fruit (hot-house), gold-leaf, hats (straw), incandescent mantles, mirrors, musical instruments, muslins, pianos, quicksilver, silk, watch glasses, wax heads, figures and flowers, woodwork (carved decorative).

Unsatisfactory State of Affairs.

It might be imagined that the years of hard work given to the subject by Parliament and the Board of Trade would evolve something that was finally satisfactory, producing uniformity, and simplicity as far as that was practicable, and removing all cause of complaint. Such an expectation, if, in fact, it ever existed, was destined to complete and speedy disappointment. The new schedules, of course, meant the framing of new rates. Every station dealing with goods traffic has a rate book in which Parliament requires to be entered every rate between that station and all other stations to which it forwards goods and merchandise. There are thousands of such stations and, it has been stated, millions of such rates. Thus an immense burden of work was thrown on the companies, whose business it at once became to examine all their rate books and rates to see that they were in conformity with the new obligations and restrictions imposed on them. Rough estimates were made that the reductions would amount to an annual sum of £500,000 sterling, but the cutting-down process was not general. Specific rates were mentioned on which the decrease ranged from 10 to 20 per cent. The great point was that for the future increases in rates could not be made. Whether the altered rates were few or many, however, the companies deemed it necessary to withdraw all their rate books and construct fresh ones. Possibly this would not have mattered very seriously had there been nothing but the class rates to consider. The new classifications and schedules being available the only other piece of necessary knowledge was the distance of any particular place to which it was desired to consign goods. Given these three requirements the rates could have been worked out as necessity arose and the new rate books gradually written up; and consignors would have been able easily to satisfy themselves as to the accuracy of the charges. All this, of course, presupposes that the consignments would complete their journeys on the lines of the company to which they were originally handed. Where they passed from the company's line to that of another company some complication would have been introduced, because the whole of the schedules

of charges were not identical, there being some variation between those of the different companies. Moreover, there were in some cases special sections of line, such as that through the Severn tunnel, where exceptional charges were permitted by Parliament either in the shape of higher mileage rates or of what may be called "bonus mileage." For example, the Severn tunnel is reckoned as 12 miles long; and for some traffic the Forth bridge is counted as 23 miles and 14 miles for other. In consideration of the extra cost of these works Parliament has permitted an extra charge to be levied on all merchandise using them.

There was, however, a serious complication in the shape of "exceptional rates." These rates are reductions from the class rates and are granted for a variety of reasons. One of the most important of these is volume of traffic. Where particular goods are frequently passing between two points in large quantity and may be depended upon to maintain a constant flow of traffic sufficient to afford good truck, or perhaps train, loads, when the goods are not easily liable to damage, or when there is keen competition, the companies concerned reduce their class rates. It is stated that at the present time (1914) about three-fourths of the goods and merchandise traffic of the country are carried at these "exceptional," or reduced rates.

Exceptional Rates.

The time allowed the companies to revise their rates was so short that it was not possible in all cases to deal completely with even the class rates, and to a very considerable extent the "exceptional" rates were untouched when the time came for the new charges to be put into operation. As a consequence, a considerable volume of traffic that had formerly been dealt with at "exceptional" rates was charged at the higher class rates. The immediate result was an extremely violent storm of protest throughout the length and breadth of the land. The charges were none of them above the legal maxima allowed by Parliament after so many years of laborious investigation and intricate work, but the futility of all this labour was at once apparent. Traders refused to pay their accounts and made vehement demands for further parliamentary interference. A House of Commons committee was appointed and reported that: "they failed to see that any increase was justified, that the action of the companies had unreasonably disturbed the trade of the country, and that it ought to be placed

out of their power to act in a similar manner in future."[1] The committee also expressed the opinion that Parliament did not leave a margin between the old rates and the statutory maxima for the companies to take immediate advantage of it, but only to provide for certain contingencies such as a rise in prices or wages.

Railway and Canal Traffic Act, 1894.

The result was the Railway and Canal Traffic Act, 1894, the first section of which enacted that : "Where a railway company have, either alone or jointly with any other railway company or companies, since the last day of December, 1892, directly or indirectly increased, or hereafter increase . . . any rate or charge, then if a complaint is made that the rate or charge is unreasonable it shall lie on the company to prove that the increase . . . is reasonable, and for that purpose it shall not be sufficient to prove that the rate or charge is within any limit fixed by an Act of Parliament or by any Provisional Order confirmed by the Act of Parliament." The Act also imposed on the companies the obligation to keep at their head offices, and open for inspection, a rate book showing the rates in force on 31st Dec., 1892; and it gave the Railway and Canal Commissioners power to make an order which virtually amounted to an authorisation to the complainant to withhold from his payments to the company concerned the amount of the increase about which he complained.

Effect of the Act.

The effect of this Act was, of course, really to set up new and reduced maxima, because the companies were so bound down by it that naturally they were chary of increasing rates which might have to be defended under the stringent provisions of what may quite fairly be called an antagonistic Act of Parliament. In the future increased profit balances could only come from greater economy of working rather than from increased charges. The restriction, which will be regarded as perfectly justified or otherwise according to the point of view of the critic, had two direct effects. It forced the companies to seek their economies by joint action in one or two directions which proved, as they were bound to do, most unpopular. And it forced them to be exceptionally careful of the reductions they made in existing authorised rates because of the extreme difficulty which would occur in restoring them to their former level should experience of their

[1] *Elements of Railway Economics*, by W. M. Acworth.

working prove them to have been based on mistaken calculations or assumptions, and therefore unprofitable. The economies which caused so much antipathy were based on such things as the joint dealing with claims. In the past a very lax system of adjusting claims had prevailed. Consignors or consignees whose goods were damaged in transit claimed compensation and backed up their claims by a threat to transfer their traffic to a rival company unless the claims were met. As a general rule the claims seem to have been met ; and the companies alleged that often they were badly victimised. In the end some of them, particularly the London and North Western, Great Western, and Midland, whose interests clash very considerably, especially in the Midland counties, came to an understanding that they would more rigidly enforce their rights in connection with "owner's risk" rates.

Owner's Risk Rates.

"Owner's Risk" rates apply principally to things roughly described as undamageable. They are not really incapable of being damaged, but they are such that given reasonably fair handling they are most unlikely to be injured during transit. The companies accordingly quote a reduced rate in consideration of the trader agreeing to relieve them from such liability for damage as there may be. These reduced rates were largely used for some goods such as the various products of iron and steel, and, strange as it may seem, the companies appear not to have interpreted the "owner's risk" provision very stringently. Often in the stress of competition they acknowledged and paid claims where only "owner's risk" rates had been paid which, later, they came to denounce as preposterous impositions. Eventually the three companies came together on this question and simultaneously notified traders that in future traffic would not be accepted at owner's risk rates unless the consignor either signed a general agreement relieving the companies from all claims for loss, damage, misdelivery or delay, or failing this used the companies' own printed consignment notes embodying this clause in the terms on which the consignment was accepted. This new policy was strenuously resisted by the traders ; by those who may be described as reasonably minded and those who were otherwise, because a clause in the agreement and on the consignment note was regarded as too stringent. It required wilful misconduct to be proved before the companies held themselves liable

for damage, and it was rightly pointed out in reply that such proof was impossible unless the trader was able to follow the consignment throughout its journey; and that, of course, was out of the question.

Demurrage and Warehouse Charges.

Other matters in which economies (or perhaps increased earnings is the better description) were sought were demurrage and warehouse charges. The companies came to the conclusion that in both these directions they had been unnecessarily lax, so the time allowed for the detention of trucks, or the free warehousing of goods, was reduced and the charges imposed for exceeding these free limits were more strictly enforced. To some business men these alterations were serious, especially in the case of free warehousing. Many merchants, such as those dealing with copper, and iron and steel, have no warehouses of their own. They use the railway warehouses and conduct their business from comparatively small offices situated in the centre of a large town. To provide warehouses in those central situations would be an expensive matter, to move their offices from the centre to an outlying district where sufficient warehouse accommodation would be obtainable at a much cheaper rate would be inconvenient. Naturally they protested against a charge which would increase their working expenses. Equally naturally the companies felt that they were entitled to make better and more remunerative use of the warehouses and rolling stock which they have provided.

Pooling Competitive Traffic.

A third way in which it was sought to improve profits was by means of joint working agreements to "pool" competitive traffic. Under these arrangements it was sought to make economies by avoiding duplication of services.

Increasing

In none of these directions, however, was the effort rewarded with any appreciable success, and it was not until 1913 that the companies got rid of the old 1894 restriction which prevented them from raising their rates and fares. Relaxation came, in the end, as a *quid pro quo*. The strike of railway men in 1911 will be remembered. In the settlement negotiations the representatives of the Government promised (in return for concessions made by the companies at their request, which would entail an increase in the cost of working) that the

companies should be given freedom to recoup themselves by means of increased charges. A special Act of Parliament was passed, and in 1913 there was a general increase of about 4 per cent. in all goods and merchandise rates and an increase in passenger fares (particularly excursion fares) and in the season, or contract, ticket rates.

[Further increases have been permitted in 1920. See Chapter X.]

CHAPTER IV

THEORIES AS TO THE BASIS OF RAILWAY RATES

So far we have been dealing with the gradual evolution of railway rates. It is now necessary to examine the purely economic side of the subject: to discuss the principles on which railway managers act when framing their rates and the prevailing public opinion as to how they should act. For it has to be admitted at the outset that there is no subject on which public opinion is so generally, or so unanimously, opposed to the conditions that prevail. A large majority of the business men who have anything at all to do with railway consignments is dissatisfied with, and keenly critical of, the principle which underlies the system of railway rates. The complaints generally made are that charges are excessive; that their basis is theoretically unsound; that their effect results in an unjust discrimination against different kinds of goods and merchandise, against individuals and districts, and against home as compared with foreign imported produce. The complaints are all old; they have been discussed time after time; they have formed the subject of enquiry by several parliamentary committees; but they persist, and must be dealt with again in detail.

How Railway Rates are Framed.

One of the most common criticisms is that rates are unjust because they are not based strictly on cost of service. It seems to the superficial observer so simple to ascertain what is the actual cost of service. In business, cost of production is regarded as the first essential fact for a manufacturer to know. Without such knowledge there is the inevitable danger of unprofitable production and ultimate bankruptcy for the man who neglects it. And so the business man takes good care to get out an average which will represent with sufficient practical accuracy what it costs him to produce a particular article. He also gets out an average which represents the cost of marketing his products and the various "dead expenses" inseparable from his business. With these two facts before him he is supposed to be able to fix his selling price on a basis which will not only cover his costs of production and dead expenses but also give him a reasonable profit as a reward for his industry and

Rates and Costs of Service.

the capital he employs. Whether, however, all "costing" proceeds in this simple manner is another question. In the actual affairs of business symmetrically balanced theories such as these often have to give way to the exigencies of compelling circumstances. Instead of starting from the bottom and saying direct production costs me so much, dead expenses amount to so much, and my profit should be so much, therefore my selling price must cover all these things, he has to start with the knowledge that the market price for a particular commodity is already fixed for him and that being so he must make the other components of the selling price fit into the figure which he knows he cannot exceed. He may have a great admiration for his theory, but if he adheres to it and ignores stubborn facts his efforts are liable to failure. The symmetrical theory of costs first and selling price after is therefore not of quite such universal application as might at first seem certain. But in any event the manufacturer can always obtain a sufficiently good average cost figure for all practical purposes.

It is not so with the railway manager. He is dealing with a complex organisation not solely engaged in carrying goods traffic.

Parliamentary Requirements.

Before Parliament permits him to use his railway (for passenger traffic, at any rate), he must have a system conforming to certain requirements as to which he must satisfy the Board of Trade—the body to which Parliament has delegated the duty of supervision.[1] The road bed must attain a certain standard ; so must the station and siding accommodation ; so must the signalling arrangements ; so must the rolling stock. Parliament, in the interest of public safety, even interferes with the number of hours worked by the employés whose labour he controls. The bulk of what constitutes a railway system has been provided for the use of both passenger and goods traffic indiscriminately, and it is so used. Who, then, is to disentangle the complications and say that the cost of moving a particular commodity a certain distance amounts to a particular figure ?

Cost of Different Services.

This cannot be done from the expenditure figures as tabulated in the Board of Trade Bluebook. Maintenance of way and works, which it has been seen from the rearranged table already given amounts to nearly £12,000,000 out of a total of £76,750,000, cannot possibly be

[1] The Ministry of Transport has been substituted for the Board of Trade. See Chapter XI.

accurately divided between goods and passenger traffic. The cost of passenger station maintenance, of course, could easily be separated, but how is the expenditure on permanent way, signalling apparatus and similar arrangements to be apportioned? It might be divided on a proportionate basis according to the relative receipts from passenger and goods traffic, but that would be a very rough approximation and might not necessarily bear any sort of relationship to the actual cost attributable to each source of revenue; and also, it has to be remembered, if goods alone were being dealt with, if the railway did not carry passengers, the "way and works" would not need to be kept in nearly as perfect a condition as they are where a mixed service prevails.

Maintenance of rolling stock (£12,000,000) should be apportioned without much difficulty, but this could hardly be the case with the amount put down as traffic expenses (£41,000,000) or general charges (£11,500,000). We therefore get roughly £63,000,000 out of a total of £76,750,000 of expenditure, which would be extremely difficult to divide between the two sources of revenue—goods and passenger. Scarcely anything is impossible in modern accounting if the book-keeping groundwork is sufficiently good, but obviously the possibility of basing rates on "cost of service," with any reasonable approach to accuracy, is not only very doubtful but the labour entailed would be such as to make it scarcely worth while attempting so great a task for such problematical results.

Difficulty of Analysis.

To get at the essential facts it would be necessary, for instance, to analyse the work of each signalman and platelayer; to say that so many hours were spent by the one in signalling for goods traffic and so many hours by the other in repairing the permanent way so that it may be efficient for the use of goods and mineral trains. Both sets of men are engaged intermittently and indiscriminately in dealing with both goods and passenger traffic, thus, even though it were possible, the task of apportioning the cost of their labour between the two services would be stupendous. The practical railway manager regards it as scarcely worth the trouble, and the same conditions apply to a very large extent throughout the system. According to some expert opinion, it is even open to argument whether the expenditure on way and works and some part of that on working the traffic could not be altogether ignored where goods and mineral traffic are

concerned. Solid substantial permanent way and elaborate signalling arrangements are the requirements of passenger traffic, not of goods, and the railway manager would not be excessively unreasonable if he argued that these things were required in so perfect a condition for passengers only and therefore he was entitled to ignore their cost as far as goods are concerned. If his railway carried no goods he would still be required to maintain the whole of the permanent way in its perfect condition, though as the wear and tear would be smaller the expense would be correspondingly diminished. But, on the other hand, if his line carried no passengers the expenses under both headings would be enormously reduced. Goods and mineral traffic could be worked under much more primitive conditions than those required for passenger traffic.

Unsatisfactory Figures.

If, however, the zealous manager insisted on getting out cost figures the result obtained would be to a large extent an unrepresentative arithmetical average having no real vital application to the actually existing railway. Costs necessarily differ with various sections of the line. Gradients vary, and therefore it costs more in actual haulage expenses on some sections of the line than on others. For the same reason cost of construction varies in the different sections and so the allowance for interest on capital must correspondingly vary, and if exact costing is to be obtained then a general average for the whole system would be quite hopelessly inaccurate in such cases. Another factor which would prove inconvenient in the settlement of such a problem is the variation in the volume of traffic. On main lines where the volume of traffic is largest the cost of service would be spread over a large number of units and the average would be small. On unimportant branch lines with a smaller volume of traffic the average per unit would possibly be larger ; at any rate, it is doubtful if it would at all correspond with the cost per unit on the main lines. It is quite probable, therefore, the cost of service charges, if strictly and mathematically carried out, would lead to even greater inequalities than there now are and would cause an even bigger outcry than is sometimes heard under present conditions. It would penalise some districts and would put manufacturers carrying on operations in them out of some of the markets now open to them. It would inevitably mean that goods of low value could not be carried for any distance ; they would be driven off

the railways and put out of markets. And even average costs would do it in some cases.

Application of the Cost of Service Principle.

It must not be assumed that the inference is that cost can be entirely ignored; that, of course, is absurd. The point is that the railway manager cannot afford to apply the cost of service principle strictly and logically or he would lose traffic that now brings him something, at any rate. He has a lot of dead charges that must go on. If he is to run a railway at all they are bound to be incurred and it will pay him to get traffic so as to spread these costs over a large number of units and bring down the average. One of the most important things that should be constantly before his mind is to keep his system as fully occupied as its physical limits will permit. The system must either be well maintained or abandoned, and if he is to maintain it, it will pay him best to use it to the fullest possible extent.

Mr. Acworth and Railway Economics.

Mr. W. M. Acworth, who, as a railway director, may be assumed to have close inside knowledge of the subject, and who was a member of the Board of Trade Departmental Committee on Railway Accounts and Statistical Returns, has gone into this aspect of the subject in some detail in his book, *Elements of Railway Economics*. Dealing with the headings of expenditure in the Board of Trade Returns the points he makes are: (1) General charges have slight connection with the amount of work done; (2) about three-fifths of the cost of maintenance of way and works is independent of the traffic passing over the lines; (3) much of the expenditure on maintenance of rolling stock is due not to the stock being worn out but to its becoming out of date, and therefore rolling stock which would otherwise be unemployed can be profitably employed if the receipts cover maintenance proper, though not replacement; (4) a considerable part of the traffic expenses is non-apportionable. His conclusions, therefore, are (1) the great bulk of the traffic expenses cannot be allocated; "no one knows or can know, what the cost of carriage is"; (2) expenses increase as traffic increases but not in direct proportion.

Briefly summarised, the points against the strict application of charges based on the cost of service are; (1) From the point of view of the trader it would not work; it would place an insupportable

burden on some individuals and some kinds of traffic and would force traffic off the railways ; (2) From the point of view of the railway managers it would be (*a*) too complex to be obtained in sufficient detail to be of real value ; (*b*) and if it could be obtained it would ignore the equally important principle that, as there is so large an expenditure that cannot be avoided if the railway is to exist and be worked at all, it will pay to deal with the traffic from a commercial rather than a scientific point of view and so increase the volume of traffic that dead and unavoidable expenses per unit will be reduced to the smallest possible average ; (3) Under this latter system some traffic may appear to be overcharged in comparison with other, but in reality it is being carried at a smaller rate than would be the case if the low value traffic were driven from the railway by being called upon to bear an arithmetically exact share of costs equal to that which the higher value traffic could bear without appreciable difference or without its effect being felt.

Criticism of Cost of Service Principle.

Another system that has its advocates is that of equal mileage rates. It is argued that the charge for conveying one ton of goods or merchandise one mile, or a number of miles, should be equal whatever the direction in which the traffic moves. To a very large extent this is what happens theoretically. It will be recalled that the schedule of charges set out above is based strictly on mileage, but the schedule in no sense imposes equal mileage rates. The charge per mile differs with each class of traffic, and, in addition, it diminishes as distance increases. Probably these departures from strict equality of mileage rates would escape criticism, assuming the critic to be well informed ; but the multiplicity of " exceptional rates," to which reference has already been made, introduces complications, and to these must really be attributed the demand sometimes made for equal mileage rates. In this aspect the subject really becomes one of differential rates, and would perhaps best be dealt with under that heading. For the sake of comprehensiveness in the discussion of the various theories it must briefly be dealt with here. Exceptional rates, it must be remembered, have largely superseded the statutory rates. Railway managers have worked on the principle that wherever traffic could be obtained in sufficient volume to justify it, the statutory charges should be reduced. Repeatedly traders have

Equal Mileage Rates.

pointed out that a market for their goods exists in a particular place but they cannot compete there because other manufacturers are nearer and their cost of transport is consequently lower. Enquiry has shown that a sufficient volume of paying traffic could be secured to justify the creation of an exceptional rate low enough to admit the distant manufacturer to the desired market, and the rate has been granted. Or it may be that the question of competition has not been mentioned or considered at all. Traders in a particular district have asked the railway companies for reduced rates solely on account of the volume and regularity of the traffic ; and in this connection it must be remembered that goods managers are constantly preaching the advantages to be derived from large and constant volume of traffic in enabling them to load their trains economically and reduce costs. Repeatedly they have endeavoured to induce agriculturists to combine their consignments, so that loads might be larger, and the inducements offered have been appreciable reductions in rates. It seems a business-like procedure that they should do so, and from this point of view doubtless no one would condemn it. But it is precisely these reductions that have led to the complaints of the inequality of mileage rates charged.

Exceptional Rates

Exceptional rates have brought on to the railways a large volume of traffic that otherwise could not exist, and have widened the area of trade. If the strict mileage rate, increasing arithmetically with each mile travelled, were the rule much traffic would at once be destroyed, or at most would be carried but a limited distance. Long journeys would only be possible for valuable goods which could bear the weight of the charges ; those of smaller value could not be carried outside their own limited area, or, perhaps, would not be carried at all. Trade would thus become much more localised and centralised than it is ; competition, which we used to be told was the life-blood of commerce and industry, would be restricted, and many a producer would be excluded from markets now open to him solely because exceptional rather than equal mileage rates prevail.

Zone Principle of Rates.

A further suggestion that has been made is that rates should be based on " postal principles," or that there should be zones within which the charges should be the same. The introduction of postal principles would involve one specified charge whatever the distance. To make it

possible the charge would have to be, from the public point of view, so low that no one would feel a grievance ; that the man whose goods were being carried but a short distance would not feel that he was paying more than he ought, while the other man whose merchandise usually travelled far was paying less than he ought. From the point of view of the railway manager the single charge would have to be so high that the great bulk of his traffic was remunerative, and this would at once squeeze out the short distance traffic. Words would be inadequate to describe the storm of protest such a system would produce. The zone suggestion is not altogether impracticable ; indeed, to some extent it already exists. Stations in certain districts, such as some of those in the South Staffordshire Black Country, are grouped together, and from London, say, the rate to each of them is the same, irrespective of the slight difference in distance. The Metropolitan area and some of the ports also constitute these zones. But to apply the principle completely to the whole country would cause difficulties similar to those already mentioned in connection with the postal principles suggestion. The man whose traffic did not go the full length of the zone mileage would feel that he was being unfairly treated in comparison with his competitor (or even a manufacturer in an entirely different and non-competing industry) whose traffic consistently travelled to the full extent of the zone. It would make little difference that the rate he paid was low and not burdensome. The mere fact that he was not getting all he was entitled to would inevitably breed a sense of grievance, or injustice.

Real Principles of Fixing Rates.

What, then, is the principle on which railway managers work in framing rates ? Concisely put, it is known as " charging what the traffic will bear." But this must necessarily be a blend of three things—(1) cost of service ; (2) distance ; and (3) value of the commodity carried. Usually the third quality is looked upon as the only consideration and consequently charging what the traffic will bear is regarded as unjust. No doubt the attention paid to this aspect of the problem is considerable, but it is obvious that, roughly, cost and mileage cannot be entirely ignored. For instance, it will have been seen, from the tables set out in earlier pages, that class rates invariably increase with distance, whatever the nature of the commodity carried. The things that vary are the levels at which the charges for the different

classes start and the rate of increase in the charge as the distance increases. The starting level gets higher as the classes ascend from A to 5 while the rate per mile decreases as the mileage travelled grows greater. Again, it is quite obvious that the question of cost must be taken into consideration; an effort must be made at least to prevent actual loss. The practical railway man may condemn as impossible the contention that rates must uniformly and invariably be based on cost of service; but it is clear that he would be courting financial disaster if he set out to ignore cost altogether. His claim is really that, apart from the difficulties to which reference has already been made, difficulties that make cost of service an impossible basis, he must be allowed greater liberty of action than such a system would give him. He declines to be bound absolutely by either cost or mileage. He has a certain object in view—to keep the system well occupied, on the principle that the greater the turnover the lower the average of dead charges per unit of the thing "produced," which in his case is transport. It has been seen already that if a railway is to exist at all there is much unavoidable expenditure of money in providing for traffic and in maintaining the service. This preliminary expenditure must be incurred whether the traffic obtained is much or little, and so must the continuing maintenance expenditure except, of course, that while some of it is unavoidable, whatever the volume of traffic, there must necessarily be variations in its extent according to whether the volume is large or small. One of the primary objects, therefore, must be to get traffic and, within limits, the more traffic increases the less will be the cost per unit. The principles have been admirably summarised by Mr. W. M. Acworth[1] as follows—

I. Get traffic. The more traffic carried the less it costs to carry. Therefore, first and foremost get traffic.

II. Charge no rate so high as to stop the traffic from going: subject to

III. That no rate shall be so low as not to cover the additional cost incurred by the railway in dealing with the traffic to which the rate applies.

It will be seen from this that the phrase "what the traffic will

[1] *Elements of Railway Economics.*

bear " is capable of negative expression, *i.e.*, not to charge what the traffic will not bear. Sir George Findlay, in his book, *The Working and Management of an English Railway*, writing with the experience obtained as the general manager of an English railway, says—

" What the Traffic will Bear."

" The rates are governed by the nature and extent of the traffic, the pressure of competition either by water, by a rival route, or by other land carriage, but above all the companies have regard to the commercial value of the commodity and the rate it will bear so as to admit of its being produced and sold in a competing market with a fair margin of profit. The companies each do their best to meet the circumstances of the trade, to develop the resources of their own particular district, and to encourage the competition of markets, primarily, no doubt, in their own interests, but nevertheless greatly to the advantage of the community."

It is often objected that the system of charging what the traffic will bear is unfair. Traders want uniformity, definiteness and easy applicability of principle. They object to an outside authority assessing them, or at any rate their goods. It is an objection inherent in human nature. Antipathy to the income tax is an example. The taxpayer objects to the assumption that because his income reaches a particular figure therefore he is able to pay a certain rate and a certain amount of tax on it, because no account is taken of varying circumstances which give a varying value to incomes, even when the nominal gross amounts may be the same. It is so in business, the objection being in this case that the market value of a commodity is not necessarily the measure of its value from the point of view of profit, and that as with incomes this value will vary with commodities of equal market price. On the other hand, selling value is the only available guide, rough and ready though it may be.

Criticism of the Principle.

But whatever arguments may be used against charging what the traffic will bear, the fact remains that it is the system that has received parliamentary sanction in the shape of the general classification, which, from beginning to end, is nothing else but a huge attempt to frame rates on the " what the traffic will bear " principle. Classification is not a new thing. Parliament and the people interested proceeded on such lines from the earliest canal days. The canal tolls were graded according to the nature of the thing carried. So were the earliest railway classifications, which were modelled very closely on

Parliamentary Sanction of it.

those of the canals. If the present-day classification is examined, its whole aim will be found still to be to grade the rates according to value. There are some departures from this idea. The way things are packed when handed to the companies makes a difference. It will be found that an article packed so as to secure convenience of handling, or so as to permit it to be loaded into a truck to the best advantage, without waste of space may be in class I, II, or III, but if not so packed, and consequently a truck will not hold so great a weight, it is in class II, III, or IV—a class higher (and therefore subject to a higher charge) than the class in which it originally appears. The method of packing may not only facilitate handling and loading, but also reduce risk of damage, which again is a reason why it may appear in a lower rated class than otherwise. Still the fact remains that the main object of the classification is to discriminate between commodities according to their value. And therefore, as Parliament has approved the Clearing House classification, Parliament has also approved the principle of charging what the traffic will bear.

Principle Applied to Shipping.

The principle has general world-wide application in regard not only to railways but to shipping. In connection with shipping it is a well-known fact that at certain seasons, or under certain circumstances, the shipping companies will transport pig-iron and other kinds of iron and steel practically, if not entirely, as ballast ; the nature of the general cargo carried makes a quantity of pig-iron, or some such heavy commodity, a most useful thing to have. As bearing on the universality of the application of the principle to railways the following passage from a report of the Inter-State Commerce Commission of the United States may be quoted—

An American View.

" It was very early in the history of railroads perceived that, if these agencies of commerce were to accomplish the greatest practicable good, the charges for the transportation of different articles of freight could not be apportioned among such articles by reference to the cost of transporting them severally ; for this, if the apportionment of cost were possible, would restrict within very narrow limits the commerce in articles whose bulk or weight was large as compared with their value. On the system of apportioning the charges strictly to cost, some kinds of commerce, which have been useful to the country, and have tended greatly to bring its different sections into more intimate business and social relations, could never have grown to any considerable magnitude, and in some cases could not have existed at all, for the simple reason

that the value at the place of delivery would not equal the purchase price with the transportation added.

" The traffic would thus be precluded, because the charge for carriage would be greater than it could bear. On the other hand, the rates for the carriage of articles, which within small bulk or weight concentrate great value, would, on that system of making them, be absurdly low when compared to the value of the articles, and perhaps not less so when the comparison was with the value of the services in transporting them. It was therefore seen not to be unjust to apportion the whole cost of service among all the articles transported upon a basis that should consider the relative value of the service more than the relative cost of carriage. Such method of apportionment would be best for the country because it would enlarge commerce and extend communication ; it would be best for the railroads because it would build up a large business ; and it would not be unjust to property owners, who would thus be made to pay in some proportion to the benefit received. Such a system of rate-making would, in principle, approximate taxation ; the value of the article carried being the most important element in determining what shall be paid upon it.

" To take each class of freight by itself and measure the reasonableness of charges by reference to the cost of transporting that particular class, though it might seem abstractedly just, would neither be practicable for the carriers nor consistent with the public interest. The public interest is best served when the rates are so apportioned as to encourage the largest practicable exchange of products between different sections of our country and with foreign countries ; and this can only be done by making value an important consideration, and by placing upon the higher classes of freight some share of the burden that on a relatively equal apportionment, if services alone were considered, would fall upon those of less value. With this method of arranging tariffs little fault is found, and perhaps none at all, by persons who consider the subject from the standpoint of public interest."

Yet another authority[1] may be quoted—

Another View.

" We hear a good deal said about charging what the traffic will bear ; and the man who avows this principle is compared by anti-monopolists with the robber barons of the Middle Ages. He is represented as fleecing a helpless public out of all its hard-won earnings. In the proper meaning of the principle the case is just the opposite. Charging what the traffic will bear is a very different thing from charging what the traffic will not bear. It is a hard principle to apply intelligently ; but when it is thus applied it adjusts the burdens where they can best be borne, and develops a vast amount of business which could not otherwise exist."

Illustrations.

If these opinions should not be regarded as conclusive it will be well to look at the question from the point of view of its actual working. The rate from Birmingham to London for " crude red iron ore " used to be 8s. 8d.[2] per ton in

[1] Professor Hadley : *Railway Transportation.*
[2] *In* 1914.

4-ton loads, and for gramophones 47s. 6d. per ton. The 8s. 8d. rate was actually less than the class A rates (the lowest provided in the classification approved by Parliament), it being a special rate made by the railway companies. The selling value of the ore then was probably not much if any more than 15s. per ton, but at any rate, it was easily inside £1 per ton. Also the quantity of a ton-weight of ore convertible into metallic iron is appreciably less than a ton so that the railway is carrying something of no value in combination with something of limited value. It is not necessary to know the selling price of a ton of gramophones to be able to appreciate the different value of the two things carried. The rate for one is probably quite as heavy as that class of traffic will bear, but it is questionable whether the sale of a single gramophone would be prejudiced if the rate were 57s. 6d. or even 67s. 6d. instead of 47s. 6d. per ton. And from the point of view of the carrying company there is a great difference in the value and cost of the services rendered, though these considerations might almost be ignored when discussing the principle of charging what the traffic will bear. The iron ore rate is merely a haulage rate and does not include any other services. The other rate is a "C. & D.," or collected and delivered, rate. Again, a railway truck will carry a much greater weight of iron ore than of gramophones—five to ten tons of the one compared, probably, with much less than a ton of the other—exactly how much is not very material. Coal is another fine example of things of limited value carried long distances. Plenty of coal, for instance, is carried from the Midland counties to London by rail, and from South Wales to the Midlands. If coal were made to bear a rate composed of the actual working cost, an exact proportion of dead expenses, an exact percentage of profit, at a level charge of so much per mile, it would not get on to the railways at all. It is charged what it will bear. In the case of London, this depends upon a variety of things, the most important, probably, being the competition of sea-borne coal from the north-eastern counties. Midland coal, therefore, bears a rate which is dependent upon its competitive value in the London market. It is a low rate, but it is only a haulage rate, the coal being loaded in trucks belonging either to merchants or to the collieries, and the railway companies do nothing in the way of collecting, loading or delivery. The rate for gold bullion and specie is £10

per ton, but, of course, it never travels in ton lots, being dealt with as parcels. The charge includes special supervision and insurance; both services not required in the case of such commodities as coal and iron ore. But if ample allowance is made for these things there is still an immense difference in the two sets of charges. Gold therefore pays a good deal more than cost of service plus dead expenses plus percentage of profit, and it can afford to do so. Can it be imagined for one moment that the amount of the charge makes the slightest difference to the quantity of gold sent by train? The commodities taken for the purpose of illustration are extremes, of course, but they serve the more clearly to bring out the point that large differences in rates do not matter so long as the commodity on which the higher rate is levied is of sufficient value to support the rate; that it is charged not more than the traffic will bear. There are many other things closer together in value on which different rates are charged, nor is the reason altogether apparent to the superficial observer, but the explanation is that the classification which settles these points of differences has been gradually built up as the result of actual experience in working traffic. It is imperfect, no doubt, as are all things devised empirically on a basis of values which cannot be permanently stable. Business men, no doubt, could furnish many examples of inconsistency in the classification, but on the whole it fulfils the purpose intended, viz.: to get a good paying rate for things of high value and to handle commodities of inferior grade as cheaply as possible. In the main, it is a very good thing for trade generally in that it permits a larger and freer movement than otherwise would be possible. If dead charges were not averaged down in this way there would be a still greater weight of them to fall upon things of high value which possibly might have to bear an even higher rate than they do now.

CHAPTER V

ALLEGATIONS OF DISCRIMINATION AND EXCESSIVE RATES

THERE is a very widespread and unchanging opinion in the minds of the general public that railway rates in this country are excessive compared with those of other commercial countries of the first rank ; that the companies discriminate unfairly between different districts and sometimes between individuals ; and that foreign imported goods are given preferential rates to the detriment of home products.

Are Railway Rates Excessive ?

Discrimination between individuals need not concern us at all. It is occasionally proved, but it is a very rare offence, prohibited by the legislature, which has rightly provided remedies against it. Discrimination between districts or places when closely examined becomes very largely a question of equal mileage rates, or rather the absence of them. Traders find from experience variations in the rates charged for carrying the same commodity to two places at equal distance, or approximately so, from the point of despatch. Or the rate from two places, again about equally distant, to a common centre is not the same for either place. There are at once complaints that one or other place is being discriminated against to its detriment. As a rule, the explanation is a perfectly reasonable one. In some cases the difference is due to water competition by sea, navigable river, or canal. Traders in the locality which is regarded as having a preference over the other may have available an alternative water route for their goods, and as it is generally conceded that normally water transport is cheaper than land transport, the railway companies find it necessary to frame their rates on a basis which will permit competition with the carriers by water. It is not necessary invariably to cut below the water rates ; something extra may often be charged for the greater speed of delivery, but still the competing influence is there, and if traffic is to be obtained between places favourably situated for water transport it cannot be ignored. Liverpool and London and Hull and London furnish instances of sea competition, and the same thing applies to other ports. The river Severn, in conjunction with the canals inland from Worcester,

Discrimination.

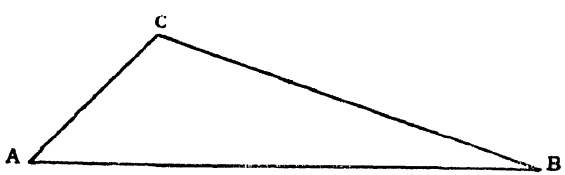
furnishes a reason why railway rates from Bristol and the South Wales ports to the western Midlands should be lower than might otherwise be the case. The railway manager argues that he is inflicting no hardship on traders elsewhere when he reduces his rates between places affected by any form of water competition. If his rates were not specially adapted to meet the prevailing circumstances his line would not carry any traffic between those places, but the traffic would go all the same. It would be carried by water probably at a still lower rate than that which the railway charges. The net result would be that both parties would be worse off. The traders who now complain would have to meet competition that is keener to the precise extent of the difference between the land and the water rates. The railway company would lose so much traffic, which, while not yielding the fullest possible margin of profit, is yet profitable, and, moreover, is increasing the profit on all other traffic because it is helping to reduce the average expense per unit of traffic by keeping the line more fully occupied than would be the case otherwise.

Competition.

Another form of discrimination as between rival places or districts, neither of which enjoys the advantage of water transport, arises from competition between railways themselves. The idea of competition between railway companies is usually derided. It has to be admitted that in many respects there is not free competition. Even that which formerly existed has been enormously reduced by the modern "pooling" arrangements under which companies whose areas are the same have been able to effect working agreements which abolish much of the former competition. But notwithstanding ingenious devices of this nature, there must still remain the competition which arises from geographical causes, if from no other. Take the case of Birmingham, and its surroundings, and London as an example. There are three ways to London from this Midland area—the London and North Western, the Great Western, and the Midland. There is not a large difference in mileage by either of the first two companies ; but the Midland route is appreciably farther. Ignoring special rates, it may be recalled that the class rates have been roughly fixed by Parliament at so much per ton per mile, the rate diminishing as the distance increases. Under these schedules, therefore, the North Western and Great Western class rates are

fixed for them by the nature of the traffic and the distance, and these are maxima rates beyond which they cannot go. The Midland having a greater mileage is able, theoretically, to charge proportionately more while still adhering to its schedules. In actual working, however, it would be impossible to charge up to these maxima powers. If the Midland company desires to get any Birmingham to London traffic it must abandon its class rates and charge no more than the North Western and Great Western. There is no alternative if this traffic is desired. It has already been pointed out repeatedly that one of the first principles of all railway management must be "get traffic" so long as it will yield the barest margin of profit. In these circumstances, therefore, it will probably pay to make special rates and come into line with the other companies, providing the traffic secured is of sufficient volume and value. As far as the Birmingham district traffic is concerned, no one is a penny the worse if the Midland adopts this policy. But out of competition such as this arise complications which are better explained in the abstract than the concrete. It is well, therefore, to drop the names of the companies and to keep in mind only the geographical situation. The argument will then apply to any similar set of circumstances. Assume two towns, A and B, directly connected by rail and having also an indirect connection by another line. Assume also that on this second line there is a town C. Diagrammatically the position may be illustrated as below—

Illustration.



The company with the direct route between A and B has its maximum scale charge fixed by Act of Parliament and is unable to exceed this scale, though it may reduce its rates as much below the scale as its governing officials consider expedient. It has already been seen that whatever is the rate for the direct journey cannot be exceeded by the longer indirect line through C. The company having the connection *via* C finds it worth while to come down to the level of the rate for the shorter direct route and does so. At C, however, there is no competition, so the scale rates are adhered

to, and the rate from A to B *via* C is little if any more, perhaps less, than the rate from C to B. The trader at C often regards this as a grievance. He argues that if merchandise can be carried the whole way from A to B through C at a rate which works out at, say, 2½d. per mile while his rate is, say, 3d. per mile, therefore he is being discriminated against to the advantage of his competitors at A. But if the worst possible construction is put on the facts as they exist, is he any the worse off? He is not being charged more than the legal rate and the through traffic, on the principle laid down, is performing a useful service. If there were not through traffic he would still be paying the same rate, and it is quite conceivable that by means of the through traffic the prospects of his obtaining a reduced rate are much greater than they would be if it did not exist. On the whole, therefore, the arrangement may be described as a purely business one, and the question of unfair discrimination may be dismissed as untenable.

What has become one of the standard illustrations of, and arguments in support of, this particular phase of railway policy is taken from Hadley's *Railroad Transportation: Its History and its Laws.* As it deals with actual experience rather than theoretical argument it is worth quoting at length—

An American Illustration.

"On the coast of Delaware a few years ago there was a place which we shall call X, well suited for oyster-growing, but which sent very few oysters to market because the railway rates were so high as to leave no margin of profit. The local oyster-growers represented to the railroad that if the rates were brought down to one dollar per 100 lb. the business would become profitable, and the railroad could be sure of regular shipments at that price. The railroad men looked into the matter. They found that the price of oysters in the Philadelphia market was such that the local oystermen could pay one dollar per 100 lb. to the railroad and still have a fair profit left. If the road tried to charge more, it would so cut down the profit as to leave the men no inducement to enter the business. That is, these oysters would bear a rate of one dollar per 100 lb. and no more. Further, the railroad men found that if they could get every day a car-load, or nearly a car-load, at this rate it would more than cover the expense of hauling an extra car by quick train back and forth every day, with the incidental expenses of interest and repairs. So they put the car on and were disappointed to find that the local oyster growers could only furnish oysters enough to fill the car half full. The expense to the road of running it half full was almost as great as running it full: the income was reduced one-half. They could not make up by raising the rates, for these were as high as the traffic would bear. They could not increase their business much by lowering rates. The difficulty was not the price charged, but the

capacity of the local business. It seemed as if this special service must be abandoned.

"One possibility suggested itself. Some distance beyond X, the terminus of this railroad, was another oyster-growing place, Y, which sent the oysters to market by another route. The supply at Y was very much greater than at X. The people at Y were paying one dollar per 100 lb. to send their oysters to market. It would hardly cost 25 cents to send them from Y to X. If the railroad from it to Philadelphia charged but 75 cents per 100 lb. on oysters which came from Y, it could easily fill its car full. This was what they did. They then had half a car-load of oysters grown at X on which they charged a dollar, and half a car-load from Y, on which they charged 75 cents for exactly the same service.

"Of course, there was a grand outcry at X. Their trade was discriminated against in the worst possible way—so they said—and they complained to the railroad. But the railroad men fell back on the logic of facts. The points were as follows : (1) a whole car-load at 75 cents would not pay expenses of handling and moving ; (2) at higher rates than 75 cents they could not get a whole car-load but only half a car-load, and half a car-load at one dollar (the highest charge the article would bear) would not pay expenses. Therefore, (3) on any uniform rate for everybody the road must lose money, and (4) they would either be compelled to take the oyster-car away altogether or else get what they could at a dollar and fill up at 75 cents. There was no escape from this reasoning, and the oystermen at X chose to pay the higher rate rather than lose the service altogether."

It would be difficult to find a clearer example than this of the cause of what at first sight might look like most unfair discrimination.

Remarks. Here is a case where the trader at the intermediate point is not merely not worse off because of an even lower through rate than he pays, but, on the contrary, is distinctly benefited by the through rate against which he first protested as the worst possible kind of discrimination. And, though this aspect of the subject is not under consideration, the example may also be used as an illustration of the results which follow from charging what the traffic will bear. By following this latter principle a useful service is maintained whereas equal mileage rates or even equality of rates would inevitably entail the abandonment of the service.

One further example may be quoted[1] and this an English one—

An English Illustration. "By the Great Eastern Railway, which goes in an almost direct line, Yarmouth is 121 miles, Norwich is 114 miles, and Cromer is 138 miles from London. But there is another route *via* the Great Northern from King's Cross which, passing Peterborough, 76 miles, and Lynn, 115 miles, turns east along the north coast of Norfolk and reaches Cromer in 160 miles,

[1] Acworth : *Elements of Railway Economics.*

Norwich in 167 miles, Yarmouth in 187 miles. And not only is this latter route a great deal longer to Cromer and very much longer to Norwich and Yarmouth, but all along its course from Lynn on the west to Cromer on the east, it is cut by the direct Great Eastern lines from London. The result is inevitable. Unless the Great Northern route goes out of the through business altogether, agreeing not to compete (probably being given a *quid pro quo* by the Great Eastern elsewhere) its possible rates for London traffic are fixed for it. Their highest point will be somewhere near Cromer, based on the Great Eastern London-Cromer distance, and they will fall westwards towards Lynn and southwards towards Norwich and Yarmouth. In other words, no additional charge will be made for carrying the traffic the last fifty miles of its journey to Yarmouth. But this applies to London only. Intermediate places on the Great Northern, say Hatfield or Hitchin, have not the Great Eastern route available. They must send their traffic—goods, not passengers, for passengers can route themselves by breaking the journey at Cambridge —by the Great Northern circuitous route. For such traffic the rates, we may assume, will rise on a normal mileage basis, and therefore from Hitchin to Yarmouth, 155 miles, the rates will be considerably higher than if the railway company had received the traffic in London and had had to carry it 32 additional miles before it reached Hitchin.

"We may assume that, if a trader at Hitchin happened to discover this, he will be indignant. Certainly on the face of it, he appears to be badly treated. But is it so in reality? Are there any special circumstances entitling him to be charged less than the normal mileage rate? If not, he cannot complain; he is only charged on actual distance. Is the Yarmouth traffic carried at his expense? No. For we have seen that, even with rates far below the average, it is yet more profitable to the railway to carry traffic than to lose it altogether. Is the Great Northern Company enabling the London trader to obtain an undue advantage over his competitor at Hatfield or Hitchin? Again, no! The London trader has access to the short and direct route. There is no reason why he should pay any more than the rates natural to that route. Hitchin's only route to Yarmouth is a circuitous one. This may be Hitchin's misfortune, but it is not the fault either of the London trader or of the railway company. On the whole there seems no reason to doubt that the railway company is enabled to carry traffic past Hitchin to London for considerably less than nothing."

There we may leave the question of discrimination as between districts. It is a question, like most others connected with railway working, from which it is extremely difficult to exclude controversial, or what may be regarded as partisan, methods of description and illustration; but the variety of the instances given should be an answer to such criticisms and should be conclusive evidence that, hard as the case may be of the man who is in the position of the Hitchin trader, the real disadvantage he suffers is a geographical one, or a fortuitous one arising from the circumstances under which the railways of the

Difficulties of the Position.

country were laid out. And this treatment is not due to any desire to discriminate, or even to accidental discrimination, but to a clearly defined and well established principle of railway economics.

English and Foreign Rates.

Complaints that English rates are excessive compared with those made by the railways of foreign countries are not usually based upon exactly comparable conditions. Before comparison can be made it is necessary to enquire minutely so that it may be certain that like is being compared with like. Frequently it will be found that the rates compared to the disadvantage of the British charges do not represent anything like the same conditions. As a rule the British rates used in controversy include not only haulage but collection and delivery and other terminal services, whereas the foreign rate with which comparison is made includes nothing beyond the haulage. An agency other than the railway company arranges for collection and delivery, and performs most if not all the terminal services. Again, in most European countries with sufficiently efficient railways to furnish anything in the nature of a comparison there are two classes of service known as *grand vitesse* and *petite vitesse*. The *grand vitesse* about compares with the British service; the *petite vitesse* is slower, and the rate charged is correspondingly lower. It will be found that some of the comparisons made are between the *grand vitesse* of the British service and the *petite vitesse* of the continental.

Source of International Disparity.

By far the most important source of international disparity, however, arises out of the difference in origin and ownership. Most of the European railways are either State-owned or State-subsidised. In France, for instance, the Government has provided land, constructed permanent way, built stations and leased all this to companies who have only had to lay the rails and provide the rolling stock. In addition the French Government has given other financial assistance and has guaranteed interest. The amount contributed by the Government and local authorities has been stated at roughly £192,500,000. The annual charge on the State has been placed at £11,000,000. Of course the State expects to get something in return in the shape of taxation and facilities for the transport of mails, troops, and public servants; while between the years 1950 and 1960 it will become the absolute owner of about 25,000 miles of railway

valued at roughly £650,000,000 sterling. From the point of view of the railways this has its advantages and disadvantages. Among the advantages may be reckoned the guarantee of interest and the smaller capital outlay with its consequent superiority of dividend earning power. Among the disadvantages is the control exercised by the State over rates and charges. There is similar control in this country but not to the same extent. Here a railway manager cannot increase a rate without the sanction of the powers that be. In France rates cannot be reduced without the approval of the Minister of Public Works. And reductions of rates usually imply sacrifices on the part of the consignor: longer time for delivery so that trucks may be better loaded, minimum quantities must be paid for whether the consignment is as much as the minimum or not, and the liability in respect of delay or damage is reduced. The railway manager also has to submit to the manipulation of his rates so as to favour national commercial interests. And frequently these interests are summed up in the framing of specially low export rates. It will be seen from this brief summary that the essential conditions on which comparisons may be safely based are extremely different in the two countries.

German Railways.

As soon as the antipathy with which they were originally regarded had passed away Prussia came to the conclusion that the railways would be better publicly than privately owned, but at the outset the difficulty of raising the money stood in the way of this policy being carried out. Concessions were granted with a guarantee of interest, the power of State purchase being retained. Other German kingdoms and dukedoms adopted State ownership from the outset. Later Prussia built strategical railways for military purposes, and later still, under Bismarck, by purchase obtained control of all the main lines of North Germany whether within the boundaries of the kingdom or not. Military reasons were not the only ones for this policy; it also had in view the furtherance of the national fiscal policy, particularly by means of low export rates and the prohibition of low import rates. Also their revenue-producing power has been used for the benefit of the State with the result that there have been complaints that the State has sacrificed the railways to the Exchequer; that the lines have been "starved"; that traffic has been driven from the railways to the waterways, and that "it

would cost hundreds of millions to bring them up to the standard of American efficiency."[1] The experience of traders is summed up in the sentence—

"Traders engaged in export business have gained very material advantages by the concession to them of exceptionally low export rates, while traders who do an exclusively home business are worse off under a State than they would have been under a company regime."[2]

Other Continental Railways.

In Holland much financial assistance has been given by the State. Belgium owns practically the whole of her railways and operates them with two objects in view: the affording of cheap transport generally, even though this may entail a burden on the taxpayers and the feeding of the port of Antwerp. Belgium, since 1834, has spent not far short of £100,000,000 on railways. Denmark has both built and subsidised railways. The main object having been to furnish cheap transport, the question of a profitable return on the capital expenditure has been quite secondary.

Difficulties of Comparison.

As far as Europe is concerned, it is apparent that there can be no possible comparison with the conditions which characterise British railways. In all the countries with which comparisons are generally made there are circumstances, the influence of which, on railway rates, cannot be estimated. Broadly stated, the effect is to subsidise the traders who use the railways at a greater or smaller expense to the State, and the product is a system which, at a moderate estimate, cannot be described as more efficient than the British. What would the conditions be here if our railways had received this State help? The question cannot be answered, of course. But it is not inappropriate to contrast, briefly, their experience with what has been written of the Continent. They have had neither subsidy, nor guarantee of interest. They have had to pay in many instances excessive prices for the land they have taken. They have had to pay grossly extravagant Parliamentary costs when promoting the Bills sanctioning their enterprise. They have been put to great expense by the various Parliamentary and Royal Commission enquiries that have been held; enquiries that seem almost as numerous as blackberries in autumn. They have had to conform to Parliamentary requirements in constructing their track and

[1] Pratt: *Railways and their Rates.* [2] *Ibid.*

providing its equipment, both stationary and moving. They have had to submit to Parliamentary regulation of their rates and fares, and the hours of labour and wages of some of their servants.

United States Railways.

There is yet another country with which comparison is made—the United States. In both countries the new method of locomotion was introduced at about the same time ; but whilst the United Kingdom was settled the larger portion of the United States was unoccupied and undeveloped. Population was concentrated on the Atlantic and Pacific coasts (principally the former) and on the great rivers. New settlers turned their faces westward to a new Land of Promise where Nature had lavished rich bounties and the hand of man had not been stretched out to claim them. Pioneers had pushed their trails out to these virgin lands and had begun to realise their possibilities. To them a railway was essential. It meant the softening of the rigours of pioneer life, more effective protection from marauding Indians ; and, above all, an outlet for the surplus products of their lands. They were glad to get a railway at any price, and " at any price " did not mean the exorbitant outlay of capital. It meant the giving of land freely for the track, and the acceptance of economical construction and conditions generally such as Parliament made impossible here. What mattered it if the track was of a kind which the British Government would have regarded as unstable, or if the system of signalling and controlling moving trains was imperfect, even almost non-existent in some cases ? The *trains* were what they wanted, and having got them they were content to run the risk of derailments, collisions and the running down of live stock and human beings. The essential point to be remembered, however, is that construction was cheap, and further that not only was land for the track given freely, but also large tracts of land on either side of the line were allotted to the railway companies for sale to settlers so that the companies might reap some of the benefit which flowed from the risk they had incurred in opening up the country. Professor Hadley[1] assumed that the average cost of construction of American railways was $45,000 (£9,375) per mile, and the average cost for the whole of Europe at the time he wrote (1885) was $115,000 (£23,958) per mile. Against these sums he contrasts the following which showed the average

[1] *Railroad Transportation.*

cost per mile of line open in the United Kingdom :—1863, £32,804 ; 1872, £36,000 ; 1874, £37,000 ; 1876, £39,000 ; 1878, £40,000 ; 1881, £41,000 ; 1883, £42,000.

Cost of Construction.

This question of the cost of construction is an exceedingly difficult one to unravel and consequently the estimates as to its amount have varied with different authors. Writing in 1905, Mr. Acworth puts the cost of constructing the railway proper (*i.e.*, road and buildings) of the United Kingdom at a round figure of £800,000,000, which works out at about £36,400 per mile of line open at that time and £21,000 per mile of single track. Using the "Bulletin of the International Railway Congress Association" for Feb., 1911, as his authority, Mr. Edwin A. Pratt [1] gives the cost per mile at £55,712. From the same source he gives the following corresponding figures (per mile in each case) for the countries to which reference has previously been made—

Germany	£22,821	Denmark	£10,884
France	£28,611	United States of America	£15,071
Belgium	£37,088	Canada	£12,022
Netherlands	£17,350		

The figures may not be minutely accurate, but probably it will be safe to assume that their relationship is sufficiently good to afford a fair standard of comparison. In any case, however, it must be sufficiently clear that cost of construction in this country has been immensely greater than that of any other country with which useful comparison of rates can be made. Heavier cost of construction, of course, means a larger outlay of capital on which either interest or dividends must be paid ; and it should not need to be pointed out that these things stand in the way of reductions of railway rates. Obviously, if railways are well managed the lighter the capital charges the greater the possibility of profitable working and the lower the rates that need to be charged to secure a profit.

Special Circumstances of the United States.

Other reasons than the difference in capital charges (differences in the nature of the services) have been pointed out in connection with European countries. Differences of quite another type are met with in connection with the United States. America is a country of longer distances and greater population than the United Kingdom ; and in addition as regards agricultural products of much greater export trade. These things in combination give the

[1] *History of Inland Transport.*

railway manager of the United States an immense advantage in handling freight economically. Take the case of grain only. Large quantities from the surrounding country are concentrated in elevators at convenient centres, and from these are transported to the port of shipment. The trains are exceptionally large ones, they carry thousands of bushels of grain, and from a place such as Buffalo they run straight through to New York, a distance of 440 miles, without a break. The trains are loaded mechanically from the elevators and discharged mechanically into the shipping in New York harbour. Thus terminal charges are reduced to a minimum and they are spread over hundreds of miles so that the average addition per mile to each ton of produce carried becomes infinitesimal. Almost similar illustrations of the method of dealing with other forms of agricultural produce could be cited, but doubtless sufficient has been said in explanation of the manner in which such low average rates per ton per mile are shown by United States statistics.

British Peculiarities.

British railways have not in the past published sufficiently detailed statistics to enable the ton-mile rate to be obtained for this country. But quite a superficial knowledge of conditions here is sufficient to show that apart from the capital burdens they have to bear, their task is quite a different one. They have neither the distances to haul nor the quantities to handle. Big, fully-loaded, trains are possible when they are dealing with imports such as foreign meat and with minerals, but taking the home trade generally it runs in much smaller quantities, so small that it has been described as "retail" business. In 1903 Lord Stalbridge, a former chairman of the London and North Western Railway Company, stated that while the largest consignment of coal amounted to nearly 1,000 tons the average was only 17½ tons, 80 per cent. of the consignments were less than 20 tons, and some were as small as 2½ tons. It has been stated concerning general merchandise, that less than sixteen years ago,[1] on the Great Eastern Railway, 90 per cent. of the consignments were of 1 ton or less and 70 per cent. were of 3 cwt. or less. Much may have happened in the sixteen years which have elapsed since these calculations were published. During the whole of the period the constant effort of the railway managers has been to promote better loading of goods trains with the object of reducing the number of

[1] *Written in* 1914.

trains and the goods train mileage. Some success has resulted from these efforts. But, on the other hand, the tendency of modern business has been against them. It has become more and more the custom of business men, whether working as wholesalers or retailers, to work with the smallest possible stock and to order small quantities more frequently as goods are required. This tendency has to be set against the efforts of the railway managers, so that quite probably the figures which were accurate less than a decade ago are sufficiently so now to illustrate the point that while the railways of the United States are handling immense quantities and carrying them distances which are geographically impossible here, British railway managers are mostly concerned with what comparatively may be described as trivial quantities hauled for a few score miles at most.

When all this is demonstrated, however, are the results so hopeless, so severe a handicap to the British trader as is often made out ?

Is the British Trader Handicapped ?

There is no evidence to suggest that there is any equality between United States and British rates for long hauls, though it may be so in connection with some of the British rates for large quantities of imported goods such as the special meat trains from Liverpool to London. But British railway managers and other authorities have seriously questioned whether the American rates for small quantities carried short distances are any lower than, if as low as, the corresponding British rates. In 1902 there were letters in the *Times* on the subject from Sir Geo. S. Gibb (then Mr. Gibb, and manager of the North Eastern Railway Company) and Mr. M. B. Wied, of the Baltimore and Ohio Railroad. The details of the correspondence cannot be given, but Sir George Gibb asserted that "for the quantities in which English traders actually consign their traffic and for usual English distances, English rates are lower than American," and he supported his statement with figures. Mr. Wied, on the other hand, denied the assertion, and also produced figures in support of his views. Mr. W. M. Acworth subsequently joined in the controversy with the statement :—"As for America, where, if anywhere, average rates are low, Mr. Gibb has recently shown to demonstration in your columns that rates for small consignments—the only rates affecting the English small farmer—are much higher in the States than in

England." A few years ago an elaborate comparison of United States and Caledonian rates was made by the officials of the Caledonian Railway Company, which showed very conclusively that British rates were lower than American for distances up to about 50 miles and higher for longer journeys. The point of all this evidence, of course, is that the exceptionally low ton-mile rates of America are averages which have little real relationship to the actual rates paid ; that they cover rates which are actually heavier as well as lighter than British rates ; and that while in this country geographical limitations and conditions of trade are such that it is impossible to produce such low averages, the trader actually pays less rather than more in America for his "retail" consignments. Averaged in another way, however, the comparison between this country and the United States is not unfavourable. Below is a table giving United States figures for 1907-8, the year ending in June (compiled from the "Statist's" annual American Railway supplement), and those for the United Kingdom for 1907 and 1912, compiled from the statistics issued by the Board of Trade.

	United States, 1907–8.	United Kingdom, 1907.	United Kingdom, 1912.
Tons carried . . .	1,521,065,000	515,887,116	520,279,128
Freight train mileage .	589,323,000	164,374,855	151,892,869
Total receipts from freight	£343,956,250	£61,202,831	£64,048,814
Receipts per freight train mile	11s. 8d.	7s. 5·3d.	8s. 5·2d.
Average receipts per ton carried . . .	4s. 6·27d.	2s. 4·2d.	2s. 5·5d.

Conclusion.

The immense differences in the quantities, distances and earnings are impressive, but the main object in working out the figures is to show the average receipt per ton carried. In the United States for the year taken the average receipt per ton per mile works out as low as ·765 cents., or roughly ¾d. per mile. And yet at the same time the average receipt per ton carried comes out at 4s. 6·27d. against 2s. 4·2d. and 2s. 5·5d. in the two years given for Great Britain and Ireland. The British figures, of course, are averages, but still there is the fact that on the average the cost of transport in the United States

amounts to approximately twice that which has to be paid in this country. There is no contradiction between these figures and the American ton-mile rate, and no reflection on the efficiency of American railways. What it means is that the distances there are so much greater than they are here that on the average a ton of minerals or merchandise travels so much farther that, notwithstanding an unequalled ton-mile rate, the cost of transport mounts up mile by mile until, in the end, it is nearly twice as much as the corresponding cost in this country. Put in still another way it means that in this country the average addition to the delivered or free on board cost of an article, due to the necessary expense of transport is about half the corresponding addition due to the same cause in America. It follows, therefore, that, notwithstanding the complaints of excessive rates, cost of transport is not here the burden that it is in America because the goods transported do not have to travel so far.

CHAPTER VI

THE QUESTION OF FOREIGN PREFERENCE

CONSIDERATION of the question whether British railways give preferential rates for the carriage of foreign imported produce brings us once again on to controversial ground, and it is difficult to avoid at least the appearance of partisanship. It is necessary, however, to examine the subject; not for the sake of proving that either the traders who complain, or the railway companies who make the rates, are wrong; but because in the examination there are interesting points in railway economics; points to which repeated reference has been made in earlier pages, are again illustrated. As a preliminary it is well to set out the law on the subject. The Railway and Canal Traffic Act of 1854, in section 2 laid it down that—

Preferential Rates.

"Every railway company, canal company, and railway and canal company, shall, according to their respective powers afford all reasonable facilities for . . . traffic . . . and no such company shall make or give any undue or unreasonable preference or advantage to, or in favour of, any particular person or company, or any particular description of traffic in any respect whatsoever, nor shall any such company subject any particular person, or company, or any particular description of traffic to any undue or unreasonable prejudice or disadvantage in any respect whatsoever. . . ."

Railway and Canal Traffic Act, 1854.

Again, section 27 of the Railway and Canal Traffic Act, 1888 says—

"(1) Whenever it is shown that any railway company charge one trader or class of traders, or the traders in any district, lower tolls, rates, or charges for the same or similar merchandise or lower tolls, rates, or charges for the same or similar services than they charge to other traders, or classes of traders, or to the traders in another district, or make any difference in treatment in respect of any such trader or traders, the burden of proving that such lower charge or difference in treatment does not amount to an undue preference shall lie on the railway company.

Railway and Canal Traffic Act, 1888.

"(2) In deciding whether a lower charge or difference in treatment does or does not amount to an undue preference, the Court having jurisdiction in the matter, or the Commissioners [*i.e.*, the Railway and Canal Commissioners] as the case may be, may so far as they think reasonable, in addition to any other considerations affecting the case, take into

consideration whether such lower charge or difference in treatment is necessary for the purpose of securing in the interests of the public the traffic in respect of which it is made, and whether the inequality cannot be removed without unduly reducing the rates charged to the complainant : Provided that no railway company shall make nor shall the Court or the Commissioners sanction any difference in the tolls, rates, or charges made for, or any difference in the treatment of, home and foreign merchandise in respect of the same or similar services.

" (3) The Court or the Commissioners shall have power to direct that no higher charge shall be made to any person for services in respect of merchandise carried over a less distance than is made to any other person for similar services in respect of the like description and quantity of merchandise carried over a greater distance on the same railway."

There are one or two important points to notice in connection with these enactments. First of all in the Act of 1854 it is necessary to remember that the words used are "*reasonable* facilities," and "*undue or unreasonable* preference or advantage." Preference or advantage, as such, are not prohibited ; the legislature only steps in when either of these qualities of a rate or toll become "undue" or "unreasonable." The same words, "undue preference," occur again in the first sub-section of section 27 of the Act of 1888. Sub-section 2 of the same Act goes still further, even to the extent of authorising the legal authorities to consider questions of public interest in deciding whether a preference is "undue" or not. It also says that there shall be no difference in treatment for the same or similar services whether the merchandise is of home or of foreign origin. It is abundantly clear from these passages that the legislature deliberately gave the railway companies considerable freedom to frame their rates according to the requirements of trade. The only things prohibited are preferential rates when the services rendered are exactly similar. Keeping these facts in mind, it is well to examine some typical complaints that preference is given in the rates at which foreign imported produce is carried.

Comparison of Acts.

The complaints may be roughly divided into two classes : (1) those which compare a continental through rate to some place in this country with the corresponding British rate for the reverse journey ; (2) those which compare an English rate for imported goods from the port of disembarkation to an inland centre with rates charged for British produce carried over the same line in the same direction, often for shorter distances.

Nature of Complaints.

Through Rates from Abroad.

Taking first the through rates from abroad, it is necessary to recall what has already been said as to the steps taken by the governments of European countries to foster the development of their ports and their export trade. It is on record in a Foreign Office report (Cd. 8,720 of 1898), fuller extracts from which are given in the Appendix, that the railways of Austria-Hungary at that time gave a reduction of 10 per cent. on rates on sugar and 15 per cent. on iron and steel intended for export. Belgium had made "very great reductions" in export rates. Denmark subsidised a steamship line so that a reduction of 20 per cent. might be made in the rates for exported agricultural produce. Germany granted special rates to her North Sea ports with the result that the report says in commenting on a tabular statement: "It will be seen that the local rates are 200 per cent. higher per kilometre than the preferential rates to North Sea ports." Finally, it is on record that France also grants specially reduced rates on domestic products sent to the coast for export.

Exceptional Treatment.

Conversely it has to be remembered that while this exceptional treatment is given to outgoing produce it is not extended to that which is imported. The imports are not particularly welcomed—therefore the rates are not lowered to facilitate their competition with home industries. This is illustrated by a sentence in a letter from a former British Consul in Germany, also given at greater length in the Appendix: "Thus German coal from Silesia to Stettin pays from 74 to 77 pfgs. per 100 kilos; British coal from Stettin to Silesia pays 106 to 110 pfgs."

Lower Export Rates.

When conditions such as these prevail, it is easily understood that many through rates from the Continent to England, lower than those from England to the Continent, might be quoted if the trouble were taken to collect them. It is true that British railways also quote exceptionally low rates for goods intended for export from this country as compared with the rates charged, even to a seaport, when the goods are intended for home consumption; but under the "same or similar services" clause, whatever rate is put on the books for export should also be available for import between the two particular points to which it applies. This exceptional treatment, of course, is beneficial to exporters, but it cuts both ways.

In some cases other influences than the lower continental special export rates affect the charges for goods imported into England. An example of this was furnished some time ago by means of a rate for spelter from Stettin to Birmingham. For 10 ton lots this, at that time, was 16s. 6d. per ton, and the corresponding rate from Birmingham to Stettin was given as 23s. 5d. per ton. The firm of Birmingham merchants who furnished this comparison regarded it as conclusively proving preferential treatment especially as the German forwarding agents who quoted the 16s. 6d. through rate also quoted 6s. per ton for transport from Stettin to Hull. The inference was drawn that 6s. was the sea freight and consequently the amount remaining for railway carriage from Hull to Birmingham was 10s. 6d. per ton. As compared with 11s. 4d. per ton, which is the rate charged by British railways for 10 ton lots of spelter from Birmingham to Hull, there was apparently a preference of 10d. per ton in favour of the foreign articles on the railway journey alone. Enquiry, however, proved the inference to be inaccurate. North of England shipowners of repute definitely assured the enquirer that a railway preference was not given, but that the portion of the 16s. 6d. through rate paid for the land journey from Hull to Birmingham was 11s. 4d. per ton, or exactly the same as the rate for British spelter from Birmingham to Hull. The allegation of preference, therefore, fell to the ground. The sea freight from Stettin to Hull was thus reduced to 5s. 2d. per ton. It may be asked: "Why is it that the sea freight from Stettin to Hull is 5s. 2d. whereas the rate quoted from Birmingham to Stettin shows, after deducting 11s. 4d. railway rate from Birmingham to Hull, a balance of 12s. 1d. for sea freight?" The difference must clearly be outside any question of malevolent railway influence, and an explanation is not essential to the object in view; but it may be stated that the difference, as may be inferred, is entirely due to shipping policy. Spelter from Stettin is in competition with the same metal produced on the borders of Belgium and Germany which comes by way of Antwerp to Harwich and then inland. If the shipping company trading from North German ports in the Baltic is to carry any spelter to England the rate must be such as will compete with that for the shorter journey from Antwerp. Hence the "cut" in rates. But there are no such considerations affecting the reverse journey and the normal

Import Rates.

rate is charged. What, therefore, at the outset looked like a clear case of preference given by the railway companies turned out to be a matter entirely within the region of shipping policy, or economics, whichever term is preferred.

Influence of Continental Rates.

The influence of continental export rates is clearly seen in the following example of "preference" which has been quoted: Iron bars and sheets, Charleroi to Birmingham, 21s. 10d. per ton, from Birmingham to Charleroi, 24s. per ton. When the example was investigated it was found that the British railway rate for 10 ton lots of bars and sheets between Birmingham and Hull or Harwich in either direction was 12s. 6d. per ton, whether the material is British or foreign. The difference between the two through rates quoted (2s. 2d. per ton) must therefore occur outside the borders of the United Kingdom and in view of the known circumstances of general application, the reasonable inference is that it is due entirely to the special continental export rates.

A similar example quoted concerned machinery in parts consigned from Chemnitz to Birmingham at 64s. per ton, whereas the rate for the same things from Birmingham to Hull was 26s. 3d. And it was pointed out that while the Chemnitz-Birmingham rate averaged 0·98d. per ton per mile the Birmingham-Hull rate averaged 2·4d. per ton per mile. At the time of enquiry, however, it was stated that again the rate of 26s. 3d. applied between Birmingham and Hull irrespective of the direction or the origin of the machinery conveyed, and that the whole difference lay outside this country. The through rate from Chemnitz to Birmingham, to represent the conditions accurately, should have been stated as follows: Chemnitz to Hull, ton-mile rate, 0·69d.; from Hull to Birmingham for the remainder of the journey, 2·4d.

Neglect of Real Causes of Difference.

The fact appears to be that although these and similar examples are publicly produced as evidence that the British railway companies grant preferential through rates on imported foreign produce, the people who make the complaints have been content to accept the figures as they find them, ignoring the evidence as to continental railway policy and making no enquiry as to the real causes of the difference. The most surprising thing is that if the circumstances alleged are really believed they are not made the subject of complaint to the Railway

and Canal Commissioners who have absolute power to deal with them under the law already quoted.

More easy to examine are the complaints that fall under the second division—those based on comparisons of British rates for imported goods from the port of entry to an inland centre, with the rates charged for home produce carried over the same line for the same or even a shorter distance. Many have been made from which a selection may be given. The Scottish Chamber of Agriculture once complained to the Board of Agriculture that while 70s. per ton was charged for 20 ton lots of British meat from Haddington to London the rate for similar quantities of foreign meat from Glasgow to London was 45s. per ton. It was found that the 45s. rate was an exceptionally low one, adopted to meet shipping competition. Fresh meat could be sent in 20-ton lots from Glasgow to Grangemouth by rail, and thence by sea to London for 39s. 2d. per ton, and the railways concerned made the 45s. rate with the object of obtaining this traffic. But as far as Glasgow was concerned there was no preference to the foreign meat because, once the 45s. rate for 20-ton lots had been entered in the railway rate books as required by law, it was available for all and sundry consignors indiscriminately and irrespective of whether they were consigning 20 tons of foreign or Scottish meat. But there is yet another fact which disposes of the suggestion of preferential treatment. If Haddington were on the route from Glasgow to London there would have been more reason for the complaint, though it would not have been entirely justified; but Haddington is on the east coast and Glasgow more to the west of Scotland—virtually on the west coast as far as shipping competition is concerned. The circumstances, therefore, are not parallel. If there were ground for complaint it is that mileage rates are not equal; but we have seen that this principle of charging is impracticable.

Comparison of Home Rates.

A much more common, in fact a standard, illustration of preference is that of meat carried from Liverpool to London at 25s. per ton, while from Cheshire stations the rate is 40s. per ton. In the first place it needs again to be noticed that the 25s. rate from Liverpool applies equally to foreign or English meat so long as the specified tonnage per consignment (which happens to be 3 tons) is maintained. That disposes of

London Meat Traffic.

the charge of preferential treatment as far as Liverpool itself is concerned; but larger issues than this are opened up. The foreign meat traffic from Liverpool and Birkenhead is enormous. Both the London and North Western (from Liverpool) and the Great Western (from Birkenhead) run at least one special meat train to London each day and sometimes two or three trains, and the North Western has sent four. They are large trains, each van is loaded to its full capacity-varying with the nature of the meat (fresh, frozen or chilled), and once made up they run straight through to London without stoppage or shunting except such as arise from the exigencies of the service as a whole. There is no crawling from station to station to pick up a succession of partly-loaded trucks. Consequently the expense of running these special trains is reduced to a minimum, and though it may possibly happen that the rate per ton is barely profitable, yet the tonnage handled is so great that this, combined with the reduced expense, makes a train load of meat a very profitable thing, especially when it is remembered that the large quantity dealt with profitably helps so greatly to reduce the average of dead expenses per unit, a point which has already been dealt with at length.

Somewhat similar circumstances were under review in what has become known as "the Southampton case," brought through the instrumentality of the Mansion House Association against the London and South Western Railway Company. It was alleged that—

"quantities of foreign hops, fresh meat, lard, butter, bacon, and cheese arriving at Southampton docks and sent by through train to London were unduly preferred over similar home produce. It was proved that the foreign produce was in large packages and full train loads, whereas the home produce was delivered in small quantities badly packed and picked up in small consignments at various stations. It was held that the difference of treatment did not amount to undue preference merely because the merchandise was foreign."[1]

The case is important in that it enabled the Railway and Canal Commission to give a clear decision that mere difference in the rates charged did not constitute undue preference, and that a railway company is entitled to take into consideration when framing a rate the nature and volume of the traffic for which it is quoting special terms. The

"Undue" Preference.

[1] Evidence of Mr. W. H. Macnamara, Registrar of the Railway and Canal Commission, before the Royal Commission on Railways appointed in 1913.

governing conditions in all these questions are that the preference must not be "undue," and that there must be no difference in treatment for "the same or similar services." As a result of this case some interesting and illuminating figures were given to the public. The London and South Western Company showed that a train load of bacon or the like produce loaded at the docks and sent through to London at 6s. per ton, earned 12s. 6d. per mile (total distance, 78 miles), and after allowing 2s. 6d. per mile for working expenses there remained a profit of 10s. per mile. The rates charged for the uncertain "retail" local traffic averaged 15s. per ton for the same distance, but a train only earned 5s. per mile, and after again deducting 2s. 6d. per mile for expenses (which would be an under-estimate if the same figure had any exact application to the foreign through traffic) there remained a profit of only 2s. 6d. per mile. Obviously if the local rates were reduced to the 12s. 6d. level there would be no profit on the business until such time as it was enormously stimulated, developed and organised, if ever that time arrived.

Sentimental Aspect of the Question.

The sentimental aspect of these questions is always one that makes a strong appeal. The idea that a British railway company is dealing with foreign produce on better terms than it fixes for that of home origin outrages patriotic sentiment and secures unbounded sympathy for the supposed sufferers, but it will be found that in the large majority of cases alleged, if the "preferential" railway traffic were stopped at once, the goods would still reach the same destination by the all-water route, instead of partly by water and partly by rail, and the competition which the British producer has to meet would not be diminished, but more probably intensified.

Another Illustration.

One other example may be referred to. The rate for imported china from London to the Potteries was given as 20s. per ton and for English china from the Potteries to London as 32s. 6d. How this comparison came to be made publicly unless through either ignorance, culpable negligence, or a deliberate attempt to deceive, it is difficult to understand because a mere application for the rates made by a private individual without explanation or reason of any kind for the application brought forth the following list of rates by return of post. China and earthenware (from the Potteries to London),

packed in cases or crates, at carrier's risk, and collected and delivered, 32s. 6d. per ton ; at owner's risk, 30s. per ton. Ditto, consigned direct to a shipper for export, carrier's risk, 26s. 8d. per ton ; owner's risk, 25s. China and earthenware sent loose at owner's risk and exclusive of collection and delivery, and also of packing into the railway truck and unloading, in 2-ton lots, 20s. ; 3-ton lots, 19s. 2d. ; 4-ton lots, 18s. 4d. per ton. It was clear, therefore, that the manufacturers in the Potteries had the advantage of a 20s. rate equally with their foreign competitors. An important fact omitted or suppressed was that the 32s. 6d. rate included not only collection and delivery but also insurance against damage, whereas the 20s. rate includes none of these services. All the railways do for this charge is haul the china from station to station. Upon the sender falls the task of carting to the station and packing his china or earthenware securely in the railway truck and the receiver has to unpack and cart away. There is no possible basis of comparison between a 20s. rate under these circumstances and a 32s. 6d. rate, which includes the services mentioned.

Reckless Allegations.

With these examples of the carelessness with which allegations of preferential treatment for foreign imports are made, specific cases may be left and the consideration of general principles resumed. It has been seen that legally the allegation that preferential treatment is given to foreign imported produce, cannot be maintained because Parliament has prohibited not preference pure and simple, but undue preference. Full liberty has been given to take into consideration circumstances such as volume and regularity of traffic. And these conditions have been found more commonly, though not exclusively, in conjunction with foreign than with home produce. There might be found, if the search were made, scores, probably hundreds of instances where special or exceptional rates have been made for home produce which is not even distantly affected in the matter of transport by the competition of foreign imported produce. It is one of the commonest things in business for a trader who has a large consignment to send, for instance, one running into a thousand tons, or perhaps even a hundred tons, to apply to the railway company concerned for a special rate, and to be successful in his application. That rate must be entered in the rate books of the stations affected, and as long as it remains there it is available for

all other consignors who can offer a similar quantity for the same place. But what is the position of the small consignor of, say, one or two tons whose goods are going exactly the same journey as the large consignor's ? Is he entitled to complain that his larger trade rival is being treated with undue preference ? Apparently he does not think so because complaints of this nature are never heard. In the home trade it is unquestioningly recognised as a principle to be followed that the larger the consignment the lower the rate per ton (within limits, of course), to which it is naturally entitled. It is only when the difference occurs in connection with foreign imported produce that there is an outcry. Yet the principle is the same whether the goods affected are of home or foreign origin.

In the last resort the question is narrowed down into one of pure business, or railway economics. The managers of the railways know from experience that it pays them to make these exceptional rates for foreign imported goods (and for those of home origin also), when they can be assured of a large and constant volume of traffic. And knowledge of the fact and the practical application of it are not confined to this country. It is put into practice in other lands of which probably the finest example is afforded by United States practice. It is neither more nor less than the practical application of this principle to the large loads and long hauls possible in that country that has given it the extraordinarily low average ton-mile rates of a halfpenny to three farthings to which earlier reference has been made. And it is also part of the accepted practice of charging "what the traffic will bear." The allegation of preference is defeated, therefore, by the general application of the principle of lower rates for large quantities not only to foreign traffic coming in from the ports, but also to home produce moving about inland, and further by the fact that a special rate, as long as it remains on the rate books, is applicable to all consignments in both directions between the two points to which it relates so long as the attached conditions are fulfilled by the consignor.

Another practical question to be borne in mind is that if Parliament dropped the word "undue" and prohibited preference without qualification of any kind, it would not prevent much of this foreign competition, and would "cut both ways." It would not affect the foreign competition because most of the specially low rates have been framed

Can Change be Effected ?

to meet the competition of water carriage. If the rates were raised for the Southampton docks traffic on the South Western Railway and the Liverpool meat traffic on the London and North Western and Great Western railways, the goods would not cease to reach the London market. Instead they would make the whole journey to London by sea and the farmers and traders who complain would be no better off in the end. It would "cut both ways," because if preference is prohibited many of the special, or extraordinary rates which represent reductions from the authorised class rates, would probably have to be abandoned, and the return to the class rates would be a serious disadvantage to trade and commerce generally.

Enquiries.

The subject is one that has been revived at intervals for many years and yet Mr. Macnamara, to whose evidence before the 1913 Royal Commission reference has already been made, stated that the Southampton case is the only one that has ever been brought before the judicial body appointed to hear and decide such questions, viz., the Railway and Canal Commissioners. And in this instance the allegations were not proved. There has even been a special Parliamentary Committee (known as Lord Jersey's Committee), appointed to consider the allegations that imported foreign farm and dairy produce was unduly preferred. This body was not bound in its decision by questions of legality. It was appointed to enquire as to actual conditions and had freedom to deal with them in its report from the point of view of business, equity, or common sense. And yet the committee also found, according to the evidence of Mr. W. F. Marwood, C.B., Assistant Secretary to the Board of Trade, given before the 1913 Commission, "that any preference there was was sufficiently explained by such considerations as volume and continuity of traffic."

Inequalities Due to Economic Conditions.

When all is said, however, and when it is convincingly demonstrated that purely business and economic conditions explain all the inequalities, the fact will still remain that immense quantities of imported foreign produce are being carried by English railways at much lower rates per ton than those at which home produce is carried, and that the companies are making a better profit out of this traffic than they do out of the consignments of home produce. The explanation, it is hoped, has been satisfactorily given ; the remedy is

not so easy to find unless it be in a better organisation in connection with and a more complete concentration of home produce so that it can be handed to the railway companies in larger volume and with greater regularity than has hitherto been the case. In the matter of agricultural organisation for the transport and marketing of fruit, vegetables and other farm produce, the United Kingdom is far behind some of her European neighbours, whose natural advantages are not in any way superior to ours, even if they are not occasionally inferior. It is an old subject, this question of closer combination and improved organisation. It has been preached for years, but the progress made towards its realisation has been so discouragingly small that, apparently owing to the natural temperament of the British agriculturist, its early attainment seems unlikely.

CHAPTER VII

GOVERNMENT CONTROL OF RAILWAYS

THE fact of Government control of railways is so familiar that in all probability few people ever pause to think about its origin, the reason for it, or its extent. It is an everyday circumstance that excites neither attention nor comment unless some person, angry because of an unfortunate experience, says, in indignation, that the Government ought to make the railways do something which will prevent him from suffering again what he regards as injustice, imposition, or laxity. We are all prone to cry out for Government control or interference under such circumstances. But why is there Government control of the railways? In these days we are all familiar with limited liability companies; impersonal bodies, which, being incorporated by law, have legal entity entitling them to act almost as freely as a single person. They are required to conform to various restrictions and regulations imposed solely for the protection of the public from fraud, "the public" being their shareholders and all with whom they have business dealings. The requirement of the use of the word "limited" in their titles is an instance of this. Outside these regulations, however, the limited company has as much freedom as the private trader or of traders joined in an ordinary unlimited partnership. For it must be remembered that both are equally subject to such things as Factory Acts. The railway companies are subject to all this control and more.

Government Control of Railways.

Possibly, if the railways were new things in process of evolution at the present time they would be ordinary limited companies. There is nothing to prevent such a company from buying a considerable quantity of land and using it for any proper business. Why, therefore, should the railway companies be subject to any different treatment? Why should they not have registered themselves as ordinary limited liability companies and have proceeded with their business? In every respect but name they are limited companies. They are incorporated joint stock companies; they are governed by

Exceptional Position of Railways.

Boards of directors, and the liability of their stockholders is limited to the amount inscribed on the face of their stock certificates.

Reason for Exceptional Position.

Primarily the reason appears to be that their origin antedates limited liability legislation. The company laws did not take useful shape until 1862; there was nothing even resembling them until 1844. The first railway Act was passed in 1801 authorising the construction of the Surrey Iron Railway. That, of course, was a very different thing from the railways as we now know them. Still, there was the precedent. There were no limited liability laws, and an Act of Parliament was required for the incorporation of a company to construct a railway. Nothing was then legally known but a private partnership, a Charter of Incorporation granted by the King, or a company incorporated by Act of Parliament. Possibly a very wealthy person having faith in the commercial prospects of such an undertaking as the Surrey Iron Railway might have used his wealth to purchase land and construct the railway without let or hindrance. But even in those days a railway was an undertaking in which a number of capitalists had to join their capital in order to carry out the objects in view. There is no obvious reason why these pioneers should not have combined in an ordinary partnership, except that each person concerned would have been jointly and severally responsible for the debts of the whole undertaking. In the case of failure it would have been possible for the creditors to proceed against all or any single one of them for the recovery of the whole debt owing. The raising of capital for large undertakings under such circumstances, would have been virtually if not absolutely impossible. Better protection than that of ordinary partnership arrangements was required to enable capital to flow freely into such channels for its useful employment, and so the joint stock company, incorporated by Act of Parliament, became familiar though not the common thing the limited liability company is to-day. In this way Parliamentary control began, and the origin has some antiquarian interest, if no other.

Government Caution.

Probably the reasons which actuated Parliament at the outset were not clearly defined. There was, no doubt, a feeling that something new, and of immense power for good or evil, was being created; and that special care in regulating the powers conferred was required. Now, however,

the control is such a familiar and accepted condition that the reasons for it are clearly defined as follows: Because (1) special powers of purchase were given; (2) monopoly powers were given; (3) of the relation of the railways to the welfare of the public; (4) the interests of the owners and the public vary to a large extent.

Take, briefly, these four points; there is first the special powers of purchase. The assistance which Parliament rendered in this connection may seem small. In earlier pages attention has been called to the extent to which the landowners were able to "bleed" the companies. As a general rule the price paid for land has been extortionate, and as a consequence the capital burden has been unduly swollen. But without the powers of compulsory purchase, which Parliament gave them, the railway companies might possibly not have been able to come into existence at all, or their routes might have been so extraordinarily devious and circuitous as to have imperilled their existence or nullified the advantages of rail transport. Without the powers of compulsory purchase bestowed by Parliament it would have been possible for any and every landowner to refuse to part with his land. One or two obdurate persons could have wrecked a scheme which in later years has proved itself to be of vital importance to the nation.

Special Power of Purchase of Land.

The monopoly powers given to the railway companies, which forms the second reason for control, were more apparent, perhaps, in the early days than they are now. The modern system of great trunk lines has left scarcely any place of importance at the mercy of one company; but it must be remembered that the original lines were not trunk lines. They were more or less isolated fragments designed to serve particular districts of comparatively limited area, and those districts were more or less dependent upon the line which ran through them. They still retained the old roads and in some cases the canals, but the railways were intended to displace both these, and to a large extent they did so. Even now, with all the developments, there remains a considerable extent of country within which monopoly conditions still prevail. The railway service between agricultural districts and market towns is still largely of this character. These places are not touched by the competition enjoyed by large centres of population in all parts of the country.

Monopoly Given to Railways.

The third and fourth reasons are really inseparable. The welfare and interests of the public demand cheap and rapid means of communication for passengers and goods of all kinds. It is not necessary to dwell upon the dependence of huge aggregations of the population upon the regular, prompt and speedy transport of food stuffs, or of industry upon the equally efficient movement of its raw materials and finished products. Cheapness, efficiency and equality of treatment are vital in both these connections. Without them the industrial development of Great Britain could not possibly have been a tithe of what it is. On the other hand, of course, the interest of the railways, or at any rate, their shareholders, is solely concerned with profit-earning. And the pursuit of profit is not always such a matter of enlightened self-interest as the old economists believed and taught. Given monopoly powers a large profit may possibly be obtained from a minimum of business exertion combined with high charges. On the other hand, the same object may be attained from an increased volume of business combined with rates showing a minimum of profit. Parliament decided that so far as possible the latter method should prevail in connection with the railway companies. Public welfare also includes the safety of the lives and property of the community—the protection of both from injury arising from the inefficiency of the means of transport provided and the neglect or careless use of those means.

Railway Companies and the People.

The control of Parliament is, therefore, exercised first over the construction and equipment of the railways and the rates and fares which they charge and, secondly, by requiring the companies to furnish to the public detailed particulars as to the nature and volume of the business they conduct, the charges they make, the amounts they earn and the profits resulting. A brief statement such as this gives a fair idea of the nature and extent of Parliamentary control ; but this aspect of the question is worth a little more detailed elaboration. It has already been seen that the control was exercised from the very outset in the fixing of the tolls which the companies were empowered to charge for the use of their "rail-ways" by common carriers. It is also on record that in 1836 the Taff Vale Railway Company were prohibited from paying more than 10 per cent. dividend per annum, and provision was made for the reduction of the

General Control of Government.

company's rates if the profit earned was excessive. The company were required to submit their accounts to the justices sitting in quarter sessions who were empowered to make such reductions in the rates charged as would bring the profits within the prescribed limits. Justices of the peace in quarter sessions were empowered to do many things in those far-off days, which, now, have come to be regarded as altogether outside their purview as justices; and many of these old powers though fairly well exercised, have been abrogated. But the idea of their attempting to regulate railway rates has its humour, especially in view of what has been previously written concerning the years spent on this kind of work at a later date, the complications and grievances which it evoked, and the drastic measures which Parliament had to take to end the difficulties.

Railways and the Board of Trade.

In 1840 Parliament began to exercise a general control, as distinct from the supervision, of detail such as the tolls which each particular company might charge. An Act was passed in that year requiring notice of the opening of all new lines to be given to the Board of Trade, the object being to give the officials of that Department an opportunity to inspect the permanent way and its equipment. Possibly it was thought that mere inspection would secure efficiency of construction; possibly experience showed that it did not; but at any rate, two years later power was given to the Board to delay the opening of any new railway until the inspectors were satisfied as to the character of the work—as to whether construction had been carried out in a manner that made the line safe and suitable for public use. This power of inspection and delay still remains with the Board of Trade, and it has been developed in various directions. It has been extended, for instance, to the rolling stock, the point, of course, not being as to its comfort, but its stability and its equipment in such matters as brakes. Also in case of accident the Board of Trade has power to, and does, send down an inspector to hold an enquiry and to report as to the cause of the accident. There was a feeling in the first half of the nineteenth century, when so many railways and amalgamations of railways were being promoted, that the Board of Trade should have power to consider schemes from the point of view of their usefulness not merely to the districts concerned but nationally. A wide survey of this kind seems now

to be the most useful thing that could have been devised. The Board held this power for a time and acted upon it ; but it was abolished after a very brief trial. Abolition came, not because the idea was bad or because it was wrongly carried out, but because Parliament was jealous of its powers and duties being usurped by a department of the Civil Service, and because promoters of schemes which did not secure a favourable report from the Board raised an outcry against it ; as naturally they would, if only as a matter of tactics whereby it was sought to nullify the effect of the bad report. In these early years the first railway commissioners were appointed, but their official life was comparatively brief, and it was not until 1873 that the Railway and Canal Commissioners as we now know them, were appointed.

Reference has already been made in earlier chapters to some of the subsequent railway legislation. The Act of 1854, it will be remembered, imposed on the companies the duty of affording " all reasonable facilities " for traffic and prohibited the giving of " undue or unreasonable preference or advantage." In 1863 there was an Act dealing with agreements for joint working, which provided that such agreements should not affect any of the tolls, rates, or charges which the companies respectively were authorised to demand. It also required that the sanction of the Board of Trade should be given before any agreement should become operative, and gave the Board power to revise such agreements periodically and to modify them as might seem fit for the protection of the public.

Railways to Grant " all Reasonable Facilities."

The Railway and Canal Commissioners were created by the Act of 1873. They were not to be interested in any railway or canal stock, and to them was transferred the jurisdiction of the Court of Common Pleas under the Act of 1854 and the power to approve and revise working agreements under the Act of 1863. This, however, is not the only matter of importance dealt with in the 1873 Act. For the first time the companies were required by law to keep rate books at each station, or wharf, showing every rate to every place to which consignments are booked, to keep the book open to inspection at reasonable hours without fee, and to distinguish in the rates the charges for haulage from those for terminal services. Next, railway

Railway and Canal Commissioners.

agreements for the control of canal traffic or tolls were prohibited unless sanctioned by the Commissioners whose approval was to be withheld if in their opinion an agreement was prejudicial to the interests of the public. And finally, the same Act required railway companies owning or controlling canals to keep them in thorough repair, dredged, and in good working condition so that they may be kept "open and navigable for the use of all persons desirous of using them."

In the Cheap Trains Act of 1883 the duty on fares was abolished where the fares do not exceed 1d. per mile and reduced to 2 per cent. on fares exceeding 1d. per mile in one urban district. The Board of Trade were also given power to order the provision of proper accommodation for passengers at fares not exceeding 1d. per mile, or for workmen's trains; and reduced fares were imposed for the army, navy, reserves, auxiliary forces and police on duty.

Cheap Trains Act, 1883.

The Act of 1888 is one of the most important railway Acts ever passed. It sets up a new Railway and Canal Commission whose duties and powers it extends and more clearly defines. It gives the Commissioners judicial powers to deal with complaints as to facilities and rates, to pass judgment and to award damages. The Court of Commissioners thus established is a specialised body. Its president is a judge of the High Court, and there are two other members, one of whom is required to be "of experience in railway matters." The Act does not, of course, remove the railway companies from the jurisdiction of the ordinary law courts of the country in common law or Chancery matters. Actions to recover damages either to goods, or to an individual, for instance, are still heard in the County Courts, or the High Courts, according to the nature of the case; but all purely railway litigation, questions of facilities, rates, undue preferences,come within the jurisdiction of the Commissioners.

New Railway and Canal Commission, 1888.

The most important feature of the Act, however, will doubtless be considered to be Part II. It was section 24 of this which required the companies (within six months of the passing of the Act) to submit to the Board of Trade a revised classification and a revised schedule of maxima rates and charges applicable thereto, showing the amount of all terminal charges. This was the section which led to the immense

Maximum Rates and Charges.

work of revision (not finally completed until 1894), to which extended reference has been made in the chapter dealing with the evolution of railway rates and charges. The ultimate conclusion of all the labour, it will be remembered, was the abandonment of the maxima rates, over the preparation of which so many years had been spent and the indirect setting up of new maxima within and below these, by the provisions of the Railway and Canal Traffic Act, 1894. Section 1 of this latter Act laid it down that—

> " Where any company or companies have, since December 31st, 1892, directly or indirectly increased any rate or charge, or hereafter increase, directly or indirectly, any rate or charge, then, if complaint is made that the rate or charge is unreasonable it shall lie on the company to prove that it is reasonable, and for that purpose it shall not be sufficient to show that the rate or charge is within any limit fixed by an Act of Parliament or by any Provisional Order confirmed by Act of Parliament."

The Act of 1888 was also important in that it amplified the law relating to reasonable facilities and undue preference, and by section 27 placed on the railway companies the duty of proving that differences in charges do not amount to undue preference. The same section also includes the enactment as to the question of undue preference being considered in relation to public service, which has been quoted earlier, and the restriction that there shall be no difference in rates or treatment in respect of " the same or similar services." In the same Act there are various minor provisions, such as the fixing of the charge for copies of the classification at 1s., and the requirement that all rates, tolls and terminals shall be kept separate and distinct in rate books at the stations to which the rates apply.

Reasonable Facilities.

Part III of the Act of 1888 dealt with canals and applied all the railway provisions of Part II to them. It went much farther than this, however. Section 38 provides that where the directors or officers of a railway company, or any person on their behalf, have control over canal charges, and it is proved to the Commissioners that these charges are such as to divert traffic from the canals to the railways to the detriment of the canals or of traders, the Commissioners may require the charges to be adjusted so as to be reasonable as compared with the railway charges. Failing adjustment, the Commissioners themselves may make the necessary alterations. Power is also conferred on the Board of Trade to inspect canals which are in such a condition

Protection of Canals.

as to be dangerous to the public, or to cause serious inconvenience or hindrance to traffic, and to enforce efficiency as in the case of a railway. Railway companies are prohibited without express statutory authority from using their funds to acquire any canal interests, and if they contravene the section "the interest so purchased shall be forfeited to the Crown and the persons responsible for the misapplication of railway funds shall be liable to repay them." The one relief granted is power to authorise the abandonment of a canal, or part of one, which is unnecessary or derelict ; but before the Board of Trade can give this sanction it must be proved (1) that the canal is unnecessary ; (2) that the application has been authorised by the shareholders ; (3) that proper notice has been given ; and (4) that compensation has been made to all persons entitled to it.

Traders' Indifference.

On the whole, it will be seen that the Act of 1888 was of far-reaching importance, placing the railway companies under much more stringent government control than had previously existed. The futility of some of the work done as the outcome of the Act has already been referred to. One other comment that arises is as to the small use which traders appear to have made of the powers conferred upon them, especially in relation to canals. It is frequently alleged that canal traffic is stifled in the interests of the railways and that the canals themselves are inefficient. The clauses of the Act which have been quoted appear to provide a remedy for both these allegations, if traders will have the energy and enterprise necessary to take the preliminary step of bringing the matter before the Board of Trade. It may be urged that most traders would not care to face the expense involved in proving complaints of this nature which might be made ; but there are plenty of canal carrying companies interested in the efficiency and cheapness of water transport, and combination to bring such questions before the properly constituted authorities should not be beyond the bounds of possibility if there is any solid basis of justification for the allegations occasionally heard.

Accounts and Returns Act.

Other Acts have been passed since the 1894 Act to which reference has been made, but they are of minor importance and need not be reviewed in detail. An exception to this, however, is the Railway Companies (Accounts and Returns) Act, 1911. Extended reference to this Act will be necessary in the next chapter dealing with statistics and

accounts. Here it is only necessary to refer to the subject as indicating another direction in which Government control is exercised. As early as the Act of 1840 the railway companies were required to make returns to the Board of Trade in respect of traffic, tolls, rates, and accidents. The power thus given has been maintained unimpaired ever since, and the railway companies have been required to make annual returns according to forms devised by the Board of Trade, the general outlines of which, as well as the details, have been published in special Blue Books issued from year to year. The point of interest, of course, is that the publicity thus secured has operated as a check on the acts and policy of the companies.

Consequences of Government Control.

It is not necessary to spend much time on considering the consequences of Government control. Those consequences must be fairly obvious. Necessarily Government control must add to the expense of working railways, and very little consideration will soon afford convincing evidence that, in this particular, control has been expensive from the very beginning. The Acts of Parliament necessary before the companies were able to begin work were control in its most intimate and minutest form. And instances have been given of the very considerable costs to which the companies were put to obtain their Acts. Companies of equal size financially and commercially to these original railway concerns can now be brought into being under the limited liability laws for less than a tithe of the cost of the Acts which were the necessary preliminary to the construction of a railway. Capital charges were also increased by the manner in which Parliament encouraged competition, which, after all, was only another and indirect method by which control was exercised, for in this way control was exercised over the rates and tolls of the companies. As to this policy of encouraging competition a joint committee of both Houses of Parliament, reporting in 1872, stated that Parliament's "policy, or want of policy, had rendered [Railway] systems less efficient and more costly." The encouragement of competition meant, of course, the duplication of the capital employed to do a given volume of work and an increased burden of capital charges to be borne by traffic; it increased in this way the expense of operation in order to secure the restriction and reduction of rates and charges which already were stringently restricted in the Acts incorporating the companies. The requirements

as to construction, equipment, and working furnish further evidence of expense arising from control. The necessity of such requirements is not questioned. Parliament, it will be admitted, was, and is, entitled to lay down any conditions which appear likely to promote the safety of railway travellers. This is quite obviously a reason why the companies could not be allowed unfettered freedom to construct and equip their lines in the manner and up to a standard that seemed best to each particular company. A minimum standard must necessarily be set up, beyond which, of course, the companies could be given liberty to go as far as they liked. But while admitting its necessity, it is incumbent to recognise that it meant increased cost and diminished profit-earning power, which is an aspect of Parliamentary control that must not be lost sight of in any and every connection in which it may be imposed. The necessity may not be disputed, but the consequences should always be borne in mind. It is possible, of course, that this particular kind of control, being recognised as desirable, has been pushed farther than is necessary for the safety of the travelling public. Government departments that have to sanction or certify any particular thing are apt to be very self-protective in their methods. The responsibility of approval or disapproval rests with the officials of the departments concerned, and it is merely human nature that these gentlemen should take care that their responsibility is amply covered. The average civil servant does not care to be called upon to justify some particular decision which after events prove to have been unsound or not to have gone as far as subsequent experience has shown to be necessary. He is taking as few personal risks as possible, and he gives himself what business men call "ample cover" so that there shall be a margin for any errors he may have made. In this way regulations and requirements may have been carried to excess. One does not censure departmental officials; one merely points out the tendency as an unfailing characteristic of human nature, especially of that portion of humanity that finds itself in a Government office.

Another expense inseparable from Government control is that arising from the preparation of the required statistics for publication. It may be large, or small; possibly large in the aggregate though relatively small to the whole expenditure of railway

companies ; but it exists, and it must be taken into account when consequences of this nature are being estimated. Finally, it is often alleged that another kind of consequence of Government control is inelasticity of rates and charges. Parliament has fixed maxima charges, and while leaving liberty to reduce the actual rates to any extent below the maxima, has made it extremely difficult to restore to its former level a charge once reduced. Railway officials assert that this has made them chary of reducing rates. They are only induced to do so when they have fairly conclusive evidence that the reduced rate is not going to be an unprofitable one ; they are not inclined to be unduly speculative in their actions in such matters. Doubtless other consequences of Government control exist which have escaped notice, but sufficient will have been said to bring out the point intended—that it has its disadvantages as well as its advantages. That it may easily be carried to harmful lengths is clearly apparent ; that it is necessary will not be disputed. The determining point is whether " on balance " the ends to be attained justify the means taken to attain them.

Expense and Inelasticity.

CHAPTER VIII

RAILWAY STATISTICS AND ACCOUNTS

IT has already been mentioned as an instance of Government control that from the earliest years Parliament has required the railway companies to make financial and statistical returns to the Board of Trade. This, however, is not the full extent of the control exercised. The form of accounts to be issued to shareholders and the periods at which they shall be issued have also been laid down by Acts of Parliament. For some time it was complained that the form of accounts and statistics thus required was bad; how inadequate and defective has been seen in the earlier chapter dealing with expenditure. There, it will be remembered, it was pointed out how impossible was the task of obtaining anything but a very vague approximation of the various costs of transport (the cost of actually moving goods, or passengers), of the maintenance and repairs which arise from doing this work, and of the many incidental expenses attributable to the various departments of railway working. It is not surprising, therefore, that the form of accounts was severely criticised by writers in the technical and lay press and sometimes by shareholders at half-yearly meetings. For a long time criticism and agitation seemed futile, but in June, 1906, the President of the Board of Trade appointed a departmental committee "to consider and report what charges, if any, are desirable in the form and scope of the Accounts and Statistical Returns rendered by Railway Companies under the Railway Regulation Acts." The committee reported in May, 1909. In passing, it may be mentioned that Mr. W. M. Acworth, to whom several references have been made, was a member of that committee, and in the report and forms of accounts recommended may be traced what appears to be the influence of his views.

Financial and Statistical Returns.

Departmental Committee of Board of Trade.

The sections of the committee's report dealing with the form of financial accounts raised little, if any, controversy. One of the first

recommendations is that in future the accounts should be annual. Until 1911 they were issued each half-year, half-yearly dividends were recommended, and half-yearly meetings of stockholders held to consider and confirm the reports. Outside these old companies (such as railway, canal, water and gas companies), incorporated by special Acts of Parliament it is difficult if not impossible to find parallel instances. In the case of limited companies the invariable rule is to submit accounts and hold a meeting of shareholders once a year. It is, however, almost as invariable to find dividends declared half-yearly, that which is not declared at the annual meeting being called the interim dividend. But although reports and accounts are only issued once a year it is customary for directors of companies to have before them approximate accounts for the half-year when considering the declaration of an interim dividend. The departmental committee recommended that if the system of annual accounts was enforced by Parliament on the railway companies power should be given to the directors to pay interim dividends. Equally as important from the statistical point of view was the further recommendation of a uniform date for the closing of all railway accounts, in other words, that they should all close their year on the same day. The final recommendations of importance in this connection are designed to secure the separation of the income arising from railway working proper, from that derived from subsidiary enterprises, such as the working of docks and hotels, and to separate the earnings received from joint lines. Equally important are the scheduled forms of accounts devised by the committee, which prescribe the manner in which all these various details are to be separately dealt with in their own special accounts, and then brought into the general account of income and expenditure. Looked at in their skeleton form these new accounts seem to be based on a very clear and comprehensive system which is all linked up admirably in the general revenue account. The least that can be said for them is that they appear well contrived to secure the desired separation of the revenue results of railway work from those of the subsidiary undertakings.

Report of Committee.

When the committee came to deal with the non-financial side of the statistics, however, the subject became much more controversial. There were, of course, many things which were accepted without

question, such as returns of the mileage run by engines, the number of the various kinds of rolling stock, the number of passengers carried, and the receipts in each class, the number of tons of minerals and merchandise carried and the receipts, and the train miles run both loaded and empty. This latter division is new and of special interest as showing the extent of the mileage of return journeys which empty trucks have to be hauled, and, of course, hauled unprofitably. It is a condition which arises extensively in connection with coal traffic. Railway, as well as privately owned trucks, are hauled from the coal mines to the point at which they are to be emptied and then go straight back again empty to the mines to be loaded again. It is not uncommon to find numerous trucks that never do anything else but move between two given points. An instruction is painted on them permanently that when empty they are to be returned to a specified colliery. The returns in future will take account of this movement of full and empty trucks.

Non-Financial Statistics.

An acute difference of opinion arose as to whether the committee should recommend the adoption of ton mile and passenger mile statistics. By many critics a ton mile and a passenger mile are regarded as the most perfect units of railway service that can be devised. They combine the two important things—weight or numbers and distance. Thus, 1 ton carried 1 mile gives one ton mile, while 10 tons carried 10 miles give 100 ton miles, and similarly with passengers. Given this data, it is astonishing what a number of ingenious combinations can be worked from the remainder of the material to be found in the statistical returns. The departmental committee mentioned the following as "the more important statistics deduced from ton miles and passenger miles"—

Ton and Passenger Miles.

(1) The average train load of goods and of passengers, obtained by dividing the ton mileage and the passenger mileage, respectively, by the train mileage.

(2) The average wagon load and the average carriage load, obtained by dividing the ton mileage by the wagon mileage and the passenger mileage by the carriage mileage.

(3) Ton miles per engine hour.

(4) The average length of haul for goods and passengers, respectively, obtained by dividing the ton mileage and the passenger

mileage by the total tonnage and the total number of passengers conveyed.

(5) The average receipts per ton per mile and per passenger per mile, obtained by dividing the goods receipts by the ton mileage and the passenger receipts by a passenger mileage.

(6) The average density of traffic per mile of road or mile of track, obtained by dividing the ton mileage and passenger mileage by the length of road or by the length of track.

Ton mile statistics, however, are capable of even greater variety than this. A list of no fewer than twenty-four different kinds of information which can be obtained from them is reproduced in an appendix, and should be examined as an instance of the length to which the manipulation of railway statistics can be carried.

The Railway Attitude.

Foreign and colonial railways have adopted ton mile statistics, but the only English railway which compiles them is the North Eastern. The North Western and Great Western companies used to do so but abandoned them as not worth the trouble and labour expended upon them. This latter statement may be taken as indicative of the attitude of all the English railways. Inside opinion mostly pronounces against their usefulness and value. Opinion in favour of their adoption has included a minority of stockholders and most writers on financial and commercial subjects in the daily and weekly press. One of the most common arguments used in discussions as to the burden of railway rates, whether it is heavier in Great Britain or abroad, is based on the use of the United States ton mile figures, and as there is nothing of the kind published in this country, exact comparison is impossible and its absence seriously hampers the discussion. It may be that if the required figures were forthcoming they would not be strictly or usefully comparable because statistical averages can be seldom used unless accompanied by ample information as to the exact manner of their compilation and what they include ; but all the same the absence of a British ton mile rate is severely felt in these discussions and criticisms, and those who are hampered by its absence are apt to demand that the deficiency shall be made good. It is obvious, of course, that ton mile statistics cannot possibly be the panacea for all the ills from

[NOTE.—In 1920 the Ministry of Transport required the Railway Companies to compile ton-mile statistics. Reference to this will be found in Chapter XI.]

which the railways are often alleged to suffer. After all, a ton mile rate is but an average, subject to all the defects of an average, covering a multitude of widely divergent things and conditions, and exactly representing none of them. It does not follow that because the average rate per ton mile for the whole of a railway's goods traffic is, say, 1d. (possibly it is less, possibly more ; the figure is only intended as an illustration), the goods manager can afford to carry things such as bicycles (which, though relatively light in weight, take up a great deal of space and are awkward to handle) for an average rate of 1d. per ton per mile. An exactly similar argument would apply to furniture of the better kinds, or to motor-cars, or light horse vehicles. It may be that by far the greater part of the traffic of his railway consists of compact heavy things which load into trucks with the minimum of wasted space. Of course such uniformity of traffic is exceptional, but it is quite possible for a railway with an immense coal and mineral traffic to get a very low average ton mile rate. What would be the value of knowing that the average ton mile rate is, say, one halfpenny when a request is made for an exceptionally reduced rate for a large consignment of bicycles, or valuable furniture, or any goods which combine lightness with exceptional size ? To rely solely on a low average ton mile rate under such circumstances would be to court an unprofitable transaction. It is obvious, therefore, that while ton mileage figures may be useful, or interesting, they are not infallible.

Arguments for and Against.

But let us take some of the arguments for and against set out in the report of the Departmental committee. Considered from the point of view of management and control, it is admitted, the committee say, that large average statistics, such as those based upon ton miles, which can only be obtained some weeks after the period to which they relate, can in no way be used to replace rough and ready statistics which are immediately available. Many witnesses emphasised the necessity of continuous supervision and check by subordinate officers in order to secure the efficient loading and economical working of trains. They expressed the opinion that the information furnished by the daily dissection of guards' journals, by daily and weekly records of the loading of trains and wagons, and of the tonnage at principal stations, by the average earnings per goods and mineral train mile, and by similar detailed returns, is quite

sufficient for the proper working of a railway without the addition of ton mile statistics. They further declared it impossible to replace by ton mile statistics the existing system of supervision. The committee, however, did not think it followed that ton mile statistics are useless, but that while a general manager, for instance, might not find it possible to dispense with detailed figures, yet statistical information for use of the higher officials must be given in a more concentrated form than that prepared for the use of subordinate officials engaged in the detailed operation of the line.

Value of such Statistics.

In a series of paragraphs the report compares the value of ton mile statistics with receipts per train mile as a measure of efficiency in railway working. It points out that while in so complicated a business it is plainly impossible to assemble in a single figure the record of the whole work performed, some useful purpose is served by statistics, which, from their comprehensive nature may be used to indicate in a general way the condition of the business from year to year. At present the only figure of this kind available is the average gross receipts per train mile. Such a figure, however, is only reliable so long as the average rate remains constant. A rise in it may be due either to improvements in loading, to increases in the rates charged, to an increase in the average length of haul, or to an alteration in the relative proportions of high-class and low-class traffic. The average train load in tons is a more reliable figure for such comparisons. The general conclusion they drew was that as a measure of efficiency, statistics as to the average train load give information which is not afforded by figures showing the average receipts per train mile.

A Fallacious Figure.

Another advantage claimed for ton mile statistics is that their employment would result in more attention being paid to the proper loading of every train and every wagon. The railway witnesses, however, were mostly of opinion that this purpose is at present adequately served by the detailed returns as to loading, etc., already taken out by the British railways, and that the average wagon load based on ton mileage is a fallacious figure likely to mislead in that it does not represent the load per journey.

It was alleged that the use of ton mile statistics led to undue concentration of attention upon the securing of heavy loads, to the detriment of public convenience, and to the delay of traffic for the

purpose of getting full loads with a view to the production of a higher figure for the average load.

The committee admit that practically no instance was brought to their notice of any definite increase of earnings or decrease of expenditure in any specific case which was the result of the use of ton mile figures and which could not, or ought not, to have been brought about by other means. In view of the fact that these statistics are large averages, however, the committee did not regard this as inconsistent with their general utility in relation to railway control. They admit that it is difficult to see in what way the average rate charged upon all classes of goods on every section of the line could be usefully employed in arriving at a decision as to what would be a suitable rate for a given commodity to be carried for a given distance. At the same time it is probable, they report, that the average rate would constitute a useful item of information to be carried in the mind when dealing with the rate to be charged for any particular class of traffic. The opinion was also expressed that average statistics must not be employed for purposes for which they are not fitted, but there was evidence that they might be rendered more useful if compiled not only for all classes of goods traffic over the line, but for separate commodities or groups of commodities, over the whole line and over different sections of the railway. With regard to cost, the evidence was conflicting as to how far it is practicable to divide, with some approach to accuracy, the expenditure common to both passenger and goods traffic.

Considering the subject from the point of view of shareholders and of general statistical information, the committee reported that they had not found evidence of a widespread demand for ton mileage figures. Although they are a record of work done in a sense in which train miles are not, they are imperfect in that they take no account of such important things as terminal charges and make no distinction between the various classes of traffic. For instance, 10 tons of coal carried 100 miles in one truck and 10 tons of furniture carried the same distance, but in several trucks, would both be represented by 1,000 ton miles. As a measure of the actual work performed in carrying goods from point to point, however, such statistics constitute a source of information which would be of value not only to railway shareholders but to the public at large. An important

Shareholders' Point of View.

point in favour of ton mileage, it is pointed out, is that it affords a means of judging, over a period of years, the variations in the average loading of trains and wagons, in the average length of haul, in the average density of traffic, and in the average rates charged by the companies.

Useful for Comparison.

The committee also say there is reason to think that a knowledge of the average rate per ton per mile charged by English railway companies would provide material for a more definite answer than can at present be given to the charge, sometimes brought against our railways, that English goods rates are the highest in the world. A more just comparison of the level of the rates in this country and in the United States of America would be rendered practicable if it were possible to produce actual figures to show the average haul in this country. If, as is probable, the average haul here were found to be at most one-fifth or one-fourth of the average haul in the United States it would follow that a comparison of the average rates charged in the two countries would not be fair without taking into account the fact that the terminal charges in this country are a far larger proportion of the total rate than in America.

Fears of Abuse.

Some witnesses were apprehensive of the use to which the statistics might be put by persons seeking material for factious criticism of the railways, if the publication of such figures were required. One, indeed, thought it probable that if the average goods rate were published traders would try to use it against the railways; but evidence given by other witnesses seemed to suggest that the advantages of comparison would outweigh these dangers.

Peculiar Conditions of British Railways.

It was frequently urged by the representatives of the railway companies that the conditions peculiar to British railway business were such that ton mile statistics were quite unsuitable for use in this country. The objections fall mainly under three heads:—(1) The great difficulties which stand in the way of actual compilation in this country; (2) the circumstances which would render the statistics, if obtained, especially inapplicable as tests of efficiency or as a record of work done; (3) the expense of compilation without corresponding advantages.

The committee, in conclusion, expressed the opinion that such

statistics would be useful, but they did not recommend their adoption in face of the railway opposition and the absence of any considerable demand for them by shareholders and the public because "a large part of their usefulness might be lost if their compilation resulted solely from compulsion." They were also of opinion that, however useful they might prove from the point of view of general information, there was not sufficient ground for insisting on their being compiled by all companies unless and until they came to be adopted by a considerable number of the important companies.

Not Recommended.

There were two minority reports. The first, a short one, was signed by three of the members who desired to make ton mile statistics compulsory on the ground that they stand on the same footing as other accounts and should equally be made statutory; that they know no reason why a large part of the usefulness of such statistics might be lost if their compilation resulted solely from compulsion, and that sufficient weight had not been given to the interests of the public which in this matter coincide with those of shareholders.

First Minority Report.

"If the control of the Board of Trade and of Parliament over the railways is to be wise and salutary it must be based on adequate knowledge. Adequate knowledge cannot exist until comprehensive information is produced showing the total amount of the work done by the Railway Companies for the public and the average charge made to the public for doing it."

Finally, they recommended the adoption of schedules drawn up for the purpose of eliciting ton mile and passenger mile statistics.

Three other members signed a second and much longer minority report, the whole tenor of which is directly opposed to these statistics. Briefly put, their objections are that "averages" are of no use whatever in enabling railway officials to determine the efficiency of the service, and cannot displace day to day control. The evidence submitted to the committee tended to prove the uselessness of the ton mile rather than its utility as a measure of efficiency. "It is of importance to remember that this form of statistics has been tried and found wanting by two of the principal railway companies in Great Britain, viz., the Great Western and the London and North Western. The English railway managers who have formerly controlled railways abroad or in the colonies, where this statistic has been compiled, have

Second Minority Report.

come to the conclusion that it is useless in this country." The publication of such information would lead to misleading comparison between railway companies and between different periods for the same railway company. The really important commercial consideration must always be the money earned by a train rather than the number of tons of varying descriptions of merchandise which it contains. A moderate estimate of the cost for ton mile statistics alone for all the railways, would, in their opinion, amount to at least £35,000 per annum.

Outcome of Committee's Report.

The outcome of the committee's report was the passing of the Railway Companies (Accounts and Returns) Act, 1911. This Act follows exactly on the lines of the report. It adopts the skeleton forms of account which appear in the schedules agreed upon by all the members of the committee, but excludes ton mile and passenger mile statistics. It makes annual accounts compulsory, fixing 31st Dec. as the day for the termination of the year, and removes the obligation to prepare half-yearly accounts and hold half-yearly meetings. On the whole it will probably be admitted that the Act makes a long step in a desirable direction, although possibly many critics and students of railway affairs will regret the omission to make the ton and passenger mileage statistics compulsory. Actual experience of the working of the Act and the suitability of the new forms of accounts had not been obtained at the time of writing because the Act did not become operative until 1st Jan., 1913, and the first returns under it had not been issued. But the skeleton accounts scheduled certainly bear evidence of more logical common sense than those of the past. In future it should at least be possible to obtain a clear statement of the revenue from all sources and of the expenditure under the various headings such as maintenance and renewal of way and works ; maintenance and renewal of rolling stock ; locomotive running expenses ; traffic expenses ; general charges ; rates, taxes, etc. An idea of the manner in which this work has been done may be obtained from the forms of revenue and expenditure accounts reproduced in an appendix.

CHAPTER IX

STATE RAILWAYS

Reasons for State or Privately Owned Railways.

In the United Kingdom of Great Britain and Ireland, in the United States of America and in Canada the railways are the property of, and are worked by, joint stock companies. In Europe (to a very large extent), Australia, and South Africa they are the property of, and are worked by, the various States. It may be wondered why there should be this marked difference. Questions of principle, or of public policy had something to do with it, but in the main these questions did not obtain recognition until long after the establishment of railways, and the explanation of the difference in ownership must be sought in other directions. So far as this country is concerned, the development of railways under private ownership was largely a matter of circumstance. At the time when the first steam railways (railways as we know them in the modern meaning of the word, as distinct from the original and primitive forms), were being established, the economic mind of the nation was rapidly tending all in one direction ; the direction of individualism. Adam Smith and his successors had preached the doctrine in opposition to the system of close State supervision and regulation that had prevailed in their day and earlier. Individualism was almost, if not quite, the beginning and the end of their doctrine. They propounded the theory that the State was not fitted either to conduct or to regulate business undertakings. If nations were to attain their fullest measure of commercial and industrial development and success, the less the State interfered the better. Individuals, if left to themselves and freed from the hampering restrictions to which they had been and were subjected, would pursue a policy of self-interest. Each would devote himself to the work for which he was best fitted and for which his circumstances, natural or acquired, were most favourable ; and as a consequence commerce and industry would develop on natural lines and attain the greatest possible measure of prosperity. This policy has been variously called the policy of enlightened self-interest, individualism, Free Trade, or *laissez-faire*.

Concurrently with this development of economic opinion and the gradual putting of it into operation the industry and commerce of the country were expanding rapidly and wealth was being accumulated in greater volume than ever before. The capital required for railway construction and equipment was available, and as its possessors had the required enterprise to apply it to that purpose, State assistance or State ownership were unnecessary. Many mistakes were made in those early days. There was much that in later times would have been called "wild cat speculation"; schemes were promoted for which there was no demand, no real reason, and which had no possible prospects of ultimate success; and the capital invested in them was wasted. Such are always the penalties attending the initial stages of new industries under an economic organisation such as ours. And the projects to which these criticisms did not apply, which were destined ultimately to be successful, were not without their faults. To mention but one of them—they were relatively too parochial, or too provincial; they lacked national scope and completeness. It was thought sufficient, for instance, to construct a railway from London to Birmingham, and another from Birmingham to Liverpool. Thus what is now a great trunk line was originally in two sections. And there was a short railway from Leicester to Swannington (a small place within the county of Leicester, intended for a purely local service—the transport of coal to Leicester. Parliament did not help any of these schemes; it neither found them capital nor land, nor even helped them to acquire land on reasonably fair terms. It did not interfere, except in ways which now seem open to criticism, because, instead of facilitating the construction of railways, it really made their initiation and creation more costly than ought to have been the case. The railway systems of to-day might possibly have been better (though the possibility is not to be accepted as a certainty) had there been State construction and ownership. The State might ruthlessly have cut down the exorbitant demands of landowners; certainly the preliminary expenses of promotion would have been less than they were. The railways might have been less heavily burdened with capital, and the systems might have been laid out more comprehensively on national lines and with less duplication and overlapping, had we been given a State system rather than

Why British Railways are Privately Owned.

private systems. Even these advantages, however, are not admitted by the critical opponents of State railways. But if Parliament had exercised a wise controlling hand ; if it had been less jealous of its own powers and privileges and had given to some specially created body power of inspection, supervision and direction we might have had a better national system ; one less expensive and one in the evolution of which less wealth would have been wasted. But, as has been said, Parliament only interfered in ways that are now criticised ; ways that added to the original cost.

Notwithstanding all this, however, the system, or systems, evolved were until quite recent years the subject of national pride and foreign envy. Great Britain had obtained a national system comprehensive, efficient, and prosperous, which cost the State (in other words, the taxpayers) nothing, which was and is a large source of revenue[1] to the State chiefly in the sphere of local, or municipal government, and which in addition has been a source of profit to investors.

European Policy.

Foreign experience has been very largely, though not quite entirely distinct from this. It is now customary for controversialists to speak of Continental State ownership of railways as the outcome of an enlightened national policy having clearly in view the requirements of the nations in question. According to this view the European governments either constructed or acquired their railways because they desired to work them, say, in conjunction with, and as supplementary to, the national system of protective import tariffs. The argument is that if the governments desired to shape the development of their natural resources and to promote national industry and commerce, it was futile to leave privately-owned railway companies with the power to modify these protective measures by such things as low rates for imported produce carried in bulk. There seems to be no possibility of doubt that in the case of Prussia these, or similar ideas, had their influence in shaping the national railway policy ; it is not questioned that the Prussian railways were acquired and have since been extended and conducted with the object of facilitating national development.

[1] The amounts paid as rates and taxes by British and Irish railway companies in the last five years given in the returns were : 1908, £4,884,442 ; 1909, £5,010,378 ; 1910, £5,102,311 ; 1911, £5,078,853 ; 1912, £5,136,203. In addition they paid each year well over another quarter of a million as Government duty.

Another argument advanced is that the States became the owners of their railways because they desired to hold the balance evenly between traders, to help traders by working at the lowest possible rates, and to work also in the interests of the railway employés. But when the history of the railways comes to be enquired into there is a distinct suggestion that these fine altruistic theories are in the main mere after-thoughts developed in the light of subsequent experience, which itself was shaped more in conformity with the demands of shifting public opinion, than a perfected theory such as that now put forth ; that the States took over the railways not always because they wanted them, or because they had any of these theories in mind, but because, for financial reasons, they had to ; because private railway finance broke down. In " new " countries, such as Australia, quite different considerations have actuated governments. The natural resources of new countries can be opened up much faster with railways than without them. With a population still small and natural resources merely latent, private enterprise is not always very ready to find capital for railways, though the experience of the United States of America furnishes a conspicuous example to the contrary. In the main, therefore, new countries, if they were to have railways on at all a comprehensive scale, if they were not to wait long for them, and if the opening up of their natural resources was not to be a slow process, had perforce to make their own railways ; and at the outset their taxpayers had to pay for them indirectly.

Altruistic After-Thoughts.

It will be seen, therefore, that different countries pursued the policy best suited to the conditions prevailing at the time, and, as has been said, it is only within quite recent years that we have heard any suggestions that the British system, both physically and theoretically, is not the best. That, of course, may be but another instance of our national insularity, but still it is so. Why then the change in opinion, partial though it may be ? Why the loss of the prevailing satisfaction ? Why the criticism of private ownership ? Why the suggestion that State railways would be an infinitely superior thing ? No simple comprehensive answer can be given to those questions. The change has come because of a variety of reasons. For one thing there has been an immense change in opinion as to the directions in which the State may usefully act. We are no longer

Why the Change in British Opinion ?

individualists in the former acceptation of the term. It is no longer held that a policy of enlightened self-interest is all sufficient. The State has stepped in gradually to regulate first one sphere of industrial or commercial activity and then another until at last the idea of such interference has become so familiar that the majority accept it unquestioningly as something quite right and necessary. From being individualists we have become more or less socialists, although we may not wear the red tie nor subscribe to some socialistic organisation. And the socialists themselves have helped to familiarise the public with the idea by preaching State ownership insistently in season and out of season. We have become used to the idea of a State postal service, a State telegraph service, and now State telephones. From these to State railways is but a more or less large progression according to the mental constitution of the individual. The growth of international competition has been another cause of the change. As business men have had to fight harder and harder to maintain their markets, not only abroad but also at home, they have, especially in the latter connection, looked closely for reasons why foreign goods can reach the inland towns of England on such extremely favourable competitive terms. Among other things they have found the very low combined rail and shipping rates from the countries of origin. Naturally, when they find their competitors deriving so much assistance from bounties in the shape of reduced rates given by State railway systems, they are apt to regard those systems as something eminently to be desired. There is much misunderstanding on the subject, as will have been seen from the earlier chapter dealing with the allegations that the British railways grant preferential rates on foreign imported produce ; but when the misunderstandings are cleared away the fact remains that European State railways do grant reduced rates on domestic produce exported from their country and not on that which is imported. British railways, on the other hand, grant reduced rates both ways, and, purely as circumstances are, it happens that the reductions on imported goods are taken most advantage of ; at any rate, more is heard of them than of the reductions on exports. In this way there has developed a party in favour of the nationalisation of British railways.

Spread of Socialism.

Another force influencing opinion in the same direction has been

the attitude of trade union labour. To a much larger extent than ever before the trade unions are permeated with socialism ; but this is not their aspect to which reference is intended : it is the call for State regulation of and intervention in labour conditions. In recent years this has been so loud and insistent as not to be denied. In some respects this intervention has not been completely successful from the labour point of view, but still it has not been without its effect on railway working. Its culminating point was reached when the Government stepped in to end the recent strike by setting up Wages Boards. Its effect is twofold. It encourages the aspirations of railway labour for a State-owned system under which it is believed conditions of work will be infinitely superior to anything experienced in the past. Under such a system the railway employé hopes to get, and believes that he will get, a shorter working day and increased payment. On the other hand, the opinion has been expressed that the continuance of this kind of interference will place such a burden on the railways that ultimately the state in common justice to the present stockholders, who have become financially interested solely as investors, and from a business point of view, must acquire the railways and work them along the lines of policy recently developed.

Influence of Trade Unionism.

Finally, another circumstance has been pointed to as working in the direction of nationalisation—what has been described as "the breakdown of competition." It cannot be maintained that competition between the various companies working in the same territory has altogether ceased. In a variety of ways it exists and the public derive benefit from it. And as long as two independent companies serve the same district there must always remain a basis of competition in their working. It may not be very active, but there it is. To mention but one instance, there is always the fact that the shorter distance will govern the rate or fare as the case may be. But while this is so there has been in recent years a very great advance in the direction of eliminating competition. Working agreements have been made between groups of companies to "pool" traffic in districts where their interests have hitherto clashed. As examples of this may be mentioned the arrangements made by the London and North Western and Midland companies in respect of season tickets, etc.,

"Breakdown of Competition."

to which more extended reference has been made in earlier chapters. Where the two lines both touch two towns the holder of a season or contract ticket between these towns may use either line indiscriminately, no matter with which company his contract may be made. Similarly, certain kinds of carted goods traffic will be collected by the carts of either company. In the treatment of claims the existence of these working agreements enables the companies to act together ; in fact, there is now a Clearing House joint claims committee. Not less important has been the reduction in competing services which the agreements have enabled the companies to bring about. In short, the agreements, it is believed, have enabled the companies to effect considerable economies. From the public point of view the question is : What will this develop into ; where will it end ? Competition, it will be remembered, was largely relied upon by Parliament to obviate the necessity of close regulation for the protection of the public against the possibly bad effect of quasi-monopolistic conditions. If competition continues to diminish ; if more and closer working agreements are made, and the companies, though still possessing their separate entities and separate organisations, become in effect little less than one huge industrial concern, what becomes of the regulative and protective force of competition ? It must diminish proportionately to the increase in the number and extent of the working agreements, and its complete destruction is not altogether beyond the bounds of possibility. If that should happen, what would take its place ? Nothing else could do so, but an increased and increasing regulation by the Government, or the State. The question has been asked whether the State is capable of exercising the extended and more intimate supervision required to replace the lost influence of free competition ; and if it is, ought it, in justice to the stockholders, to be exercised ? Some of the foremost authorities on what may be called railway politics, men of recognised ability who have considered the question from this point of view, are of opinion that the elimination of competition means ultimately that the State must take over the railways and work them. Some are not enamoured of the prospect. They believe that under State ownership there would be a loss of efficiency and that quality of adaptability so essential to their conduct on commercial lines ; and they believe that financially also there would be loss of efficiency ; that the

bargain must inevitably be a bad one for the State. Yet they believe that in the eventualities foreshadowed, nationalisation must come.

Arguments for Nationalisation.

It must not be assumed from this outline of the development of opinion that there is as yet a majority of the population in favour of nationalisation. Whether there is or not has never been tested, and possibly there will never be any direct test. But it is certain that originating in a variety of circumstances, and developing along the lines indicated, there has been in the last decade or so a distinct growth of public opinion in favour of State acquisition and operation. The arguments advanced in favour of State action may be briefly summarised under the five following headings—

(1) The socialists would welcome it because it would be a large step forward towards the attainment of their ideals.

(2) Traders desire it because they believe it would be possible to obtain reduced rates and fares through the systems being organised with a greater regard for the requirements of commerce rather than the earning of dividends.

(3) Some favour it because they believe that the profits realised from a national industry such as transport should be applied to the relief of taxation.

(4) Social reformers look to it as a means of helping their schemes for the rehousing of urban populations in suburban and rural districts.

(5) Labour organisations look to it as a means of securing better working conditions, shorter hours, and higher wages.

Mutually Destructive Reasons.

One brief, simple reply is often made to these reasons—that they are mutually destructive. If the railways are to be nationalised and used as instruments for the accomplishment of social and labour projects, then they can neither be expected to realise a profit for the relief of taxation, nor to give reduced rates and fares to the trading and travelling public ; and, of course, this line of argument applies conversely. But the subject is much too large and important for a series of arguments such as these to be disposed of so summarily. It is, of course, true that all these ends cannot be attained concurrently with complete success. The real question is as to whether State

ownership is desirable. When, and if, that is decided affirmatively, will come the question as to which line of policy is to be pursued—are the railways so acquired to be worked for a profit in relief of the National Exchequer, or are they to be worked for the benefit of trade, labour, and the social advancement of the nation ?

German Experience.

Advocates of nationalisation from the business point of view seek support for their arguments principally in the experience of Prussia and Belgium. The case for the affirmative in connection with Prussia was very ably put by Professor Hermann Schumacher[1] in a paper submitted to a Congress of the Royal Economic Society in January, 1912. Very briefly summarised, his argument was that the Prussian railways were not nationalised for either military, commercial-political, or financial reasons, but to make them subservient to the economic interests of the nation. While private enterprise provided adequately for the industrial west, the agricultural east, not proving so attractive to privately owned capital, was poorly served. State ownership enabled this inequality to be remedied. It also made possible the abolition of differential rates such as occur under private ownership, and thus gave the State the opportunity of securing the measure of uniform treatment necessary to secure the even and widespread development of the resources of the country, both natural and human. The author of the paper claimed that the nationalisation of the Prussian railways had fulfilled every expectation. It had saved the German people thousands of millions of marks ; it had removed the evils connected with differential railway rates ; it had enabled the Government to foster a policy of industrial development ; it had offered almost unlimited scope for economies. Financially, the results were described as magnificent. The gross working profits had risen from 222,000,000 marks in 1883 to 548,000,000 in 1908, the aggregate since nationalisation had been 12,000,000,000, and after payment of maintenance and preservation expenses out of revenue, a total of nearly 3,000,000,000 marks out of the surpluses had been placed at the disposal of the State for other purposes.

At the same Congress Professor Ernest Mahaim (Liége) dealt with the experience of Belgium, where the State, for politico-economic

[1] Professor of Economics in the University of Bonn.

reasons, constructed and worked the main lines and left others to private enterprise, but ultimately had to take over most of these private companies "for reasons of general policy and to secure the economical working of the railways." He claimed that under the State the railways had been worked to promote the industrial and commercial expansion of Belgium, but at the same time they had been worked as a service which should neither be a national charge, nor a fiscal expedient, but which should be required to cover its expenditure by its earnings—*i.e.*, at cost price. As an illustration of this he mentioned that from 1835 to 1908 the average annual profit had worked out at 0·054 per cent.

The Railways of Belgium.

The State railways of Holland and Denmark do not, as a rule, furnish many arguments for the controversialists. In both countries the systems have to work in competition with very considerable facilities for transport by water and have to do their work cheaply in order to obtain any traffic. And it seems to be generally admitted that in the early days of railway enterprise capital was not attracted to either country with the result that failing provision by the State both would have been faced with the alternative of possessing no railways or of having to wait a very long time for them.

Holland and Denmark.

Australia and South Africa are used as examples of State action to promote the development of "new" countries and of the manner in which a necessary service can be given to regions, or districts, which the private capitalist would not contemplate as offering a favourable investment.

Australia and South Africa.

As there are two sides to every question, so we find, when the arguments of opponents of State railways are considered, that a very different opinion is entertained concerning all these national systems. In the case of Germany it is admitted, even by supporters of State action, that nationalisation has proved a bad bargain for the smaller States because their systems are not large enough to permit the best results to be obtained. The Prussian railways, from the point of view of the critics, are anything but what they are made out to be. They admit, of course, that German export trade has received incalculable benefits from the specially low rates made with the object of extending it. But when it comes to the internal

Criticism of German Results.

movement of merchandise they contest, point by point, the arguments that German traders are better served than British when actual conditions are properly contrasted. Their assertion is that the low German rates often quoted against British rates, to the disadvantage of the latter, are for an infinitely inferior service which does not include collection and delivery (for which separate charges are made by forwarding companies altogether independent of the railway companies), and that the service performed by the railways is solely that of haulage and at much slower speed than that attained in this country ; slower speed not so much in actual travel along the railways but in the time occupied from handing in to delivery. Where quicker delivery is required higher rates are charged. It is also asserted that less liability is taken for loss, damage, mis-delivery, and delay than is normally accepted in this country. Equality of treatment, upon which so much stress is laid by advocates, is also criticised. Of course, unjust preference is denounced by the critics, but they contend that equality of treatment under State systems becomes too rigid ; that it does not allow of sufficient elasticity in dealing with special circumstances ; and that if railway rates were always framed on this basis in regard to distances there would often be cases where manufacturers were excluded from markets that otherwise are available to them when the system pursued is that of "charging what the traffic will bear." The favourable financial results upon which the other side lay stress are alleged to be due to the starvation of the system ; if it were kept in as efficient a state as it ought to be, such as that maintained by British and American railways, then the financial results would be very different. A greater contrast than that afforded by these two sets of opinions it would be difficult to imagine. Fortunately the object here is merely to state them, not to pronounce judgment upon them.

Special Circumstances of Belgium.

Conditions in Belgium are subjected to quite as severe criticisms of a different kind, though one of them is similar—the financial aspect. An average annual profit of 0·054 per cent. (fifty-four thousandths of 1 per cent. !) in seventy-four years is regarded not merely contemptuously, but questioningly. Apply the position to any business. Would the proprietors of any concern which made such a microscopical profit over such a period of years consider that they

had made such a profit at all ? Rather, it is suggested, they would seriously consider whether they had not really made a loss in view of the intangible things such as depreciation, the calculation of which can never be made exact. There has been a great deal of criticism directed to the Belgian railways (some of it apparently very sound criticism), and one of the points made is that no one can possibly say that they have made an average profit of even fifty-four thousands of 1 per cent. because the accounts are so confused and unsatisfactory that it is impossible to say what is the amount of the capital employed, or the real expenses of the railway. The critics are more definite when they deal with the abuses to which they assert State ownership gives rise. These are in the nature of indirect bribery and corruption for the purpose of securing votes. It is stated that in Belgium the existence of a large class of railway employés who are also voters, has led to the over-staffing of the railways and to the treatment of the staff on lines which would not be countenanced on privately-owned railways. Also it is stated that because of the same political influence money has been lavished in one place on such things as station accommodation and equipment while other places have been starved.

French Experience.

France furnishes the strongest argument of the opponents of nationalisation. From the very first the French investor fought shy of railways, and in the end the Government found it necessary to undertake the work of constructing the road-bed, bridges, stations, etc. Concessions were then made to companies who were to lay the rails, provide rolling stock, and work the railways. In this way the main lines of France were provided and the impetus thus given to development encouraged private enterprise. To trace the subsequent history with all its vicissitudes would involve detailed treatment such as is unnecessary to the purpose immediately in view, but ultimately among other things the State had to extend the term for which concessions had been granted and to guarantee interest on capital. For a long time it also worked a short line (3000 kilometres), and of this experiment it has been stated that the management was "generally considered of a mediocre and unprogressive character,"[1] while "from the financial point of view the results given by the

[1] M. Pierre Leroy-Beaulieu's paper at the Royal Economic Society's Congress.

old State railways have always been bad." On 1st Jan., 1909, the State took over the Western Railway, which appears to have been a most unsuccessful undertaking, never earning sufficient net revenue to enable it to dispense, as did other companies, with the State guarantee of interest. Concerning this experiment M. Leroy-Beaulieu writes that State management in 1911 cost the taxpayers 50,000,000 francs more than the worst year, and 62,000,000 more than the average year, of the old company. From 1909 to 1911 gross receipts rose from 219·3 to 231·4 million francs, working expenses from 152·8 to 207·3 millions, the net product fell from 66·5 millions to 24·1 millions, and the deficit on capital charges rose from 35 to 77·4 million francs. Four-fifths of the increased expenditure, it is pointed out, is on account of expenses of personnel, and the author states that it is due to an excessive increase in numbers which he attributes to political influences. He also criticises very severely the inefficiency, ineptitude and rigidity of the management. Perhaps the most striking illustration of this which he gives is contained in the following quotation from the letter of a stationmaster read in the French Chamber—

" In the time of the Western Company we stationmasters had orders to use the rolling stock as quickly as possible, and to send to a given station all that we did not ourselves require. Under the State all is changed. Every stationmaster is forbidden to load any wagon without the orders of the distribution bureau of the district. This bureau is, as is well known, a new creation specially designed for the purpose of finding situations for so many more bureaucrats. Recently, having received two wagons loaded with horses, accompanied by an order to send these wagons to Caen after they were unloaded, I thought to do well by loading in these two wagons 200 sacks of grain, which had been waiting in the sheds for several days to go to Caen. But, alas, I did not know the bureau of distribution. The next day I saw my two wagons return, and I received at the same time an order to unload them. I was reproved into the bargain for excess of zeal. I had to obey the order. That evening I sent the wagons empty to Caen. Next day I received two others also empty, into which to load the grain."

One other quotation may be given from the same source—

" Complete disorder, in fact, reigns in the administration of the State railways. This administration which in three years has not succeeded in making an exact inventory of its material, is also ignorant of the exact number of its employes in different classes."

The operation of the Italian State railways has been described as " so defective as to attain the proportions of a public scandal,

if not a national disgrace." It is alleged that instead of the Minister of Railways controlling the railway servants they intimidate him.

Other Criticisms.

Australian State railways, the critics declare, are unprofitable and a drain on the State, while the difficulties arising from political pressure have forced the governments to appoint commissioners with very wide powers to manage the railways as would a board of directors. In New Zealand the railways are described as having been constructed and worked for development purposes, and particularly the provision of employment. As to the financial results, it has been stated that for twenty years the Dominion had been losing at the rate of £350,000 per annum. That, of course, is a relatively small sum taking all the circumstances into consideration, but it is significant, from the point of view of the critics, when considered in relation to the fact that the construction of the New Zealand railways was carried out for a sum substantially less than the corresponding figure for this country. If, they argue, it is not possible to show a profit when cost of construction has been so light, what would be the experience of the United Kingdom in view of the inevitably large cost of acquiring expensively-constructed railways such as ours ?

Another argument of the critics concerns the financial aspect of the acquisition of British railways. The price that would have to be

The Cost of Acquiring British Railways.

paid, is, of course, purely a matter of conjecture, but obviously the State would have to be a fair buyer, not a confiscator, of private property. Working on this basis, in the light of the powers possessed, and taking into consideration the nature of the various stocks into which railway capital is divided and the rates of dividend, the *Railway News* has calculated that for the British railways (English, Welsh, and Scottish, Irish being excluded), the fair price would be £1,759,818,000. The total capital of these railways at 31st Dec., 1912, was £1,289,614,000, so that on this basis State purchase would at once increase the capital invested by no less than £470,000,000 sterling. That, of course, would be at the outset a step in a direction antagonistic to the desires of those people who favour nationalisation as a means to secure a profit in relief of taxation, and also of those who look to it to afford cheaper facilities or better conditions of labour. Presumably the medium of purchase would be a specially created railway stock bearing a low rate of

interest. For the sake of illustration assume that the purchase is made by means of Consols at 2½ per cent. per annum. It would not mean an extra 2½ per cent. on £470,000,000. The average rate of dividend on all classes of English and Welsh railways stocks for the year 1912 was 3·58 per cent., so that on the £1,103,310,129 of capital of English and Welsh Railways roughly 1 per cent. would be saved, which is equal to £11,033,101. The average dividend for Scotland was 3·07 per cent. for the same year, so that on the £186,304,376 of Scottish capital the saving would be roughly £931,521. The total saving on the existing capital at the rates of dividend mentioned would thus be £11,964,622. Against this has to be set the 2½ per cent. on the extra £470,000,000, or so, of capital required for the purchase which would amount to £11,750,000. The net result would be a decrease of £214,000 per annum in the requirements for interest on the national railway security as compared with the dividends at present paid on the existing stocks. A saving of less than £250,000 would not go far towards the attainment of the objects referred to. Put in another way the figures are not much more hopeful. The net revenue of the railways of England, Wales and Scotland in 1912 was £45,625,657. The amount required to pay 2½ per cent. interest on the *Railway News* figure is £43,995,450, which would leave a surplus of £1,630,207. That again would not help the nationalisers very much. It may be said that the *Railway News* figure is excessive; and there is no reason why the Government should pay so large a premium on the face value of the existing railway stocks. On the other hand, it may be argued that it would be necessary to pay more than 2½ per cent. per annum on any new Government railway stock issued, and that the higher rate would swallow up the surplus shown by the figures taken. Naturally all these calculations must be purely speculative, but even so they serve to illustrate the position. There is, however, another financial aspect which deserves consideration and that is the effect of the purchase on national credit. The National Debt, funded and unfunded, at 31st March, 1913, was £661,473,765; to add to it the *Railway News'* £1,759,818,405 would make it £2,421,292,170, or over three times as much as now. It would be debt incurred for what may fairly be termed reproductive purposes (though in the strict sense of the word it would not be so, for transport is not a productive undertaking

but really a charge on production); but still it would be debt, and the greater the National Debt the weaker is the country's credit. Lowered credit means depreciated market value of the securities which represent the debt. A further argument on similar lines is that the creation of so much additional Government stock would mean such a flooding of the market with additional trustee securities that again credit would be weakened by the pulling down of the value of the whole range of these securities. Such an occurrence would not merely mean the reduction of a paper or nominal figure of value; something printed in an official Stock Exchange list. It would mean that, of course, so long as the owners of trustee securities were able to hold their stocks and were not forced to sell them. Such things are not held for ever. They are sometimes passed on from generation to generation, and the holders from time to time receive their dividends on the full face value of their stocks, which means that as long as they retain their ownership their income is undiminished. But if realisation were necessary, sale under the conditions mentioned would mean a serious diminution of capital in comparison with its normal amount.

Inefficiency of State Management.

It is not necessary to dwell on the arguments that State management is inefficient compared with that of private companies; that the State cannot get as much labour out of its employés as does the private employer; that the economies which are supposed to result from unification of management are gravely illusory, or that Parliament has neither the time for railway business nor a sufficiently defined railway policy to enable it to assume the ownership, and direction in large matters, with satisfactory results. The arguments on both sides have been presented as comprehensively as possible, but the subject is one that really demands a book to itself, and it will have been realised how directly conflicting are the opinions of the supporters and the opponents of railway nationalisation. With that the final decision as to which set of arguments is right, or, if neither is completely convincing, which is the more expedient policy, must be left to individual students of the question.

CHAPTER X.

GOVERNMENT CONTROL DURING THE WAR

IT will have been realised from the preceding chapters that this volume, as originally published, was written prior to the European War of 1914–18. The war drew a great dividing line across railway history, ending a well defined period and opening another. What has been written concerning the years prior to 1914 remains good; it is a history of great achievements under the former organization of British Railways. The reprinting of this volume gives an opportunity of saying something as to what has happened in the interval between 1914 and 1920; but the new period is too near its opening, and the reorganization, which (at the outset at any rate) must necessarily be its chief characteristic, has not yet reached even the experimental stage, being, so far, merely "on paper," for it to be possible to reach final conclusions of any value.

The Great Dividing Line.

Immediately war was declared the Government acted under the powers conferred on them by The Regulation of the Forces Act, "Commandeered" 1871, and took possession of most of the railways of the country. The official announcement on the subject issued by the Board of Trade was as follows—

Railways.

GOVERNMENT CONTROL OF RAILWAYS:
TERMS OF COMPENSATION.

The Regulation of the Forces Act, 1871, under which His Majesty's Government have taken possession of most of the railroads of Great Britain, provides that full compensation shall be paid to the owners of the railroads for any loss or injury they may have sustained thereby, the amount of such compensation to be settled by agreement or, if necessary, by arbitration.

His Majesty's Government have agreed with the Railway Companies concerned that, subject to the undermentioned condition, the compensation to be paid them shall be the sum by which the aggregate net receipts of their railways for the period during which the Government are in possession of them, fall short of the aggregate net receipts for the corresponding period of 1913. If, however, the net receipts of the Companies for the first half of 1914 were less than the net receipts for the first half of 1913, the sum payable is to be reduced in the same proportion. This sum, together with the net receipts of the Railway Companies taken over, is to be distributed amongst those Companies in proportion to the net receipts of each Company during the period with which comparison is made.

The compensation to be paid under this arrangement will cover all special services such as those in connection with military and naval transport rendered to the Government by the Railway Companies concerned, and it will, therefore, be unnecessary to make any payments in respect of such transport on the railways taken over.

BOARD OF TRADE,
15th September, 1914.

Financial Arrangements.

This announcement, it will be seen, says more about the financial than the operative side of the arrangement, though possibly the latter may be regarded as the more interesting from some points of view. The financial side of the arrangement was peculiar. It has been varied since originally made. For instance, in March, 1915, railwaymen's wages were increased and it was agreed that the proportionate deduction which was to be made "if the net receipts of the companies for the first half of 1914 were less than those for the first half of 1913," should not be made, but "that 25 per cent. of the war bonus granted to railway employés who come within the railway conciliation scheme should be borne by the railway companies and not by the Government." The long continuance of the war and its consequent holding up of necessary works of renewal and extension also called for some modification of the original agreement, and the companies were permitted to make provision for these necessary works before arriving at the balance of their net receipts, even though the renewals or extensions had not been, and could not be, carried out.

These modifications, however, did not affect the principle of the arrangement which set up a standard of net receipts, or profits, and as actual profits under the control fell below those of the standard period, the contribution of the Government under the guarantee increased or diminished. The effect of the arrangement was two-fold. On the one hand it secured the financial position of the companies. Whatever might happen under the control, the monopolising of their services by Government traffic, or the curtailing of their facilities for public transport owing to the exigencies of the war, their former financial position was to be maintained. On the other hand, the guarantee relieved the Government from the necessity of paying directly for the work done on their behalf, such as the running of troop trains. This must have been an enormous convenience and a great saving of labour.

Operating Arrangements.

The railways became one system so far as war traffic was concerned (the movement of troops, ordnance, stores, and the ten thousand and one things used in the war), but the ordinary business of the companies went on as before, subject, of course, to the requirements of the war traffic. The administrative and operating staffs remained the same, except for the depletions arising from the war ; the general managers and Boards of Directors remained the same, except, of course, for such changes as arose through the effluxion of time (which would have happened in the ordinary course had there been no war), or through the Government "borrowing" the services of railway officials for other work. For instance, the original Coal Controller was Sir Guy Calthrop, General Manager of the London and North Western Railway Company, and the staff of that department included many railway officials. None of the old organization of the railways was dispensed with. On top of it, however, was imposed a small central, or executive committee composed of railway officials and directors who had absolute and unquestioned control of all the systems taken over so far as war traffic was concerned ; and as time elapsed their control extended in other directions. To them the requirements of the War Office were notified, and they had to organize the necessary transport and issue their orders to the various companies affected. In this way the former barriers between the companies were broken down, and the different systems worked as a single unit where Government traffic was concerned. Troop trains passed from one system to another without any of the previous formalities being observed ; in effect there was no "foreign" rolling stock on the lines. The sole consideration was to get the Government traffic over the quickest, or most convenient, route, irrespective of the number of the different lines over which it passed.

A State System—with a Difference.

It will be seen, therefore, that during the war there was virtually a State railway system, but it was a State system with a difference. The arrangement was, of course, an immense convenience to the Government, in fact it was an indispensable necessity for the proper conduct of the war ; but the experience gained has been of no value to the student of that perplexing problem, the State ownership of railways. Everything was subordinated to the

requirements of the war. Passenger services were curtailed and withdrawn; ordinary goods and minerals traffic was delayed because the requirements of the Government were so large that it could not be moved; and as a consequence industrial establishments were sometimes brought to a temporary standstill. And at the time of writing, well into the third year since fighting ceased, there are still vexatious curtailments of services and delays in traffic which are the after effects of the extreme disorganization from which the railways suffered, and the drafts made on their personnel and material, when the pressure of war reached its maximum. In ordinary times such conditions would have provoked an outcry of very considerable proportions. A Government system that could not do better than this would never be tolerated in this country. As an example of State ownership, therefore, the experience of the past six years has been of no value. The systems have not been worked on normal lines for the benefit of the public, but on abnormal lines to suit military requirements. The student of State ownership will still have to base his final conclusions on the conditions as they existed prior to the war.

There have been two remarkable developments during this long period of railway control; (1) the railways have ceased to be as profitable as they were; (2) a Ministry of Transport has been created; and these subjects may be dealt with in the order stated, the second being reserved for Chapter XI. First as to the loss of profit. There has been some unjustifiable mystery and much misunderstanding on this subject, and, remarkable as it may seem, the spokesmen of the new Ministry have been largely responsible for this. During the period of the war the usual railway statistics became disorganized, and, although it did not require much hard thinking to reveal the fact that much civil traffic that formerly was remunerative had disapperaed from the railways, and its place had been taken by Government traffic, on account of which no direct payment was made but which was paid for indirectly under the guarantee, it came as a rather severe shock a few months after the armistice to find the Minister of Transport telling an astonished House of Commons that the railways were losing at the rate of 60 millions sterling per annum. How the loss arose was

Reduced Profits.

not made clear, nor the period over which it extended; and subsequently the Minister and others were responsible for exasperating variations in their statements as to the extent of the loss, until finally they put it at 50 millions, which in the end was inaccurate.

To say the least, it was rather an alarming statement that companies, which in 1912 had earned a profit of over 47 millions, had lost, under State control, 50 millions. Fortunately, it is now possible to dissipate some of the mystery. *The Economist* is responsible for a statement that: "up to the end of 1918, the railways earned more than the Government Guarantee," and in the issue of 17th January, 1920, *The Statist* published a tabular statement of the revenue and expenditure of the controlled railways of the United Kingdom for the seven months ending 31st October, 1919, which showed a balance of earnings over expenditure of £12,355,357. The table further showed that to meet the Government guarantee referred to in the earlier part of this chapter, the *pro rata* amount required for the seven months was £30,216,500. The proper statement of the position, therefore, seems to be not that the railways, in 1919, lost 50 millions (or in fact any other of the varying amounts which were mentioned), but that while still making a profit, their net earnings fell below those of 1913 (their basis year) by some millions, which the Government have to make good under their guarantee.

But even this modified statement of the position may seem alarming without explanation of its causes. No one thing is entirely responsible, and, bitter as have been the complaints made from time to time concerning the Government's handling of the railways, it would be a most unjust thing to lay all the blame at the door of the Government. In common with so many other industries, the railways have felt the paralysing, exhausting consequences of the war; perhaps they have felt it more than any other essential industry because of the peculiar nature of the services they render and the "plant" used in rendering them. Almost at the very outset of the war it became necessary to abandon valuable sources of revenue. For instance, very soon they had to curtail passenger services, and tourist and excursion traffic was abandoned entirely. And as the war dragged on, increasing its seemingly exhaustless demands on the manhood of the country,

Causes of the Retrogression.

things went from bad to worse from the purely railway point of view. The denudation of their "fit" male labour was carried, probably, to the utmost possible limit consistent with the safe conduct of the services which the Government found it expedient and necessary to leave to the public. Restricted services and a deficiency of fit experienced labour, of themselves, mean greater relative expense in working. Nor was this all. There came a time, it will be remembered, when the conduct of the war demanded, imperatively, a large increase in the communications in the rear of our lines in France. There was only one quick, serviceable way of getting the required increase—by using some of the home facilities. And so thousands of railway wagons and many locomotives were taken out of service in Great Britain and shipped to France. In places, even permanent way was sent to the same destination. Some unimportant cross country lines were taken up wholesale and the service abandoned; in other cases, sometimes on what had become important suburban lines, one pair of metals was taken and such service as was allowed to remain was given by means of a single line. It is doubtful whether any exact public statement of the number of wagons and engines transferred to France has ever been made, but these significant passages occur in a white paper issued by the Ministry of Transport in the first half of 1920—

"The stock of locomotives available for traffic on the sixteen principal railways on the 30th June, 1919 [seven months after the armistice] was 17,743, a decrease of 1,186 compared with the number available at the end of 1913. . . . These sixteen principal railway companies in Great Britain had actually in traffic on 30th June, 1919, 650,606 wagons, or 45,315 less than on the 31st Dec., 1913."

No doubt, the decrease in the number available under both headings was not attributable entirely to the rolling stock sent to France. It may be so, of course; but on the other hand it has to be remembered that during this strenuous period it was impossible to execute repairs with the former promptness, and, as a result, the number of engines and wagons constantly out of service awaiting repairs was considerable.

The profit earning powers of the railways were curtailed in other directions besides these. Every expense of railway working has increased in common with those of all other industries. Coal, iron

and steel, wood, paint, every "store" in fact, has risen enormously in price. And labour costs have advanced possibly to an even greater extent in the aggregate. It was inevitable, of course, that the wages of railwaymen should follow those of other industries, although it is but fair to add that the remuneration did not increase in anything like the proportions of that obtained by munition workers. Relatively, the improvement in the position of the railwayman was insignificant. In the aggregate, however, the additional burden placed on the companies became considerable. The increases were given in the shape of "war bonuses" which ultimately totalled 38s. per week. The minimum pre-war rate for an adult was somewhere about 20s. per week so that with bonus added, it became 58s. In 1919 there was a wages strike. That circumstance is immaterial from the point of view of this book except as leading up to the fact that, as a result, the various minima of the companies were made uniform, the number of "grades" of labour was reduced, a permanent wage basis of a minimum of 100 per cent. above pre-war rates established, and an arrangement made whereby under a system of wages boards, the wages should fluctuate with the cost of living as shown by the Board of Trade Index Number. Since this arrangement a further increase has been automatically awarded by the declared increase in the cost of living.

General Increase in Expenses.

It is obvious, therefore, that the diminution of profit earning powers of the railways has been due to a conjunction of complex circumstances rather than to any one cause, although the remuneration of labour may be predominant. It certainly has not arisen from a falling off in traffic. The White Paper already quoted from, says on this point—

No Decline in Traffic.

"With a decreased number of locomotives and wagons in traffic, and with a shorter working day [the reduction in the hours of work from 11½ to 8 hours per day], the railways are actually coping with a larger volume of work than in 1913. The total number of passengers carried by the sixteen principal railway companies (exclusive of season ticket holders) during the year 1919 was 974,259,966, an increase of 156,278,127 passengers, or 19·1 per cent. as compared with the year 1913. The number of season-ticket holders, equated to annual tickets, conveyed during the year 1919 was 735,172, an increase of 245,692, or 50.2 per cent. as compared with 1913. These season-ticket holders are responsible for from 100,000,000 to 150,000,000 additional journeys, so that the annual carriage of passengers is nearly 300,000,000 more

than in 1913. Freight revenue on the controlled railways during the past year [1919], was nearly £5,000,000, or 7 per cent. more than in 1913, on the basis of the same charges and excluding Government traffic amounting to £21,000,000, of which probably one-half was freight traffic. The total freight receipts were, therefore, approximately 20 per cent. in excess of 1913."

Making Good the Deficit.

There are only two ways of making good a deficiency of profits such as has been indicated—the continuance of the Government payment under the agreement (which, now that the war is over and the volume of Government traffic is probably not a tithe of what it was, means the payment of a subsidy from national revenue), or the increase of the earning capacity of the companies by means of higher fares and freight rates. Subsidies to industries are opposed to our national economic and commercial policy. It is not surprising, therefore, that the Government decided that subsidies must cease within a definite period, and that the railways must be given the power to pull themselves out of their difficulties by the increases mentioned.

As a matter of fact, increases began quite a long time ago. Passenger fares were raised by 50 per cent. at the beginning of 1917. The ostensible reason for this, however, was not the making good of a deficit, because apparently the deficit had not then arisen, but the restriction of travel. The stress of the war was beginning to be more severely felt by the nation. Railway staffs were depleted and their rolling stock was being shipped to France. It was essential, therefore, that railway travelling should be reduced, and if possible, to the barest essential minimum; and a 50 per cent. increase in fares, together with smaller percentage increases in season ticket charges, were resorted to as a means of attaining the desired end. Opinions differ as to the effectiveness of this device in fulfilling the avowed object, but there is nothing to be gained in pursuing that subject. The important fact is that such an increase was made, and that it still remains to swell revenue as working conditions become more normal.

Increases in Goods Rates.

But obviously, the increase in passenger fares was not sufficient of itself to restore the companies to their normal profit earning capacity, otherwise there would be no deficit for the companies and the Ministry of Transport to worry about in 1920. A really serious attempt

to adjust the revenue balance was made in January, 1920, when the following increases in goods rates became operative—

Description of Traffic.	*Increase per cent.*	*Additional flat rate per ton.*
Coal, coke, and patent fuel	25	3d.
Class A Merchandise	30	3d.
,, B ,,	40	3d.
,, C ,,	50	6d.
Classes 1 to 5	60	1s.
Rolling Stock	60	—
Live Stock (Truck rates)	60	1s.[1]
,, ,, (head rates)	60	—
Carriages	60	—
Small parcels	100	—
Returned empties	50–100	—
Merchandise and parcels by passenger train	50	—
Other traffic	60	—

[1] Per truck.

These increases, it will be seen, follow the principle referred to in earlier chapters—that of charging what the traffic will bear. The more valuable the traffic the higher the percentage increase.

Second Increase in Charges.

Not unnaturally, it was hoped that these increases in charges would restore the profit earning power of the railways to its old level. Possibly it would have done so, but the rise in the cost of living gave the employés a further advance in wages under the arrangement already referred to, and, in addition, commodities increased. The railways, therefore, were faced with the certainty of diminished profits notwithstanding the higher charges they had been permitted to make. The Minister of Transport appointed an Advisory Committee to consider the subject and make recommendations as to the measures to be taken to make the railways self-supporting, and to relieve the country of further payments under the guarantee. The Committee made two reports. The first recommended a further 25 per cent. increase in ordinary passenger fares making, with that of 1917, a total addition of 75 per cent to pre-war charges. The normal rate for third-class travel, which had been one penny per mile, thus became 1¾d., and in addition there were increases in the workmen's fares and season ticket rates. It was obvious,

however, that this advance would not bring in sufficient revenue to wipe out the deficit and that goods rates must also be increased. On this subject the Committee presented a report which contained some interesting figures. These stated that the actual deficit for the 3 months, April, May and June, 1920, was £9,900,000, and that the estimated total deficit for the 16 months to 31st July 1921, (by which date the Government desired the deficiency to be wiped out), was £66,000,000. Towards that the increase in passenger fares was expected to yield £17,000,000, leaving a total of £49,000,000 to be found by means of increased goods rates. To produce this sum in 11 months (from 1st Sept., 1920, to 31st July, 1921) the increases in rates would have to be such as would produce £53,500,000 in a year. To raise this money the Committee recommended, roughly, an increase of 100 per cent. plus a flat amount on all pre-war rates.

The Final Goods Rates.

The statement of the increases is too long to be given in detail, but the main classes may be set out, the percentage increase in each case being based on the pre-war rates—

(1) Coal, coke, and patent fuel—
100 per cent. plus a flat rate of 6d. per ton, irrespective of distance, subject to a maximum addition of 4s. per ton.

(2) Merchandise (other than coal and coke) in Class A of the General Railway Classification—
100 per cent. plus a flat rate of 6d. per ton, irrespective of distance, subject to a maximum of addition of 4s. per ton.

(3) Merchandise (other than patent fuel) in Class B—
100 per cent. plus a flat rate of 6d. per ton irrespective of distance.

(4) Merchandise in Class C—
100 per cent. plus a flat rate of 6d. per ton irrespective of distance.

(5) Merchandise in Classes 1 to 5—
100 per cent. plus a flat rate of 1s. per ton irrespective of distance.

(6) Rolling stock—
100 per cent. plus a flat rate of 6d. per ton irrespective of distance.

(7) Live stock conveyed by merchandise train at truck rates—
100 per cent. plus a flat rate of 2s. per truck or part truck irrespective of distance.

(8) Live stock by merchandise train conveyed at head rates—
100 per cent.

(9) Small parcels (as defined in Part VI of the railway rates and charges orders) conveyed by merchandise train—
100 per cent.

(10) Returned empties conveyed by merchandise train or by passenger train or similar service—
100 per cent.

(11) Merchandise and parcels conveyed by passenger train or other similar service (including perishable merchandise—
75 per cent.

(12) Excess luggage conveyed by passenger train —
The existing charges, with an addition thereto of $16\frac{2}{3}$ per cent.

There are, in addition, numerous variations and exceptions, but sufficient details have been given to present an outline view of the steps which the new Ministry hopes will be sufficient to restore the railways to their former prosperity, and relieve the Government of the liability under which they rest as a consequence of having taken possession of the systems in August, 1914. It will have been noticed, of course, that the increases are sufficient to wipe out a 16 months' deficit in 11 months. Obviously, if the calculations on which the increases are based are accurate, and if they do not result in a restriction of traffic leading to a falling off in revenue, the increases in a full year (from 31st July, 1921, onwards, for instance) will produce £4,500,000 more than is required to restore the railways to their former position. It is possible, therefore, that after July, 1921, there may be slight reductions in the charges, indeed, the Advisory Committee when publishing them described them as temporary.

CHAPTER XI

FUTURE RAILWAY POLICY

THE second of the great developments arising out of the war period—the creation of a Ministry of Transport—is probably the more important of the two in that it represents the adoption of a definitely new policy. There has always been more or less of a Ministry of Transport (in fact if not in name), because railway and canal affairs have been supervised by the Board of Trade, at the head of which, of course, is the President, who is a Minister, and, usually though not necessarily, a member of the Cabinet. The creation of a Ministry, however, has taken all these affairs out of the hands of the Board, and further powers have been added—for instance, the general supervision of road transport. It was originally sought to give the new department still larger powers, but Parliament did not go all the way with the proposals. However, the Ministry is in existence and it has a much wider sphere than was possessed by the Board of Trade. It has greater power in initiating reforms for instance, and has already outlined a comprehensive scheme for the future organization of railways. This scheme is so important, and marks such a great departure from the long established policy which has been pursued in these matters, that it seems desirable to adopt the unusual course of setting out the White Paper in full as follows—

The Ministry of Transport.

RAILWAYS.

GROUPING.

It is proposed that the railways of Great Britain should be formed into a limited number of groups, say, five or six for England and Wales, and one for Scotland. The Irish railways naturally fall to be dealt with under the new legislation in regard to Ireland. The groups will be determined on the basis of operating economy, and all direct competition between the groups will, as far as possible, be eliminated. The groups which it is proposed to form are roughly—

1. *Southern*, combining the South Eastern and Chatham, the Brighton, and the South Western.
2. *Western*, the present Great Western system with the Welsh lines.
3. *North Western*, combining the North Western, the Midland, and the Lancashire and Yorkshire, North Staffordshire, and Furness.
4. *Eastern*, combining the Great Northern, the Great Central, and the Great Eastern.

5. *North Eastern*, the present North Eastern system and the Hull and Barnsley.

6. *London Group* (local lines) ;

and a

Scottish Group for the whole of Scotland.

In each case the new group would absorb the smaller and independent broad gauge lines within its area, but railways which may be classified as " light," whether existing or future, will be wholly excluded from this grouping arrangement, and proposals with regard to these light railways are indicated later.

It is hoped that the amalgamation of companies in the respective groups will be carried out voluntarily ; but as the scheme depends on the amalgamations, powers will be sought in a future Transport Bill to compel amalgamations (on terms, failing agreement, to be settled by some tribunal) in any cases where they are not voluntarily completed in a reasonable time to be specified.

It is recognised that a more logical grouping of the existing systems might result if regard were had exclusively either to geographical or to operating considerations ; but the amalgamation of complete undertakings as the initial step will avoid many of the difficulties which would arise if undertakings had to be divided. It would be open to the new group companies to exchange between themselves lines which project from the territory of one group into that of another, and at a later stage it may become necessary to require them to do so.

MANAGEMENT.

Each of the grouped railways will require a Board of Management, and in order to secure efficiency and uniformity, and avoid undue cost, the number of members composing the Board should be limited to probably 21. The composition of the Board is considered to be of the greatest importance, and whilst in the past the directors of railway companies have all been appointed by the shareholders, the Government are of opinion that the time has arrived when the workers—both officials and manual workers—should have some voice in management.

The Board of Management should, in the opinion of the Government, be composed of representatives—

(*a*) of the shareholders, who should form a majority on the Board, and of whom a proportion should hold large trading interests ; and

(*b*) of employees, of whom one-third might be leading administrative officials of the group, to be co-opted by the rest of the Board, and two-thirds members elected from and by the workers on the railway.

FINANCE.

The Act of Parliament should lay it down that rates and fares shall be fixed at such a level as, with efficient and economical management, will in the opinion of a prescribed authority enable railway companies to earn a net revenue substantially equivalent, on some pre-war basis to be settled in the Act, to the combined net revenue of all the companies absorbed in the group. With due care and economy it should be possible for group companies to improve on their pre-war return ; but, in that event, the Government is of opinion that such surplus revenues should not accrue entirely to the companies. The State would be very materially extending the " charter " of the companies

and is entitled to participate in such surplus revenues, and settlement of a suitable sliding scale to regulate their division presents no insuperable difficulty.

DEVELOPMENT FUND.

It is not contemplated that the Government's share of the surplus revenues should be thrown into the general revenue of the country. Much development work has to be done which is beyond the financial resources of the localities, and the intention is that the Government's share of these surplus profits should be funded for development purposes, to assist backward districts, to develop light railways, and for other appropriate purposes in connection with transportation, as may be approved by Parliament in the Act.

RATE-FIXING MACHINERY.

The financial stability of the groups on the one hand, and reductions of rates on the other, can, in the opinion of the Government, only be assured if there is adopted a procedure for fixing rates which, whilst being flexible, will command the confidence of railways and traders. The Statutory Rates Advisory Committee is now engaged upon a systematic review of railway rates and charges, the principles upon which they are to be fixed, the machinery by which they shall be governed, and the Committee's reference will later be extended to cover fares.

The machinery for dealing with the railway rates and charges of the country is generally admitted to rest upon an unsatisfactory basis; but it is hoped to place the whole system of rates and charges upon a sound footing after the Rates Advisory Committee has reported.

The first object of the revision will be to secure financial equilibrium to the railways of Great Britain as a whole, and it is anticipated that, having regard to the size and diversity of traffic conditions in each group, the revision in aiming at this result will also secure an approximate equilibrium within each of the proposed groups. If, however, revenue were not obtained at least equal to the basic revenue agreed upon, the procedure contemplated is that the Rates Advisory Committee—or whatever body may be appointed to exercise its functions—should be asked to consider modifications in the scheme and to make recommendations to the Minister as to-day.

It is not possible at this stage to indicate in detail what machinery should be set up for dealing with appeals from traders on railway rates. The Rates Advisory Committee is conducting an exhaustive enquiry, and the Government must await their report before it can embody any proposals in a Bill.

The Government does not propose to give to the companies any financial guarantee. It proposes to set up a flexible rates machinery, which will enable appropriate charges to be levied, and to leave the railway companies to rely upon this machinery for the maintenance of the financial position of the groups at the level agreed.

The earnings of the companies must, of course, be subject to the normal fluctuations of traffic and to the express stipulation that the undertakings are being managed with due care and economy. This stipulation is considered essential to the protection of the public; but on the other hand it is proposed to grant to the companies a right

of appeal to a judicial tribunal if the Minister of Transport refused, upon their application, to put the machinery for revising rates in motion.

WAGES AND WORKING CONDITIONS.

It is proposed to provide by the Bill for a permanent machinery to deal with questions of railway wages and working conditions, on the lines of the two Boards which have been established temporarily by agreement, namely, the Central Wages Board, consisting of equal numbers of managers and men with an appeal to the National Wages Board, consisting of four managers, four men, and four users of the railway, with an impartial chairman.

FUTURE POWERS OF THE STATE IN RELATION TO RAILWAYS.

It will be proposed to confer certain powers upon the State in relation to railways. These powers may be conveniently grouped under the following headings—

(*a*) For the protection of the public.

(*b*) For the economical working of the railway systems of the country.

(*c*) To safeguard the national interests.

(a) *For the Protection of the Public.*

(1) The State would have the right to require adequate services and adequate facilities, including minor extensions in the geographical area which it is proposed to allot to each group company. A group company should, however, have a right of appeal to a tribunal to be prescribed if it contends that the requirement involves a capital expenditure which would seriously interfere with its finances.

(2) Subject to the same right of appeal, the State should have power to require alterations, improvements, and additions necessary for public safety.

(b) *For the Economical working of the Railway Systems of the Country.*

(1) In order to obtain the best standards of permanent way, rolling stock, plant, and equipment which are necessary to secure the financial returns to the groups and yet keep railway rates as low as possible, the State must (subject to a similar right of appeal by the companies) have the power to impose such standards.

(2) The State ought to have the right to require co-operative working, including granting of running powers, common user of rolling stock and facilities on equitable terms, the pooling of traffic and receipts where competition is causing waste, and the common user of workshop and manufacturing plant.

(3) In order that the public may know, and the Government be in a position to judge of the working of the railways, the Ministry should have full power to prescribe the form of accounts, to regulate the manner in which they are compiled, and to require the compilation of such statistics and returns as are, in the opinion of the Minister, necessary, with a right of inspection.

(c) *To Safeguard the National Interests.*

The railways should be required to submit for approval their proposals involving capital expenditure and also their plans for raising capital required.

It is necessary in view of the fact that the State is to provide machinery for adjusting rates intended to produce a certain net result,

that the State should approve, and, if necessary, have power to require, adequate reserves for depreciation and renewals to be made before dividends are issued. This again should be subject to a right of appeal to the prescribed tribunal.

LIGHT RAILWAYS.

It is proposed to exclude light railways from the grouping arrangements. Light railways must rely largely for their prosperity and development upon the goodwill and assistance of the main-line companies in whose districts they lie. It is essential that the main-line companies should have no grounds for fearing competition from an ambitious light railway company, or combination of light railway companies. It should, therefore, be provided that where a group railway can prove to the satisfaction of the Ministry of Transport that the light railway is changing in character and is, in fact, becoming an ordinary railway, or is competing for main-line traffic, the group company may absorb the light railway on fair terms, and make it a part of its own system.

In so far as traffic for which transport facilities are required justifies the provision of standard gauge lines operating more or less under the same conditions as lines owned by main-line companies, the Minister should have power to insist that the group companies should provide the lines which are necessary. Different considerations apply to light railways, *i.e.*, lines of much lighter construction with less onerous conditions of operation attached to them, constructed wherever possible along the verge of roads and subject to less stringent regulations than is the case with regard to normal railways.

The construction and management of light railways of this description should be in the hands of separate undertakings.

If this means of transport is to be developed for the benefit of agriculture and other industries, the State must encourage private enterprise or local authority enterprise by some financial assistance in the construction and development of light railways throughout the country. The policy of grouping light railway systems so far as possible as a means of securing economy in management, maintenance, repairs, etc., is considered wise, and experience has already shown that this can be done successfully.

It should be the policy of the Ministry to stimulate the development of light railways constructed, equipped, and worked on the cheapest possible lines. It may be found that the present procedure under the Light Railway Acts, by which powers to construct light railways are sought and granted, may require to be modified.

DOCKS.

The Government have no present intention of altering the status of the dock undertakings of the country, but some of the temporary powers conferred upon the Minister of Transport by the Ministry of Transport Act, 1919, in connection with non-railway owned docks, should, in their opinion, be retained and extended to railway-owned docks.

CANALS.

The future of canals involves questions of great difficulty and complexity. The best advice available is being sought, and the whole

subject is about to be investigated by a Committee which has been set up under the chairmanship of Mr. Neville Chamberlain, M.P., and pending the receipt of the report of this Committee, the Government feel that they are not in a position to formulate a policy.

Revolutionary Proposals.

The most revolutionary feature of the proposals is the creation of five main groups in each of which several important, and hitherto independent, companies are to be combined. The scheme, of course, has yet to secure the approval of Parliament, and, as it will interfere drastically with large vested interests, from which strenuous opposition may arise, it may not do so. If it does, however, the combinations resulting will be huge both as regards capital and extent of operations. In effect it means, if adopted, the abandonment of some of the most important theoretical principles which have influenced the attitude of Parliament towards the railways of the nation. It will be remembered that in the chapters dealing with railway history attention was called to the reliance which Parliament paid on the free play of competition to protect the public from the dangers of monopoly abuse which might so easily arise in connection with railway transport. It cannot be doubted that in the past this free competition has been regarded as of inestimable value to the community. But on the other hand there have been critics who have pointed out the duplication, overlapping and resultant waste arising from this policy. Without taking sides, it can be said quite fairly that economies would have resulted had the railways of the country been laid out as one system on comprehensive lines ; economies in preliminary expenses ; economies in construction, and economies in operating expenses. Another comment may also be made in all fairness and impartiality : it seems inconceivable that a cheaper and more expeditious service will not be the result of amalgamations of lines such as that foreshadowed. There are some things in the proposals which will meet with unanimous approval, *e.g.*, most of the proposals under the heading—" Future Powers of the State in Relation to Railways," particularly those which deal with standardisation of permanent way, rolling stock, etc., and the requirement of co-operative working and the pooling of traffic and receipts where competition is causing waste.

When we come to consider the scheme as a whole it is extremely difficult to preserve the desired impartiality of comment and

exposition, but it is desirable that some of the criticisms that have been raised should be briefly referred to.

Some Criticisms.

The main one is that it is an attempt to nationalise the railways by subterfuge. These critics may agree that the idea of unification is an excellent one but they enquire, quite pertinently, what moral right the Ministry of Transport and Parliament have to prescribe the form of management. Of course, a combination of the companies mentioned in any one of the six groups would naturally mean an amalgamation of the various Boards of Directors into one, and the resignation of a number of those who had hitherto been on one or other of them, otherwise the combined boards would be too large and unwieldy for the most useful and effective work. But this would happen in connection with any amalgamation even if originating altogether outside Parliament. The further proposals also excite criticism ; the inclusion in the boards of officials and manual workers. As for the officials, their inclusion or non-inclusion probably would make little difference either way. It is impossible to imagine any Board of Railway Directors, however old-fashioned and conservative, attempting to direct the affairs of the company they control without the assistance of the advice of their most expert officials. A board that acted without such guidance might involve their company in grave difficulties even if they did not altogether ruin it. On these grounds the critics contend that there is no need to include officials on the boards of management ; that the work can be done just as efficiently under the old arrangement which better defines the interests of the owners of the capital of the companies and their paid servants.

This latter criticism applies with equal, if not greater, force to the inclusion of the representatives of manual labour. The shareholders in a railway may be inclined to enquire on what grounds of equity, or policy the management of the undertaking, which has been created out of their invested capital, should be entrusted to men who have no financial interests at stake, no capital to lose, and insufficient breadth of training and outlook to be able to take a comprehensive view of the affairs of a vast undertaking. Further, the critics demand why the Government, which has not put a single halfpenny

Manual Labour and Management.

piece into the transport industry, should endeavour to set up what at least is a colourable imitation of a State system in this manner, and why, if a State system is desired, the Government do not do, what, in their view, is the right thing—set up one legitimately by buying out private enterprise on fair, equitable terms. From these criticisms it will be inferred that the critics have no objection to the proposed amalgamations, as such, or to a State system, but they are opposed to the manner in which it is proposed to obtain a colourable imitation of a State system, which will leave the Government in an irresponsible position and yet give them power to interfere in directions which hitherto have been regarded as outside their sphere, and also will give them a share in the profits of the companies without their making any financial contribution or assuming any financial liability.

Ministry's Inherent Possibilities of Usefulness.

But while these proposals of the Ministry of Transport, which have been adopted by the Government as their future policy with reference to railways may be criticised, it is not to be assumed that the Ministry deserves final and complete condemnation. To say the least, it possesses inherent possibilities of great usefulness and service to the community. It is all to the good, for instance, to have the supervision of national transport taken out of the hands of a Department, which, however efficient, has many other things to think of, and placed in the hands of a new Department, which having no other duties, or preoccupation, can devote itself exclusively to the one job, can concentrate on it, specialise on it, and train a race of civil service railway specialists. In that direction seems to lie much greater efficiency of supervision, and orginality of direction, and if these expectations are not disappointed, the national benefit resulting should be incalculable. It is time we ceased to look upon railway companies as more or less nefarious bodies to be regarded with suspicion and kept under constant restraint. The new Ministry will keep them under constant supervision, no doubt, and probably there will be more of it then ever before ; but there are also indications that our transport system is to be recognised in future as a great national asset which it is the main business of the new Ministry to encourage and foster for the ultimate benefit of the community as well as the companies themselves. If this atmosphere is sedulously

cultivated the Ministry will fill an important place in our national life, and many benefits will flow from its activities.

Ministry's Important Results.

The creation of the Ministry has had one or two important results already. One of them concerns the machinery for adjusting rates and fares. In the past this has been a very difficult and cumbersome proceeding. It was not impossible, theoretically, for the companies to increase their charges to the public, but to do so was such a considerable task that it was seldom attempted. Prior to the war, of course, it was quite right to regard such attempts as objectionable and not in the national interests. If the profits of the companies were inadequate (and, except from a comparative point of view, that suggestion could not be made), the appropriate remedy could more properly be applied by means of internal reorganization and economies. Since the war that expedient has become inadequate, and, unfortunate as it may be, it has to be recognized frankly that the cost of transport has increased seriously, and that the only proper way to provide a remedy is to increase the charges made to the public. Without a Ministry of Transport, or, to be strictly correct, without the powers conferred on that Ministry by Parliament at its creation, it would have been very difficult to secure the necessary adjustment of charges. This work is now simplified, and from the fact that the Ministry is guided by the advice of a committee on which business interests are represented, and that the committee has the assistance of officials reputed to be experts in railway matters, the public should feel confident that any increases made are not only justifiable, but essential, and that they are not mere attempts at spoliation on the part of the railway companies.

New Railway Statistics.

One of the first acts of the new Ministry has been to require the railway companies to compile "ton mile" and "passenger mile" statistics, and so the vexed controversy which has agitated the old railway management and their outside critics has been settled once for all. These new statistics are published every four weeks, and though it is too early yet for it to be possible to make any valuable comparisons, some interesting information has been revealed. The scope of the statistics is roughly indicated by the following table extracted from the returns for the four weeks ending 1st February, 1920.

Tons, Net Ton-Miles and Average Length of Haul, in respect of Freight Traffic (including Live-Stock and Free-hauled Traffic other than in Departmental Trains) for the four weeks ending 1st February, 1920

	England and Wales.			Scotland.			Great Britain.		
	Including Free-hauled.	Per cent.	Excluding Free-hauled.	Including Free-hauled.	Per cent.	Excluding Free-hauled.	Including Free-hauled.	Per cent.	Excluding Free-hauled.
General Merchandise (including Live Stock)—									
Tons	5,184,817	22·02	5,067,715	1,021,028	25·70	998,584	6,205,845	22·55	6,066,299
Net Ton-Miles	484,052,233	35·28	477,727,101	82,913,987	47·68	82,031,230	566,966,220	36·67	559,758,331
Average Length of Haul (miles)	93·36	—	94·27	81·21	—	82·15	91·36	—	92·27
Coal, Coke, and Patent Fuel—									
Tons	14,091,937	59·85	13,306,137	2,221,926	55·93	2,070,315	16,313,863	59·29	15,376,452
Net Ton-Miles	667,557,418	48·66	624,726,927	60,057,490	34·53	56,982,835	727,614,908	47·07	681,709,762
Average Length of Haul (miles)	47·37	—	46·95	27·03	—	27·52	44·60	—	44·33
Other Minerals—									
Tons	4,268,517	18·13	4,141,922	729,667	18·37	699,310	4,998,184	18·16	4,841,232
Net Ton-Miles	220,411,988	16·06	216,168,972	30,933,514	17·79	30,148,097	251,345,502	16·26	246,317,069
Average Length of Haul (miles)	51·64	—	52·19	42·39	—	43·11	50·29	—	50·88
Total Freight—									
Tons	23,545,271	100·00	22,515,774	3,972,621	100·00	3,768,209	27,517,892	100·00	26,283,983
Net Ton-Miles	1,372,021,639	100·00	1,318,623,000	173,904,991	100·00	169,162,162	1,545,926,630	100·00	1,487,785,162
Average Length of Haul (miles)	58·27	—	58·56	43·78	—	44·89	56·18	—	56·60

Receipts and Receipts per Ton-Mile of Controlled Railways in Great Britain (excluding Government Traffic), for the four weeks ending 1st February, 1920

Freight Train Receipts (based on 24 Working Days).			Receipts per Ton-Mile.	
Gross.	Excluding Cost of Collection and Delivery.	Ton-Miles.	Gross.	Excluding Cost of Collection and Delivery.
£7,813,284	£7,068,996	1,458,058,309	Pence. 1·286	Pence. 1·164

It is explained that "Freehauled traffic" referred to in the heading to the table, includes companies service materials conveyed without charges on revenue earning trains. Traffic conveyed on ballast trains or departmental trains has been excluded, and also companies' sheets, ropes, chains, packing, etc., which are regarded as part of the wagon equipment.

New Information.

The table gives for the first time an idea of the average length of haul for each kind of traffic in each division of Great Britain and for the country as a whole, and it is interesting to find that for the whole country, and for all traffic, the average length of haul in the period covered was only 56·18 miles, and that the average receipt for the service of hauling (exclusive of collection and delivery) was 1·164 pence, or less than one penny farthing per mile. That is, double the United States pre-war average, but in view of the length of haul and the nature of the traffic handled, to which reference has been made in earlier chapters, the average charge may not appear excessive; indeed, in view of the complaints as to the burden of charges, probably it will be regarded as a surprisingly low average. Since 14th January, 1920, there has been an increase in freight rates and another comes into operation on 1st September. The effect of the first increase was seen in the average receipt per ton mile, which was 1·576 pence for the four weeks ending 25th April, 1920. Of course, there will be a further increase in the charge in September. It is also interesting to find that in the four weeks ending 1st February, the average train load was 132·38 tons compared with 135·94 in the four weeks ending 28th March, and it is rather astonishing to find that in freight traffic the number of miles per engine hour was as little as 3·07 in the one period and 3·11 in the other. No doubt, at the end of the year the periodical tables will be amalgamated and totals and averages for the whole year will be given. Such information will be interesting to compare from year to year; but now that such figures are compulsory, it is a matter for regret that similar information is not available for the long pre-war period, so that the work done by the railways under the old conditions might be compared.

II. Canal Economics

CHAPTER XII

CAPITAL REVENUE AND TRAFFIC

Canal statistics are scanty and far from satisfactory. By the Railway and Canal Traffic Act, 1888, the companies are required to make an annual return stating their names, the name of their principal officer, and the place of their office; and giving a short description of their canals. By the next section of the same Act power is given to the Board of Trade to require returns as to capital, revenue expenditure, profits, etc., "from time to time . . . not being oftener than once a year." The power given is ample enough for all purposes, but apparently it has not been thought worth while to require such returns to be made regularly from year to year, as is the case with railways. Since the Act was passed three returns have been made—in 1888, in 1898, and in 1905, the latter being for the purposes of the Royal Commission on Canals and Waterways. Apparently it had been decided by the Board of Trade that decennial returns were sufficient until the commission was appointed. The returns are unsatisfactory because, taken individually, they are not easily comparable. The last of the three attempts to bring them into line, but even this has its pitfalls for the unwary. For example, in one place the length of the independent canals and navigations in England and Wales (independent in that they are neither owned nor controlled by railway companies) is given as 2,896 miles, of which 2,564 miles are under the control of canal companies and other authorities and 332 miles are without controlling authorities. In another place, however, the length for England and Wales is given as 2,456 miles. The explanation of the discrepancy is that in the first case account has been taken of every canal and waterway existing whether capable, in its present condition, of being put to useful service or otherwise. In the second case, account is taken only of those canals on which a record of traffic is kept and therefore capable

Returns Required by Parliament.

of, and actually being put to useful service. The larger distance may be regarded as representing potential waterways, and, of course, it was useful for the Royal Commission to have a complete census of the waterways. For practical and comparative purposes, however, the smaller figure is the only one which has any interest.

Canal Traffic Records.

For the whole of the United Kingdom the length of canals on which a record of traffic is kept is given as 4,673 miles, which compares with 23,441 miles of railway. The latter figure, it will be remembered, does not represent length of running track, which is 40,034 miles, sidings being ignored. The railways of the United Kingdom, therefore, are more than five times as long as the canals, of if running track is taken, nearly nine times as long. These 4,673 miles of canals have a total paid-up capital of £47,550,768 as compared with the railways' £1,334,963,518 in 1912. Per mile of canal the capital amounts to £10,175 ; per mile of railway it is £56,949, or per mile of running track, £33,345. The total revenue of the canals in 1905 was £2,680,710, or £574 per mile. The expenditure was £1,891,213, or £405 per mile, and the profit was £789,497, or £169 per mile. The proportion of expenditure to receipts was 70·5 per cent., while in the case of railways it was 63 per cent. in 1912. The profit earned was thus equal to 29·5 per cent. of the income compared with the 37 per cent. earned by railways. From the point of view of the capital employed, however, the financial return is an extremely poor one. The gross revenue does not amount to more than 5·6 per cent. of the capital while the net revenue in only 1·6 per cent., compared with 3·55 per cent. for the railways. The income is derived from three sources—from tolls, £1,319,204 ; from freight as carriers, £828,302 ; and from "other sources," £533,204. The proportions of these to the whole are respectively 49·2 per cent., 30·9 per cent., and 19·9 per cent. It is apparent, therefore, that to a very large extent the canal companies are toll-takers rather than carriers. They provide and maintain the waterways and charge for the use of them ; and there, in many cases, their activity ceases. The actual work of transporting merchandise is left to canal carriers. The gross expenditure is also divided under three headings—management and maintenance, £800,251 ; transit expenses, £661,089 ; "other expenditure," £429,873 ; and the

proportions of these to the total expenditure are respectively 42·3 per cent., 34·9 per cent., and 22·7 per cent. On their work as carriers the companies appear to make a fairly good profit. The receipts from this source, as has been seen, amount to £828,302, and presumably "transit expenses," £661,089, represent the cost of doing this work. If that is so there is a profit of £167,213, which is equal to 25·29 per cent. of the receipts.

The returns are least satisfactory when we come to the tonnage figures. In the summary table for the United Kingdom the quantity of merchandise and minerals carried is given as follows—

	Tons.
1888	36,461,682
1898	41,600,706
1905	43,161,926

On the face of them such figures certainly appear surprising. They suggest that the water-borne traffic of the country is quietly but steadily expanding from year to year; and this is altogether opposed to one's preconceived notions, even though they may be based on quite a superficial knowledge of the subject. For example, it is common, whenever canal traffic is mentioned in public, to allude to the inefficiency and constant decline of our waterways, rather than their quietly increasing usefulness. It is a serious, and stupid, defect of the summary table that it makes no attempt even to warn investigators that the figures are not to be relied upon. The explanation is only to be found later by means of patient search through the detailed table dealing with the tonnage passing over each canal or waterway. Examination of this table reveals instance after instance in which it is stated: "no return for 1888," while from the same waterway there are returns sometimes for 1905 only, sometimes for that year and for 1898 as well. The principal cause of the growth, however, is to be found in the particulars concerning the Manchester Ship Canal. That canal was not completed until 1893. Naturally it could not make any return for 1888. In 1905 the traffic on this important waterway totalled 5,999,400 tons. Here, then, is the explanation of a variation of, roundly, 6,000,000 tons. Again the Gloucester and Berkeley Ship Canal is marked "no return for 1888," whereas in 1905 1,053,724 tons passed over it. Together these two ship canals account for well over 7,000,000 tons, which is more than the

difference between 1888 and 1905. Of course they are parts, and very important parts, of the national system of waterways, but when their influence on the returns is exactly ascertained, the results seem to bear out the general impression that on the whole the inland waterways of the United Kingdom are retrogressive rather than progressive.

Accuracy of the Returns.

Another point has been made concerning the accuracy of the tonnage returns. The traffic carried is analysed under four headings —(1) loaded and discharged on the canal; (2) loaded but not discharged on the canal; (3) discharged but not loaded on the canal; (4) not loaded or discharged on the canal. Heading number one, of course, relates to purely local traffic confined entirely to the canal on which it originates, and there should be no question as to the accuracy of that total which is stated at a little over 14,500,000 tons for England and Wales. Heading 2 relates to traffic originating on a particular canal and passing on to another or others; heading 3 deals with traffic originating elsewhere and concluding its journey on the canal which makes the return; heading 4 gives entirely through traffic which neither begins nor ends its journey on the canal which makes the return but merely passes along it on the way to its destination. In these headings, it has been suggested, there is much duplication of the quantity. For example, take a consignment of 100 tons of goods passing over three canals. Canal A counts 100 tons as loaded but not discharged; Canal B, the intermediate canal, counts 100 tons of traffic not loaded or discharged; and Canal C counts 100 tons not loaded but discharged. In this way the original 100 tons can come into the reckoning three times and can become 300 tons in the final total. This, however, is not the full extent of the possible error which increases with the number of canals over which the traffic passes. A boat might be loaded in the South Staffordshire Black Country and pass on to London by the following canals: Birmingham Canal Navigations, Warwick and Birmingham Canal, Warwick and Napton Canal, Oxford Canal, Grand Junction Canal and Regent's Canal. There are here six separate canals, and, if the criticism offered has any foundation in fact, then the consignment from the Black Country would appear in the returns no fewer than six times. Of course, all the canals mentioned have passed this particular consignment along and all

have derived some revenue from it. Each is legitimately entitled to say that its waterway has been used by boats carrying a certain tonnage of goods or minerals ; but when all the totals are brought together in a summary, 600 tons, say, of traffic really relates to the movement of but one consignment of 100 tons. Faced with such a difficulty the returns may not unnaturally be regarded with suspicion and used with great hesitation when the point under consideration is the part which the canals play in transporting the products and manufactures of the United Kingdom. The totals of traffic loaded and discharged, and loaded but not discharged would probably come nearest to giving us an idea of the real volume of traffic on the canals, but unfortunately it is not possible from the returns to get out such a figure for the whole of the United Kingdom. It can be done for England and Wales for the year 1905. The total traffic for these divisions of the Kingdom returned from all sources was 41,178,172 tons. Of this 23,454,557 tons come under the headings "loaded and discharged," or "loaded but not discharged," which leaves a total of 17,723,615 tons which either was discharged but not loaded, or neither loaded nor discharged on the particular canals making the returns. Presumably the 17,723,615 tons was through traffic which had already been counted under the other two headings, and of the original 41,178,172 tons the duplication thus made is equal to 43 per cent. Assuming, however, that the 43,000,000 tons given in the return is correct for 1905 it does not tell the whole story. It takes no account of the traffic which passes along waterways on which no record is kept. Taken as it stands, however, the total of 43,000,000 tons makes a poor comparison with the 461,000,000 tons returned for the railways of the United Kingdom for the same year—1905. The railway traffic is more than ten times as great.

Re-arrangement of Returns.

The defects of the figures given in the volume of returns (Vol. IV of the publications of the Royal Commission) are recognised in the final report, where a new table appears, including only those waterways in regard to which full statistics of traffic have been returned for each of the three years : 1888, 1898 and 1905. This rearrangement deals with only 3,148 miles of waterways for the United Kingdom divided up as follows : England and Wales, 2,416 miles ; Scotland, 153 miles ; Ireland, 579 miles. The totals for the United Kingdom may be set

out as follows, the seaborne traffic on the Manchester Ship Canal being excluded from the tonnage—

Year.	Total Tonnage conveyed.	Total gross Revenue.	Total Expenditure.	% of Expenditure to gross Revenue.	Total net Revenue.
1888	35,301,857	1,978,834	1,277,740	64·6	701,094
1898	36,011,241	2,033,222	1,498,053	73·6	535,169
1905	34,136,767	2,081,552	1,571,260	75·5	510,292

There is no hint of an explanation as to why the traffic increased 709,384 tons, or 2·008 per cent., in 1898 compared with that for ten years earlier, nor of any reasons for the subsequent decline of 1,874,474 tons, or 5·2 per cent. between 1898 and 1905. But the table brings out more clearly the general fact not shown in the returns proper (Vol. IV) that water-borne traffic has declined within the last generation. Comparing 1905 with 1888 there is a fall of 1,165,090 tons, or 3·3 per cent.

Gross revenue in the same period has been quietly progressive. From 1888 to 1898 there was an increase of £54,388, or 2·7 per cent. ; from 1888 to 1905 it was £102,718, or 5·15 per cent.

Increase of Gross Revenue.

The explanation advanced for this is the large increase of revenue on two or three waterways, such as the Aire and Calder and Leeds and Liverpool canals, which counterbalances the decreases on many others. The Aire and Calder is one of the few inland waterways which have been developed on modern lines and have consequently improved their position. The average receipt per ton for the three periods was : 1888, 1s. 1·45d. ; 1898, 1s. 1·55d. (= + 0·1d. compared with 1888) ; 1905, 1s. 2·63d. (= + 1·08d. compared with 1898 and + 1·18d. compared with 1888)

But while gross revenue has increased, the total expenditure has grown at an even faster rate, with the natural result that net revenue has also declined.

" This decrease (says the report) would have been still more serious had not the collective gross revenue of the companies derived from sources other than freights earned as carriers, or tolls, risen from £281,638 in 1888, to £404,855 in 1905. Most of this increase is derived from the increase in rents of property belonging to the companies, but some of it from the supply of water, cranage, haulage, etc."

Relative Importance of Waterways.

The relative importance of the waterways in the three divisions of the United Kingdom may be inferred from a comparison of the following figures (which relate solely to England and Wales) with those already given—

Year.	Total Tonnage conveyed.	Total gross Revenue.	Total Expenditure.	% of Expenditure to gross Revenue.	Total net Revenue.
1888	33,123,666	1,824,593	1,168,185	64·2	656,408
1898	34,022,493	1,855,106	1,369,190	73·8	485,916
1905	32,340,264	1,910,712	1,447,595	75·8	463,117

Tonnage of British Canals.

One other small, but interesting, point is worth brief attention. When the details of traffic for 1905 are examined it is surprising to find that the largest tonnage given for any single canal company is the 7,500,000 tons of the Birmingham Canal Navigations. The Manchester Ship Canal in the same year did not reach 6,000,000 tons, and no other canal reaches 3,000,000 tons. Some of the more important totals are: Aire and Calder, 2,800,000; Leeds and Liverpool, 2,400,000; Bridgewater, 2,100,000; Grand Junction, 1,790,000; the Thames (between London Bridge and Cricklade), 1,390,000; Trent and Mersey navigation, 1,317,000; the Weaver navigation, 1,076,000; Gloucester and Berkeley Ship Canal, 1,053,000; and Regent's Canal, 1,045,000.

Decline of Canals.

The statistics as a whole show quite clearly that however potentially important our canals and waterways may be, at present they are a comparatively neglected and insignificant means of transport. The historical reasons for this have already been seen; in the succeeding chapter other reasons for their present position will be given.

Rates and Tolls.

Not much time need be spent in outlining the basis of canal tolls and charges, because it is very similar to that explained in the chapters dealing with railways; indeed, it will be remembered that the original railway schedules were based on those of the canals which were already in existence. From the extremely simple examples that have been given in earlier chapters, however, there has been, as in

the case of the railways, great development. The canals, nowadays, have just as detailed and elaborate classifications of minerals and merchandise as have the railways ; in fact, in some cases the railway classification is used with just a few variations to meet special circumstances. The classes are lettered and numbered just the same: A, B, C, 1, 2, 3, 4, 5, and normally there is the same ascending rate of charge from class A to class 5. The schedule of maximum rates and charges of the Shropshire Union Railways and Canal Company is reproduced in the Appendix. This, it will be seen, in general outline, is in all respects similar to a railway schedule of charges and is framed with the specific intention of charging "what the traffic will bear." One point of difference will be noticed and that is that the rates "taper" more rapidly than do the railway rates, *i.e.*, the distances for which the specified rates per ton per mile apply are smaller, the lowest rate being reached after a journey of only 30 miles as compared with 100 miles in the case of the railways. It will be seen also that the canals are entitled to charge station and service terminals in just the same way as the railway companies. Few of the canals, however, are carriers, being merely toll-takers. In these cases tolls are scheduled in the same manner, but in the majority of cases there is an important difference from the schedules of charges for conveyance. The tolls are not graded so fully. As a rule, the numerical classes are grouped together and one rate of toll applies to all of them. The schedule of the Birmingham Canal Navigations Company, an exclusively toll-taking concern, is reproduced in the Appendix. It will be seen that in this case the variation mentioned is not the only one. First of all, class A is divided for the purpose of giving a specially low rate for things of small value such as basic slag, unground gas lime, refuse and rubbish for tips. These things are in class A, division I. Having made this departure from what has become familiar in the case of the railway schedule, the remaining articles in class A and class B are lumped together. Timber is removed from class C and put into a special class by itself. Finally, the ordinary variations end with the grouping of the numerical classes to which reference has been made, the gradation thus being less than that of the railways. There is, however, one abnormal variation. There is what is called scale 2 which, under the circumstances specified, removes certain articles of low value, such as cannel, tap, mill, forge, and coal

cinders, from the ordinary classes and imposes a special rate. Tap, mill, and forge cinders are bye-products of ironworks, of the process of refining pig-iron and converting it into bars, sheets, or angles, and they have some value because in addition to the slag and other refuse of which they consist, they contain a recoverable quantity of iron. It should be added that the company do not invariably charge their maximum tolls as scheduled ; indeed, there are many reductions in actual working.

No Differential or Preferential Rates.

Happily there are no questions of differential rates or preferential rates for foreign produce to discuss in connection with the canals, for which, possibly, the comparatively insignificant part which they take in the transport work of the country is responsible. The only complaint ever made concerning them is that for through traffic some of the companies insist on maintaining the maximum toll charge and decline to grant concessions. For example, if a consignment has travelled 30 miles on one canal, and, if continuing its journey on the same waterway, would be entitled to the lowest scale toll for the remainder, passes immediately on to a second canal, the second canal company takes no account of the previous journey and charges the scale toll applicable for the length of journey on its waterway just as if the traffic originated with it. That is one of the defects arising from the multiplicity of canal companies owning comparatively short lengths of waterway.

CHAPTER XIII

DEFECTS OF THE CANAL SYSTEM

WE come now to a much more interesting subject—the consideration of the defects of the national waterways, the causes of those defects, and the possibilities of the future. It is a subject which arouses keen controversy, the partisans of water and land transport being as diametrically opposed as are those who take sides over certain questions of railway policy. On one point, however, all are agreed—that with one or two exceptions (where the owners of the waterways have had faith in their undertakings and enterprise enough to modernise them and to conduct their business on sound commercial lines) our waterways are in a neglected, defective condition, taking but an insignificant part in the transport industry. Their general condition may be summed up in a sentence taken from the report of the last Royal Commission appointed to investigate the question and suggest remedies : " With a few exceptions waterways stand as they stood in the middle of the nineteenth century." This sentence is a sufficient condemnation of the system. The industries and commerce of the country have grown enormously since the middle of the last century. To give but one instance, the output of coal has grown from 64,000,000 tons in 1854 to 260,000,000 tons in 1912. Foreign trade alone (imports and exports combined) has grown from £268,000,000 sterling to £1,231,000,000 sterling since then, and it is a recognised economic fact that the home trade is always immensely greater than the foreign. In the same period the population of England and Wales has about doubled. All this, of course, means a vast increase in the transport work arising out of the industries and requirements of the population. How great has been this increase may be assumed from a comparison of some railway figures for England and Wales alone for the years 1854 and 1912 :—Miles open, 1854, 614 ; 1912, 16,223 ; Capital, 1854, £240,235,000 ; 1912, £1,103,310,000 ; passengers carried, 1854 (including season-ticket holders), 92,346,000 ; 1912 (exclusive of season-ticket holders), 1,161,992,000 ; total traffic receipts, 1854, £17,342,000 ; 1912, £101,240,022. Concurrently with this enormous

Defects of Canal System.

expansion inland waterway transport has been retrogressive. With one or two conspicuous exceptions, the physical condition of the waterways is generally inferior to what it was half a century ago and the traffic which passes over them has diminished in volume. Were it not for the tonnage attributable to such new waterways as the Manchester Ship Canal and to improved waterways such as that belonging to the Aire and Calder Navigations Company the traffic of the canals would show an enormous decrease in even less a period than half a century.

Causes of Decline of Canal System.

Why is it that a means of transport, which, at its introduction, conferred an immense benefit on the land by reducing the cost of, and generally facilitating, transport has fallen thus into desuetude? The primary reason seems to have been the lack of faith in the future of their undertakings shown by the canal proprietors at the time of the introduction of railways. These people, who, hitherto, had enjoyed a virtual monopoly of the most easy means of inland transport then existing, and who had grown rich on the profits of their enterprise seem, in the main, to have been panic-stricken by the mere idea of railway competition. We hear much nowadays of the superiority of water transport over land transport for a large range of industrial products and raw materials. Whether it is so or not appears to depend largely on circumstances, or even, perhaps, the point of view of people interested on one side or the other. As to which view is accurate it will be possible to form a more definite opinion later. But at the outset many of the canal companies seemed to have no doubts on the subject. To them the day of canal usefulness was ended and their chief business appeared to be to get rid of their canals as quickly as possible. Hurriedly they parted with them to the newly-created railway companies. No thought seemed to have been entertained that it was desirable or possible to put their waterways into a condition to resist the new form of competition.

Railway Ownership of Canals.

The railway ownership of canals which thus resulted is frequently advanced as one of the reasons why water transport has declined, and with some justification. But while this is so, there has been much injustice done to the railways in this connection. It is a long time since they acquired the canals, and the present generation of business men, knowing only that about one-third of the canal

mileage of the United Kingdom is either owned or controlled by railway companies, but knowing nothing of the historical reasons why this ownership came about, have been free in their denunciations of the railway companies for having acquired canals in order that they might "strangle" competition. It is an admitted fact that in the main the railway companies acquired canals because they were forced to do so. The canal proprietors of those early days of the nineteenth century, anticipating the ruin of their business with the advent of railways, raised parliamentary opposition to the bills promoted to empower the construction of railways. Sometimes they went so far as themselves to promote bills seeking authority to convert their canals into railways. The price of the withdrawal of their opposition was the purchase of their undertakings. In this way the railways became absolute owners of 965 miles of canals in England and Wales, whereas the length of independent canals and navigations of the same division of the United Kingdom on which a record of traffic is kept is given as 2,456 miles. In addition they control another 218 miles. In justice to the railway companies it should also be mentioned that while they have taken no steps to improve or develop their canals they have maintained them efficiently. It is admitted by the Royal Commission that on the whole their canals have been kept in a good state of repair, far better than some of the independent canals. Sometimes this has entailed heavy expenditure. The Birmingham Canal Navigations afford an instance of this. These canals run through mining districts where there have been subsidences of land. It is stated that in one case where the canal originally ran through a cutting it is now carried on an embankment because of the subsidence of the surrounding land due to mining operations. Nothing but the long purse of the London and North Western Railway Company, stated one witness before the Royal Commission, has saved this canal from destruction and kept it in a condition which enables it to pass an average of about 7,500,000 tons of traffic per annum. And 7,500,000 tons, even though it is mainly local traffic, is some answer, though not a complete one, to the allegation that the railways have "strangled" the canals.

While so much is admitted in justice to the railways, it remains a fact that their ownership of canals has not been altogether beneficial. They may have saved these canals from becoming derelict,

they may have made them available for local traffic (the London and North Western Company use the Birmingham canals largely as feeders for their own and other systems), but at the same time their ownership or control has impeded the use of the canals for through, or long-distance, traffic. It is asserted that while they have been quite willing to use the canals, and to allow them to be used for local purposes, they have taken good care to hurry the through traffic off them on to their own systems. If waterways are to be used for through traffic it is essential that through rates should be arranged for the whole journey. Through traffic is discouraged, if not made impossible, if all the canal companies insist on charging their scale tolls. On this point there are some instructive paragraphs in the final report of the Royal Commission, which seem worth while quoting at considerable length—

Has Railway Ownership been Beneficial?

"The allegation that railway companies owning canals discourage through traffic over their own and other canals by refusing to give a reduction on through tolls was chiefly made in connection with the Birmingham canal system. Under the Act of 1846 . . . the London and North Western Railway Co. have a supreme voice in fixing the tolls on this system. . . .

"About the year 1875 the Warwick, Grand Junction, and other canal companies interested in the through trade from Birmingham to London, approached the Birmingham Canal Company with a view to arranging through tolls, which did not then exist at all. The Birmingham Canal Company declined to accede, and in 1877 the matter was taken before the Railway Commission, who ordered a through toll. This order was, on the motion of the Birmingham Canal Co., set aside or reversed by the Courts. An arrangement, however, due, it is stated, to the influence of the Board of Trade, was made in 1884 for through tolls; but the Birmingham Company insisted upon higher tolls per ton per mile for 14 miles than those given by the other companies concerned, except the Oxford Canal, of which only 5½ miles are traversed in the through route. Under this agreement, which is stated to have arrested a previous steady decline of the through trade, meetings of representatives of the companies interested have been held from time to time to consider proposed modifications of through tolls.

Refusal of Through Tolls.

"A number of instances were furnished to the Commission, in which while other companies were anxious to reduce, and in fact did reduce, their shares in the through tolls, the Birmingham Canal Company refused to do so. Mr. Impey, representing the South Staffordshire Freighters' Association, produced figures showing that while, on a number of important articles, the other companies made considerable reductions of tolls, the Birmingham Canal Company maintained their original toll on the level of the 1884 agreement. He summed up the matter by saying: 'After

Reductions Declined.

a great many years' negotiations certain through tolls were agreed to by the Birmingham Canal Company on certain traffic and by certain specified routes, but it only applies to portions of the traffic passing over or arising on their system, and they still take the large proportion of the through rates fixed in 1884, notwithstanding that very large reductions have been made in the tolls by other parties to the agreement.'

" He gave as an instance the tolls on iron. The other parties to the agreement have so far reduced their share of the through rate on iron that they are now getting the equivalent of 0·21d. per ton per mile, while the Birmingham Company, maintaining the original toll rate of 1884, are getting 0.5d. per ton per mile. Mr. Gordon Thomas estimates that the rate for low-class traffic charged on the Birmingham Canal was 300 per cent. per mile higher than that charged on the Grand Junction Canal.

" The London agreement of 1884 was followed by numerous other agreements for through tolls from Birmingham to other parts of the kingdom, and these tolls are the subject of similar complaints. . . . Some of the statements made on this question and the figures given were challenged by Mr. Jebb on behalf of the Birmingham Canal Company, who stated that the refusals of reductions in tolls had not exceeded 10 per cent. of the applications. It is fair to quote on the same side Mr. H. Waddy, the general manager of the Sharpness New Docks and Gloucester and Birmingham Navigation Company, who said he had never found any difficulty ' in getting tolls ' from the Birmingham Canal Company, and that ' obstacles are not put in the way of traffic.'

" The representatives before the Commission of the Birmingham Canal Company did not deny the higher charges made in respect of through traffic over their section of the water routes, though they did deny the motive or intention of diverting trade to the railways imputed to them. It was explained that the reasons for a higher toll per mile were that the Birmingham Canal is specially costly to maintain owing to the large expenses incurred for the water supply of a canal at an exceptional height above sea level, and to the subsidences caused in certain parts by coal workings ; while the distances travelled on this canal are comparatively short. It was agreed that it is fair that reductions should be made over the longer and less costly portions of a through route rather than over the shorter and more costly parts. It was also alleged that the present traffic is much congested and that no substantial additional traffic could be accommodated."

The Railway Attitude.

The Royal Commission, in the passages quoted, have dealt with the question of through tolls most impartially, and there does not appear to be justification for the unrestricted denunciation usually indulged in. But at the same time it has to be confessed that railway ownership of canals is not the sort of thing to encourage through traffic. Railway companies are organised for land transport. In their opinion canals are as much out of date as pack-horses became when canals were introduced, and they see no advantages to be gained by

organising water transport for through traffic. Rather there is something to be lost because of the duplication of facilities, some of which, from their point of view, are altogether unnecessary.

Railway Ownership and Competition.

Railway ownership of canals is not beneficial from other points of view; it diminishes competition. It will be remembered that in the case of railways Parliament originally relied more on the influence of competition than restrictive or regulative legislation to keep in check any monopolistic tendencies that might otherwise have developed. In the same way the retention of the competition of water transport was regarded as desirable. To this end it gave, in 1845, power to the canal companies to become carriers of goods on their canals as well as toll-takers, and also to make arrangements for this purpose with other canal companies, even to lease their undertakings to other companies. Very little advantage was taken of either of these powers though the companies substantially reduced their tolls—to the extent of six-sevenths in some cases, the report says. And yet, such was the fatuity of the legislature, no fewer than seventeen canals were allowed to be absorbed by the railway companies in one year alone—1846. Ultimately action was taken (but not until 1873) to prohibit agreements which would give railway companies the right to interfere with the traffic, rates, or tolls of canals, but it was not until 1888 that Parliament prohibited, under heavy penalties, the application of railway companies' funds for the acquisition of an interest in a canal without statutory authority. The mischief had been done by that date, however, and though there are now no amalgamations of canals and railways, yet the possession by the latter of the canals already acquired is an effectual bar to the extensive and useful canal amalgamations such as we are told are virtually necessary if water transport is to be of any considerable use in the future.

Amalgamation of Canals.

There were amalgamations of canals in the pre-railway days and within a short period of their establishment. The Birmingham Canal system as it now exists is an amalgamation of the canals of four companies, the last of which was taken in in 1846. The Shropshire Union system is also an amalgamation of the routes of four separate companies. Later, in 1874, the Sharpness New Docks and Gloucester and Birmingham Navigation Company purchased the Worcester and

Birmingham Canal. But the restraining influence of railway ownership and control appears to have been felt even before this. Mr. Gordon Thomas told the Royal Commission that—

" previously to the control or acquisition of the Birmingham and other canals by the railway companies the Grand Junction Canal Company had large schemes for amalgamation with other canal companies, but they were unable to carry them into effect."

The position occupied by the railway companies, however, is not the only difficulty in the way of through rates. Multiplicity of ownership and the indifference of canal companies themselves seem to be just as serious disadvantages. As long ago as 1888 Parliament gave the canal companies power to establish a Clearing House similar to that which has proved not merely useful, but indispensable, in the case of the railways. The sole object, of course, was to facilitate through traffic on the canals by affording the means whereby the claims of the different companies might be adjusted. But the canal companies have never taken advantage of their powers. Each acts for itself, and very often, apparently, without any consideration for the needs of through traffic. There was abundance of evidence before the Commission that " to send a small cargo over no great length of miles they have to negotiate with three or four companies or authorities separately," or failing this the money for the payment of tolls has to be entrusted to bargemen who work the traffic. Another witness spoke of the extraordinary amount of clerical work entailed in sending a small cargo on a not very long journey by canals. It is astounding in view of this evidence to find that under the Railway and Canal Traffic Act of 1873—

Defects of Divided Ownership

" A canal or railway company can fix a through rate to any place, give notice to the other companies whose waterways or railways are included in the journey, and if they take objection can refer the matter to the Railway Commissioners, who have power to decide the matter. . . . The Railway and Canal Traffic Act, 1888, extended to traders as against all railway and canal companies the right to apply for through rates and facilities over their lines, subject to the provision that no application shall be made to the Railway Commissioners by the person interested until he has first made a complaint to the Board of Trade and that Board has endeavoured to settle amicably the differences between the complainant and the company."

It is an admitted fact, of course, that resort to the court of the Railway and Canal Commissioners is an expensive matter, but still supineness of the canal companies in a matter affecting their

interests so vitally seems beyond the bounds of comprehension. Their condemnation is admirably summed up in one paragraph of the report—

"This entire want of co-operation or organisation is, no doubt, largely due to the fact that most of these companies or authorities are merely toll-takers, and have no other interest in the carrying trade. If, as in the case of the railways, the owners of the waterways also owned the means of transport, and controlled the whole traffic over sufficiently long routes, it is hardly open to question that a far more efficient organisation for through traffic would have everywhere come into existence. In the days when canal companies enjoyed almost a monopoly of large classes of traffic they were able to secure a good revenue merely by taking the high tolls which they then took advantage of their position to impose. It is vain to imagine now, when, so far from having a monopoly, they are at very serious disadvantages in competition with the immense and far-reaching organisation of railways, directed by the skill of highly-trained and well-paid officials, they can live by the same simple system. Yet most of them have made no attempt to organise or promote through traffic. They are content to take tolls on any traffic which may happen to pass over their unimproved and often deteriorating waterways. The difference is that the traffic is in many cases smaller and that to keep any of it the tolls have to be much lower than in the days when canals had to contend with no competition superior to that of horse traction or roads."

Who is Responsible for Neglect of Canals?

It is the fashion to condemn railways as responsible for the neglected, unused condition of our inland waterways, and some of the condemnation they have earned; but it is refreshing to find the Royal Commission speaking out so plainly in condemnation of the canal companies themselves. It cannot be too tenaciously remembered that to a large extent their own apathy is also responsible. Then, perhaps, we may get a proper perspective view of present conditions and their causes.

Physical Defects.

Primitive commercial organisation, or no organisation at all, divided ownership, and railway control, however, are not the only defects from which our inland waterways suffer. Their physical defects are just as formidable. As far as the navigable rivers are concerned the chief defects appear to be the lack of means for the regulation of their flow, and, in some cases, for keeping a clear, well-dredged channel. Lack of regulation of the flow means floods in winter and insufficiency of water in dry weather. Both these defects are capable of being sufficiently controlled if not entirely removed by modern scientific systems of weir construction. As it is, however, our navigable

rivers, which were the chief highways of commerce in the pre-canal days, are put to comparatively little use in many cases. The Severn to Worcester is described in the Commission's report as one of the best English waterways. In the first half of the eighteenth century and earlier it was the chief highway for traffic from the Midlands, and even up as far as Lancashire, to Bristol, then the second port of the kingdom. Large sums have since been spent on it to make it navigable ; but still the traffic declines. A day spent in travelling by boat from Worcester to Gloucester was chiefly remarkable because of the insignificant volume of up traffic met with on the journey, and the up or import traffic is that which most uses the river. Similar stories of neglected possibilities would be revealed if the other navigable rivers were dealt with in detail. There is a fair volume of traffic in their estuaries, as a rule, but it soon finds the railways and moves inland on them rather than on the rivers and canals.

The defects of the canals are of a different kind. Sometimes water supply is not good ; in winter they may become ice-bound and blocked to traffic ; but in the main their use is hindered by variety of dimensions. One of the principal controlling elements in the use of a canal is the size of the locks. As the weakest link governs the strength of a chain so, as a rule, the smallest lock governs the size of the boat that can use the canal ; but sometimes a canal has been allowed to become so shallow that a boat which could pass the smallest lock could not pass along the channel. Having in view the origin of the canals, their promotion by comparatively small companies in comparatively small sections, and the continuance of this small proprietorship, it is not surprising to find that there is considerable variation in the size of the locks on the canals of the various companies. But it is surprising to find that "the dimensions of locks vary even on the same waterway, often without any apparent reason, those near the ends of the way, or in places where there is considerable local traffic, being sometimes larger than the rest." Variations such as these are obviously a great disadvantage where through traffic is concerned. The boat and its load must be such as will pass the smallest lock or the shallowest water, no matter how large the canal may be in other places. To the carrier on a small, narrow canal these difficulties would be of no effect physically.

Variety of Dimensions.

His boats built for the conditions under which they are generally used would pass almost anywhere.

Commercially, however, there is a great disadvantage in the small boat for moving large volumes of traffic. The dimensions of a boat and the load it can carry can be largely increased (in the case of a boat adapted to a small narrow canal, at least quadrupled) without any appreciable increase in the cost of labour except that required for loading and unloading. The labour required to navigate a boat carrying 100 tons would be very little more than that required for a boat carrying from 25 to 30 tons, nor would the cost of haulage be increased in anything like the same proportion as the load. Such, at any rate, is the inference to be drawn from a work on British canals by the late J. E. Palmer, for many years a director of the Grand Canal Company of Ireland. But if the carrier with small boats can send them anywhere, the carrier who usually works on large canals or rivers with large boats is pretty well confined to his own customary area. It is no use his contemplating sending through traffic off his usual waterway on to those of other companies unless he first assures himself that the boats can pass the locks ; and if the journey is a fairly long one, covering the waterways of three or four companies, it would be pretty certain that they would not.

Disadvantage of Small Boats.

The Royal Commission took waterways with locks over 14 ft. wide as the standard and called them "barge canals," and those with locks under 14 ft. wide were called "narrow canals." It was found that of the artificial canals 1,165 miles were narrow and 762 miles barge canals, while of the navigations 478 miles were narrow and 834 miles barge. It will be seen, therefore, that apart from the difficulties arising from lack of uniformity in the size of locks, by far the greater proportion of the mileage of inland waterways is not of a sufficient size to permit the most economical handling of through traffic by making it up into large loads.

Barge and Narrow Canals.

Another defect arising from limited size and defective construction is the impossibility of using improved methods of tractions, chiefly mechanical methods. Narrow, shallow canals with banks unprotected by brick-work or other retaining contrivance cannot be used for barges driven by steam. The wash from the propellers would

Difficulty of Using Modern Methods of Traction.

destroy the banks, for one thing. And if the traction were by means of electrically-driven locomotives running along the towing paths, possibly the same difficulty would arise. In any case, however, even supposing there were none of these physical difficulties in the way of mechanical traction, it is a question whether the use of steam or electricity for the narrow small boats, which alone are now possible, would be remunerative because of the limited load which could be carried. For mechanical traction to be used to best advantage the capacity of the boats would have to be largely increased.

Defects and Physical Characteristics of England.

Other defects arise from the physical characteristics of England. The canals which cross between east and west have to surmount what is often called the "backbone of England," their summit levels running up to about 650 ft. above sea level. The ascents to and descents from these levels mean flights of locks, which are not only a hindrance to the free movement and speed of traffic, but also are expensive to maintain and work. The water required for the summit levels has to be pumped up from the lower levels to which it gravitates as the locks are used.

This is how the position is summed up in the Report of the Royal Commission—

Review of Position.

"The foregoing review of the actual material condition of the English waterways at present shows the impediments thrown in the way of through, or long-distance, traffic by differences in sectional area, size of locks, depth of channel, and general condition, by divided ownership of different waterways, and by the deteriorating condition and insufficient depth of channel in some sections of through routes. It is never easy to predict whether a cargo loaded at one point may not prove too heavy to be taken through a distant point."

Almost as important as a deterrent influence is the lack of transport organisation and facilities on the part of the canal companies.

Lack of Transport Organisation.

As has been seen, most of them are mere toll collectors; they make no effort to organise the business of transport in the way the railway companies have done. If a trader has a consignment to send, say, to London, he may pack it, address it to the consignee, notify the railway company that it is ready, and there, beyond paying the bill, his concern with the consignment comes to an end. The railway company will collect his consignment, load it into

trucks, carry it to the place specified and deliver it to the consignee without any further trouble to the trader. If necessary they will store the consignment until it is convenient for delivery to be taken. The canal companies, as a rule, render none of these services and afford no facilities. If the trader wants to send a consignment by canal he has to do all these things for himself, or to employ a forwarding agent to do them for him. The canal companies do not help him in the least ; they merely collect tolls from him.

Present Position of Canals.

It is not surprising, in view of all these defects that have been pointed out, that the canal system of the country has fallen into such a secondary position. There are exceptions, of course, such as the Manchester Ship Canal, which, at length, has attained the distinction of paying a dividend on the capital provided for its construction, in addition to large benefits indirectly conferred on the city of Manchester and a large surrounding area ; but in the main the system is either inadequate or unfitted to perform the work which the advocates of water transport contend it could and should p
of the country.

CHAPTER XIV

ADVANTAGES OF WATER TRANSPORT

THE advantages of water transport are not so numerous as the defects of the waterways to which the last chapter was devoted. They may be summed up in a sentence—that transport of goods by water is cheaper than by land. And in that sentence is the whole explanation of the agitation for an extensive improvement of inland waterways, both natural and artificial. Commercial competition becomes wider in its scope (is more international now than it was local two generations or so ago) and of greater intensity from year to year. Both manufacturers and merchants are constantly on the look out for anything which will reduce the cost not only of producing commodities but also of getting them to the desired markets. How almost hopeless seems to be the possibility of securing substantial reductions in railway rates has been seen in the preceding chapters, where the smallness of net earnings and the return on capital were demonstrated. From the business man's point of view this difficulty is a matter of direct everyday experience rather than an inference drawn from Blue Book returns, and so he turns with longing to the waterways for the reductions he requires and finds them inefficient for their purpose. Hence his desire for improved canals.

General.

Why is water transport cheaper than land transport? The difference arises entirely from the medium used for transport. The cheapest form of it, of course, is that by sea. There is no permanent way, or track, to construct for the ocean-going vessel; no gangs of men are required to keep it in repair. Permanent way has proved one of the most expensive things to acquire, construct and maintain for the railway companies. The shipping companies have no capital locked up in works of this kind. The only capital required is for the provision of the necessary vehicles, ships, and for the maintenance of the required organisation. Another advantage is the large bulk of cargo that can be moved in a single unit; larger than is practicable with any other form of transport. Inland waterways do not enjoy all these advantages. The "permanent way" is not always provided

Cheapness of Water Transport.

by Nature as is the sea. It is, of course, in the case of the navigable rivers but even with these there is usually some expenditure required to adapt them for the most efficient service and to keep them in this condition. Artificial canals, however, have to be constructed and water provided for them, which means the acquisition of land for the waterway, and often also for storage purposes, and, of course, a considerable amount of navvying work in construction. And when made there are maintenance expenses to be provided for.

Cheaper than Rail.

Still, even with artificial waterways, men of practical experience in their management, or use for transport, assert that the cost of water transport is less than that incurred in connection with railways. The late J. E. Palmer, to whose work[1] reference has already been made, quoted a director of Messrs. Tates, Ltd., sugar refiners, as telling the Royal Commission that " during five years the saving in freight averaged 14 per cent. by using canals, where they existed, instead of railways." Mr. Palmer gave three reasons why water transport is cheaper. The first of them is the smaller cost of permanent way, to which reference has already been made. This, of course, must vary with circumstances, the chief of which is the nature of the country through which the canal is to be cut. Dividing capital by mileage, an average of roughly £56,000 per mile, is given for railways and of roughly £10,175 per mile for canals. Such figures, however, can hardly be accepted as conclusive because it is impossible to say how much canal capital has been mixed up with railway capital in the returns of the companies, but at any rate the difference is such as to allow room for a very large margin of error and still leave the comparison in favour of the canals. Another point to be remembered, however, is the difference in the conditions prevailing at the times when the canals and the railways were constructed. Canals preceded railways by roughly half a century, and for all practical purposes their construction ceased when railways began. The constructors of canals had the advantage of cheaper land and cheaper labour when they were creating their undertakings, and the extensions since made have been relatively insignificant. Railways beginning later had to pay more for their land and labour, and, having remained progressive, their extensions have become more and more expensive with the passage of years. The money required

[1] *British Canals; Problems and Possibilities*, by J. E. Palmer.

for some of the recent extensions in London would have been sufficient to construct a whole canal in the days when this form of transport had its birth. It follows, of course, that if we were starting *de novo* to construct a canal system the capital cost would be very much greater than that of the original canals. The late J. E. Palmer expressed the opinion that "adequate barge canals in England would probably cost an average price per mile nearer to that of railways than to the original cost of the canals," but, he added, "enlarging existing canals would cost appreciably less."

To the smaller original cost of canals has to be added the further advantage that normally the cost of maintenance is also less. It seems impossible to obtain from the various Blue Books an exact and strictly comparable figure of average cost per mile for maintenance of canals and railways. According to the annual railway returns the cost for maintenance of "way and works" in the United Kingdom in 1912 was £11,707,708, which works out at £499 per mile of line. The canal returns give the cost of "management and maintenance" for the United Kingdom in 1905 as £800,251. As this figure applies to 4,673 miles of canals and waterways the average works out at £171 per mile. Later, in the final report of the Royal Commission, in the section where a new table is set up dealing only with companies which have made returns for each of the three years taken, there is also an attempt to analyse the expenditure in greater detail. In this section the purely maintenance expenses as distinct from management expenses for 3,148 miles of canals in the United Kingdom in 1905 amounted to £444,406, which averages £141 per mile. The two canal averages work out remarkably closely when the differences on which they are based are considered. Possibly it may be felt that there is sufficient correspondence between them to make them approximately reliable. In connection with the railway figure it is difficult to know whether allowance must be made for the maintenance of "works" as distinct from "way," and if so what. On the figures as they stand, however, there is a considerable margin in favour of the canals and in support of the argument of the advocates of canal reconstruction that the maintenance of canals is much less costly than railways.

Small Cost of Maintenance of Canals.

In the same connection it is argued that increasing railway

traffic means increased wear and tear of permanent way and vehicles, whereas in the case of waterways the extra wear and tear arising from increased traffic is practically negligible; and the actual working experience of some of the canal companies, such as the Manchester Ship Canal, proves that this is so; that a very substantial increase of traffic can be accommodated on a waterway without anything like an equivalent increase in the cost of maintenance.

Increased Traffic on Rail Means Increased Wear and Tear.

The second advantage which contributes to bring about the cheapness of water as compared with land transport is the smaller cost, load for load, of boats than railway rolling-stock. The weight of a railway wagon is stated to range between half and three-quarters of the weight of the load it can carry, whilst canal boats can carry five or six times their own weight of goods. This means, of course, that a railway engine has to haul a very much greater proportion of non-paying load than that hauled on the canals, and correspondingly the proportion of wear and tear due to non-paying and paying load is so much the greater in connection with the railways. For the same reason the cost of construction in relation to carrying capacity is greatly in favour of the canal barge. Mr. Lionel B. Wells, formerly engineer to the Weaver Navigation, told the Royal Commission that—

"a railway train loaded with 200 tons costs £3,360 and a steam barge to carry the same tonnage £1,600. The steam barge can tow three barges each carrying 200 tons and each costing £1,000. The cost, therefore, of the steam barge and the three dumb barges is £4,600. Railway rolling-stock to carry the same tonnage costs, Mr. Wells stated, £15,000."[1]

Still another advantage claimed is that it is more economical to carry goods when the unit of conveyance is a large one—

". . . for the ratio of expenses diminishes in proportion as the load increases to a greater extent with water transport than rail transport."[2]

The third advantage urged is that the cost of motive power is less on suitable waterways than on railways for the same load. This proposition, of course, presupposes waterways of the most suitable sectional area and barges of the proper relationship to the sectional area if the best results are to be obtained. Given these things, then, it is stated, the power required to move a given load on land will move five times

Cost of Motive Power Less.

[1] J. E. Palmer: *British Canals.*
[2] J. E. Palmer.

that load on water. Actual comparative figures are not available because the English railways do not publish ton mile statistics, but Mr. Bartholomew, whose evidence has already been referred to, told the Royal Commission that on the Aire and Calder Navigation the cost of haulage in 1907 was : by steam tugs $\frac{1}{20}$ of a penny per mile, and by horse haulage $\frac{1}{10}$ of a penny per mile. The cost of hauling coal in tank barges on the same waterway was $\frac{1}{110}$ of a penny per mile.

It is not to be assumed that these contentions that water transport is cheaper than land are admitted without dispute. There are recognised authorities on the economics of transport who take quite the opposite view. Their arguments are that the results obtained in European countries are not to be relied upon because they are not obtained as a result of free competition and because the physical characteristics of those countries are so different from those of the United Kingdom. With regard to the competition, they point out that the governments of France and Germany, for instance, are either the absolute owners of both railways and canals or have a large financial interest in both. And because of this the competition of the railways is regulated and restricted with the avowed object of preventing it from destroying the competition of the inland waterways. The only free competition, it is urged, prevails in this country and in the United States of America. Here it is admitted that the canals have been unable in the past to compete with the railways and have only been able to retain a modicum of the transport business of the country as a whole. The answer of the canal advocates is that the success of the English railways in opposition to the waterways is not due to any inherent disadvantage of waterways but to the lack of enterprise on the part of the canal companies ; their antiquated unprogressive methods. In the few instances where the owners of canals have had the energy to modernise the waterways and work them with vigour their efforts have been rewarded by increased traffic and large profits. In the United States of America the opponents of canals assert that the free competition of railways has resulted in traffic being attracted from the artificial waterways notwithstanding the expenditure of immense sums of money in enlarging and improving those waterways so as to make them capable of dealing with traffic in the most satisfactory and economical

Divergent Views.

manner. In the same way the railways of the United States of America have taken traffic from so magnificent a natural waterway as the Mississippi. The railway advocates, of course, admit that the river remains an immensely important highway of commerce but, they assert, if water transport possessed in fact all the advantages claimed for it in theory, then the railways would not have been capable of living in competition with such a river as the Mississippi, much less of obtaining traffic from it and of arresting the continuance of its rate of development.

Comparison with Foreign Countries.

Advocates of water transport maintain that valuable direct evidence as to its advantages is to be obtained from the experience of other countries, particularly the western European countries—Germany, Belgium, and France. It is, therefore, of value to summarise briefly what has been done in these countries, as outlined in the report of the Royal Commission. Holland is not dealt with in this connection because its waterways, though used largely for transport, are intended primarily for drainage rather than commercial use.

French Canals.

France began to construct canals long before we did in this country—early in the seventeenth century ; but the really material facts date from the close of the eighteenth century and the beginning of the nineteenth. The State in that period began the policy of granting financial assistance for the development of waterways. The policy pursued also included, as in the case of the railways, the granting of concessions, but the system was not altogether successful because of the high dues which were charged, and in 1845 a law was passed authorising the State to repurchase the concessions. At first railway development had the same influence on canals as it had in this country. The tendency was to regard the future of water transport as hopeless. The traffic declined for this reason and because of the vigorous rate competition instituted by the railways. In other respects the hostile attitude of the railways who refused in any way to co-operate with the waterways damaged the latter. But the State had faith in the usefulness of the waterways and between 1831 and 1847 over £13,500,000 were spent on improvement and construction of rivers and canals. The greatest period of development, however, dates from 1879, when a comprehensive programme was adopted involving a cost of £28,000,000. As recently as 1903

a new programme was adopted under which another £8,250,000 were to be spent. From 1841 to 1900 the amount actually spent by the State was: on improvement and construction, £61,603,237; on maintenance and heavier repairs, £30,384,073—Total, £91,987,310. This, of course, will ultimately be increased by at least £8,250,000, the estimated cost of the 1903 scheme, so that finally at least £100,000,000 sterling will have been spent by France on the improvement of her waterways, natural and artificial. In return for her expenditure she possessed, in 1905, 1,306 miles of rivers and 1,671 miles of canals, together 2,977 miles, with a minimum dimension capable of accommodating boats of 300 tons capacity. The tonnage carried grew from 18,000,000 tons in 1880 to 34,144,000 tons in 1906, an increase of 90 per cent. The ton mileage for the same period grew from 1,244,000,000 to 3,163,000,000, the increase in this case being 154 per cent.; and the mean length of travel from 62 to 92 miles. In the same period the tonnage carried by the railways grew from 80,774,000 to 139,000,000, an increase of 72 per cent. and the ton mileage from 6,417 millions to 10,959 millions, or 71 per cent., while the mean length of travel having started at 79 miles rose to 81 miles and fell back again to 79 miles. The waterways have been toll-free since 1879, and the average freight charges are described as "low . . . much lower than those in England, which, however, include tolls." The railway rates are usually kept 20 per cent. above the water rates with which they compete.

Belgian Canals.

The Belgian waterways system is described as one of the most intensely developed in the world. The total length of the system (canals, and canalised and open rivers) is 1,345 miles, of which 900 miles are State-owned and 115 miles are owned by provinces, communes and concessionaires. The total expenditure of the State from 1831 to 1905 on construction and the larger works of improvement is given as £15,810,000, and the total cost of current maintenance and improvements as £4,958,000. The canals are not toll-free but the dues are light. The attitude of the Government is admirably summed up in the following paragraph from the report of the Royal Commission—

"The annual cost of maintaining the waterways is almost met by the receipts from the dues, but the State expects no return or profit upon the money spent upon construction and large improvements. It is

considered in Belgium, as in France, that these works will increase the commerce and wealth of the nation, and that the increase of commerce and wealth will strengthen the national public revenue."

The Government adjust the railway rates (the railways are chiefly their property) so as to prevent waterway carriers from being crushed by competition. The total tonnage of goods and merchandise carried on the waterways increased from 25,242,000 tons in 1890 to 53,345,000 in 1905, or 111·3 per cent.; the ton mileage grew in the same period from 358 to 708 millions. Between 1888 and 1905 railway traffic grew from 40,352,000 tons to 65,319,000 tons. Of the total traffic (rail and water) in 1888, 38 per cent. was water-borne and 62 per cent. rail-borne. In 1905 the proportions were: water-borne 45 per cent., rail-borne 55 per cent. The average freight on the waterways (including dues) is about 0·37d. per mile, and this is 60 per cent. of the railway rates.

An interesting comparison between the circumstances of Belgium and England is given as follows—

Comparison between England and Belgium.

"In both cases there are important mining and industrial districts situated at about the same distance from the nearest great port. Liége has sometimes been called the Birmingham of Belgium. But Liége is provided with cheap and effective water transport. A cargo of minerals can be sent from Antwerp to Liége, a distance by water of 95 miles at a freight, including dues, of 2s. $4\frac{3}{4}$d. a ton, *i.e.*, a freight per ton per mile of about 0.30d. A cargo of iron rails can be sent from Liége to Antwerp for export at 2s. 7d. per ton or 0·33d. per ton per mile. The goods can be taken from or to the side of the sea-going ships in the same barge which carries them to or from Liége. Not content with these favourable conditions as compared with anything in England, the Belgian Government are . . . undertaking canal improvements to enable barges carrying cargoes of 1,000 tons to navigate between Liége and Antwerp. Birmingham is at nearly the same distance from the ports of Liverpool and Bristol as Liége is from Antwerp. To convey the same goods between Birmingham and either of these ports by water would cost about thrice as much per ton per mile as the transport between Liége and Antwerp, and it would moreover be necessary to incur the cost and delay of transhipment from one boat to another on the way. If it is also taken into consideration that the English railway rates are higher than Belgian, it will be seen that the English Midland manufacturer is, in respect of rates for transport, at a considerable disadvantage in competing with his Belgian rival both in regard to the import of raw material and the export of manufactured produce."

In Germany the introduction of railways was the cause of the same stagnation of waterways as in other countries but "renewed

attention began to be paid to this means of transport about the middle of the seventies," and this led to "a progressive development in the character and importance of the works for improving the conditions on the navigable waterways, and to a gradual but very considerable increase of the expenditure thereon." The scheme of development was planned so as to secure east of Berlin waterways navigable for 400 ton boats and west of Berlin 600 ton boats. Figures as to total length of the German waterways vary from 7,700 to 8,500 miles, according to the inclusion of certain small canals and estuaries, but the total length on which the traffic is of importance and its amount can be stated in figures is 6,200 miles. The free navigable rivers are of more importance than the canals in Germany. The rivers are public property, and with a few exceptions the construction of the canals has been carried out by the State and they are administered by the State. The construction of harbours and wharves for commerce is usually left to the municipal authorities. The result of this enterprise has been the attraction of industrial establishments to the banks of the waterways, where many of them have constructed their own works, and it has promoted the decentralisation of industry.

The German Canals.

In the Prussian portion of Germany the control of all State-owned waterways, as in France and Belgium, is in the hands of a department of the Ministry of Public Works. By far the larger portion of the waterways of Germany are in Prussia, and that country, from 1815 to 1906, spent £13,181,000 on improving the free rivers and £13,200,000 on the construction and improvement of canalised rivers, and in 1905 alone spent £804,240 on maintenance of the waterways. In some cases the free rivers such as the Rhine and Elbe, are free from dues, and those on the canalised rivers and canals are low; on the Mark waterways from 0·074d. to 0·015d. per ton mile; on the Main from 0·124d. to 0·062d.; on the Dartmund-Ems canal from 0·068d. to 0·010d. The total revenue derived from traffic etc., in 1905 was £340,700, so that the excess of expenditure over receipts was £463,540. The State also foregoes interest on the capital sums expended on improvements. As the total capital expenditure has been £26,500,000 the interest charge on this at 3½ per cent. would be £927,550, which, added to the deficit mentioned

The Prussian Canals.

above, makes a total of £1,391,000, which is equivalent to an annual State subsidy to the traffic on the waterways. To make the traffic pay maintenance and interest would mean an increase of dues from £340,000 to £1,391,000 per annum. The deficit is attributable to the rivers being free. On the canalised rivers and canals the income from dues just covers the cost of maintenance.

Increase of Traffic in Germany.

From 1885 to 1905 the traffic on German waterways increased from 2,976 to 9,300 million ton miles, the actual increase being from 13,600,000 tons to 67,000,000 tons. In a period of twenty years, therefore, the waterways traffic increased more than three-fold, while the railway tonnage increased more than two and a half in the same period. Taking the revenue from railways and canals together the State obtains 7 per cent. return on the capital invested. The capacity of the barges used on the Rhine goes up to 2,000 or even 2,500 tons, while the 600 ton barge is becoming the typical vessel on the Elbe, Weser and Ems. Still further constructive work was sanctioned in 1905 at an estimated cost of £16,728,750, and the 600 ton barge will be the standard to which the new waterways will be made. The policy of the Government in this case is not only to make the canals self-supporting by means of the dues, but also to provide 3½ per cent. interest on the capital expended. Other German States were considering extensive navigation schemes at the time of the report.

Continental Results not Applicable.

These brief summaries of the principal points of the report concerning France, Belgium and Germany have been reproduced mainly for the purpose of supplying concise information as to what has been done by some of our greatest commercial rivals. At the same time, they afford proof of the contention that properly developed waterways can be made to play an immensely important part in national systems of transport. The facts are also evidence of the faith which the governments of these countries have in the utility of water transport. They have thought it worth while to spend millions of pounds on the improvement of natural waterways and the creation of artificial ones; to keep the two kinds of transport alive and vigorously working side by side. Obviously they must believe that some economic advantage is to be gained or their policy would have been different. Still, when all this is admitted the critics are

legitimately entitled to say that the facts furnish no real argument in favour of the superior advantages of water transport. The canal traffic is all "bounty fed." Large sums have been spent on construction and improvement and the Governments concerned either derive no financial return, or at best a microscopical one, on the money they have expended. In addition the waterways are protected from the severity of railway competition. They retain their traffic, not because it is proved that on their merits, or intrinsically, they furnish a cheaper means of transport, but because the railways are not permitted to attempt to get it from them. Conditions in this country are quite different. To bring them into line would mean a complete reversal of national policy. The Government, according to the views of the railway advocates, could not well subsidise canals and at the same time restrain the railways from competing with them. Before they could do this they would, in fairness and justice, at least have to acquire the railways. Under any other conditions they would not merely lay themselves open to a charge of gross unfairness, but they would be provoking a widespread financial crisis, the disastrous effects of which cannot be estimated.

CHAPTER XV

RECOMMENDATIONS OF THE ROYAL COMMISSION

IT remains now to set out as briefly as possible the recommendations of the Royal Commission appointed in March, 1906, to enquire into and report on the canals and inland navigations of the United Kingdom. The fourth and final report (Vol. VII of the publications of the Commission) was issued in December, 1909. The terms of reference were—

General.

" to enquire into the canals and navigations of the United Kingdom, and to report on—

(1) Their present condition and financial position ;

(2) The causes which have operated to prevent the carrying out of improvements by private enterprise, and whether such causes are removable by legislation ;

(3) Facilities, improvements and extensions desirable in order to complete a system of through communication by water between centres of commercial, industrial and agricultural importance, and between such centres and the sea ;

(4) The prospect of benefit to the trade of the country compatible with a reasonable return on the probable cost ; and

(5) The expediency of canals being made or acquired by public bodies or trusts, and the methods by which funds for the purpose could be obtained and secured ; and what should be the system of control and management of such bodies or trusts."

Sufficient has already been written concerning the first and second terms of reference except that the latter may be slightly emphasised by three points from the report. In explanation of the causes which have operated to prevent the carrying out of improvements by private enterprise it is stated : " most of the independent canal companies have not the means to make large improvements, and for the most part neither the will nor the energy," and it is not practicable to raise funds by private enterprise because there is " a complete want of faith in the future of canals on the part of that investing public who so freely send out their money for railway construction and mining enterprise in distant parts of the world." The Commission thought that some of the causes might be removed by legislation if the parliamentary procedure for purposes such as amalgamations,

Why Private Enterprise Fails.

etc., were made cheaper, but, they added, the obstacles to improvement "cannot be removed . . . by legislation on minor points, although such legislation may be a necessary feature in a larger schemes of reform."

On the third term of reference (facilities and improvements desirable, etc.), the Commission came to the conclusion that as a first step in any comprehensive scheme of waterway development it would be desirable to take what has been called "the cross" in hand for gradual but continuous improvement. "The cross," as will be seen from the map reproduced, connects the Thames, the Severn, the Mersey and the Humber, giving access to all these rivers from the Midlands. The routes should be treated as great highways traversing central England. They should be amalgamated under a single control and should undergo such improvements as would make them efficient means of transporting a volume of long distance traffic far larger than that which they at present attract. If these improvements are undertaken many of the great manufacturing and consuming centres of England will be linked with each other, and with the great seaports by waterways permitting the cheap transport of minerals and goods not requiring the highest speed.

"The Cross" Recommended.

"The Midland districts will have cheap access to and from the four great estuaries for the import of raw material and the export of certain classes of products; and coal may be brought to London by improved waterways from the coalfields of South Staffordshire and from those in the counties of Warwick, Nottingham, and Derby."

The Commission thought that with necessary modifications the general policy of waterway improvements adopted on the continent can be applied to this country, but their investigations into the requirements of commerce, the water supply available, cost of construction, etc., brought them to the conclusion that it would not be practicable to adopt in this country so large a standard of canal dimensions as that which has been adopted for German and part of the Belgian waterways or even, perhaps, so large as the French and the other Belgian waterways. They suggest that the arm of the cross from Birmingham and Leicester to London (which they call route A) should be improved to the 100 ton standard; that from Leicester, Burton and Nottingham to the Humber (route B) should be improved to the 300 ton standard between Leicester and Fradley junction respectively

Suggested Dimensions.

and Nottingham, and from Nottingham to the Humber so as to accommodate 750 ton vessels; that from Wolverhampton and Birmingham to the Mersey (route C) to the 100 ton standard; and that from Wolverhampton and Birmingham to the Severn (route D) to the 100 ton standard from Wolverhampton to Stourport and from Birmingham *via* Droitwich to the Severn at Hawford, while the Severn should be improved to a 750 ton standard up to Worcester and to 600 tons up to Stourport.

Prospect of Benefit to Trade.

On the fourth term of reference (the prospect of benefit to trade compatible with a reasonable return on the probable cost) the Commissioners briefly sum up their views as follows—

"The Commission as a whole are unable to state that in their opinion there would be a reasonable direct return on such probable expenditure. Some of the Commissioners would give a negative and some an affirmative answer to the question whether there would be an adequate direct return."

If the matter could be considered simply with regard to benefit to commerce and industry they would recommend the larger 300 ton scheme, but as the prospect of a reasonable direct return on the capital expended, and that presumably within reasonable time, must be considered, they do not think they can go beyond the expression of the opinion that if "the cross" were brought under single control and improved, and the minor canals were improved, these measures would result in great benefit to the trade of the country. They therefore base their further observations on the supposition that the smaller scheme (100 ton standard, with a higher standard for the rivers) will be adopted. They feel convinced that the more or less gradual application of the improvements involved in that scheme would greatly benefit consumers of coal and other commodities. The tendency of manufacturers to leave the Midland for the coast would probably be arrested if cheaper rates could be provided to and from the ports.

Local Favouritism by State Aid.

To the argument that it is not fair to give any kind of economic State aid to certain parts of the country unless the benefit can be extended to the whole country, they say that Scotland and Ireland have both received such aid, and that if attention had been paid to such an argument the expenditure of public money in other countries would have been prevented. The Governments of these other countries, however,

appear to believe that if one part of a country is made more rich and prosperous the interests of the whole cannot fail to be promoted. And in this country it may be held that improvements affecting certain districts would be of great advantage to the country as a whole.

Cost.

Coming to the question of cost, the report tabulates in detail the total cost of improvement and the annual charges for the four routes exclusive of their branches, which might subsequently be acquired and exclusive also (which is most important) of the cost of acquisition. The table deals with 533·84 miles and gives the following totals—

Cost of improvement	£14,756,923
Cost of water supply	481,986
Total	£15,238,909
Annual charge for interest and sinking fund on total cost at £3 12s. 3d. per cent.	£550,505
Annual cost of pumping	33,904
Annual cost of management and maintenance	182,919
Total	£767,328

Insufficiency of Figures.

Obviously figures such as these must be regarded as defective because of the two omissions specified, particularly the cost of acquisition. Part of the defect is remedied, however, in a second table, which gives the total cost of improvement and annual charges for the four routes and their branches, cost of acquisition again being excluded. In this case, also, the Birmingham Canal, as a whole, is included though it is not contemplated to raise the whole of it to the standard of the large capacity canals, but merely to acquire it and work it as a feeder. This gives a total of 1048·77 miles and the totals as before are—

Cost of improvement	£16,951,924
Cost of water supply	581,986
Total	£17,533,910
Annual charge for interest and sinking fund on total cost at £3 12s. 3d. per cent.	£633,411
Annual cost of pumping	65,303
Annual cost of management and maintenance	305,467
Total	£1,004,181

This, however, is not the whole annual charge. A sum of £93,844

per annum of "other expenditure" (not explained in the final report) has to be added. The gross income of the four routes at present is: from tolls, £434,509; from other sources, £133,462; total, £567,971. In estimating the future revenue required from tolls the following figures are given—

Total annual charge and "other expenses" .	£1,098,025
Less present revenue from "other sources"	133,462
Future revenue required from tolls . .	£964,563

As to the quantity of traffic required to produce this £964,563 per annum the Commission say—

". . . if we assume that the average toll on all these waterways will not exceed 0.2d. per mile the total ton-miles of traffic required will amount to 1,158,000,000. Distributed equally over the 1,048 miles of the routes and branches this works out at 1,104,000 tons per mile. If distributed over the main lines only, viz., 533 miles, it works out at 2,173,000 tons per mile. The existing tonnage on these waterways amounts to 16,600,000 tons. If it is assumed that the average travel is 12 miles the present traffic amounts to 199,200,000 ton miles. Additional traffic would, therefore, be required amounting to 958,800,000 ton-miles to meet the total expenditure when, in the course of years, the whole scheme of improvement had been completed."

Can an exact Estimate of Cost of Transport be Arrived at?

The Commission

" do not believe that any very exact estimate of the cost of transport on the improved waterways can be arrived at. But upon the figures which have been placed before them . . . there is much reason to believe that, if on improved canals trainloads of 260 tons could be conveyed in shorter time than loads of 50 to 60 tons are conveyed on the present canals, tolls remaining at their existing level, there would be a large reduction on the cost per ton mile of conveyance. This reduction in the cost of transport would be effected through the competition of carriers who would be enabled to carry at less cost on a larger and better highway in consequence of the increase in the weight of cargoes and the saving of time and labour. If, however, the authority controlling the amalgamated waterways were to reduce the toll per ton per mile the total cost of conveying cargo would be still further reduced."

Future Policy.

The Commission recommended that the future policy as regards tolls should be

". . . to render the unified and improved waterways self-supporting so far as concerns maintenance and management and interest on capital expended on improvement. But it may well be considered whether with a fair regard to existing transport interests, the State might not wisely take upon

itself the cost of acquisition of such waterways as may be needed for each successive scheme of improvement."

If this view is adopted they recommend that

" . . . this State-aid should be given by way either of free grant or of advances with a long-deferred term for repayment, or by a combination of both these methods.

" In support of such a policy it may be urged that the present condition of canals is, to a great extent, due to legislative errors and neglect in the past and that it is desirable to repair these errors, which have undoubtedly put our national industry at a disadvantage in competing with foreign rivals, and to promote the lowering of rates for inland transport, especially of coal and raw materials."

The fifth and final term of reference concerns the question of control, assuming that the work of unification and improvement is carried out. As to this the Commission do not favour the plan that the State should make the improvements and lease the canals to the present canal companies or an amalgamation of them, because they do not think it possible to evolve a capable body out of them. They recommend that the English and Welsh waterways should be placed under the direct control of a Waterways Board who should submit schemes for (*a*) acquisition, and (*b*) improvement of waterways, to the Development Commissioners appointed under the Development and Road Improvements Funds Act. These latter Commissioners may make recommendations to the Treasury on which advances may be made to public authorities for various specified purposes, one of which is " the construction and improvement of inland navigations."

Question of Control.

As a conclusion to this section of their report the Commission say that they have

" . . . realised more and more as their enquiry has proceeded how hopeless it would be to expect anything from the waterways system of England and Wales in the future for the benefit of trade and industry, if the waterways were left in their present disunited and unimproved condition. With a few notable exceptions the canals at least would become less and less efficient and useful ; and many would swell the list, as years went on, of disused or derelict canals. Thus, a system of transport which in foreign countries has become of great value to trade, as a result of measures of unification and improvement, would in this country be practically lost."

Limit of Utility Reached in England and Wales.

They have also

" . . . become more and more convinced that the measures which they propose for the unification, reconstruction, and improvement, and for

the central administration of the more important waterways, if carried out gradually and continuously, are not only the best steps that can be taken to save the system from destruction, but also to afford a reasonable prospect of benefit to the trade of the country commensurate with the expenditure to be undertaken. Some of the Commissioners, as stated, do not believe that in addition to this benefit an adequate return would be obtained on the capital outlay. Other Commissioners look forward to the creation of a traffic so considerable that, in course of time, an adequate return direct, as well as indirect, on the outlay may fairly be anticipated."

Method of Acquisition.

Finally, it is recommended that the financial procedure for acquiring the waterways should resemble that adopted in the Port of London Act, 1908. The properties of the dock companies were vested in the new port authority which was authorised to issue port stock in substitution for the existing stock of the dock companies. They further recommend (1) that the stock issued to acquire canals should be in the nature of a free grant, or of a loan with long deferred date of repayment of interest and capital, or a combination of both free grant and loan ; (2) that the stock issued or loans raised by the new authority for the purpose of carrying out the works of improvement of waterways should be guaranteed by the State ; (3) that the commencement of the sinking fund for the redemption of the last mentioned stock or loans should be deferred for a period of years.

Waterways Board.

If, for financial or other reasons, it should not be thought advisable to commence the works of improvement at once they still think that in any case, and as a first and most important step the acquisition and unification of these waterways by the Waterways Board should be carried out. This step by itself, and apart from any large works of improvement, would be an appreciable benefit to commerce ; and by reason of the economies resulting from the substitution of a single large administration for many small ones, might enable a certain though not a large, reduction of tolls to be effected.

Other Recommendations.

There are also recommendations as to other English and Welsh waterways, and as to those of Scotland and Ireland, but as the main problem begins and ends with "the cross" the extracts may be left at that. It should be added, however, that there are two or three minority reports from members of the Royal Commission who did not agree with the whole report or who dissented from it entirely.

Whatever may be thought of some aspects of the report it will be generally admitted that from other points of view it is a most valuable document. Taken in conjunction with the other six volumes of evidence and statistics it is a thorough investigation of a difficult subject, and it contains much information never before available.

Value of Commission's Report.

But when the conclusions arrived at are considered it must appear even to the most impartial student as rather weak. Indecision seems to be one of its characteristics. Reading "between the lines" there is a suggestion that some of the Commissioners wanted to recommend the 300-ton scheme for "the cross," but in the end followed a policy of mere expediency and came down to the smaller canals. Again, there is weakness in the manner in which the question of direct return is dealt with, and because the cost of acquiring the canals is ignored. It would seem to be essential that if the scheme is to obtain the most widespread support there should be the fullest possible information as to the total cost. It is not sufficient to say that there would be an immediate outlay of £15,238,909 to be ultimately increased to £17,533,910 when all the valuable branch feeder canals are acquired and improved. Seventeen and a half millions, apparently, is not half the cost. In their report the Commission have not taken the trouble to set out the capital of the companies proposed to be taken over to form "the cross," and its branches, which appears to be just over £17,250,000. And this is bare capital. It makes no allowance for compensation for compulsory purchase in the case of canals, such as the Birmingham, where the shareholders are in enjoyment of a steady dividend. The omission is another instance of the defects of the statistics compiled for the Commission. Nor is there anything convincing in the way the report deals with the raising of the increased revenue which would be required to meet the cost of improvements, management and maintenance—£964,563 per annum. Why is the figure 0·2d. per ton per mile selected as the future average toll? On what is it based? No information is given. We are merely told that it is a hypothetical figure and that if it is accepted then there would be required 958,800,000 ton miles of traffic at that average price to cover the cost of improvements, maintenance and management. In other words, the present traffic would require to be more than quadrupled. Possibly such an

increase would not be too large to be attained on improved canals, but in view of the manner in which it is arrived at is the figure worth the paper it is printed on ? No one can say. Controversy is certain to be raised as to whether the State should acquire the canals and forego any return on the capital thus expended. The point need not be discussed. It raises a new principle which is altogether opposed to past national policy.

Canals and Local Industries.

On one point, however, there appears to be no possible room for doubt—the unification and improvement of the canals would be of immense benefit to the industries in the localities affected. It would give them a valuable alternative means of transport, and if "the cross" were worked in sympathy with the ideas of the Royal Commission it cannot be doubted that the new transport would be relatively cheap. It might happen that if the railways were put under no restraint as to competition they would reduce their rates in all the districts touched by water competition with the sole object of killing that competition, and the Royal Commission estimates of the probable return would be badly at fault. In such a case the annual loss to the State, apart from the lack of interest on capital which the report recommends, would be considerable. Still, even so, there would remain a distinct benefit to the traders concerned in the possession of much cheaper transport by rail as the result of the improvements made in the waterways. On the other hand, there would be yet another set off to be made when attempting to estimate the balance of advantages. It is quite probable that railway competition, such as would be necessary to accomplish such a result, would so seriously affect profits as to cause dividends to be reduced. In that case there would be not only the national loss but also the loss to the railway shareholders concerned.

It will be realised from these few concluding comments on the report how extremely complex is the problem to be faced. It is not proposed here to attempt a solution. The object in view has been to set out the whole question as fairly and comprehensively as possible so that its difficulties might be realised, and so that, perhaps, some small measure of guidance may be afforded to students of the problem.

PART III

SHIPPING AND OCEAN TRANSPORT

CHAPTER I

EARLY NAVIGATION AND THE COMMENCEMENT OF MODERN INTERNATIONAL TRANSPORT SERVICES

General.

THE preceding sections of this book have dealt mainly with questions of land transport, or at least the carriage of goods between districts or countries in fairly close proximity to each other. But there is a greater question, so far as distance to be traversed is concerned. Discovery and invention have had the effect of widening the area of markets to so remarkable a degree that the beginning of the twentieth century finds the extent of the market only limited by the area of the habitable globe, in other words, there is in a very real sense to-day a world market, and the possibility of world trading to which previous human history can furnish no parallel. The secret of this greatly extended trading area is bound up first of all with the improvement of the ship, the vehicle of ocean transport, and, secondly, with a series of inventions which have rendered mankind independent of natural forces, in that man himself has devised artificial methods of ship propulsion which have entirely revolutionised the conditions of international trading. The revolution of shipping business, the ship and her management, the science of navigation and the opening up of trade routes afford one of the most interesting stories in the annals of human activity. Nor will it be inexpedient to devote a few pages here to outlining the main points in this story.

It is unnecessary to do more than refer to the shipping and international trade of the ancient world or even of mediaeval times. As has already been noted, primitive man very early realised the advantages of a water route and devised craft capable of serving him for various purposes on river, lake, and sea.

From these primitive craft evolved a variety of water-borne

vessels; and it is interesting to know that as time went on, in widely separate parts of the globe, boats of various dimensions but of remarkably similar design and construction were produced. And by the beginning of the sixteenth century a sailing ship was available in European waters, which was capable of going anywhere and doing anything. It might be difficult to give a decided opinion as to the original type of this ship. Phoenician traders had visited Western Europe in almost pre-historic days, and it was the tin mines of Cornwall that first brought Britain within the ken of civilisation. Ships that could sail from the Levant to Cornwall, even though the greater part of the voyage was within sight of land, must have been strong capable craft. Nor is it unduly exercising the imagination to surmise that those vessels were the direct progenitors of the ships by means of which Venice consolidated her power at the head of the Adriatic, and organised regular trading cycles which brought Western Europe, the East, and the great stretch of intermediate lands into trading relations.

Evolution of Shipping.

The modern ship, then, owes her origin to the Mediterranean, for the Viking type of ship, which had served the English not only in the time of Alfred, but down to Plantagenet days, was superseded for trading purposes by ships of the Mediterranean model, when the Crusading energies of Richard I brought Englishmen into close touch with this more businesslike form of ship. Henceforward English shipbuilders and designers produced for the foreign trade a ship which in her principal dimensions and model, resembled the Venetian vessel. Gradually there evolved the apple-bowed ship, with full round lines, with good cargo-carrying capacity, and capable of facing heavier weather than any previous type of ship known in Western Europe. Previous to the Crusaders, the Englishman, though innately a sailor, had confined his energies mainly to the North Sea and coasting trades. The increasing dominion of the English King on the Continent had attracted English ships as far south as Bordeaux, but it was the carrying of troops and stores to the Levant that gave the initial impetus to the movement that resulted in making the Englishman first of all a world trader, and in course of centuries the world trader.

Origin of Modern Ship.

In *Hakluyt's Voyages* there is an account of an English ship

touching at the island of Madeira in the middle of the fourteenth century. This may be apocryphal, but it contains a germ of truth—English shipping had ceased to be limited in its sphere of action and was preparing to compete on every sea for the trade which began to show unmistakable signs of an undreamed of development.

Early English Adventure.

The conditions of living for the great mass of the people were remarkably different five hundred years ago. The fruits and vegetables grown in England were vastly different from those with which we are familiar, and the foodstuffs on which the people depended varied according to the season of the year in a way of which we can barely form a conception. It was with great difficulty that live-stock could be kept alive during severe winters. Indeed, it was the custom to kill a large number of animals at the approach of winter and preserve their flesh for consumption during the long winter months by means of salting. Scurvy and similar diseases were prevalent, and the use of condiments and spices was absolutely necessary to health. Thus trading relations with countries where these commodities were produced was rather more than a business consideration; it was a matter of life and health.

Need for Spices promotes Trade.

For some centuries the Venetians were the link between East and West. They brought the spices as well as luxuries of the East, and exchanged them against the wool, cloth and metals of Western Europe, and by means of well organised trade routes, they maintained a system of world trading which was highly profitable to themselves and of the greatest moment to a large and developing part of Europe and Asia.

Venetians the World Traders.

Unlooked for events, however, at first transferred and then rudely broke down the Venetian trading system. The Turk appeared upon the scene, and by the conquest of Constantinople in the year 1453 erected a bar to trading relations between East and West, which meant that either the Turk could tax at will commodities which were necessaries of life to the population of Western Europe, or that he could cut off supplies altogether.

Turks Control Supplies.

This situation unfolded itself just at the moment when certain virile people were beginning to feel the spur of a new and highly elevating force, namely, nationality. Europe had in theory been

one great community with the Emperor at the head of things secular, and the Pope at the head of things spiritual. There had been signs of a restiveness which augured badly for the permanence of a theoretically perfect system of human government. The English had for centuries been an uncertain quantity in European affairs. The Norman Conquest and its issue increased this uncertainty. And to make a long story short, with the birth of that great movement known as the Renaissance, European society, if that term be admissible, from having been divided horizontally became subject to a vertical division, as the feeling of nationality asserted itself.

Rise of Nationality.

The Englishman, the Frenchman, the Dutchman and the Spaniard, each found himself pricked in his tenderest spots—his pride of race and his physical well-being—by the success of the Turk.

It was not to be expected that the barring of trade routes would be accepted without either a protest or an attempt at finding other routes along which trade might pass free and unchallenged. Political history tells how Europe made her protest to the Turk. Commercial history more satisfactorily shows how the intrepid trader and mariner found a way where diplomacy and force failed. The Venetians lost their supremacy in commerce partly owing to their quarrel with the Turk, mainly through European jealousy, and their own moral decay. Thus the interest of the story shifts from the Mediterranean, and we must look to England, the Netherlands, and the Peninsula for the real answer to Turkish aggression.

Trade Hindrance through Turkish Conquest.

The problem before the trading community was to discover a new route to India. The Englishman, the Spaniard, and the Portuguese each conceived a theory and proceeded to work it out. The patient Dutchman was content to rest on his oars for a space, and meantime quietly prepare himself for the commercial struggle that must result.

A New Route to India Required.

First among Portuguese navigators comes Prince Henry, a Portuguese, yes, but with sufficient English blood in his veins to give him that dogged perseverance tempered by cautious imagination which led him to exert his energies in the right direction. He and a succeeding band of intrepid sailors coasted down the west side of the African Continent, and it was a Portuguese, Vasco da Gama, who, first of

Portuguese Navigators.

navigators, rounded the Cape of Good Hope, and running up the east coast, heard of the possibility of reaching India by trusting to the monsoon. Such a possibility was not to be lightly disregarded; da Gama engaged an Arab pilot, and boldly shaped his course across the unknown ocean. True courage usually meets with its reward, nor was the rule broken in this instance, for on 20th May, 1498, da Gama and his little squadron arrived safely at Calicut. The great problem had received one solution. There was a long sea route to the Indies, and henceforward European traders might voyage to the Far East unhampered by the Turk or by any force except their own commercial jealousy.

Columbus and America.

The Portuguese, however, were not singular in seeking a new route to India. A great Italian sailor had been studying the question, and influenced somewhat by speculation as to the formation of the world in some scientific books, but mainly urged on by his own genius, he determined to find India by sailing westward. His own countrymen were unwilling to help in any such foolhardy enterprise. Henry VII of England refused to lend ships and money; a refusal he lived to regret. At length, however, after seven years of disappointment, the Spanish Sovereigns, Ferdinand and Isabella, furnished the necessary vessels and equipment. Columbus sailed on 3rd August, 1492, in a small ship attended by two caravels containing a force of 120 men. After many hardships he landed at one of the West Indian islands and the outward voyage terminated at Cuba and Hayti. It was not until March, 1493, that Columbus arrived back at Patos, and, then, with but the wreck of his expedition, in one of the caravels—the other vessels having been lost. Voyaging in those days was no arm-chair occupation.

Columbus at first thought he had reached the neighbourhood of India, little dreaming that it was a New World that had been brought within the sphere of European domination.

Navigators from the Peninsula had thus discovered the sea route to India, and opened up unexpected possibilities across the Atlantic.

English Endeavour.

Englishmen also had their dreams, but their realisation entailed voyaging northward. To these mariners the success of Portugal, on finding a south-east passage to India, suggested the possibility of there being either a north-east or a north-west passage, which would serve

equally well the needs of commerce and be the English route. It is unnecessary to give here the details of the long and interesting story. Suffice it to say that Sir Richard Chancellor, going North and East, failed, indeed, to reach India, but carried his ships into the White Sea, and sucessfully opened up diplomatic and commercial relations with Russia, which had the greatest importance commercially at the moment. All Russian trade with Western Europe was thereby diverted from the Hanse monopoly, and between England and Russia a growing trade resulted.

The Cabots.

Sailing in the other direction, John Cabot and his son, Sebastian, attempted to find the North West Passage. Again, there was failure as to the main object of the voyage, but a greater success was achieved in that this and subsequent voyages made known the coast line of North America, and thus laid the foundation for Anglo-Saxon dominion there, which has become one of the great factors for good in the modern world.

Rise of the Dutch.

The aggression of the Turk and the stirring of the modern spirit had, indeed, achieved much. Long ocean voyages became practical business, and large areas of the globe hitherto unknown, and whose very existence was unsuspected, were brought within the pale of colonisation, trade and civilisation. During the latter half of the sixteenth century and all through the seventeenth century, these new routes and these new countries were being further studied and exploited by the interested countries. The Dutch came upon the scene, and on the failure of Spain and Portugal, took up the premier position as world traders. Englishmen at first enjoyed the danger and incident of distant voyaging. The policy of Spain and Portugal tempted many an English sailor to evil courses, prematurely degenerating into piracy, and the Spanish Main gained an unenviable reputation for all that is vicious and bloodthirsty. Happily, however, the commercial instinct of the nation was sound and in due time asserted itself. Cromwell initiated a policy which enabled England to gain the commercial supremacy which had seemed likely to remain with the Dutch, and thenceforward Englishmen have generally been the first on every navigable ocean.

The great belt of continents east and west had been discovered, but there were several surmises as to the existence of a great

southern continent. Dutch navigators went south from their East Indian possessions and part of the Australian coast became known. The completion of the work of discovery was effected by Captain Cook between the years 1768 and 1779. Thenceforward, Australasia, including the main continent of Australia, the islands of Tasmania and New Zealand, and many groups of islands, containing much of interest to both the anthropologist and the trader, have been known to civilisation ; and the loss by England of some of her fairest possessions in North America led her to develop the new land to the far south, the result being the Commonwealth of Australia and the Dominion of New Zealand, so familiar to voyagers to-day.

Captain Cook and Australasia.

From the time of Captain Cook practically the whole trading area of the world has been known and a great work of trade development has been proceeding. New routes, new possibilities new forms of ships and new methods of navigation have completely changed ocean voyaging as practised by Columbus and Raleigh, Davis, Cabot, or Chancellor.

Trade Development.

CHAPTER II

THE PERFECTING OF THE VEHICLE OF OCEAN TRANSPORT

WHEN the nineteenth century dawned, English ocean-going shipping consisted mainly of two types of ship, the Indiaman and the Free Trader. The former was the great link between England and the Far East, and carried on a trade which was more than ordinarily lucrative, owing partly to the monopoly conferred by the Charter of the East India Company, but it must not be forgotten that it was owing also to the very great risks that attended distant voyaging a century ago.

The Indiaman and the Free Trader.

Dating from the days of Queen Elizabeth the East India Company had, through many vicissitudes and after disputing Portuguese, Dutch and French pretensions to the paramount trading position in the Far East, become a great almost a national, institution. This favoured Company (favoured because its Charter, granted by the English Government, assured it of the monopoly in the Indian trade) had become well-nigh a sovereign body. Indeed, it exercised many of the functions of sovereignty, without being encumbered with responsibilities. From the headquarters, in Leadenhall Street, London, an Empire was governed by a Board of Directors. To understand the situation it is necessary to remember that there was no submarine cable, and no steamship communication between England and India. The route along which all communication must pass was the long sea voyage via the Cape of Good Hope, and many weeks or months must elapse before the home management could either direct or check the action of the managers on the spot. The position was both novel and anomalous in the world's history, and yet on the whole it worked well. There were undoubtedly abuses, but the native traders of the Far East had learned by long and bitter experience that the Englishman, with all his faults, was to be preferred to any competitor in trading relations. The genius for self-government, colonisation, and the conduct of a great and developing trade, untrammelled by regular Government supervision enabled the Englishman more than to

East India Company.

hold his own in those distant seas. And the outcome was that a trading company laid the foundations of an English Empire of the East, and governed many millions of human beings in a way which would merit the envy of either the ancient or the modern world.

The Company's Ships.

It is, however, the trading energies of this great Company that are interesting in this connection. There was, for those days, a great exchange of goods carried on between Europe and the Far East, the principal part being in the hands of the English East India Company. For purposes of transport a fleet of fine ships had come into being ; indeed, the East India Company's ships were the finest specimens of naval architecture of their day. The regularity of their services, the high standard of efficiency of their officers and crews, and the mail and passenger facilities thus organised, entitle us to look upon these ships as the precursors of the modern liner.

The Free Trade Type of Ship.

But in addition to this Far Eastern trade, England was carrying on a very great commerce with other parts of the world. For this more miscellaneous trade another type of ship was employed, smaller, but more cheaply built, more economical to handle—in a word, a commercial ship of comparatively great economic value. This ship is typified by the West Indian Free Trader—a vessel of small tonnage as compared with the Indiaman ; a mere cockleshell as compared with trading vessels of to-day. This Free Trader of a century ago might measure from 300 to 700 tons, whilst the Indiaman's measurement would vary from 1,000 to 1,500 tons. The latter was frigate-built, carried a large crew, and was fully armed. She was frequently a fast sailer, and, owing to the high freights of those days, she made large profits in spite of extravagant management and comparatively small carrying capacity. The Free Trader, on the other hand, had to meet the competition of all comers in certain trades, and in order to do so, had to be run economically and carry every ounce of cargo possible. Keen competition for ocean transport had led to the evolution of a very useful ship, which, although small, could accomplish a great amount of work at small expense. It is of great interest to notice these points, for it was from these beginnings, and from the experience of management and organisation of these two types of ship, that modern English shipping and its management have evolved.

English Monopoly of World Trading.

During the troublous times on the Continent, English shipping had enjoyed almost a monopoly of world trading. But a competitor, little thought of at first, but destined to become formidable, appeared upon the scene.

English and American Ships.

The Eastern areas of North America, during the days of the wooden sailing ship, contained unfailing supplies of all the materials then required both for shipbuilding and ship equipment. It is true that the trees were mainly of soft wood, but such material was adaptable, and experience proved that ships built of soft wood, though not so long-lived as those constructed on the English principle, of oak or teak, were very efficient vessels for cargo-carrying purposes. Moreover, English builders and designers were conservative. They jealously adhered to the bluff bow and heavy stern, and proportions of beam to length, which might ensure safety, but were ill-calculated to produce speed in sailing. The American builders, untrammelled by tradition, evolved a new model and produced a ship that could sail at almost twice the speed of the English built ship. Then as now, both traders and travellers considered speed, for, though in perhaps a somewhat less degree than to-day, time meant money. Hence, American shipping began to advance in importance and to find its way into all trades, until, by the middle of the century, British shipping was on the defensive in almost every trade, and American tonnage assumed dimensions which very seriously threatened the old British supremacy. From the economic point of view the situation was fairly simple. The British ship was strong and safe, she could deliver her cargo in sound condition, but she was slow. The American ship, on the other hand, was fast, but was weak, and was apt to land cargo in a damaged condition. It was a question of speed against safety—or from the English point of view, the necessity to cut oneself adrift from old prejudices, improve the model and dimensions of the ship, and so gain the double advantage of speed and safety. To the credit of the English shipowner, the latter policy was adopted, and beginning with the building of the *Challenger* by Mr. Richard Green, of London, in the year 1850, a type of ship was produced, the equal of which for speed, economy of working, and strength of construction, has never been equalled. The British clipper ship which aroused the attention of the trading world, first in the China tea trade, then

in the Australasian and West Coast trades, become a great factor in developing world commerce, and bringing within the reach of all classes of the community, commodities which ships of the Indiaman type had supplied to the wealthy alone.

Shipping Competition.

It would not be fair to give the impression that American shipping competition was overcome solely by the production of the British clipper. That event undoubtedly had a very great effect. But there were other factors at work. Wood, either hard or soft, is of but limited application to shipbuilding. After a length of 300 ft. had been attained, it was found that wood failed to give the necessary stability for ocean voyaging. Attempts had been made to build water-borne craft of metal. The success of Cort's rolling mill opened up great possibilities, and it was found that iron frames sheathed with iron plates, would produce a vessel that not only would float, but had a greater carrying capacity and strength than a wooden craft of the same dimensions. At first, however, and for some decades, there was a prejudice against ships constructed of iron. The possibility of the compass being dangerously deflected appeared to be the cause of the loss of the *Tayleur*, a large iron ship, on Lambay Island in the year 1854. Sir William Thompson, by his inventions in connection with the compass, obviated this danger, and the experience that iron ships were stronger, of greater capacity, and could be built up to hitherto unthought of dimensions, sealed the doom of the wooden ship. Some shipowners obstinately kept to the old-fashioned vessel, and an interesting attempt was made to combine the two materials by the construction of composite ships, *i.e.*, ships having iron frames and wood planking. But the test of time completely proved the superiority of the iron ship, for practically all ocean-going purposes.

Iron Adopted for Shipbuilding.

The adoption of iron for shipbuilding gave British builders a very great advantage. Great Britain was not only the chief iron-producing country, but had a large labour force skilled in iron construction work. Thus, until Germany developed her iron industry and then turned her attention to shipbuilding, and the United States, after concentrating attention on internal development for nearly forty years, once again entered the lists, both as a shipbuilder and as an ocean carrier, British builders and owners enjoyed a great

opportunity, an opportunity they were by no means slow to improve.

Steel Ships.

Experience of iron for shipbuilding had to be gained. The first iron ships were far too heavily built, but as time passed, experience and knowledge took the place of rule of thumb, and a remarkably efficient ship resulted. Not an ounce of unnecessary material was to be found in her construction and equipment. Gradually iron gave way to steel, it having been proved that soft steel is more adaptable and suitable for shipbuilding than wrought iron. Again, a reduction in the weight of metal resulted, and there was a corresponding gain in carrying capacity. Nor was the use of iron or steel limited to the hull of the ship—cables, masts, and even rigging are now of steel, steel wire rope being stronger, lighter and handier than hemp or manila. In every particular the sailing ship was the subject of improvement, until about the year 1890, there had been evolved as perfect a vehicle for ocean transport purposes, propelled by canvas, as it is possible to imagine.

Advance of Science of Navigation.

Hand in hand with the improvement of the ship, science, invention and discovery had been creating a science of navigation served by instruments of a precision almost superhuman. Every ocean, sea, and river along which the world commerce passes has been mapped, charted, buoyed where necessary, and studied to the extent that practically every hydrographical and meteorological phenomenon is known, and the skilled navigator has knowledge of every toward or untoward contingency. For nearly two centuries the theory of trade winds has been known, and routes have been standardised in the published *Sailing Directions*. Work commenced by officers of the East India Company was continued by James Horsburgh and Lieutenant Maury, and is now kept up to date by the British Meteorological office and the American Weather Bureau. Some even of the most out-of-the-way coasts have been lighted, and the lighthouse system has been brought up to an advanced stage of perfection. Docks, harbours, warehouses, quays have been provided for the safety of ship and cargo ; and in a word shipping business appeared, about half a century ago, to have evolved a system of organisation by means of which the great quantities of raw materials and manufactured goods, which distant parts of

the world have produced for purposes of trade, could be shipped in sailing vessels, which could speedily and economically effect the work of transport. The sailing ship apparently had been improved to the point at which it was safe to foretell that she would be a permanent adjunct to the commerce of the world. But in things human, perfection is never really attained ; it appears to be on the point of attainment, and then new possibilities arise and the old passes away. So it was with the sailing ship. An exceedingly economical, capable, and at the same time beautiful type of ship had been produced ; but within a few years it was realised by far-seeing commercial men that the sailing ship was doomed to disappear. That she is still able to trade on one or two routes is a remarkable testimony to her efficiency, but, sad though it may be, for some years past it has been well known that the sailing ship cannot compete with the modern steamer. The steamer, too, has been another great factor in giving to British shipping long years of supremacy. The foreigner could have bought our sailing ships, and operated them in competition with us ; but to operate steamers on a large scale required many facilities which we organised when no one else was ready to do so. These facilities and our coal supply, our engineering skill, together with the business ability of our shipowners have been a heavy handicap to foreign rivals, and have taken long years of patient effort to wear down.

Special Types of Ships.

As at the beginning of the nineteenth century our shipping could be divided roughly into two great classes—the Indiaman and the Free Trader—so to-day there are two main types of ocean-going vessels—the liner and the cargo steamer. But these two types can be subdivided into numerous classes, for few things are more interesting in the modern development of shipping than the growth of special types of vessels for special trades.

The Liner.

The passenger and mail liners have been subject to this evolution to almost as great a degree as the cargo steamer. The *greyhounds* of the Atlantic differ in many remarkable ways from the Far Eastern and South African mail steamers. This is due partly to differences in the trades, but mainly to a variety of conditions, which could hardly have been foreseen by even the most far-seeing shipping managers. Until quite recently the tonnage of the Indian or Australian liner was limited

by the dimensions of the Suez Canal. For, as originally opened, this waterway had a depth of only 24 ft. During the first twenty years of its existence, the depth was only increased by 1 ft. Nor was it until the year 1902 that it attained a depth of 26 ft.; four years later 27 ft.; and with further deepening operations, it attained 28 ft. in 1908, and it has since been still further increased to a minimum depth of 36 ft.[1] With increasing depth of water the Canal Company have increased the width to 240 ft. at the surface, but even to-day the dimensions of shipping using this route are limited as compared with the ships crossing the Atlantic. As an instance of this may be cited the *Aquitania*, the Cunarder, which, on leaving the builders' hands in May, 1914, proceeded down the Clyde, drawing no less than 29 ft. of water, and on service her mean draught is about 34 ft., which renders her when loaded unable to traverse the Suez Canal, with its present minimum depth.

Limits of Shipbuilding.

Ports, docks and rivers, too, have their effect on the type and measurement of a vessel engaged in a given trade. For the North Atlantic trade, the leviathans of from 50,000 to 60,000 tons now operating, are not the maximum tonnage that could make the voyage between the Mersey and New York. But the fact that the Cunard liners of under 40,000 tons cannot, with safety, call at Queenstown for the mails, and that the larger vessels of the Hamburg-American Line cannot complete their coaling and equipment at Hamburg, suggests that, until some of the more important harbours and rivers are deepened and improved in many other respects, the limit of size has almost been reached. The Atlantic trade has been the pioneer in ships of great tonnage. It is true that the *Great Eastern* was designed for the Far Eastern trade, but her early voyages were made across the Atlantic, and she was never used as a passenger or cargo ship in Eastern waters. Practically the Far Eastern routes were operated by comparatively small ships until the opening years of this century.

Ships in Eastern Waters.

Twenty years ago 6,000 or 7,000 tons was the size of the largest mail steamers to Australia. The *Ophir* of the Orient line, in which King George, when Prince of Wales, visited Australia, is only 6,814 tons register, and the

[1] The Canal Company announced in June, 1914, that from the 1st of January, 1915, vessels *drawing* up to 30 feet of water will be able to pass through their waterway.

Himalaya, built for the Peninsular and Oriental Company, twelve months after the *Ophir*, is only about 80 tons larger. Owing to the increased dimensions of the Suez Canal, the more recent additions to the P. & O. Company's fleet—the *Medina* and the *Maloja*—measure 12,500 tons, showing a very considerable increase in size. But for vessels trading to Australasia, those using the Cape route have recently attained a much more impressive tonnage. The *Ceramic*, of the White Star Line, measures no less than 18,500 tons; and the tonnage of the steamers of the Aberdeen Line has been increased during the last two years from vessels like the *Marathon* of 8,000 tons, built in 1904, first of all in 1911, to 11,200 tons, the *Demosthenes*, and then in 1914, to 15,000 tons, the *Euripides*. But these are rather cargo liners than mail passenger ships.

With the growth of tonnage it has been possible entirely to revolutionise the passenger accommodation on board ship. The early steamer, following the tradition of the sailing ship, was built with a full poop, so that the passengers were carried in what was really the most uncomfortable part of the ship, right over the propeller, where there was a maximum of vibration and discomfort.

Revolution of Passenger Accommodation.

The pioneer in improvements in passenger service was the late Mr. T. H. Ismay, of the White Star Line. He boldly broke away from all precedents, and placed the passenger accommodation amidships, where there was the minimum of motion, vibration and discomfort. His lead was quickly followed, and from the early seventies there was a growing competition, notably among the North Atlantic Companies, to provide their passengers with accommodation containing comforts and luxuries which in smaller vessels could not have been attempted. It is not an exaggeration to say that the Atlantic liners of to-day contain sleeping, refreshment, recreation, and even bathing accommodation equal to anything that can be enjoyed within most up-to-date hotels on shore.

Mr. Ismay as a Pioneer.

As the *Aquitania*, which left the Clyde to take her place on the Liverpool-New York service in May, 1914, is the last word in mail and passenger shipping, a short description of the vessel and some novelties in her equipment will sum up the progress made in this direction. This ship was launched on 21st April, 1913, from the yard of John

The "Aquitania."

Brown & Co. at Clydebank. Her principal dimensions are: Length, 901 ft.; breadth, 97 ft.; depth to boat deck, 92 ft. 6 in.; gross measurement, 47,000 tons; speed from 23 to 24 knots an hour. Her first trip across the Atlantic (June, 1914) was accomplished in five days, seventeen hours: the best day's run being 602 knots. The average speed over the whole distance of 3,181 miles was 23·1 knots an hour. She accommodates 3,250 passengers, and a crew numbering about 1,000. For the safety of this large number of people the most vulnerable section of the ship has been specially constructed with two shells—a ship within a ship—both the inner and the outer shells being absolutely watertight. The space between the two shells has an average width of no less than 15 ft.; whilst at short intervals there are bulkheads dividing this *safety* space into small compartments. Thus, in the case of collision either with another vessel or with an iceberg, causing a fracture of the outer plating, only a comparatively small section of the ship would be flooded. In addition to the double skin, the vessel has no fewer than sixteen bulkheads, extending fully across the beam of the ship. These are also absolutely watertight, separating the ship into seventeen sections, each of which is capable of floating by itself. Nor is this the whole provision made against the danger of being sunk in mid-ocean, for each of the decks is watertight. The vessel is thus as unsinkable as the art of man can make her, but in case the worst should happen, sufficient life-boats (two of which are fitted with motor engines and wireless telegraphy) are provided to accommodate every member of the ship's company. The passenger accommodation is replete with every convenience and luxury: verandah cafés, drawing rooms, lounges, gymnasia, a swimming bath, even a theatre; whilst some of the suites of rooms have private verandahs attached. For a crossing of five days, luxuries like these seem superfluous, but they are in demand by the overwealthy. The machinery for driving this large vessel at an average speed of over 23 knots an hour consists of a triple-compound system of turbines on four shafts, attaining 60,000 horse-power, and there are twenty-one boilers, working at a pressure of 195 pounds to the square inch.

For a time passenger service to Africa, India and Australasia lagged behind that on the Atlantic so far as gorgeousness of decoration and spaciousness is concerned, but with the larger ships now

employed on these routes, there has been a growing luxury in equipment. A recent innovation, however, is worthy of note. The White Star Company are placing a number of steamers of comparatively large tonnage on the Australasian route via the Cape. The first of these steamers—the *Ceramic*—measures 18,500 tons, as has already been mentioned. The novelty of this service is that there is a revolt against luxury of decoration and display in the passenger quarters. Comforts and necessaries are attended to, and there are even two open-air swimming-baths provided, but the extreme of luxury has been avoided, doubtless out of compliment to the more democratic type of passenger travelling to and from Australia and New Zealand. The high-water mark of luxury is reached in vessels like the *Aquitania* and *Vaterland*, but for the solid comfort one requires when making a sea voyage, experience will probably decide in favour of a less showily fitted, but equally comfortable ship.

The Passenger Service to Africa and the East.

From the paddle steamers which carried passengers and mails during the fifties to the *Aquitania* on the North Atlantic and the *Balmoral Castle* on the South African route, or the *Maloja* or *Ceramic* carrying passengers to the Far East, there has been a very great advance made in tonnage, in comfort, in economy, and in efficiency, nor would it be safe to think that the next half-century will not witness further progress in these directions, possibly equally striking.

Probabilities of Further Development.

If the mail steamer has been improved during the past half-century, it can be said that the cargo steamer has been created. Fifty years ago the ocean carrying trade of the world was the unchallenged sphere of the sailing ship. It was thought that steamers might be necessary for the carriage of mails and passengers, but they would inevitably taint cargo, even though they could be so constructed as to compete economically for freight service. Delicate commodities like tea and fruit would, it was imagined, have their flavour spoilt. This prejudice, however, was exploded in the year 1863, when a steamer—the *Robert Lowe*—brought a cargo of tea from Hankow to London, and it was found that the tea had suffered no injury. This was the death knell of the celebrated China tea-clippers, which were gradually taken off the China service and were utilised in opening up

Creation of Cargo Steamer.

new trades and extending those already established in various parts of the world—notably with Australasia and the west coast of South America. From that time onward there has been an increasing progress in the design of ship and engine, until the present day cargo steamer is an illustration of the maximum of economic capacity, combined with the minimum of cost, weight, and working expense. The effect of the great evolution that has been going on in the perfection of the cargo vessel can be summed up in the sentence that the sailing ship of a century ago could with difficulty transport commodities in retail quantities to gratify the luxury and ostentation of the wealthy, whilst to-day, thanks mainly to economical transport facilities, the majority of the commodities that were luxuries, are now to be found in the households of the poorest, for they have become the food or clothing of the masses.

The Cargo Steamer of To-day.

An average cargo steamer of to-day measures about 8,000 tons gross, 5,000 tons net, has a length of about 480 ft., a beam of 63 ft., and a depth of 31 ft., carrying a crew of from forty to forty-five hands all told. Such a vessel, whilst the geared turbine and internal combustion engines are still on their trial,[1] would be fitted with quadruple expansion engines, with boilers working at about 220 pounds pressure to the square inch. The amount of coal consumed would average from 65 to 70 tons a day, and the vessel would steam about 4½ knots for each ton of coal consumed on a long voyage. The speed of the modern cargo steamer was considerably increased during the five years prior to the war. Eight to 11 knots used to be the usual speed ; the cargo boat of to-day will average from 12½ to 14½ knots an hour. There is little likelihood of the tonnage of this type of vessel increasing abnormally for some time to come ; for it has been the experience of managers, that, at any rate for the general cargo trade, a steamer of about 6,000 to 8,000 tons dead weight capacity is convenient to handle under present-day conditions, which may involve touching at many ports, and there making up and breaking cargo. A vessel of this measurement can do a considerable amount of her own coasting work at less cost than is entailed by discharging a full cargo say at London, and then loading parts of it into smaller coasting or continental steamers for distribution to final ports of destination. Thus a cargo steamer from Australia will discharge part of her cargo at the Tilbury Dock,

[1] Cf. next chapter.

London, then run across to Dunkirk, proceed to Hull, and discharge some wool there, and perhaps visit two or three other United Kingdom or continental ports, before the inward cargo is discharged. Meantime she may have been taking in cargo at some or at all the ports at which she has touched. This new policy of using the ocean-going steamer for coasting and continental service is a recent phenomenon, and may lead to interesting developments.

Subdivision of Cargo Space.

The cargo space in steamers of the type now under consideration is very much subdivided, and the question of utilising empty bunker space for freight purposes is also at times a possibility. Nor is it an easy task for those responsible to decide exactly where a given quantity of cargo shall be stowed. Commodities like heavy ores, and, at the other extreme, light measurement goods, may require much thought as to where they shall be stowed. Two questions arise in this connection: where is the best place for them consistent with the maximum of stability for the ship? And where can they be most easily handled when the port of discharge is reached? Great experience and knowledge of a ship's characteristics, and the conditions at sea are required in settling the first of these questions. To assist managers and captains in this difficult work, an instrument was invented some years ago, known as a stability trim and heel indicator. This ingenious instrument can be handled by either manager or captain, even though he has no scientific knowledge. The instrument consists of a case, containing a level plate on which is drawn a fore and aft sectional plan of the vessel, showing all the cargo and bunker spaces into which weight may be stowed. There is a system by means of which this plate may be suspended in a balancing frame, and by using a carefully calculated set of weights, the effect of placing cargo in any space, the combined effect of loading the ship with various grades of cargo, or any changes that may occur during the voyage, owing to partly discharging or taking in cargo, are at once registered. The great ingenuity of this apparatus can best be grasped by spending an hour testing its various possibilities: for a ship employed in trades where many ports are visited, and cargo taken in and discharged at each, its utility would be difficult to exaggerate.

A number of ingenious inventions have of recent years added very considerably to the safety of ships at sea. For instance,

a vessel can now hear and speak, thanks to wireless telegraphy. She can feel the approach of land or other vessels, thanks to automatic signalling; she can feel the sensation of cold, thanks to recent marine inventions that have been fitted to the *Aquitania*, by means of which a lowering of the temperature owing to the presence of ice is at once communicated to the officer on the bridge. In a word, a vessel can now be so constructed and equipped that, not only is she self-propelled, but she possesses the means of employing most of the senses enjoyed by living creatures.

Safety of Ships at Sea.

But the *Titanic* disaster was a rude shock to those who imagined that the modern steamship was unsinkable. And after two years, the sinking of the *Empress of Ireland* in ten minutes from the moment of being struck, has once again, and with a terrible force, emphasised the necessity for taking greater precautions. No ship ought to be allowed to carry passengers, after these two awful warnings, that has not a double skin, as well as watertight decks and numerous watertight bulkheads. The *Aquitania* is probably the safest ship now afloat, and should be the standard for all ocean-going passenger vessels. "Boats for all" was the cry after the *Titanic* was sunk, but the latest disaster shows the ineffectiveness of boats for all in cases of sudden emergency. The obvious moral is that the great aim should be to make the ship safe, and no vessel should be allowed to carry passengers unless she has every safeguard that experience has proved to be necessary.

The "Titanic" Disaster.

To conclude this chapter, a few words must be said about types of ships specially constructed or equipped for special trades. The two main types are the *tanker*, for carrying oil in bulk, and the *refrigerating ship*, for transporting frozen or chilled meat, and other perishable food-stuffs. Of beef and mutton alone about 20 pounds are imported into the United Kingdom per head of population each year. This shows the immense development of a trade that commenced as recently as the year 1880. The pioneer in the enterprise which has resulted in supplying us for over a quarter of a century with cheap meat, was Sir Alfred Haslam of Derby. The successful carriage of dead meat over a long voyage entails two requirements—there must be first of all a machine, or

Special Types of Cargo Steamers.

Refrigerating Ships.

methods, for generating cold air, and secondly, there must be some means for maintaining in the hold of the ship the low temperature thus produced. The system invented by Haslam included a refrigerating engine, capable of accomplishing the first requisite, and a system of insulation keeping out the heat, and preserving the low temperature created by the engine.

At present there are three systems for producing cold air, and two ways of insulating the holds where the chilled or frozen produce is to be stowed, either for transport or storing purposes.

Various Systems of Refrigeration. The three refrigerating systems are (*a*) by compressed air, (*b*) by compressed ammonia, (*c*) by the compression of carbonic anhydride. In the first of these, the air is drawn from the insulated chambers and compressed. This raises its temperature. Then it passes through coolers, and this cooled compressed air expands in a cylinder behind a piston, and so assists in driving the machine. In expanding thus the air

Compressed Air. loses heat and its temperature falls very considerably below freezing point. It is then driven back through wooden air passages into the insulated chambers, and produces a frozen atmosphere. The process is continuous ; thus as the air in the chamber begins to lose its extreme temperature it is sucked out again, passed through the machine and returned re-frozen.

The second system entails drawing ammonia in the form of gas from the evaporator coils. It is then compressed and driven into the coils of a condenser under pressure sufficient to

Compressed Ammonia. liquefy it at a normal temperature. Then it passes to the regulating valve, and is allowed to flow gradually into the coils of the evaporator. There the pressure is reduced. The liquid becomes a gas once more, but in doing so becomes exceedingly cold. In its cold state it cools the air that is circulated in the insulated chambers, and in losing its low temperature, it recommences its progress through the machine—a process which goes on continuously.

The third process resembles the above except that brine instead of air is the medium for decreasing the temperature in

Brine. the insulated chambers.

To insulate a ship's hold is a difficult matter and one requiring great consideration. The method employed is to line the top, sides, and floor of the space to be insulated, with wood, leaving a

space about 12 in. wide between the wood and the ship's side, or decks. This space is then filled with either charcoal or silicate cotton, which effects the double purpose of keeping the cold in and the heat out when the refrigerating machinery is at work. Insulating a ship's hold entails the sacrifice of considerable cargo space; and it must be remembered that, if there be no perishable cargo to carry, not only is there less space available for ordinary commodities, but the insulation may easily be damaged, if heavy goods such as ores, metals, machinery, and so on be carried. The trade has, however, now developed on such a great scale that it gives employment to over 200 insulated steamers. Originally invented to bring mutton from Australia and New Zealand, the success of the refrigerating engine has been so complete that the meat of the surplus animals from all parts of the world is now dealt with in this way, and a very great trade has resulted between the densely populated European and Asiatic countries on the one hand, and North and South America and Australasia on the other.

Difficulty of Insulation.

The year 1914 will probably be looked back to, half a century hence, as the year that saw the commencement of world-wide oil booming. Fifty years before the Americans had struck oil, after which the resources of Eastern Europe, and that part of the Russian Empire adjoining in Asia, have been increasingly exploited. It is practically within the last few years that the extent of the world-wide distribution of oil has been grasped. Not only is the supply world-wide, but the demand, even when it depended principally on two sources of supply, has been developing in every part of the world. From the moment that oil was discovered and utilised on a large scale, the problem of its transport has attracted some remarkably keen intellects. For local distribution the can or the barrel sufficed. For land transport to the more or less distant market the tank on wheels, or, for railway transportation, on bogies was adopted, in the first instance. All these, however, proved to be uneconomic methods for distribution on land, when once the pipe-line had been tried. To-day, in connection with the oil fields that are being worked, there are pipe-lines in some cases having a length of hundreds of miles. By means of these pipes, the oil can be easily and cheaply transferred from the well to the town or seaport. So far, however,

The Oil Boom.

there has been no question of running a pipe-line under the ocean; thus ships and steamers are required for the work of transport. Oil as a cargo presents many difficult problems to the ship-designer and manager, and owing to its nature it creates special dangers when loaded either in bulk or in packages on board an ocean-going vessel.

Waste of "Broken Stowage."

At first the oil that crossed the sea was filled into forty-gallon casks, the familiar paraffin barrel. But the transport of barrels in a ship's hold entailed, as a sailor would say, a great deal of *broken stowage*, that is, there was much space wasted. For freight charging purposes a definite space is allowed for 1 ton of measurement. This space, in the case of a steamer, is fixed at 40 cubic ft.; a sailing ship allows 50 cubic ft. Exporters soon found that about four barrels of oil occupied the space of 50 cubic ft. allowed as 1 ton of space in a sailing ship, whereas a ton weight of barrels of oil required no less than 80 cubic ft. of space, or 2 tons of steamship allowance. Thus, if oil were shipped in barrels, about one-third of the space in a vessel was wasted, and it was seen that if the package could be eliminated, there would be a saving in the space required of at least 50 per cent. At the time, however, there was no definite attempt or suggestion to carry oil in bulk, but the 4-gallon tin case, packed two or four in a wooden case, was introduced. Case oil has become a familiar object all over the world; and the case is likely to continue permanently in use because it is easily handled, and when the oil is consumed, can be turned to many useful purposes. Thus oil-ships to-day are constructed to carry oil either in bulk or in cases. And there is one of these vessels which has a carrying capacity of no less than 90,000 cases. But even taking all possible advantages into account, the case occupies space, and, for the principal markets, the transport by sea of oil in bulk is the most economical method. Not only can more oil be carried in a given space, but it can be run into the ship through pipes, and pumped out when the destination is reached; and both of these operations reduce terminal charges for loading and discharging to a minimum. For instance, a modern tanker can either load or discharge 1,700 tons of oil in bulk in about six hours. To handle this quantity of oil in barrels would require about four days. Hence the tank steamer, and the special depots for the storage of oil, are now familiar objects at all the great ports.

Carrying Oil in Bulk.

The first attempt to carry oil in bulk was made by a German, Herr Riedemann. He fitted a large sailing ship with square iron tanks on three decks, and by an ingenious arrangement of pipes, these tanks could be readily filled or emptied. But before anything in the shape of a *tanker* could be constructed, some years of experiment were necessary. Oil is affected by temperature ; a rise of 20 degrees Fahrenheit will cause an expansion of about 1 per cent. Thus, if a tanker be fully loaded and the tanks sealed, unless special provision be made for possible expansion or contraction, there is the danger on the one hand of the oil bursting the tanks, or of a space being created, which in rough weather, would be a cause of serious danger, if the oil had room to wash about. In the year 1885, a medium-sized steamer was converted, on the Tyne, for the carriage of oil in bulk. This experiment proving a success, within twelve months, a vessel was specially constructed for the purpose. Great care has to be taken with the caulking of all butts and joints, as paraffin is more penetrating than water, and a coffer-dam separates the hold space from the engines and boilers. There were various objections to the employment of tankers. And as a consequence the Suez Canal Company refused them passage through their route until the year 1902. At present, special precautions are taken, but tank steamers carrying oil in bulk are to be seen on every ocean. In the year 1912, Lloyd's Register contained the names of no fewer than fifty sailing-ships and 258 steamers fitted as tankers.

The economic advantage of this means of transport has been calculated to amount to no less than $1\frac{1}{4}$d. on each gallon of oil transported overseas.

CHAPTER III

THE ECONOMICS OF MARINE FUEL

THE great factor to-day in ocean-transport is fuel. Ship and engine have been greatly improved, methods of conducting the business have changed, routes have been modified, and a further modification may be expected with the success of the Panama Canal; but throughout all these, and above them all, dominates the commodity whence the power for driving the vessel is obtained.

Importance of Fuel in Ocean Transport.

It is no exaggeration to say that the nations which control the resources whence motive power can be produced, will in increasing measure have the oportunity of dominating the rest of the world. But incumbent on them is the necessity of so exploiting and developing their resources that they may obtain a maximum of power at a minimum of economic waste. The generation of artificial *productive power* will, as the importance of purely *destructive power* wanes, become increasingly the great factor in deciding the status of nations. Nor is this an entirely new situation. The important novelty is that artificial methods for producing power for practically all purposes, but notably for propelling ocean-going vessels, have proved their complete superiority over all old world and natural methods. Whence it arises that the people who have the acumen to take the fullest possible advantage of the new position, will, provided that their resources are adequate, and their inherent qualities are sufficiently virile, be able to take and retain a place in the front rank.

Control of Resources.

The fuel resources of the world to-day consist, for the purpose here in question, of coal and oil. The countries enjoying in the greatest degree resources, either worked or unworked, are the British Empire, the United States of America, the Russian Empire, and China. All these, except perhaps the last, are aware of the greatest issues at stake, and China is awakening to a sense of her great advantages, and to a knowledge of the vast resources which have hitherto lain undeveloped in her widely stretching dominions.

Coal and Oil Regions.

Here then is a question of world-wide interest, one important section of which can be studied to advantage in considering the economics of marine fuel.

The evolution of the modern marine engine is a story of consuming interest ;[1] here it is only possible to give an outline of the main points.

Evolution of the Marine Engine.

No sooner had James Watt produced a steam-engine, than attempts were made to apply steam power to ship propulsion. At first the experiments were almost grotesquely unsuccessful. But the men at work on this development were men of grit, nor could any failure daunt them in their efforts. The chief spheres of action were the West of Scotland and the North East coast of America ; with the result that both Britain and America claim the honour of having been the first to propel a water-borne craft by steam power.

Two facts, however, stand out among a great mass of controversy, and these should please the pride of both countries. In the year 1802, William Symington built and engined the *Charlotte Dundas*, a small craft which ran on the Forth and Clyde Canal, and was proved to be efficient for both passenger and goods services. This little craft was the germ whence sprang the *Clermont*, built by Robert Fulton at New York in the year 1807, and the *Comet*, the first steamer to run regularly in European waters, built by Henry Bell on the Clyde in the year 1812. Thus Symington solved the problem of steam propulsion by the construction of the *Charlotte Dundas*, whilst Fulton was the first regularly to utilise the invention on any scale, for he ran the *Clermont* on a regular service between New York and Albany, a distance of about 130 miles, from the year 1807.

The First Steamships.

From the beginning of last century there were two great possible developments in the business of ocean transport ; the substitution of iron for wood as the material for ship construction, and the improvement of the steam-engine to a point at which steamers could compete on commercial lines with sailing ships for the carriage of freight. Nor were these separate problems, for really the success of either depended on a common development. The modern marine engine could not work to advantage in a wooden hull, nor

Development of the Steamship.

[1] Cf. *British Shipping*, by A. W. Kirkaldy.

is it possible to imagine an *Aquitania*, measuring nearly 50,000 tons, propelled otherwise than by turbine engines driving quadruple screws.

The Fuel Problem.

As inventors and manufacturers have experimented with and finally produced a serviceable motor-car, and in much the same way as at the present moment aviators are attempting to produce a reliable aeroplane, so, three-quarters of a century ago, the forerunners of these men were giving their attention to the production of a marine engine which should be capable of propelling vessels of the largest dimensions over thousands of miles of ocean. The problem was by no means easy to solve. Engines and boilers had indeed been successfully fitted to small craft, and many of these were operating more or less usefully in European and American waters. The object that claimed the attention of the engineer was to increase the power and endurance of these engines several hundredfold in order that oceans might be traversed. Among innumerable difficulties, there were some of such outstanding importance that, unless they were overcome, success was hopeless. The low pressure paddle engine was useful for passenger and mail services, as the mail coach on the turnpike road had been. But it offered no economic advantage for more serious work. These low pressure engines even when improved to the greatest point of efficiency, entailed a very serious consumption of fuel. When worked at a pressure of about six pounds to the square inch, a boiler consumed no less than ten pounds of coal for each horse-power produced per hour ; thus the amount of bunker space required by a steamer crossing the North Atlantic was such that only mails and passengers could be carried, and there was little or no space available for cargo. As an illustration of what such conditions would mean to-day, one need but remember that a steamer of the dimensions and horse-power of the Cunard liner, *Mauretania*, had she been fitted with low pressure engines of the type in vogue sixty years ago, would have consumed the enormous quantity of between 7,000 and 8,000 tons of coal in the twenty-four hours, whereas with modern turbine engines, her daily consumption is only about 1,000 tons.

There was another great problem that awaited the solution of those interested in ocean steaming. With engines consuming such comparatively large quantities of coal, frequent facilities for

replenishing bunkers must be provided. For it must be remembered that when the steamship entered the lists there were no conveniently situated coaling stations on any of the great ocean routes as we have them to-day. The equipment and organisation of these stations has been the direct or indirect work of the steamship owner.

Need of Coaling Stations.

It was mainly these two problems, the large coal consumption of low pressure engines, and the lack of suitable coaling stations, which were the inspiration of Brunel, when he thought out the construction and equipment of the *Great Eastern.* The solution of the chief difficulty confronting the marine engineer was clearly the invention of either the compound high pressure engine, or a vessel of the dimensions of the *Great Eastern.* This is obvious to-day—it was clear to very few people in the early fifties. Brunel's theory was that by constructing a leviathan ship of 20,000 tons, the engines required for her propulsion might be, as compared with those for a 2,000 ton vessel, of very reasonable proportions, for when such a mass was once in motion it would require less force proportionately to keep it going at a fair speed; nor was he in error in this. The *Great Eastern* was designed so as to make a voyage to the Far East without requiring to replenish her bunkers, and yet she had quite considerable cargo carrying capacity in addition to carrying the fuel required for her boilers. Being also fitted to carry an exceptionally large number of passengers, this ship was, in theory, capable of making handsome profits for her owners. It is unfortunate that heavy initial expenses caused the managers to modify their original scheme for the working of this ship. It may be true that the Far Eastern trade was not then sufficiently developed to employ so large a ship, but the fact remains that the experiment was never actually made, and that after engaging in the Atlantic trade at a loss, the ship barely justified her construction by the important work she did in laying submarine cables.

The "Great Eastern."

As to the development of a system of coaling stations along the main ocean routes, this was gradually acomplished owing, in the first instance, to the exigencies of the mail and passenger services. The accession of Queen Victoria in the year 1837 marks the commencement of the era of steam for long sea voyaging. The Peninsular and Oriental Steam Navigation Company was

founded that same year. In 1838 regular steamer services were commenced across the North Atlantic, and within twelve months the Cunard Company came into existence. When once Europe and America were connected by steam services, it was obvious that other parts of the world would expect equal facilities. The British Government was not then directly responsible for India, as it became after the Mutiny, but there was a mail and passenger traffic of first-class importance between England and India, which owing to the great interests at stake, had to be maintained with the utmost efficiency. The P. & O. Company became responsible for the conveyance of mails to Alexandria, and in connection with this they organised an efficient passenger service. Mails and passengers proceeded by the overland route from Alexandria to Suez, where auxiliary steamers of the Indian Government carried them to their destination. Eventually the whole of this service was taken over by the P. & O. Company, and the route was equipped with coaling and repairing facilities. So long as Australia remained agricultural, there was but little effective demand for a steamship service for mails and passengers. But with the discovery of gold in Victoria during the fifties, a different type of settler entered that continent, and with growing business, conducted, in consequence of the gold, on the most modern lines, a clamour for efficient steamship communication broke out and had to be satisfied. Then came the great work of Ferdinand de Lesseps, and a steamship route to the Far East and Australasia, via the Suez Canal, resulted. It was merely a matter of time to equip the whole of these routes with the necessary conveniences and facilities for steam services, and as a consequence, by the early eighties, the whole of the Far East and Australasia, including New Zealand, had been brought into direct steam communication with Europe.

Development of Steamship Communications and Routes.

The steamship routes were thus gradually equipped with coaling stations, and the fuel at these stations was, for a considerable period, exported entirely from the United Kingdom, mainly by sailing vessels. The stations and the fuel were British. The expenditure connected with this organisation was very heavy, but in the case of mails and passengers, speed, not expense, has always been the main consideration. So long as the steamship was in the experimental stage she was

Equipment of Coaling Stations.

a luxury, and could only be employed on services where expense was a minor object. The important point to notice is, that the mail steamer did begin to operate along ocean routes of considerable extent. These routes were equipped with coaling and repairing facilities, and as the organisation was improved, these stations were prepared to supply not only mail steamers, *but all comers*, with fuel, and render other services. When the compound marine engine was perfected, it came about that owing to the establishment of these necessary adjuncts to steamship services on all routes, cargo steamers, which without subsidies could not previously have competed with sailing ships in transport services, were now placed in a position of advantage. Thus, although the payment of subsidies to them was neither suggested nor indeed possible, cargo steamers in increasing numbers and size made their appearance, and gradually ousted the sailing ship, proving their economic superiority, in fair competition.

Revolution in Marine Engines.

To John Elder, of Glasgow, belongs the credit for the revolution wrought by the compound-engine. His experiments almost immediately resulted in reducing the coal consumption of marine engines to a little more than one-third of what it had been. With a working pressure of 60 pounds to the square inch, instead of requiring 10 pounds of coal per horse-power, it was found that about three and a half pounds sufficed. Since John Elder's day, further inventions—triple and quadruple expansion, working at a pressure sometimes considerably over 200 pounds to the square inch, requiring only a fraction more than one pound of coal[1] per horse-power per hour —have completed the victory of mechanical propulsion over sails.

The Reciprocating Marine Engine and Modern Steamships.

Thus, to-day, the sailing ship is for all practical purposes a negligible quantity. The reciprocating marine engine attained its highest perfection at the beginning of the present century. Quadruple expansion engines at high pressure, and driving four propellers, reached a maximum of speed and efficiency in vessels like the *Kaiser Wilhelm II.* This fine vessel measures nearly 20,000 tons, and has engines indicating 45,000 horse-power. She attains a speed of nearly 24 knots an hour on a consumption of about 700 tons of coal a day. These figures are worth noting, for

[1] For the details of these inventions cf. *British Shipping*, Book I, Chap. XIII.

when the Cunard Company arranged with the Government to build for the North Atlantic service two larger and faster steamers than anything in existence, it was seriously doubted whether it would be possible to carry out the scheme. But another possibility was by that time (1907) available. As far back as 1894, the *Turbinia* had been built at Newcastle-on-Tyne, and to this comparatively small craft a new type of engine had been fitted by the inventor, Mr. C. H. Parsons. These engines, known as steam turbines, included the adaptation of a very old principle, but the application was completely novel, and the invention has worked a remarkable change in marine engineering. The speed attained by the *Turbinia* broke all previous records, being no less than 34 knots an hour. After many experiments in high-speed Government vessels, this new type of engine was fitted to the *Victorian*, the *Virginian*, and the *Carmania*, all large steamers on the North Atlantic service. It was the success of these, especially of the *Carmania*, owned by the Cunard Company, which, after much consideration, led to the decision that the two special vessels to be constructed for the Liverpool-New York service should have turbine engines. These two fine vessels, the *Lusitania*, built on the Clyde, and the *Mauretania*, built on the Tyne, were placed on the service in the year 1907. Their achievements have outdone all previous records. The *Lusitania* in March, 1914, made a record day's run of 618 knots, at an average speed of nearly 26¾ knots an hour, beating the previous record of the *Mauretania*, which was 614 knots for the day's run. The fuel consumption of these vessels averages about 1,000 tons per day, and the engines indicate about 70,000 horse-power.

The Turbine Engine.

At first the turbine engine could only be fitted to vessels where speed was the great object, it being proved by experience that the greater the speed attained, the greater was the saving of fuel effected, whereas for slow-going vessels, the turbine offered no great advantages over the ordinary reciprocating engine. Experience showed that in the case of a steamer having a speed of 14 knots the running expenses of the two types of engine were equal ; as, however, speed increased, the turbine showed an increasing economy, but at a speed of less than 14 knots the reverse was the case. Ten years ago, however, the effects of gearing were tried, and it was found that, even for slow-going cargo vessels, the turbine, when the speed of the propeller

was reduced by gearing, could be the economic rival of the reciprocating engine. A steamer called the *Vespasian* was fitted with this new type of engine, and experience now ranging over nearly ten years have convinced some shipowners of the superiority, not only in economy of consumption, but in reliability, of the turbine engine for slow-speed vessels. The situation has, however, become complicated by the appearance of another rival, in the shape of the internal-combustion engine. It would appear that in this development, the attention of British engineers was so keenly focussed on the relative merits of the reciprocating and turbine engines, that for a time they neglected or treated with disdain the invention of Dr. Diesel. The engineers of other countries,[1] however, were attracted by the Diesel engine, with the result that Russia and Scandinavia are at present somewhat ahead of the United Kingdom in its application to practical commerce. To-day, however, the whole engineering world is awake to the great possible advantages of an engine that requires no boilers, and consumes a minimum of fuel.

Battle of the Rival Engines.

Thus at the present moment the shipping community, in common with marine engineers and architects, are keenly watching the performances of rival methods of propulsion. The quadruple expansion engine still has many advocates, but it would appear that the ultimate contest, so far as cargo vessels are concerned, will be fought out between the geared turbine and the internal combustion engines.

Coaling Stations, their Equipment and Supply

British and American Rivalry for Commercial Supremacy.

As has already been shown, the first coaling stations were organised to meet the requirements of British mail and passenger steamers, and the coal supplied was the product of the collieries of the United Kingdom. This latter fact has had a great and unexpected effect on the British mercantile-marine. Until the American Civil War there had been a great rivalry between the English and Americans for commercial supremacy at sea. After the war the field was left mainly to British shipping. The Americans, it is true, turned their attention almost entirely to the internal

[1] Cf. *British Shipping*, pp. 144–147.

development of their country, but the appearance of the iron ship, and the application of steam propulsion, were big factors in the situation, and these very naturally helped the British shipowner. The United States was not at that time a great producer of coal and iron. The work of developing the mineral and other resources of the country was to prove all engrossing for the next quarter of a century. But at the end of that period the American people had shown their determination to be no longer mainly producers of food-stuffs and raw materials. Nor would they be content to supply older States with the food which would enable them to devote their best energies to manufacturing the raw materials, much of which was also the produce of the western side of the Atlantic. Owing to the bountiful and easily worked supplies of iron and coal discovered in large areas of the United States, not only have the Americans become producers of both fuel and steel, but they have eclipsed all competitors in these industries, and are now producing nearly one-half of the world's supply of coal, and rather more crude steel than both the United Kingdom and Germany together. It was soon found that there was a great possible internal demand for these prime necessaries of the modern State, and this when once awakened, was found to be capable of an almost unlimited extension. The vast area of the country, and the necessity for railway extension, created a great and growing demand for the products of the mine and of the smelting works. To-day, with a new annual construction of railway track averaging about 4,000 miles, and the inevitable renewals of the older sections, there is a greater demand for iron and steel for railway purposes in the United States than from the whole of the European railway systems. But in addition to this the American initiated the utilisation of steel for many purposes for which previously it had not been considered suitable. Thus the steelmaster and the structural engineer have, to a very great extent, supplanted the stone quarry, the brickfield, and even the builder and architect; for the modern building in America is steel framed, the brick or masonry being a filling or a covering, the strength of the structure depending on girder, angle, and rivet. As the Scandinavian countries are supremely the home of the wood industry, so has America become the great steel country. For a considerable time the internal needs of the country required all the coal and steel

produced; that period is at an end, and America is increasingly prepared to compete in markets which were for long almost the monopoly of the English trader.

British Coal and Mercantile-Marine.

The shipbuilders and shipowners of the United Kingdom were the first to apply steam to purposes of ocean transport, and the employment of the marine engine hastened the coming of the iron and steel hull for ships. In this, again, Englishmen were the pioneer workers. Then as the steamer ousted the sailing ship in trade after trade, the importance of the British mercantile-marine grew, and with it the demand for British coal. These two things acted and reacted upon each other with a marvellous effect in building up a very great commerce. English coal was purchasable at almost every seaport in Europe, Asia, and Africa, and at the many coaling stations that had been established on islands conveniently situated in mid ocean on the main steamship routes. The effect of this fact is of the utmost importance, and must be realised in all its bearings, for it has been a great cardinal factor, perhaps the great factor in modern shipping business. The United Kingdom having definitely given the preference to manufacturing industries over agricultural pursuits, and being no longer able to supply herself with food-stuffs, has for long decades now been compelled to import foods of various descriptions, as well as the raw materials for some of the most important of her manufactures, in ever larger quantities. These commodities, food and raw materials, are for the most part bulky, and require shipping of great carrying capacity to transport them. When the food has been consumed, and the raw materials manufactured, the United Kingdom has been able to supply the wants of a great part of the world with manufactured goods of every description. These goods, however, are of but small bulk as compared with the great bulk of the raw materials which make up the major part of our imports. Were it a case of importing raw materials and food-stuffs, and exporting manufactured goods, the majority of ships leaving our ports would be but half loaded. The result would be that freights would be higher, and world trade would be contracted. But another influence entered upon the scene and produced a situation which, whilst tending to equalise the imports and exports of this country in bulk, at the same time, by giving British shipping a full outward freight, placed British

owners in a peculiarly advantageous position to compete for the ocean carrying-trade of the whole world. Whilst the United States and Germany were developing their coal resources, England had already passed through that stage. Her mineral resources, too, were of considerable extent, and as at the same time she had developed steamship communication, which demanded great quantities of coal to be in readiness for bunkering purposes on all ocean routes, England was in a better position to supply that need from all points of view.

British Pre-eminence.

The industries connected with shipping worked into each other's hands, with the result that somewhere about two-thirds of the world's commerce has been carried on under the British flag during the past half-century.

Foreign Competition.

It was but natural that other countries should endeavour to enter into competition with the one favoured nation. On the Continent of Europe great efforts have been made and great results have accrued. Germany has shown that she can be successful in the arts of peace and commerce. Indeed she attained a success which was calculated to benefit her destiny in a manner that mere conquest by force could never hope to achieve.

Advance of Foreign Countries.

Nearly every shipping port of Western Europe has felt the forward impulse, and the progress made has in many cases been phenomenal. During the long period of peace, commercial enterprise afforded an outlet for virile energies, with the result that in every continent the progressive nations took upon themselves the task of modernising and developing what was behind the times or inert. Thus there has been an unexpectedly great expansion of international trading relations, and, whilst Englishmen have been able to hold, and even to extend, their own spheres of influence, neighbours and competitors were also able to achieve very remarkable results. This point should be remembered, for with the work of development going on in every continent, the resources of the land area of the world have been more and more searchingly exploited. So far, however, it is safe to say that but a very small percentage of the mineral wealth of the world has been brought within the range of commercial utilisation, but that sphere is being extended every day. The effects of this unceasing activity can

easily be discerned. It is not so many years ago that English coal alone was available at the fuel stations on the principal ocean routes. But the scientist and the business-man have worked together in discovering and making available the coal resources of every continent. With the opening up of other sources of fuel supply for shipping purposes, the area that can be economically supplied with English coal has experienced a gradual restriction. But although this tendency becomes accentuated, its effects are not visible to the superficial observer, because all that he notes is the increasing export of the output from the collieries of the United Kingdom. The facts of the situation are that with a restricted area demanding our coal, there has been a greatly increased demand within that area ; hence the fact that certain markets demand smaller quantities, or none at all, is only known to the coal exporter and the freight market.

British v. Foreign Coal.

The coaling stations on the Sucz route to the Far East and to Australasia were exclusively supplied with English coal. But Australia, New Zealand, India, China, and Japan have all been steadily improving both the quantity and quality of the coal they can put on the market, and the competition is being felt throughout the Far East. The quality of some of these coals is not equal to that of English coal, but being on the spot, and labour being cheap, the difference in price is sufficient to make in some instances the poorer quality coal rather more economical for the ordinary cargo steamer to consume.

South African Coal.

The most remarkable instance of local coal, not only successfully competing in its own markets, but carrying its competition to unlooked for distances, is the coal of South Africa. Up till the period of the Boer War, this coal was only used locally, it was of poor quality, and its production was carried on in a comparatively small way. But during the war, large numbers of transports were employed carrying troops and stores to South Africa. The bunkers of these ships had to be replenished at their destination, and so the demand for the local coal began to grow very considerably. With increased production a better quality of coal was reached, or it may be the nature of the coal became better known. The result has been somewhat surprising. It has affected both the Australian route and the Australian trade. Prior to the Boer war there were some few

steamers that went to Australia and New Zealand *via* the Cape of Good Hope, but very few returned that way.

The homeward route was via Cape Horn, and steamers returning thus replenished their bunkers at South American ports, such as Monte Video, *and with English coal.* Some steamers still use this route, but an increasing number return via South Africa where that route is not barred by the terms of the charter party, and benefit by the cheap coal there available. Nor is this the whole of the story, for South African coal is now exported in fairly large quantities, and competes with English, Japanese, and Indian coal at stations like Colombo and Manila. At Colombo (1914) it sold at 10s. per ton less than Welsh coal, and was only 3s. 6d. per ton more than best Indian coal. At Mauritius it was 9s. 6d. per ton cheaper than Welsh, and 6s. 6d. per ton cheaper than English North Country coal.

Australian Coal.

Australian coal, the best of which is said to come within 12% in fuel value of Welsh, is also subject to exportation, and can compete in the various coaling stations east and south of Colombo.

American Coal.

But for the most important developments, attention must be directed to America. American coal has already made its appearance in various European markets, and some authorities predict that it will be competing with our own coal in the markets of the United Kingdom before long. The coal is of excellent quality, and in spite of the comparatively high wages paid in America, the coal measures being at or near the surface, the getting is accomplished at considerably less cost than in the collieries of this country. Good coal was sold pre-war at the Panama ports at 17s. 6d. per ton, and it was asserted that when the Canal is fully opened, American coal of good quality would be available at either end of the Canal at a price not exceeding 19s. 6d. per ton.

Coal on the Suez Route.

On the Suez route, where at present English coal predominates, the prices are much higher than this ; the pre-war price[1] for English coal at Gibraltar was 24s. to 24s. 6d. per ton, and in 1913 it was 2s. per ton dearer, possibly owing to the coal strike of 1912. At Port Said, and at the stations to the East of the Canal, prices naturally rule higher still,

[1] For recent quotations cf. Appendix.

With the Panama Canal open to traffic, and the American route in full competition with the English route to the Far East, the cost of fuel will be one of the determining factors as to which route shall be followed. Nor is the advent of American coal, shipped by American ships to American stations, a pleasurable prospect for British shipping interests, for with the export of coal on a large scale, American shipping will again become a serious[1] competitor for the ocean transport services.

The Economics of Oil Fuel

Difficulties of Cold Storage.

In its crude state, coal can only be utilised for steam-raising purposes in a furnace. Moreover, crude coal is a bulky commodity, difficult both to stow and to handle on board ship even under favourable conditions. But conditions are not always favourable, and it is necessary to have easy access to the coal, and facilities for handling it, whatever may be the circumstances of the moment, either at sea or in port. Consequently the bunker space in a steamer has not only to be in close proximity to the boilers, but in order to facilitate trimming and stoking, space that would otherwise be valuable for cargo-carrying purposes has to be sacrificed. The coal bunkers of the average steamer occupy what would be some of the best cargo space in the vessel. A steamer of medium tonnage, consuming about 60 tons of coal a day, in making the voyage from Europe to Australia, with only one bunkering port *en route*, must ordinarily carry nearly 2,000 tons of coal. A ton of Welsh coal measures about 42 cubic feet, whilst coal of various qualities may measure anything between 42 and 52 cubic feet to the ton. Hence the space occupied by the bunkers is very considerable. In actual practice when coal is cheap and freights are low, a steamer on a long voyage will sacrifice freight space and carry as much coal as possible, but should freights rule high, then as little coal as possible will be carried in order to earn the utmost possible freight. A point like this requires more experience to benefit by than appears at first sight. Comparatively small increases or decreases in freight rates and the price of fuel may, under experienced management, make all the difference between a profitable or an unprofitable voyage, or between a very ordinary result and an exceptionally

[1] For the details of this cf. *British Shipping*, pp. 414–428.

good one. A knowledge of the coal markets and the various qualities and measurements of coal are as essential in the successful management of steamers as is experience of the freight markets. In a sentence, the space occupied by coal, its nature and the difficulties attendant on its use, very considerably affect both the cargo-carrying capacity, and the economic handling of a steamer. These facts cannot be too strongly emphasised at the present moment, when another fuel and other methods of propulsion are on their trial, with results already recorded which warn the progressive shipowner that a new era in shipping has dawned.

Advantages of Oil Storage.

Whilst coal can only be utilised in a furnace, oil offers alternative advantages. It can be used to raise steam in ordinary marine boilers, or it can be so used that boilers may be dispensed with. Both these methods result in effecting economies as compared with coal consumption at present prices. Careful experiments prove that where oil is substituted for coal as the fuel to raise steam in marine boilers, one ton of oil will, on the average, do the work of one and a half tons of coal. Here at once attention is arrested because even the tyro in shipping business will realise that one-third of the bunker space is immediately economised, for oil occupies on an average about the same space as coal, viz., 40 to 46 cubic feet to the ton. But this is only the beginning, and by no means the greatest economy effected. Coal requires not only greater space, but some of the best cargo space in the ship. Oil can be stored almost anywhere so long as the receptacle is not leaky. Owing to this, oil fuel can be pumped into any out-of-the-way part of the ship, and spaces which could not be utilised for freight-earning purposes are rendered valuable in that they may contain the oil, and so set free more eligible spaces for freight-earning purposes.[1] Oil may even be carried in the ballast tanks, and thus almost every cubic foot of space in a cargo steamer may be made productive. From this it can be seen that the use of oil fuel results in a considerable gain of space, but the advantages go further yet. The transport, handling, storing and stowing of the oil cost less, and less labour is required in the stokehold. About one-third of the firemen may be dispensed with when oil is substituted for coal, and no trimmers need be carried, for oil trims itself. Fewer men require less

[1] 1920, the *Aquitania* converted into an oil-driven vessel.

accommodation and consume less food, hence wages and food bills are reduced ; and the space which the extra hands required may be used either to improve the living quarters of the staff, or to carry more cargo, or perhaps both these may be effected. An experiment was tried on two of the Canadian Pacific Company's steamers in the year 1913, which resulted in proving that the substitution of oil for coal in a steamer of about 4,000 tons, fitted with ordinary reciprocating engines, may result in a saving of over £30 a day.[1]

If, however, the internal-combustion engine be substituted for the reciprocating engine, the saving effected is considerably greater.

Saving Effected by Oil.

For in an internal combustion engine one ton of oil will do the work of four tons of oil used to raise steam in marine boilers. Hence the saving of oil over coal is greater still if the internal-combustion engines be substituted for the steam-engine and boilers. For not only is there a saving as to space for storing the oil, but as no boilers are required for the Diesel type of engine, considerable space is gained for cargo carrying purposes and there is a further reduction in the number of hands necessary for the work of the engine room, neither firemen nor trimmers being required, and the engineering staff itself can be reduced in number. Thus the food bill, too, is reduced, as is also the space required for accommodation.

By no means least among the benefits which may be expected, if the internal-combustion engine can prove its superiority in every respect over the old type of marine engine, is the beneficial effect upon labour. The hard incessant work in the stokehold has a brutalising effect upon the men employed. Firemen are a difficult set of men to manage, but it is the conditions of their employment that have produced a type of man for whom one cannot help feeling pity. The life of the ordinary sailor in cargo ship or steamer is no bed of roses ; indeed, he has suffered many a hardship and lived a fairly thankless existence. But he at all events lives mostly in the open air, and has his small compensations. The fireman, on the other hand, has frequently to play the part of a hero, and has generally to work strenuously under extremely hard conditions. Even in the best equipped vessels his lot is the least enviable of anyone employed. What wonder then that he frequently gives himself up to drink,

Effect of Oil on Labour.

[1] *The Syren and Shipping*, 16th April, 1913, p. 62.

and sometimes degenerates to a condition hardly above that of the brute creation? The utilisation of oil for marine fuel will wipe out this blot on the fair fame of shipping, and lead to a great improvement in the condition of shipping labour. For this alone its possibility should be welcomed by all who care for their fellows. A peculiarly brutalising form of work will be ended when no artificially propelled vessel contains either stokehold or coal bunkers.

Internal-combustion Engine.

Is the internal-combustion engine capable of performing the work now achieved by steam? This is at present a question for the expert. But already the performances of several large vessels under the Russian flag, and the remarkable results recorded by the *Jutlandia* and *Selandia*, give the layman cause to hope that the initial difficulties have been surmounted, and that it is but a question of time and experience to produce machinery on the internal-combustion principle that will be able to compete with the turbine and its geared form for both mail and cargo purposes.

Is Oil Available?

It would appear that the problem facing shipping managers is not so much the difficulty in perfecting the engine as the possibility of obtaining a supply of oil in all parts of the world on terms that will compare favourably with coal, and that they may have the assurance that this supply will not only be regular but will be permanently available.

Supply of Oil.

So far as the sources of the supply of oil are concerned, these are now known to be far greater than was even recently thought. For oil is found not only in the fluid state, but there are various shales, clays, and coals, from which it can be economically distilled. This latter point opens up one of the romances of scientific research and business enterprise. Oil in the fluid state has hitherto been subject to monopoly trading. The organisation of this has been rendered easy owing to the fact that two countries—America and Russia—have been able to control the world market.

"Since 1901, when the output of oil was 22,160,725 metric tons, the output has more than doubled, having reached the figure of 47,276,725 metric tons in 1912. The chief sources of the supply for that year, which indicate the width of its distribution, are as follows—

Country.	Quantity of Metric Tons.	Percentage of Total.
United States	29,615,096	62·25
Russia	9,317,700	19·37
Mexico	2,207,762	4·71
Rumania	1,806,942	3·70
Dutch E. Indies	1,478,132	3·09
Galicia	1,187,007	2·43
India	989,801	2·03
Peru	233,486	0·50
Japan	222,854	0·48
Germany	140,000 (?)	0·28
Canada	32,612	0·07
Italy	12,000 (?)	0·02
Other Countries	33,333	0·07
	47,276,725	100·00

"Among other possible sources mention may be made of Alberta (Canada), the Persian Gulf, Trinidad, Turkey (Messopotamia), Alaska, Venezuela, Ecuador, Bolivia, Colombia, probably Argentina, New Zealand, New Brunswick, Newfoundland, Barbados, Madagascar, the Philippine Islands, China, and Algeria. In other localities also promising indications occur"[1]

With increasing demands the monopolists, who control to so great an extent the oil supply at present, have been able to raise prices.

Great Oil Fields.

The great extension in the use of motor vehicles of all descriptions, operated mainly by wealthy people, has been another great advantage to the oil rings, and prices have been maintained at a very high level in spite of protests by consumers, and various efforts which have been made to create competition. But the whole civilised world is now awake to the importance of the fuel supply, whether it be in the form of oil, coal, or shale. It is an ascertained fact that in Eastern Europe there is a great area whence oil can be produced, and this area adjoins the areas already worked in that part of the world. Nor is this field limited in its extent to one country. It runs apparently with but few breaks across Persia, where Englishmen have already obtained valuable concessions, through India, and probably the richest area of all is yet to be tapped in China. For it is known that the field runs eastward to the Pacific, and the opinion of some experts is that China will become a great oil-producing country. To the south of these regions both oil and coal are known to exist

[1] Extract from *Morning Post* of 25th April, 1914.

in great quantities, and in Burma and in the Malay Peninsula, only to mention those out of many lands where there is now no doubt as to the value of the fuel resources. Reference has already been made to the oil produced by the United States of America. The value of this has set the geologist and miner to work both in the north and in the south. In Canada it is expected that the oil available will be as rich in quantity as that in the neighbouring States, whilst in Nova Scotia, New Brunswick, the West Indies (notably Trinidad), and throughout a great part of South America, there is sufficient evidence to warrant the assertion that oil in quantities capable of paying for production on a large scale, will eventually be available. Oil then, in the fluid state, is now known to exist in large quantities over widely-stretching areas of the world. That these oil fields will be worked, the present activity of the oil mining market abundantly proves. But flowing oil wells sometimes run dry, and a big demand might exhaust the oil from even so great an area as has been indicated. Against this fear it must be remembered that there are other possible sources of supply, nor have these hitherto been more than slightly utilised.

There are few countries and continents that do not contain areas of bituminous shale. That it was possible to distil illuminating oil from this was discovered in the early part of last century, but until James Young, about the year 1850, took out a patent for distilling paraffin from coal, no commercial advantage was made of the invention. Some shales will yield as much as 50 gallons of oil from one ton, and the oil can be further manufactured into gas, spirit, illuminating and lubricating oils, with varieties of heavy residuals, which can all be utilised. Young's efforts resulted in developing an important industry in Scotland, and at the present time in Scotland alone several million tons of shale are treated annually. This industry is, however, still in its infancy, and is capable of almost indefinite extension, for valuable areas of bituminous shale have been discovered in Australia, in New Zealand, and in South Africa, nor is this by any means the whole extent of the world's resources. Scotland has rich supplies, and shales are also found in parts of England ; indeed, in almost every part of the world there are either shales, clays or coals of various qualities, whence oil can be distilled. Some of these might not be commercially profitable to work, but

Oil Obtained by Distillation.

there are experts who are of the opinion that the resources of the world whence oil can be distilled are considerably greater than the resources of fluid oil. Coal itself would, under well organised conditions, be considerably more economical to use if it were analysed into its component gases, spirits, oils and residuals, instead of being crudely consumed in a furnace, where much that is of value is wasted. If coal were rightly utilised, our coalfields would enjoy a longer life, and yet be capable of rendering increased services to mankind.

A Problem for the Chemist.

As against the use of oils distilled from various shales and clays, it is alleged that some of them contain a percentage of sulphur, which is harmful in the various purposes in which the oil may be employed. Here is a disadvantage for the Chemist to rectify, nor can it be doubted that sooner or later experiment and experience will overcome this defect. Meantime, there are ample materials whence oil, free from these impurities, can be distilled.

Production of Mineral Oil.

The total world production of mineral oil, as has been noted, is about 48,000,000 metric tons, but this has to be refined before it is available either in the form of petrol for motors, paraffin for lighting, or the heavy oils for engine purposes. It has been estimated that the present war and mercantile navies of the world, if they used oil fuel exclusively, would consume about 25,000,000 tons annually; which quantity could only be procured by greatly increasing the present production, or so greatly forcing up the price as to render it economically impossible to employ oil fuel. If, however, one takes stock of the world's resources, and notes how the growing demand for oil in its various constituents, has increased the production, there is good reason for believing that in a not very remote future, should the shipping managers of the world decide on operating their vessels with oil, the quantity required will be forthcoming at a reasonable price. Since the year 1901, the production of oil has considerably more than doubled. In that year the quantity produced was only a trifle over 21,000,000 tons. If this rate of increase can be maintained the time when oil may supplant coal at sea is not very far off. And be it noted this figure only includes oil mined in the fluid state; the quantity that could be distilled from coals and shales has not been estimated, but undoubtedly it is very great. Increased

demand and the economic conditions of the various spheres of transport will render this further supply available in due course. For our own Navy, the Naval Oil Fuel Commission has been at work, and what has been attained for British warships is now public property. Sufficient is already known to warrant the assertion that an adequate supply of oil for the Navy has been arranged for at a maximum price that promises to show an economy over coal, and at a possible minimum price which should prove of considerable benefit to the taxpayer. The results of expert researches submitted to the Commission will, when made public, go far to prove that the fears expressed as to the world's resources of this valuable means of producing power were groundless. One cannot insist too emphatically on the point that when the facts are proved, the country that is the first to utilise oil on a large scale for shipping purposes, will have an enormous advantage over any competitors who lag behind. The courage of English shipowners on a previous occasion, when the issue at stake was the same, and the hazard was even greater, namely, in scrapping many hundreds of thousands of tons of obsolescent steamers, when the Suez Canal was opened, and the fact that their successors remain in the forefront of the ocean-transport industry, are the warrant for drawing the conclusion that the shipping interest of this country will not miss the present opportunity.

Danger of Monopoly.

The chief obstacle at present hindering the more extended use of oil, either in the furnace or in the cylinder, is its price. This will continue so long as the sources of supply are limited, but with the area of supply continually extending, the ordinary competition of trade should make the organisation of a monopoly in oil increasingly difficult either to arrange or to maintain. Some of the principal areas, too, are outside private control. The Governments of the countries where the richer supplies either of oils, shales, or coals exist, have an added responsibility, of which they are in most cases fully aware. It is incumbent on them to make it absolutely impossible for any syndicate, however powerful, to obtain, or to continue to enjoy, a monopoly over the sources of power. For, rightly employed by a community, these may do much to assist its progress and development—indeed, the future belongs to the progressive people who not only possess these resources, but develop and use them aright.

Even as things stand at the moment, it was calculated[1] that in an efficient internal combustion engine, oil, though the price rose to as much as £6 per ton, would show a saving over reciprocating engines driven by coal at its then price. But with increased production taking place over a greater area, prices should fall from the present artificial level, and there are experienced oil experts who do not hesitate to assert that when the industry gets into its stride, large quantities of cheap oil will be readily available for all purposes, including the supply of shipping at suitable oil stations on all routes. In order to bring this about at the earliest possible moment, the first need is that suitable men should receive a practical scientific training in oil mining and refining. So far as the British Empire is concerned, our resources are said to be ample for all purposes, but our supply of skilled men is ridiculously small. As a matter of fact, we have hitherto lamentably neglected this part of our resources, and where the British oil fields are being exploited, and where British capital is developing oil-bearing areas in other lands, the management has, to a very great extent, to rely on the advice and skill of experts from either America or Eastern Europe. To such an extent is this true, that we are in the dangerous position of having our supplies worked by men whose real interests may lie in an opposite direction. Our first duty here is to train British citizens for the purpose of developing our fuel resources. At present only one University in the United Kingdom feels its responsibility in this matter, and has definitely organised a system for training experts in oil mining and refining. There should be similar training available in every University in the Empire.

Need for Skilled Experts.

In conclusion, the urgent need for attending to this important sphere should be emphasised. There is the question of holding our own in the realm of international trade and commerce. But this is a narrow and limited part of a far-reaching question. It is not overstating the case to say that our position among the nations of the world, and the healthy, social and industrial development of the Empire as a whole, depend to a very great extent on how we tackle the problem of the exploitation and utilisation of the fuel resources, *the power resources*, of the Empire. The possibility of England, and all

Britain and her Fuel Resources.

[1] 1914.

that England stands for, being content with a lower position, when Providence has endowed her so richly in these respects, that she may not only hold her own, but continue to lead the world in all that is best and highest, would not only mean the extinction of one of the greatest civilising forces so far known in the world's history, but would inevitably result in a serious set-back to world-wide civilisation.

CHAPTER IV

MODERN OCEAN TRANSPORT

General.

To-DAY, with the exception of the areas included in the Arctic and Antarctic regions, it is possible to go, or to send cargo to almost any part of the world, making use of the ocean route wholly or mainly, with a maximum of economy, and at a minimum of trouble or danger. The question of the land road or the water route, already referred to as one of the oldest problems facing mankind, is likely to remain a living question, to the end of history. The enterprise of the Russian Government has produced the Trans-Siberian railway ; German initiative has endeavoured to construct a railway which will connect Europe with the Persian Gulf ; Englishmen are pushing on the Cape to Cairo railway. In every continent railway systems of growing importance, and offering varied facilities for travel and transport, which in some cases may compete with, but in all, must complement, the sea-services, give an ever increasing completeness to international and inter-continental communication.

Land and Water Routes.

The land road, however, is subject to special chances of interruption. Only in very exceptional cases, for instance, North America, do the transcontinental railways pass through a country the whole of which is subject to one Government. The passing of frontiers or of Customs barriers opens up the possibility of international friction. The consequences of the latter have been patent ever since the Turk interfered with the land route to the East many centuries ago. The sea route, on the other hand, has always enjoyed a greater freedom. It is true that rival nations have war-ships that may on occasion very seriously interfere with the international commerce, but whereas the railroad is fixed, and the stoppage of trains becomes merely a matter of massing sufficient force at one point, the ocean route is so widespread that even the blockading of a single coast has been found to entail very great, if not insuperable, difficulties whilst the stoppage of world trade on a large scale is well-nigh unthinkable.

In other words, wherever it is possible, the water route under modern conditions is not only the cheaper route for the transport of goods, but, given a good ship, is more reliable and safer under a variety of conditions—economical, social, or political.

Balance in Favour of Water Route.

During the past century, international exchanges have increased so greatly, both in the bulk and in the variety of the commodities exchanged, that very special arrangements have been made to cope with the various grades of goods. At one time the type of ship was simple ; indeed all ocean-going ships might almost be placed in one of two classes. But to-day the various types of ocean-going steamers are very numerous, almost each trade employing a vessel specially designed to carry on the work of that special trade with the maximum of convenience and economy.

Specialised Ships.

Thus the mail and passenger service of the North Atlantic has resulted in the evolution of the Atlantic Greyhound, a ship of great tonnage ; the greatest at present employed in any trade.

Mail Service.

In the history of international exchange, there have been developments, either gradual or sudden. The latter due to discoveries, and the radical changes wrought by discovery on the one hand, or the ingenuity of man on the other. As instances of these changes, it may be mentioned how with greater skill in seafaring, more correct instruments, and increasing scientific knowledge, ships were enabled to make longer and more venturesome voyages. In the course of these, new trades were invariably created. The discoveries of men like James Cook gave a sudden impetus to trade in new directions. Similarly, radical changes in the routes traversed by commodities transported between different parts of the world occurred when Vasco da Gama discovered the sea-route to India, and ships were enabled to carry cargoes direct to and from the Far East, without any necessity for transhipment ; and in our own time, when Ferdinand de Lesseps opened a waterway through the Isthmus of Suez, so that much of the Far Eastern trade has returned, under novel conditions, to the old world route.

Development of International Exchange.

When modern commerce commenced, an event which is by many authorities made to coincide with the discoveries of da Gama and

Columbus, there were two serious barriers in the way of an all-round-the-world route. Owing to the fact that both at Suez and at Panama there was an Isthmus unpierced by Nature, ships, on arriving at either of these points, were confronted by an impassable barrier, a very definite terminus. Vessels from Europe whose destination was either the Far East or some point in the Eastern pacific, had to make a long detour, in the one case round the Cape of Good Hope, and in the other round Cape Horn. Even ships from the east coast ports of North America must round Cape Horn in order to reach the Pacific, whence it came about that there was but a slight difference in the mileage to be run in a voyage from either London or New York to ports on the west coast of America, for from London to Callao round the Horn is 10,013 nautical miles, whilst from New York the distance to be traversed is only 325 miles less. The advantage of a waterway through these barriers was early realised. Indeed, at Suez, there was a canal suitable for the passage of small craft many centuries ago, but long ere the modern era dawned, this had silted up, nor was it until Napoleon was endeavouring to drive the English out of India, and as a first step was preparing to occupy Egypt, that a modern attempt to construct a canal at Suez was suggested. Napoleon's engineers, however, reported against the scheme, believing that the difference of water level at Alexandria and Suez would prove fatal to a successful enterprise. But shortly after the Napoleonic period, a young Frenchman, Ferdinand de Lesseps, who was Consular Agent in Egypt during the thirties, conceived a project for piercing the Isthmus. By dint of indomitable courage and perseverance, he carried through his great design, in spite of the opposition of some of the leading statesmen of Europe, notably Lord Palmerston and Lord Stratford de Redcliffe, and in the year 1869, had the satisfaction of seeing his waterway opened to the shipping of all nations. The comparatively small cutting of 1869 has been developed into a fine ship canal, having a depth of 36 ft., and a minimum surface width of 240 ft., capable of accommodating the fine vessels now linking East and West.

The Old Barriers of Suez and Panama.

Suez Canal.

The new route to the Far East effected a saving in distance of from 3,000 to 4,500 miles; for instance, from London to Bombay by the Cape is 10,700 miles, but via the canal it is only a little

over 6,200 ; the voyage to Yokohama has been reduced from 14,300 to 11,100 nautical miles. If the freight for carrying 1 ton of goods 1,000 miles by steamer be reckoned at from 2s. 6d. to 3s.,[1] the saving effected on the present tonnage passing from East to West, and vice versa, mounts up to a very considerable sum annually. In other words, the opening of the new route has been a most important factor in fostering and developing trade. Nor is it the terminal ports alone that have benefited. The Suez Canal opened up many new possibilities for trading, for there is a series of conveniently situated trade centres all along the route. Before the canal was opened, either the trade of these ports was curtailed, or English ports had served as distributing centres, and cargoes had been subjected to transhipment and rehandling, which had again led to increased cost for transport. Thus to estimate the full economic effect of the work of de Lesseps, there are a number of factors that have to be taken into account.

Effect of Suez Canal on Eastern Trade.

Growth of trade always necessitates the employment of new methods. Nor could this axiom be better illustrated than by commercial history since 1870. Western Europe enjoyed a long period of more or less profound peace. The peace was sufficiently secure to enable continental nations to develop their commerce to an extent that was not possible under the conditions existing during the first half of the nineteenth century. Germany has become a great manufacturing and commercial unit since 1870, and the Mediterranean ports have attained an importance they had not known since the days of Portuguese commercial expansion. Hence with or without the Suez Canal the English *entrepôt* trade must have been eventually affected. As soon as there is sufficient regular trade from a given trading centre to warrant a regular ocean transport service, that service will be instituted. This is the main explanation of many a modification that shipping business has experienced during the past forty years. And during the last five or ten years, more especially, this tendency has been increasingly marked. The creation of *free ports*, too, has had its effects on modifying the great position enjoyed for so long by the English ports, thanks to *free trade*.

Rise of Germany.

The Suez route to the Far East is only suitable for self-propelled

[1] Cf. *British Shipping*, p. 347.

vessels. Thus the year 1869 sounded the knell of the sailing ship in the Indian and Chinese trades. But the utility of the sailing ship continued for nearly three decades longer, and it was mainly sailing vessels that opened up, and were instrumental in the early development of, the trade with Australasia, and the west coast of America.

Panama Canal.

The barrier at Panama, too, has at length been pierced and will in due course, unless something untoward occurs, be available for ocean-going vessels of all sizes. At present one can but estimate some of the possible effects of this new route. From the experience of what has been effected by the piercing of the Isthmus of Suez, it will require two or three decades at least to make plain the full effects of French and American enterprise. Probably the greatest effects for some time to come will be local. The West Indies and the West Coast countries and provinces of North and South America will reap the first great benefits from the economic point of view.[1]

Trading Settled.

As the nineteenth century developed, the trading routes of the world gradually settled down into well defined grooves. In the first instance this was the work of England and the United States, then for a time England continued the work alone, but more recently there has been a world-wide awakening on questions of transport, and at the present moment, practically all the progressive nations are doing their share in modernising and in improving the services which keep the whole world in commercial relation. The most active maritime nations to-day are England, the United States, Germany and Japan, but some of the less observed nationalities are doing very effective work.

Development of Shipping Services.

As an illustration of how, under modern conditions, a new trade may be created, the development of shipping services between Europe and Western Australia may be taken. A little over thirty years ago this trade was in its infancy. Two comparatively small London shipping firms began sending a few small vessels to Western Australian ports. These ships, measuring from 500 to 700 tons, at first, with some difficulty, picked up a cargo by visiting

[1] For a detailed discussion of this question cf. " Some of the Economic Effects of the Panama Canal," *The Scottish Geographical Magazine*, vol. xxix, Nov., 1913.

several small ports. Then in the year 1884, a small steamer was purchased, and a coasting service was commenced, which included all the Western Australian ports, and extended as far as Singapore. The trade developed, and in a comparatively short time, a new steamer was built for the service. From that time, Western Australia has experienced a remarkable growth in commercial importance, and the trade is now sufficient to attract the services of several shipping companies. The sailing ships have done their work, and the trade is now carried on, so far as the original firms are concerned, by several first-class cargo steamers. This briefly sketched description is typical of what has been going on wherever mankind has discovered trading possibilities. The small vessel has begun trading in a tentative way with some new colony or settlement, and it may safely be said that where the community, however small, has been imbued with the progressive spirit, development has been steady. The usual sequence is that larger sailing ships have succeeded the original smaller craft, then steamers have been put on the service, and, finally, the sailing ship has been superseded, until now, in practically all trades, she is a negligible quantity. To-day, there is hardly a seaport, however small, that is not either directly or indirectly served by up-to-date steamers.

General View of International Commerce.

To understand the main routes along which at present the great ocean services run, it is necessary to take a bird's-eye view of international commerce. There are definite centres where the great mass of exported manufactured goods is produced. These centres are densely populated, and the countries where they are situated are, with the exception of the United States of America, unable to produce their own food supply. Moreover, in addition to demanding ever-increasing supplies of food, they require a vast amount of raw materials of various descriptions. There are other and more widely scattered areas where the food supply for the densely populated countries, and the raw materials required to keep loom and spindle, converter and rolling-mill employed, are produced. There is also the commodity which to so great an extent dominates shipping business at the present day, namely, fuel. As long ago as the year 1898 a well-known Liverpool shipowner estimated that the coal exported from the United Kingdom amounted to no less than[1]

[1] Cf. *Our Foreign Trade in Coal*, D. A. Thomas, p. 11.

86 per cent. of the total tonnage of exports. Of recent years our export of coal has continually increased,[1] whilst other countries have also developed their fuel resources, and are building up an export trade in various parts of the world. The great manufacturing centres of the world at present are North Western Europe and the Eastern States of North America. The food-producing countries are America, Australasia, the Far East and Eastern Europe. The main sources for the supply of raw materials are North Western Europe, Australia, New Zealand, the countries of the Far East, and parts of Africa. The great coal exporting country has been the United Kingdom; the countries now supplying other parts of the world as well as themselves with coal are Australia, South Africa, Japan, India and the United States. Bearing in mind the above points, and especially the great amount of coal leaving the shores of the United Kingdom, it is easy to see why there are two great points at which a great mass of shipping is continually passing and repassing, and that there are numerous points where shipping routes divide as vessels separate in order to reach their several destinations. The two main focussing points are, first, the entrance to the Atlantic from North-West Europe, lying between Ushant and the South of Ireland. Here is focussed the principal part of the import and export trade of Western Europe—that of the United Kingdom, France, the Netherlands, Germany and Scandinavia. These countries, taken together, own the great mass of ocean-going tonnage. And this stretch of sea leads directly to the principal European seaports, where the commercial and manufacturing industries of the Old World are concentrated.

The Two Great Shipping Points.

The second of the two great points stretches from Cape Race to Long Island, for along this stretch of sea passes the greater part of the shipping which trades between the great ports of North America and Central and South America, and Europe.

The lesser points at which shipping congregates, but to separate, are for the Far Eastern and Australasian routes via the Suez Canal, the Straits of Gibraltar, Aden, Colombo, Singapore and Yokohama; for the South American trades, Madeira, the Canary Islands and Cape Horn; for West and South Africa, and for Australasia via the Cape of Good Hope, Madeira, the Canary Islands, and the Cape

[1] Cf. *Appendix*, No. 11.

of Good Hope. With the opening of the Panama Canal, there may come into existence another great point of concentration at Panama. This route, too, will have a series of points marked by the principal islands of the Pacific Ocean where shipping routes will divide; these lesser points may be expected to grow in importance if the trade developments which are expected to result from the construction of this new waterway become concrete facts. A modern steamship is free of the ocean, and if she be of moderate tonnage can trade between practically any ports. Large steamers are restricted in their trading radius by physical obstacles on certain routes or at certain ports which limit the measurement of shipping that can participate in the trade. But with this exception the steamer is a much freer agent than the railway train, which is limited to rails of one gauge, and practically to a very circumscribed area of the earth's surface. The railway must have its termini and its important centres. There is no such necessity connected with the shipping industry. Indeed, one of the remarkable developments of modern times is the decreasing necessity for terminal ports, *i.e.*, ports where shipping companies have definitely fixed their headquarters, and where the vessels naturally go to refit, and to commence their new voyage. It is estimated that at least 20 per cent. of the shipping tonnage belonging to the United Kingdom trades permanently abroad, linking up various foreign ports and performing services of transport entirely for foreign clients. There is a grain of comfort in this for those who look forward to the time when the British Islands will have ceased to be the great importing and exporting centres, for the shipping interest can maintain itself so long as it is able to offer an economic advantage to shippers of goods.

The Steamer a Free Agent.

The success of the Panama Canal would emphasise this tendency, for it would probably lead to the institution of all-round-the-world services; liners would be continually steaming in one direction, merely stopping at convenient ports for the purpose of taking in and discharging cargo and passengers, or for bunkering and repairing. If this comes to pass the shipping of the United Kingdom, under the present organisation, which includes several important combines, will be, at any rate at the outset, in a better position to benefit by the opening of the Panama route than that of any other country.

All-round-the-World Service.

CHAPTER V

SHIPPING REGULATION AND MANAGEMENT

The Navigation Acts.

UNTIL the middle of last century the shipping of this country was regulated by the Navigation Acts. This famous corpus of legislation had commenced in Plantagenet days for the purpose of fostering the shipping interest. Under Cromwell the policy had been thoroughly overhauled and brought up to date. Indeed, by means of the Commonwealth legislation a severe check had been administered to the Dutch, and the foundation of England's mercantile supremacy on the sea had been securely laid. From that time until the year 1825, the policy continued in force. Then all laws regulating shipping were repealed by Parliament, but by an Act of that year the policy of fostering shipping was continued. The prevailing sympathy with non-intervention in trade matters by the State led to the repeal of the Navigation Law in 1849, and in 1853 even the coasting trade of the United Kingdom was thrown open. At first it seemed as though America would follow the generous example set by England, for within four months of the repeal of the English Navigation Law, the United States Government relaxed its restrictions to the extent that foreign ships were allowed to take part in American foreign trade. The coasting trade, however, was jealously restricted to American ships, and as coasting trade was loosely defined as trade between any two ports belonging to the Union, what was of comparatively minor importance sixty-five years ago, has become radically different since the United States first developed enormously within its own frontiers, and then became a world power. To call a voyage from New York to San Francisco *coasting*, required a sufficient strain to the imagination, but when that dictum is extended to include a voyage between an American port and Manila, one's imagination altogether refuses to respond; but in actual business, this absurd regulation is enforced. With the opening of the Panama Canal, and the attempt to pass American *coasting* vessels through the canal free of toll, an added advantage is offered to the shipping interest of the United States and at the

same time what may prove to be a growing disability may be placed upon foreign shipping.

So far as the British Empire is concerned, shipping business is for all practical purposes free and open to all comers. There are two restrictions that apparently remain in desuetude, namely, that the trade from any one part of a British possession in Africa, America, or Asia, to another part of the same possession, can only be carried on in British ships, though by Order in Council, the Crown has the power, if petitioned to do so by any possession, to relax this regulation ; and free intercourse may be confined to such nations as consent on their part to concede equal freedom to British vessels.

Free Shipping within the British Empire.

For, by the 16 & 17 Vict., c. 107, ss. 324–326, it was enacted, that if British vessels were subjected in any foreign country to any *prohibitions* or *restrictions* as to the voyages in which they might engage, or the articles which they might import or export, her Majesty might, by order in council, impose corresponding prohibitions and restrictions upon the ships of such foreign country ; and further, that if British ships were directly or indirectly subjected in any foreign country to *duties or charges* from which the national vessels of such country were exempt, or if any duties were imposed there upon articles imported or exported in British ships, which were not equally imposed upon the like articles in national vessels ; or if *any preference whatsoever was shown*, either directly or indirectly, to vessels of such country over British vessels, or to articles imported or exported in the former, over the like articles imported or exported in the latter ; or if British trade and navigation were not placed by such foreign country on *as advantageous a footing as the trade and navigation of the most favoured nation*, then, and in any of these cases, her Majesty might, by order in council, impose such duties of tonnage upon the ships of such foreign nation, or such duties on goods imported or exported in its ships, as would countervail the disadvantages to which British trade or navigation was subjected. And these provisions still remain substantially in force, notwithstanding that the Act 16 & 17 Vict., c. 107, has been now in great part repealed.[1]

Twenty-six years ago, by the Merchant Shipping Act of 1894, British shipping law was consolidated into one Act. This Act[2] has since been extended or amended as might be necessary to meet changed conditions. It is one of the great functions of the Board of Trade[3] to administer these Acts. That this duty is no sinecure will be realised

Board of Trade and Shipping.

[1] *Stephen's Commentaries of the Laws of England*, vol. iii, pp. 155, 156.

[2] For present state of the law, cf. *The Shipping World Year Book*. This gives annually a digest of Acts in operation.

[3] For a detailed account of the Board's duties, cf. *British Shipping*, p. 261.

from the following list, which gives some of the principal matters dealt with by the Marine Department of the Board of Trade—

The registry and measurement of ships.

The survey of ships' equipment, including life-saving appliances.

Responsibility in connection with various goods that are carried.

The load-line and general seaworthiness of ships.

The examination of all candidates for positions as ship's officers, either on deck or in the engine-room.

Responsibility for passenger and emigrant ships.

As to seamen and firemen, the Board supervises their engagement and discharge, and protects them from crimps, and will, if desired, take care of their earnings.

The inspection of provisions and the granting of certificates of efficiency to cooks.

Enquiries into wrecks and casualties at sea.

The testing of anchors and cables.

Internationa lconventions as to safety of life at sea, the unification of maritime law and signals.

This list could easily be extended, but it gives the main points, and shows the inclusive nature of the responsibility of the Board and its officials, a responsibility which continually tends to increase. The Board of Trade, too, is by the Act of 1913, the responsible authority for pilotage throughout the United Kingdom. It also controls the Trinity House, which undertakes the important duty of lighting and buoying our coasts and channels. Thus Government control over shipping in all its main and subsidiary branches is fairly complete.

Pilotage.

There is also a semi-official control that is almost, if not quite, as important to shipping as that of the Government. This is a control that the shipping interest has evolved for itself. It originated in connection with marine insurance, but has developed until it embraces not only the designing and building of a vessel, but controls the manufacture of all the materials that will be employed in the work of construction : it also holds periodical surveys during a ship's existence for the purpose of classification. This work began with Lloyd's Register, an outgrowth, but an independent institution from Lloyd's

Lloyd's Register.

Association of Underwriters, which came into existence during the seventeenth century. To-day the work of registration and all that it entails is carried on by several institutions, the principal of which, however, are Lloyd's Register of British and Foreign Shipping, the British Corporation, and the Bureau Veritas. Theoretically a man may build a ship to his own design and plan ; in practice, the great corporations for Registry of shipping have drawn up regulations based on long years of experience and scientific knowledge, and the designs of all ships now built are submitted and passed by a Registry before the work of construction commences. Without a class a ship would be unable to obtain either cargo or passengers ; nor if these difficulties were overcome would it be possible to effect an insurance upon either ship or cargo. The semi-official control then is very complete, and as effective as that exercised by the State. Indeed, so far as certain important matters are concerned, the State and these Corporations work together, the State utilising the special knowledge and facilities of these Corporations to carry out control that otherwise could only be exercised with great difficulty, and at great expense.

International Agreement.

Not the least important development of recent times in connection with world shipping is the tendency towards international agreement on all important points affecting life and property at sea. Here again both Governments and the shipping interest itself are working towards a common end. Governments are feeling their way towards a uniform code of maritime law dealing with every sphere of the industry, whilst the shipping interest, through its conferences, is aiming at a simplification of the details of shipping business by means of standard forms for charter-parties, bills of lading, insurance policies, and the many other documents as to which a dispute in a foreign land may cause so much irritation or loss.

The Management of Shipping

Changes in Shipping.

Few industries have gone through such continuous and radical changes as has shipping. The small ship might easily be owned, managed, and even navigated by one man. This was frequently the case with the *Free Trader* of a century ago. But with the great growth in the volume of international trade, necessitating a larger and more

expensive vessel, run on modern lines, entailing a maximum of efficiency and economy, the day of the private owner came to an end. Shipowning always has been essentially a rich man's business, and in spite of limited liability, and the possibility of dividing-up share capital into units of £1, it is true to say that shipowning remains a rich man's occupation. As an investment shipping shares are best avoided by people of moderate means, unless they are in some way connected with the industry and have some inside knowledge.

One Long Stage of Transition.

So far as manufacturing industries are concerned, the Industrial Revolution marks a more or less sudden break between old and new methods of organisation, the purchase of raw materials, the marketing of the finished product, and the relations between the management and the labour employed. But with shipping the changes during the past century have been almost continuous ; there has been one long stage of transition. Many of the changes have been epoch-making, and nearly all have required a radical alteration of method which has tested the business ability of shipping managers in a most exhaustive manner. Not only has steam superseded sails as the propelling force—a change that necessitated a new intellectual equipment in the men responsible for managing ocean-going vessels—but the submarine cable worked a revolution equally drastic. Nor do these two great events sum up the whole matter, for each trading country has been developing on different lines, routes have been changed, new and unthought of possibilities have opened out. In a word, the kaleidoscopic nature of the changes has been so complete and far-reaching that there has been a constant demand for the new man, mentally equipped to face constantly changing conditions. The old shipping firms in many cases have been either renewed with outside blood, or have gone under ; there has been in the forefront of the industry a continuous change in the personnel responsible for the main interests.

Greater Responsibility of Management.

By merely looking at shipping as carried on to-day, it is difficult to realise the full extent of the revolutions which have taken place in every sphere of the industry. But if one thinks of the comparative simplicity and even sluggishness of the sailing ship days in the first half of last century, and compares that picture with the complicated mechanism of the industry as carried on to-day, including in the

study, steam, electricity, refrigeration, new constructional materials, the extended and complicated technique of markets, shipping institutions, conferences and routes, one gets at least a glimmering of what has occurred, and is able to realise the great drain on a man's mental resources when he is responsible for the management of a line of steamers. The owner of a small *Free Trader* ship, three-quarters of a century ago, had a comparatively easy task. His chief care was to obtain in the first place, the services of a capable, business-like captain, for on him almost everything depended when the ship once left her terminal port ; and then he had to be careful in selecting honest agents at the ports of destination. For when once a ship sailed on a voyage, which might last two or three years, the owner's control was reduced to a dangerous minimum. He could, it is true, lay down the main principles to be followed by his servants and agents, but it was the man on the spot who had to act, and on his decision would, to a great extent, depend the success or failure of the voyage. A shipping voyage is known as a venture. The word is still adequate in describing the chances of shipping business, but in the days before the submarine cable gave the owner complete control over every transaction, it more justly and fully expressed the situation. The owner in the old days might worry, but he could not fully control. Compare his position and responsibility with those of the manager of a modern tramp steamer. The latter not only needs to know the main facts about steam, fuel, constructional materials, and the many items of knowledge, which are necessary if he is to keep the vehicle he employs abreast of the times ; but he must know the exporting and importing centres of the world and the commodities available at or for each. He must keep his finger on the pulse of many markets, know when the crops have failed in one part of the world, and have been above the average in others. He must be watchful and on the alert, so that his ship or ships may be where they are wanted at a given moment, and not side-tracked when there is a boom with consequent high freights. The successful tramp owner must be a many-sided man, knowing just a little more than his average competitor. This little bit of extra knowledge can only be obtained by the *sweat of one's brain*, but it pays handsomely, and earns the gratitude and confidence of shareholders. Such a man knows but little peace. He must not miss a single item of

news connected with markets, freights, crops, and production. This type of man is not common ; he has evolved, and is no sudden creation. How he has evolved can be traced by studying the development of the shipping industry through the stages marked by changes in ownership, management, and in the type of ship operated.

The Liner and the Tramp.

The liner and the tramp of to-day roughly represent the chartered company's vessel and the *Free Trader* of long ago. The *Free Trader* might belong either to a single owner or to a partnership. In the eye of the law a ship was looked upon as consisting of sixty-four parts, and so long as there was no further subdivision these sixty-four parts might be registered in the names of any number of owners from one to sixty-four. The liability of the several owners was limited under the Merchant Shipping Acts ; thus even after the introduction of limited liability trading, the sixty-fourth system continued to exist, but the advantages of trading under the newer system have increasingly attracted shipping managers. In the last number of *Fairplay* for the year 1913, a table is given of ninety-eight cargo ship companies, with particulars of their capital, the book value and gross tonnage of their steamers, the profit or loss made during the previous twelve months, the dividends paid, and the amounts transferred to depreciation accounts. This table shows that out of the 98 companies, 19 owned only 1 vessel, 13 owned 2, 8 owned 3, 11 owned 4, and there were 28 companies operating with from 5 to 10 vessels, 11 with from 10 to 15 vessels, 5 with from 15 to 20 vessels, and 3 with 20 vessels or over. The smallest of the companies was working with one steamer of 1,533 tons gross measurement, on a paid-up capital of £8,460 ; whilst the largest company under review owned 36 vessels of an aggregate gross tonnage of 127,596, on a paid-up capital of £499,570. On a total capital of £10,964,108, an average dividend of 12·56 per cent. was paid, whilst £3,344,643 was transferred to depreciation accounts. Some of these companies are doubtless doing regular cargo-liner work, but the majority of the ships are tramps. It is not easy to differentiate between a liner and a tramp, indeed, the distinction is rather in the management than in the vessel. The great mail and passenger steamers are liners, and except when one of them may be employed temporarily on yachting cruises, and so becomes a *passenger tramp*, there is no

doubt as to which class they belong to. The cargo tramp pure and simple, too, is easily classed. She is a handy-sized vessel, capable of visiting a large number of ports and of being employed in many different trades; thus she is ready to go where there is money to be made. But there are a large number of cargo steamers employed regularly in various trades, and these should rather be called *cargo liners*. It must be remembered, however, that a steamer may be a liner for a period more or less lengthy, and then do tramp work, and *vice versa*. In common parlance a steamer that goes anywhere and is prepared to accept practically any kind of freight offering is known as a tramp. It is this vessel that is the thorn in the sides of those shipping managers who have, perhaps after years of struggle, succeeded in developing a regular trade between two countries. When things are bad and freights are low, they are left in peace to carry on what little business there may be, but when good times come and there is a prospect of making money, the tramp appears upon the scene, and frequently contrives to spoil the market for all interested parties. It is the ubiquitous character of the tramp that has been one of the main factors in bringing shipping conferences into existence.

New Men in the Shipping World.

The modern tendency towards even greater units in the business world is fully exemplified in shipping. The small shipowner still flourishes, and it is well that he should continue to do so, but for the most part he is a new man, and with success his unit grows either by natural development or by combination. It is to a great extent the continual appearance of new men in the industry that has kept shipping up to date. The new man is naturally venturesome and ready to try new methods which give promise of an advantage over older methods employed by those amongst whom he is attempting to gain a footing. It is almost from the first his great aim to become the head of a regular line, indeed, many instances could be quoted where the owner of one small cargo-steamer employed in tramping has by perseverance and success in the first instance, and then by doggedly working at the development of one trade, built up a great liner company.

The policy of combination which is so much in evidence at the present moment, is more easily traceable in the liner companies than among tramp owners, if only for the reason that the large

combinations of capital and tonnage consequent on liner amalgamations are events of public importance, and are much discussed and criticised by the ordinary daily press. One fairly recent instance of combination, that of the Peninsular and Oriental, and the British India Steam Navigation Companies, (June, 1914), is a case where two old and firmly-established shipping firms have decided to join forces in order to present a united front, not only to British but also to threatening foreign competition. One cannot help asking the question, is this the whole extent of what may be expected? Not many months ago there were rumours that one at least of the members of this combination was being angled after by the head of another great shipping combine. His object was presumably to be ready with the strongest possible combination of tonnage, finance, and experience, to face any eventualities following upon the opening of the Panama Canal in 1915. Undoubtedly a combination of such power would have presented a very formidable competitor for any new business resulting from the opening to world commerce of a new route. Nor is this policy of combination among shipping companies confined to those of the United Kingdom. The two premier German companies, if not absolutely amalgamating, were preparing to work together under an agreement for a long term of years. And, although it has been denied, there have been rumours that the three great Japanese shipping companies are considering whether it would not be beneficial to their interests if they agreed upon a common policy. Leases and agreements, be it noted, are not infrequently the preliminary steps towards a much closer form of partnership.

Combination.

Some instances of shipping combinations will serve to show how important are the results of a long-continued effort in this direction. They may be said to have commenced on a large scale about eighteen years ago, when America made a great bid for the control of the North Atlantic service. The International Mercantile Marine Company was then established, and included the White Star, the Red Star, the American, the Atlantic Transport, the Leyland and the Dominion Lines, with about 1,000,000 tons of shipping. English managers were not slow in following this lead. One of the most important of existing combines centres round the Royal Mail Company, and

Examples of Combinations.

includes about 1,800,000 tons of shipping, and the following flags: the Royal Mail, the Union Castle, the Nelson, Lamport & Holt, the Glen Line, and Elder Dempster with its associated companies.

Railway Companies as Shipowners.

If one bears in mind, when considering this sphere of the economics of transport, that some of our railway companies have for years been endeavouring to improve their position by owning and developing terminal seaports, and have even launched out as shipowners on a more or less restricted scale, the possibility of greater amalgamations taking form is seen to be something more than a dream. The railway companies of the United Kingdom own, lease, or control over seventy ports and harbours, docks, and quays. One of these is the rapidly advancing port of Southampton. Cardiff, the greatest coal-exporting port in the world, is another. Managers of even less tried ability than those who have built up some of the large shipping combinations might well be suspected of a larger policy, when their present schemes are carried through, and we may yet see, not the nationalisation of our railways, but the working together if not the close amalgamation, of some of our leading shipping and railway companies, who would be prepared, under a simplified system of management, to offer through services on a scale and with a convenience to the trading and travelling public hitherto unattainable to all parts of the world, irrespective of either distance or of frontiers.

Economy and Efficiency.

The form of combination that has just been considered is usually advocated as leading to economies in management and the organisation of more efficient services. There is another form of combination, however, which is said to be rendered necessary by the peculiar conditions of ocean transport. This differs from the former in that, whilst in the former the individuality of the various companies that agree to combine may be merged in the bigger combination, in the latter, each member retains its individual existence, and in all but one direction, its freedom of action. The first kind of combination is a real trading together under one management; the other gives scope to the individual managers of the companies concerned, but regulates their freedom of action as to loading, and as to freight rates.

Shipping Conference.

This second form is known as the *Shipping Conference.* As has already been stated it is the weapon of the regular lines against possible depredations by irresponsible tramp vessels.

The contention that this policy of combining the shipping interests in one given trade in a conference is rendered necessary by the conditions of ocean transport, needs some further explanation. The position briefly is as follows: a cargo steamer of 7,500 tons could be built just prior to the war for about £48,000. This price is by no means fixed or unfluctuating. A steamer of this tonnage in the year 1900 cost no less than £68,000 to build. The lowest price quoted by builders was £36,000 in the year 1908, since when, with a momentary set-back in 1910, the price rose rapidly to £58,000 towards the end of 1912, dropped to £54,000 in the middle of 1913, and continued to fall to £48,000.

Small Capital Requirements.

But taking an average cost of such a vessel at £50,000, it can be realised at once that a shipping company can in normal times be established with a comparatively small capital, and if content to experiment at first with one steamer, and merely develop the fleet as success warrants, the original modest capital of £50,000 can be increased from time to time until, if the business has expanded sufficiently, one hundred steamers, a large fleet to be under one flag, need not represent a greater amount of capital than somewhere about £5,000,000; and a goodly part of that may be represented by loans or debentures. There are, however, few shipping companies whose capital amounts to anything like this sum. The capital at stake in the majority of the large cargo-steamer companies varies from £100,000 to £500,000. A comparison, however, of the capital required for carrying on a shipping business, and that absorbed by the typical land transport agency, the railway, reveals the fact that the railway company requires a very much greater capital. A small country like the United Kingdom has required for the equipment of its railways, over £1,300,000,000; and the largest company is burdened with a capital of over £200,000,000.

In facing problems of management both the railway manager and the shipowner have special advantages and disadvantages. For the construction and equipment of a railway, a large capital is necessary, but, at any rate, so far as this country is concerned,

it has been arranged that where investors were willing to advance large sums, partly owing to natural conditions, but mainly by State guarantee, the company permitted to construct and carry on a railway at great cost should have a species of monopoly in its trading; a monopoly safeguarded against abuse by the conditions laid down by the Charter of the company, and the Acts of Parliament regulating the railway system generally. Here then the railway manager has the disadvantage of requiring a great amount of capital, but as an offset to that his position is assured against undue competition. Compare with this the shipowner's position in these same respects. He can operate one, two or more vessels on a minimum of capital. He has no need to give his attention to the equipment of terminal ports, harbours, depôts, routes, and so on, but as against these easy conditions so far as capital is concerned, the sea road is so free and open to all comers, that under normal conditions, he may be subjected to competition carried to a point unparalleled in any other industry. Anyone who can impress investors with his business ability can, by raising, under limited liability conditions, a few thousand pounds, take part in the work of ocean transport. Thus without some form of regulation, shipowners declare that it would be impossible to carry on their business; and for the past forty years, they have been endeavouring to work out a system to safeguard shipping interests, and prevent the worst forms of cut-throat competition. In the first instance, it was competition between English-owned ships that had to be mitigated; for over a long period the shipping of the United Kingdom enjoyed the cream of the ocean transport business, harassed by but few foreign competitors. During this period efforts were made to organise shipping rings for the purpose of regulating at any given time the amount of tonnage that might be on the berth for a given port. The success of these rings was fluctuating. Their operations were watched with suspicion by many well-known shipping people, and from time to time the rings were broken, only to be re-formed and probably include the *breaker* in the new organisation. Where all the brokers in one trade honourably agreed to load one ship at a time, and in other ways regulate export freights, there was a chance of some success. But the great difficulty that rendered most of the efforts abortive was that these embryo

Facility of Unparalleled Competition.

Rings.

conferences had no weapon wherewith to enforce their arrangements on shippers. So long as the arrangement suited the shipper, he would be loyal to the ring, but the moment an outside ship was put on the berth offering lower rates, there was nothing to make it worth the shipper's while to ship by the ring. This drawback threatened to render nugatory all efforts towards regulating freights. But a practice which had survived from the old days of foreign ventures suggested to some ingenious brain a method for forging a weapon that would be effective in compelling all the large and regular shippers in a given trade to be loyal to the conference. During the pre-submarine cable days, it had been the rule for shippers to allow the captain of a ship 10 per cent. of the freight to enlist his good offices, presumably in case of anything going wrong at the port of destination, when only the man on the spot could act. This percentage on the freight was called primage. The *raison d'être* for the payment ceased, but shipping companies still continued the charge, giving sometimes as an explanation that it was a payment for the use of ship's gear in loading and discharging cargo. It was used, by some members of the rings, as a means of offering an inducement to shippers, *e.g.*, by halving the primage, or even by returning the whole; thus the net freight was charged, and the letter of the agreement between members of a ring was kept. The new weapon of the conferences was not really the primage itself, but it was undoubtedly suggested by this old practice. The new policy is called the system of deferred rebates, and it gives the shipping companies a firm hold over regular exporters of goods. Freights are fixed but shippers are informed that the rate is subject to a rebate, usually 10 per cent., which will be returned to the shipper at the end of a given period (six or twelve months), provided that he makes a declaration to the effect that during the whole of a given period he has shipped exclusively by conference lines. If he cannot make this declaration, the whole of the rebate is forfeited. In the case of regular shippers, these deferred rebates mount up to large sums, and thus it is not worth the while of the shipper to risk a large future repayment, in order to make a small immediate gain.[1]

Deferred Rebates.

Shipping conferences have been organised in connection with the

[1] For full particulars of the history and working of the system, cf. *The Report of the Royal Commission on Shipping Rings*, Cd. 4668, 1909.

whole of the export trade of the United Kingdom, with the exception of the North Atlantic cargo trade. The coasting trade, owing to the competition of railway companies, has not been subject to the conference system, whilst it has been found impossible to organise it in connection with a few of the import trades. This last is due to the fact that in some of the import trades, the amount of raw materials and food-stuffs to be transported is so much greater in bulk than the outward freight that the conference lines cannot restrict it to themselves. But even the import trades are coming increasingly under the influence of the conferences.

Extent of the Conferences.

Naturally there have been attempts to break the power of the Conferences; and, so far as South Africa is concerned, there is an appearance of success in that the conference lines have had outwardly to abandon the policy. The action of the South African Government, however, has led to another development which promises to put shipping business on a yet healthier basis. For in place of the shipping companies combining for freight purposes against the shippers, the new policy is based on community of interests.

Attempts to Break Conferences.

A conference undoubtedly offers a better service than competing lines can. There is regularity of both service and freight which offer advantages not only to shippers, but, indirectly, to all the labour employed, both on the ships themselves, and in the ports they frequent. This regularity of service and rate is no small benefit to the shipper, and he has grasped its utility. Hence, when the action of the South African Government threatened to break up the conference, and in theory succeeded in so doing, in practice the shipping and shipper interests have shown rather more than a tendency to work together, practically on a conference policy, without the cast-iron regulations which form an objectionable, but, at first, necessary part of the system. This gives yet another instance of the tendency of modern business towards regularity and the elimination of the element of uncertainty, which is conducive to speculation.

Benefit of Regularity.

With the great development of continental shipping, the spheres of action of the conferences have been extended. Several of them are now International, and have contributed powerfully in assisting the movement, already noted in connection with the regulation of

shipping, towards International agreements in the law and practice of maritime trade. Whilst this is true it is worth while considering to what extent conferences can regulate freights. Is their power unlimited, or does some economic law step in and restrict their power? From time to time there are suggestions made that freights in the several trades should be standardised, and at first sight the suggestion looks attractive. But a study of the subject over a sufficiently long period of time brings out some interesting points, two of them not only interesting, but informing.

International Conferences.

It will be found that the wish for standard rates is expressed by two sets of people at two different conditions of the freight market. At those exceptional times for instance, when Black Sea freights touch the figures they did in 1896, 1900 and 1912, namely, 20s., 18s., and 27s. respectively, shippers looking back to the days when rates were lower—from 9s. 6d. to 13s. 6d.—very naturally yearn after a standardised and lower rate; when the bad years for shipping come round, as come they do with persistent regularity, it is not the experience to find shippers sighing after a standard rate that might be 5s. or 6s. a ton more than the current quotation. And, on the other hand, whilst shipping managers are glowing with pleasure and good nature when the high-water mark is reached, during the lean years it is they who sigh after the more expansive days, and dream of standard rate of freight. Thus in a falling freight market the suggestion comes from the shipowner, but when the rise comes, he is satisfied with things as they are; it is the shippers' turn to see the advantage of steady rates.

Standard Rates.

So far as the question of the possibility of a conference raising freights and maintaining them at an abnormal level is concerned, the economist would say that so long as the conditions of ocean transport services remain comparatively free and open, all that a conference can effect is what a well-organised Trade Union does for the wage rate of its members. The Trade Union can enable its members to get their full economic share of the results of production, it can stave off a fall of wages to the latest economic moment, and it can accelerate a rise of wages, in that its efforts will result in winning for its members a rise the moment that there is

Economic Limits of Regulation.

economic justification for it. Under existing circumstances it is probably true to say that a conference, if well organised, does obtain for its members the full economic rate of freight under all circumstances ; it puts off the fall to the last possible moment, and obtains a rise the instant that the market will bear it. Otherwise its influence on the rate of freights is limited by the law of supply and demand. The great benefit accruing from conferences is greater regularity of service, and this is the economic justification for their existence. Indirectly, a conference fulfils the function of a regulator of freight rates. More than this, under present conditions, it is unsafe to say, for the shipping industry is affected by so many influences over which it has little or no control. As instances of these may be cited the failure of crops in some well defined agricultural area, whence in normal years, the export is considerable ; or the reverse of this : a bumper harvest resulting in large quantities of food-stuffs to carry to countries which are unable to grow sufficient food for themselves. Another instance would be the development of new areas, brought about sometimes suddenly, as by the oil boom, requiring large quantities of machinery, and other forms of equipment, in the shortest possible time. Or, again, it may be the human factor that is the disturbing element. Shipowners attracted by rising freights may act unwisely and launch an excess of new tonnage, when freights may fall as suddenly as they have risen. On the other hand, it may be the labour force that is the cause of the fluctuation. New tonnage may be wanted at short notice and shipbuilding labour may find this an advantageous moment to call a strike. The stoppage of shipbuilding when there is a great demand for tonnage will at once send freights up. Or it may be the transport workers that strike, and a great port may be paralysed in consequence. All these and many other factors are continually cropping up to overturn the most carefully-laid schemes.

Thus, so long as there is no real monopoly on the sea-route (and so far as one can see there is no likelihood of such a condition arising) it will be impossible to obtain for shippers of goods, schedules of class rates on the railway system. It is against human nature to expect either shipper or shipowner to forego his advantage when it offers. At the same time, it is well worth noting that the recent experience

Scheduled Class Rates Impossible.

in cases where a conference is forbidden by Government regulation has led not only to the suggestion, but to the practice, of shipper and owner coming to a mutual understanding. This is a tendency yet in its infancy ; it will be a shy child, and a cold wind from any quarter might lead to premature death. Its continued existence and development, however, would be an evolution on sound lines. There would result regularity of service and a diminution of speculation ; this is in accordance with the highest business development in other spheres, and so there is some precedent for it. Time alone can show whether cut-throat competition or regulation based on common interest is to be the last word in fixing freight rates.

The earnings of shipping mainly depend, of course, on freights—mainly, but not entirely, for there are some favoured shipping companies who enjoy advantages unknown beyond the circumference of a small circle. These favoured concerns flourish and make money to an extent only known to themselves, even in bad times. But they resemble manufacturers ashore, who, by using special secret processes or working patents, are able to make a rate of profit quite unthought of in normal competing businesses.

Shipping Profits.

The well-known shipping journal, *Fair Play*, in its last number for each year, publishes interesting tables and diagrams, showing the results of the past year's, or of several years', working of various shipping interests. One of these diagrams shows the amount of profit or loss made by cargo-boat companies during the past nine years ; the result being arrived at by deducting interest on loans, office expenses and depreciation at 5 per cent. per annum on the cost of the vessels owned. The results prove that shipping is a rich man's investment, for he can afford to put the lean years against the fat, and be content with an average. The table in question shows that, from 1904 to 1910, where due allowance was made for depreciation, there was not only no profit to divide, but a loss to face. The last three years, however, tell a different story ; things have been booming, and profits have been abnormal. But the downward tendency is once again being experienced, warning one again that in shipping investments, the investor must be prepared to average out profit and loss over a fairly long period of years. The shipping manager can, but usually does not, help in this. It has been in the past far

too generally the custom to divide profits up to the hilt. An unwise management shuts its eyes to the fact that each year its fleet of ships is growing older, and must sooner or later be replaced by new tonnage, if the company is to continue operating. Shareholders naturally accept thankfully all they can get in the way of dividends, but they are apt to be very angry when they are informed that their capital has petered out, and that no depreciation fund had been in operation to meet the cost of renewing a worn-out fleet. They then refuse to advance further capital, and the company goes into voluntary liquidation. Fortunately, the reports of the last few years show that managers, great and small, are more widely awake to the advantages, nay, the necessity, for an adequate depreciation fund ; and by examining the accounts published during the recent boom, the most satisfactory feature, from the business point of view, is the more general attention to the sound policy of having a sufficient proportion of gross profits set aside as a reserve.

CHAPTER VI

BRITISH SHIPPING DURING THE WAR

THE war will be remembered for many and various changes which it caused. Old customs, well established precedents, all went by the board, and in looking back there is much that shows a breaking away from the past. Part of this may be for the good of the world—much can only be looked upon as loss. Up to July, 1914, there was a chivalry of the sea and a tradition full of honour—a source of legitimate pride of every mariner, high or low. The German has done his worst to break this honourable record.

Chivalry of the Sea.

Unrestricted submarine warfare is now said to be Germany's reply to the British blockade which threatened Germany with starvation. The fact is that the British blockade of Germany did not apply to food-stuffs for civilians till Germany issued a corn requisitioning order which stultified the distinction as to destination prescribed by the Declaration of London. And let it be carefully noted and remembered that before our Government made the blockade effective against foodstuffs, Germany had sunk food cargoes on their way to this country—the notable case being the *William P. Fry*.

British Blockade of Germany.

In the year 1919, the Admiralty published a return[1] giving complete information as to our shipping losses during the period from August, 1914, to November, 1918. This return shows separately British merchant and fishing vessels captured or destroyed by the Enemy; also those damaged or molested by the Enemy, but not sunk. It records, so far as is known, the name, gross tonnage, date, position, method of attack, cause of loss or of escape, and the number of lives lost in each instance. The return concludes with three summaries in the form of tables, and these are reprinted at the end of this Section.

British Shipping Losses, 1914-1918.

These official figures show that between 4th August, 1914, and 11th November, 1918, the total number of British merchant ships lost owing to attack by surface or submarine war vessels, aircraft or

[1] *Merchant Shipping Losses*, No. 199, H.M. Stationery Office. Price 1s. 6d. net.

from the explosion of mines was 2,479, having a gross tonnage of 7,759,090. Whilst no less than 14,287 lives were lost. Of our fishing fleets, 675 vessels of 71,765 tons were lost, and 434 fishermen perished. Nor is this the full tale for the third table records that 1,885 British merchant ships, aggregating over 8,000,000 gross tons, were damaged or molested, and in connection with these, 592 lives were lost. Thus, in all, 15,313 non-combatants were ruthlessly put to death on the high seas, in many cases under circumstances of the greatest brutality; and some fifteen and three quarter million tons of our shipping was sunk, damaged, or molested. For some years this, which is only part, although the major part, of the loss, must cause a serious shortage of tonnage for trading purposes. Thus, industrial countries will, so long as this shortage exists, be inconvenienced by the difficulty of transporting raw materials and food-stuffs.

Shortage of Tonnage.

Fortunately Germany was beaten. A victorious Germany would have supplied her own requirements in raw materials and food first, and only then would they have thought about other countries. The Entente are not doing this, indeed, the tendency is in the other direction: the needs of ourselves and our allies, notably France and Serbia, are by some people getting less consideration than those of Germany and Austria.

It is very interesting to read through the "Return" carefully and note developments. The first ship sunk was the *San Wilfrido*, a steamer of 6,458 tons, on 3rd August, 1914. She struck a mine off Cuxhaven, and her crew were made prisoners. The *Dresden* captured the *Hyades*, 3,352 tons, on 15th August, 1914, and sunk her by gun-fire, 180 miles North-East of Pernambuco. The *Emden* commenced her career by capturing and sinking the *Indus*, 3,413 tons, on 10th September, 1914, 240 miles South-East by East from Madras.

It was during the month of January, 1915, that submarine attacks without warning commenced. The first victim of this purely Hun policy was the *Tokomaru*, 6,084 tons, sunk 7 miles from Havre by a torpedo, without warning; fortunately, no lives were lost in this instance, this was on the 30th January, 1915. On the same day the *Ikaria*, 4,335 tons, was also torpedoed without

Germany's "No Warning" Policy.

warning 25 miles from Havre, no lives being lost, but the *Oriole*, 1,489 tons, was less fortunate, for on the same day she was torpedoed, probably by a submarine, in the English Channel, and the master and 20 of the crew lost their lives. This begins a new chapter of sea history—a chapter purely German.

On 28th March, 1915, the *Falaba*, 4,806 tons, belonging to the Elder Dempster Line, was captured and torpedoed, the captain and 104 passengers and crew lost their lives. This was the greatest loss of life in any one case up to that date. The *Falaba* case is an instance of the fiendish attempt to sink ships with all on board in such a way as to leave no trace. When the ship was sinking the crew and passengers took to the boats, upon which the submarine opened fire on the helpless people in the open boats. But on 7th May, of the same year the crowning horror of German atrocity was accomplished by the sinking of the *Lusitania*, 30,396 tons, a few miles off the Old Head of Kinsale—the record is laconic but damning, "Submarine—no warning—Torpedo—1,198 lives lost." Another entry in the "Return" marks an event that no British sailor will ever forget. It reads as follows:—"*Brussels*, 1,380 tons, 23rd June, 1916, off Dutch coast—Torpedo Boat—Captured—Taken into Zeebrugge—Crew made prisoners—Master subsequently shot." The torpedoing of the *Lusitania* and the murder of Captain Fryatt, were not only criminal acts, but were so stupid as only to be capable of execution by a German. Such acts could not help to win the war, indeed, they had considerable effect in losing it.

Attacks on Hospital Ships.

It is hardly necessary to mention that Hospital Ships ran the same risks as War Ships or merchant vessels. The first to be attacked was the *Lanfranc*, 6,287 tons, sunk by a torpedo from a submarine, *without any warning*, on 17th April, 1917. This occurred 42 miles from Havre, and fortunately only 5 lives were lost. The following month the *Dover Castle*, 8,271 tons, also a Hospital Ship, was torpedoed by a submarine without any warning, but again fortunately only 7 lives were lost. Two other Castle Liners serving as Hospital Ships were not, however, so fortunate, for on 26th February, 1918, the *Glenart Castle*, 6,824 tons, was torpedoed by a submarine, without warning, 10 miles West of Lundy Island, and no less than 95 lives were lost; and on 27th June, of the same year, the *Llandovery Castle*, 11,423 tons, was torpedoed by a submarine, without

warning, and the loss of life amounted to 146. It must be something worse than a fiend that can attack a ship bearing the Red Cross.

The high-water mark of submarine frightfulness was reached in 1917, when our total losses of merchant vessels amounted to 1,197 ships of 3,729,785 tons: the worst month of that, or any year, being April, when 169 ships measuring 545,282 tons were lost, and the death roll was 1,125, a number only exceeded the month the *Lusitania* was sunk, viz., May, 1915, when the total loss of life was 1,208.

In spite of Hun brutality there is no case on record of a British crew refusing to sail during the period of submarine warfare. The bearing throughout the war of the British sailor was superb, worthy of the proudest moments in our history.

It has been noted that the total loss of British Ships during the war period was 7,759,090 gross tons, but part of that loss was replaced by new construction, capture from the enemy, and purchase from foreign owners. Our shipbuilding yards, in addition to assisting to keep our Navy in repair, and supplying a great amount of tonnage for war purposes, launched 4,342,296 tons of new merchant shipping. We captured 716,520 tons from the enemy, and purchased from abroad 530,000 tons. But it should be remembered that our normal increase would be much greater, and that the tonnage operated was run threadbare, whilst many obsolete vessels were kept in commission or were recommissioned. In a word, our mercantile marine at the end of 1918, was in a very different condition from that of 1914, the tonnage had decreased, and the general efficiency was considerably lower.

New Merchant Shipping.

Germany had also destroyed, during the war period[1], six million tons of foreign shipping. But our Allies utilised 1,676,155 tons of captured enemy ships, and our Overseas Dominions, our Allies and neutral states produced 6,507,231 tons of new shipping. Thus the net loss of tonnage by the British Empire, her Allies and Neutral States, was less than two million tons. But again, it must be remembered, that six normal years would have resulted in a very considerable addition to world shipping tonnage, hence, there is still a great amount of leeway to make up before commerce is fully supplied with ocean transport facilities.

Effects on Foreign Shipping.

[1] See *Parliamentary Paper*, Cd. 9221, of 1918.

TABLE "A."

Showing Number and Gross Tonnage of British Merchant Vessels Lost through Enemy Action during each Month since the Outbreak of War; and Number of Lives Lost.

Month.	By Cruisers, T.B.'s, etc.			By Submarines,			By Mines.			By Aircraft.			Total.		
	No.	Gross Tonnage.	Lives lost.	No.	Gross Tonnage.	Lives lost.	No.	Gross Tonnage.	Lives lost.	No.	Gross Tonnage.	Lives lost.	No.	Gross Tonnage.	Lives lost.
1914.															
August	8	33,796	–	–	–	–	1	6,458	–	–	–	–	9	40,254	–
September	19	84,403	–	–	–	–	2	3,816	29	–	–	–	21	88,219	29
October	14	65,161	–	1	866	–	4	11,778	24	–	–	–	19	77,805	24
November	2	3,784	–	2	2,084	–	1	3,020	–	–	–	–	5	8,888	–
December	5	15,995	–	–	–	–	5	10,040	16	–	–	–	10	26,035	16
1915.															
January	3	12,304	–	7	17,126	21	1	2,624	–	–	–	–	11	32,054	21
February	4	10,350	–	8	21,787	9	2	4,235	21	–	–	–	14	36,372	30
March	2	7,031	–	21	64,448	161	–	–	–	–	–	–	23	71,479	161
April	–	–	–	11	22,453	38	–	–	–	–	–	–	11	22,453	38
May	–	–	–	19	84,025	1,208	–	–	–	–	–	–	19	84,025	1,208
June	–	–	–	29	76,497	78	2	6,701	3	–	–	–	31	83,198	81
July	–	–	–	19	48,844	26	1	4,003	2	–	–	–	20	52,847	28
August	–	–	–	42	135,153	205	7	13,311	43	–	–	–	49	148,464	248
September	–	–	–	22	89,693	44	8	11,997	33	–	–	–	30	101,690	77
October	–	–	–	10	39,061	35	7	15,095	7	–	–	–	17	54,156	42
November	–	–	–	23	84,816	25	9	9,677	93	–	–	–	32	94,493	118
December	–	–	–	16	65,011	416	5	9,479	3	–	–	–	21	74,490	419
1916.															
January	8	27,888	17	5	27,974	28	3	6,426	19	–	–	–	16	62,288	64
February	4	14,735	1	7	24,059	34	14	36,096	243	1	970	13	26	75,860	291
March	–	–	–	19	83,492	44	7	15,597	29	–	–	–	26	99,089	73
April	–	–	–	37	126,540	119	6	14,653	12	–	–	–	43	141,193	131
May	–	–	–	12	42,165	6	8	22,356	8	–	–	–	20	64,521	14
June	1	1,380	1	11	33,849	34	4	1,747	29	–	–	–	16	36,976	64
July	2	4,710	–	21	69,962	58	5	7,760	11	–	–	–	28	82,432	69
August	–	–	–	22	42,553	4	1	801	4	–	–	–	23	43,354	8
September	1	964	–	34	84,596	16	7	19,012	4	–	–	–	42	104,572	20
October	1	1,676	–	41	146,891	182	7	27,681	15	–	–	–	49	176,248	197
November	–	–	–	42	96,672	55	7	72,137	45	–	–	–	49	168,809	100
December	10	51,999	4	36	109,936	91	12	20,357	91	–	–	–	58	182,292	186
1917.															
January	6	19,304	–	35	109,954	245	8	24,408	31	–	–	–	49	153,666	276
February	7	28,679	–	86	256,394	355	12	28,413	47	–	–	–	105	313,486	402
March	11	42,893	18	103	283,647	630	13	26,938	51	–	–	–	127	353,478	699
April	–	–	–	155	516,394	997	14	28,888	128	–	–	–	169	545,282	1,125
May	1	819	11	106	320,572	507	14	28,114	73	1	2,784	–	122	352,289	591
June	1	3,947	–	116	391,004	384	4	19,256	29	1	3,718	3	122	417,925	416
July	–	–	–	88	319,931	401	11	44,927	67	–	–	–	99	364,858	468
August	1	1,608	–	84	310,581	415	6	17,651	47	–	–	–	91	329,810	462
September	–	–	–	68	173,437	293	9	22,335	60	1	440	3	78	196,212	356
October	1	1,159	–	79	261,649	578	6	13,324	30	–	–	–	86	276,132	608
November	–	–	–	56	154,806	376	8	18,754	44	–	–	–	64	173,560	420
December	1	2,284	–	76	227,195	520	8	23,608	65	–	–	–	85	253,087	585
1918.															
January	–	–	–	57	179,973	291	–	–	–	–	–	–	57	179,973	291
February	–	–	–	68	224,501	697	1	2,395	–	–	–	–	69	226,896	697
March	–	–	–	79	194,839	490	3	4,619	20	–	–	–	82	199,458	510
April	3	4,211	–	67	209,469	488	2	1,863	1	–	–	–	72	215,543	489
May	–	–	–	59	188,729	407	1	3,707	–	–	–	–	60	192,436	407
June	–	–	–	49	158,660	453	2	4,330	16	–	–	–	51	162,990	469
July	–	–	–	37	165,449	202	–	–	–	–	–	–	37	165,449	202
August	–	–	–	41	145,721	217	–	–	–	–	–	–	41	145,721	217
September	–	–	–	48	136,859	521	–	–	–	–	–	–	48	136,859	521
October	1	1,622	–	23	54,577	318	1	3,030	–	–	–	–	25	59,229	318
To Nov. 11	–	–	–	2	10,195	1	–	–	–	–	–	–	2	10,195	1
TOTAL to Nov. 11, 1918	117	442,702	52	2099	6,635,059	12723	259	673,417	1493	4	7,912	19	2479	7,759,090	14287

TABLE "B."

Showing Number and Gross Tonnage of British Fishing Vessels Lost through Enemy Action during each Month since the Outbreak of War; and Number of Lives Lost.

Month.	By Cruisers, T.B.'s, etc.			By Submarines.			By Mines.			Total.		
	No	Gross Tonnage.	Lives lost.	No.	Gross Tonnage.	Lives lost.	No.	Gross Tonnage.	Lives lost.	No.	Gross Tonnage.	Lives lost.
1914.												
August	25	4,368	–	–	–	–	1	70	5	26	4,438	5
September	–	–	–	–	–	–	6	1,032	25	6	1,032	25
October	–	–	–	–	–	–	2	283	5	2	283	5
November	–	–	–	–	–	–	6	460	42	6	460	42
December	3	294	–	–	–	–	2	486	18	5	780	18
1915.												
January	–	–	–	–	–	–	2	222	–	2	222	–
February	–	–	–	–	–	–	–	–	–	–	–	–
March	–	–	–	–	–	–	1	289	1	1	289	1
April	–	–	–	10	1,760	20	1	170	2	11	1,930	22
May	4	689	–	22	3,982	4	6	977	28	32	5,648	32
June	–	–	–	58	7,749	17	2	368	9	60	8,117	26
July	–	–	–	36	3,966	–	3	461	26	39	4,427	26
August	–	–	–	36	2,454	–	2	436	9	38	2,890	9
September	–	–	–	6	292	–	2	153	12	8	445	12
October	–	–	–	–	–	–	–	–	–	–	–	–
November	–	–	–	–	–	–	1	162	2	1	162	2
December	–	–	–	–	–	–	–	–	–	–	–	–
1916.												
January	–	–	–	7	357	–	–	–	–	7	357	–
February	–	–	–	2	68	–	–	–	–	2	68	–
March	–	–	–	6	304	–	1	303	9	7	607	9
April	1	173	–	2	43	–	–	–	–	3	216	–
May	–	–	–	5	201	1	–	–	–	5	201	1
June	–	–	–	–	–	–	–	–	–	–	–	–
July	–	–	–	36	2,796	2	–	–	–	36	2,796	2
August	–	–	–	12	1,474	–	1	198	9	13	1,672	9
September	–	–	–	38	4,811	–	–	–	–	38	4,811	–
October	–	–	–	9	1,138	–	–	–	–	9	1,138	–
November	–	–	–	14	1,474	–	1	126	8	15	1,600	8
December	–	–	–	3	224	–	3	212	9	6	436	9
1917.												
January	–	–	–	16	2,020	2	–	–	–	16	2,020	2
February	–	–	–	28	3,152	4	2	326	19	30	3,478	23
March	–	–	–	43	3,586	3	–	–	–	43	3,586	3
April	–	–	–	41	5,920	14	–	–	–	41	5,920	15
May	–	–	–	17	1,054	–	2	394	18	19	1,448	18
June	–	–	–	20	1,296	–	1	46	–	21	1,342	–
July	–	–	–	17	2,679	1	1	57	5	18	2,736	6
August	–	–	–	4	230	1	1	12	5	5	242	6
September	–	–	–	6	233	–	1	12	5	7	245	5
October	–	–	–	3	116	4	2	111	15	5	227	19
November	–	–	–	3	87	–	–	–	–	3	87	–
December	1	113	4	2	79	–	2	221	13	5	413	17
1918.												
January	–	–	–	10	375	1	–	–	–	10	375	1
February	–	–	–	9	306	3	3	380	17	12	686	20
March	–	–	–	9	209	–	1	84	10	10	293	10
April	–	–	–	3	241	–	–	–	–	3	241	–
May	–	–	–	16	504	7	–	–	–	16	504	7
June	–	–	–	4	312	11	2	327	6	6	639	17
July	–	–	–	12	555	3	–	–	–	12	555	3
August	–	–	–	13	1,536	–	–	–	–	13	1,536	–
September	–	–	–	–	–	–	1	142	–	1	142	–
October	–	–	–	–	–	–	–	–	–	–	–	–
To November 11	–	–	–	–	–	–	1	25	–	1	25	–
Total to 11th November, 1918	34	5,637	4	578	57,583	98	63	8,545	332	675	71,675	434

TABLE "C."

Showing Number and Gross Tonnage of British Merchant Vessels Damaged or Molested (but not Sunk) by the Enemy during each Month since the Outbreak of War; and Number of Lives Lost.

Month.	By Cruisers.			By Submarines.			By Mines.			By Aircraft.			Total.		
	No.	Gross Tonnage.	Lives lost.	No.	Gross Tonnage.	Lives lost.	No.	Gross Tonnage.	Lives lost.	No.	Gross Tonnage.	Lives lost.	No.	Gross Tonnage.	Lives lost.
1914.															
August	8	44,731	–	–	–	–	2	6,575	–	–	–	–	10	51,306	–
September	5	26,932	1	–	–	–	–	–	–	–	–	–	5	26,932	1
October	7	30,193	–	–	–	–	–	–	–	–	–	–	7	30,193	–
November	1	5,732	–	–	–	–	–	–	–	–	–	–	1	5,732	–
December	2	6,024	2	1	1,209	–	1	4,592	–	–	–	–	4	11,825	2
1915.															
January	–	–	–	1	1,871	–	1	1,742	–	–	–	–	2	3,613	–
February	1	4,583	–	10	37,043	–	3	9,849	13	–	–	–	14	51,475	13
March	–	–	–	29	93,250	1	1	3,868	1	8	10,915	–	38	108,033	2
April	1	6,849	8	7	31,479	2	–	–	–	2	3,542	–	10	41,870	10
May	–	–	–	19	117,591	–	–	–	–	–	–	–	19	117,591	–
June	–	–	–	18	77,273	–	2	10,706	–	–	–	–	20	87,979	–
July	–	–	–	16	77,492	31	2	10,406	–	1	988	–	19	88,886	31
August	–	–	–	19	55,639	–	2	11,620	–	–	–	–	21	67,259	–
September	–	–	–	5	35,056	–	2	9,617	2	1	1,270	–	8	45,943	2
October	–	–	–	4	58,450	–	3	6,564	–	1	1,408	–	8	66,422	–
November	–	–	–	11	64,460	–	1	2,286	–	2	2,657	–	14	69,403	–
December	–	–	–	8	70,295	–	1	4,844	–	1	2,414	–	10	77,553	–
1916.															
January	1	7,781	–	10	50,997	–	3	8,279	–	2	3,372	–	16	70,429	–
February	1	11,484	–	7	114,010	–	3	10,876	–	1	1,680	–	12	138,050	–
March	–	–	–	13	50,657	–	1	3,381	–	–	–	–	14	54,038	–
April	1	2,195	–	12	58,543	–	–	–	–	–	–	–	13	60,738	–
May	–	–	–	10	38,156	–	–	–	–	5	17,016	2	15	55,172	2
June	–	–	–	11	50,635	–	1	3,232	–	–	–	–	12	53,867	–
July	–	–	–	6	22,528	–	–	–	–	1	1,081	–	7	23,609	–
August	–	–	–	13	34,825	–	1	4,854	–	1	7,988	–	15	47,667	–
September	–	–	–	29	122,933	–	–	–	–	–	–	–	29	122,933	–
October	–	–	–	32	125,770	1	1	8,253	–	–	–	–	33	134,023	1
November	–	–	–	36	157,633	–	4	24,258	4	–	–	–	40	181,891	4
December	–	–	–	41	168,838	–	5	34,502	1	–	–	–	46	203,340	1
1917.															
January	–	–	–	29	140,722	1	1	5,686	–	–	–	–	30	146,408	1
February	–	–	–	74	313,971	15	4	48,516	–	1	3,563	–	79	366,050	15
March	–	–	–	77	329,192	64	3	15,459	–	2	2,292	–	82	346,943	64
April	1	3,562	–	92	426,680	21	6	47,587	3	1	1,780	–	100	479,609	24
May	–	–	–	97	388,258	3	1	1,968	–	1	2,821	–	99	393,047	3
June	–	–	–	122	549,907	18	5	29,278	–	1	1,243	–	128	580,428	18
July	–	–	–	76	383,793	6	2	5,150	–	6	8,337	–	84	397,280	6
August	–	–	–	54	252,504	10	3	15,641	–	–	–	–	57	268,145	10
September	–	–	–	61	213,199	37	3	9,491	3	2	9,966	2	66	232,656	42
October	–	–	–	43	162,755	24	2	9,754	–	–	–	–	45	172,509	24
November	–	–	–	50	191,601	27	2	9,552	–	–	–	–	52	201,153	27
December	–	–	–	60	223,533	56	3	12,900	–	1	353	–	64	236,786	56
1918.															
January	1	401	1	49	188,550	23	2	8,882	–	–	–	–	52	197,833	24
February	–	–	–	53	186,283	12	1	3,752	–	2	2,686	–	58	192,721	12
March	–	–	–	81	322,239	63	3	18,047	32	1	1,855	–	85	342,141	95
April	–	–	–	65	277,984	6	–	–	–	–	–	–	65	277,984	6
May	–	–	–	74	237,420	54	1	3,949	5	–	–	–	75	241,369	59
June	–	–	–	40	183,206	12	–	–	–	–	–	–	40	183,206	12
July	–	–	–	54	208,228	18	–	–	–	–	–	–	54	208,228	18
August	–	–	–	54	199,764	7	1	2,980	–	–	–	–	55	202,744	7
September	–	–	–	34	144,601	–	1	3,550	–	–	–	–	35	148,151	–
October	–	–	–	18	85,196	–	–	–	–	–	–	–	18	85,196	–
To Nov. 11	–	–	–	2	9,608	–	–	–	–	–	–	–	2	9,608	–
TOTAL to Nov. 11 1918	30	150,467	12	1727	7,335,827	512	84	432,446	64	44	89,227	4	1885	8,007,967	592

APPENDIX I

TABLE SHOWING THE DEVELOPMENT OF RAILWAY MILEAGE, CAPITAL, TRAFFIC, EXPENSES AND RECEIPTS FOR THE UNITED KINGDOM

(The figures are taken from the Statistical Abstract.)

Year.	Length of Line open at end of each year. Miles.	Total paid-up Capital.	Number of Passengers carried. 1 Including season-ticket holders. 2 Excluding ditto.	Total Traffic Receipts.	Ditto per Mile.	Working Expenses.	Net Receipts.	Proportion of Working Expenses to Gross Profits.
		£		£	£	Not given till 1854.		%
1848	5,127	200,173,059	57,965,070[1]	9,933,552	1,937	£	£	
1855	8,280	297,584,709	118,595,135[1]	21,507,599	2,597	10,299,709	11,207,890	
1865	13,289	455,478,143	251,959,862[1]	35,751,655	2,691	17,149,072	18,602,582	
1875	16,658	630,223,494	506,975,234[1]	58,982,753	3,563	33,220,728	28,016,272	54
1885	19,169	815,858,055	697,213,031[1]	66,644,967	3,505	36,787,957	32,767,817	53
1895	21,174	1,001,110,221	929,770,909[2]	81,396,047	3,844	47,876,637	38,046,065	56
1905	22,847	1,282,801,000	1,199,022,000[2]	105,131,709	4,601	70,064,663	43,466,356	62
1910	23,387	1,318,515,000	1,306,728,000[2]	114,237,132	4,885	76,569,676	47,355,889	62
[1]1912	23,441	1,334,964,000	1,294,337,000[2]	118,307,216	5,047	81,224,343	47,329,074	63

[1] These figures are only continued to 1912, because in 1913 a new system was introduced and the figures for subsequent years are not properly comparable with those in the above table.

SKELETON SPECIMEN OF THE FORM OF DETAILED REVENUE AND
COMPANIES (ACCOUNTS AND

Dr. No. 10.—RECEIPTS AND EXPENDITURE

To Expenditure.	—	Year 19 .	Percentage of Traffic Receipts.	
			—	—
See Abstracts.	£ s. d.	£	Per cent.	Per cent.
A · Maintenance and renewal of way and works .				
B : Maintenance and renewal of rolling stock—				
£ s. d.				
(1) Locomotives .				
(2) Carriages . .				
(3) Wagons . .				
£ s. d.				
C : Locomotive running expenses . .				
D : Traffic expenses .				
E : General charges . .				
Law Charges . .				
Parliamentary expenses .				
Compensation (accidents and losses)— £ s. d.				
Passengers . .				
Workmen . .				
Damage and loss of goods, property, &c.				
Rates				
Taxes				
Government duty . .				
G : Running powers (balance, debit or credit) . .				
Total traffic expenditure £				
J : Joint lines[1] . . .				
Miscellaneous . . .				
Total expenditure £				
Net receipts . £				
Total . . £				

NOTE.—Gross receipts to include the whole of the receipts from traffic company's line by trains of other companies and no annual payment is made proportion of traffic receipts accruing to other companies in respect of running deduction from the company's traffic receipts in this statement, but to be proportion of the traffic receipts accruing to the company in respect of trains the traffic receipts in this statement, and entered as receipts in the Running

1 Under this heading should be entered only the expenditure or receipts of jointly owned and are not already embodied in those of the parent companies (see Abstract J). In the case of other heads on the respective sides of this Account.

DIX II

EXPENDITURE ACCOUNT REQUIRED TO BE KEPT UNDER THE RAILWAY RETURNS) ACT, 1911

IN RESPECT OF RAILWAY WORKING. *Cr.*

By Gross Receipts.	—	—	Year 19 .	Percentage of Traffic Receipts. —	—
See Abstracts.	£ s. d.	£ s. d.	£	Per cent.	Per cent.
Passenger train traffic—					
Ordinary passengers—					
First class					
Second class					
Third class					
Season tickets—					
First class					
Second class					
Third class					
Workmen's tickets					
Total receipts from passengers					
Mails					
Parcels up to 2 cwt., parcels post, and excess luggage					
Other merchandise by passenger trains					
F: Less expenses of collection and delivery					
Total passenger train receipts					
Goods train traffic—					
	£ s. d.				
Merchandise					
F: Less expenses of collection and delivery					
Live stock					
Coal, coke, and patent fuel					
Other minerals					
Total goods train receipts	£				
Total traffic receipts	£				
H: Mileage, demurrage, and wagon hire					
J: Joint lines[1]					
Miscellaneous					
Total	£				

carried over the company's lines, except where (*a*) the traffic is carried over the
therefor, or where (*b*) the payment made is by way of a fixed rent. The
powers exercised by them over the company's lines not to be treated as a
entered as a payment in the Running Powers Account (Abstract G). The
run by the company over the lines of other companies to be excluded from
Powers Account.

[1] jointly leased lines in respect of which the accounts are prepared by or for the joint committee and joint lines, the company's proportion of the revenue and expenditure to be spread over the various

APPENDIX III

Skeleton Specimen of the Form of Revenue and Expenditure Account imposed on the Railway Companies by the Accounts and Returns Act of 1911

Revenue Receipts and Expenditure of the Whole Undertaking

See Statement.	———	Gross Receipts.	Expenditure.	Net Receipts.	Year 19 .		
					Gross Receipts.	*Expenditure.*	*Net Receipts.*
		£ s. d.	£ s. d.	£ s. d.	£	£	£
10	Railway						
11	Omnibuses and other passenger vehicles not running on the railways.						
12	Steamboats						
13	Canals						
14	Docks, harbours, and wharves						
15	Hotels and refreshment rooms and cars where catering is carried on by the company.						
16	Other separate businesses carried on by the company (in detail).						
	Total . . £						
Miscellaneous Receipts (Net)—							
	Rents from houses and lands						
	Rents from hotels						
	Other rents, including lump-sum tolls . . .						
	Interest and dividends from investments in other companies (in detail).						
	Transfer fees						
	General interest						
	Special Items						
	Total net income						

APPENDIX IV

PREFERENTIAL RATES IN EUROPEAN COUNTRIES

THE following are extracts from the Foreign Office Reports (Cd. 8720 of 1898)—

AUSTRIA-HUNGARY.—"Preferential rates on Austrian railways are granted principally for the following reasons: (1) To enable a line of railway with a circuitous route to compete with a more direct line which would otherwise monopolise the carriage of goods from one given point to another. (2) To enable an Austrian industry to compete with a similar industry abroad which is more advantageously situated. Thus, preferential rates are granted for this reason on Bohemian glass, beet-root, and its products and on sugar for export." A reduction of 10 per cent. on rates is granted when sugar is exported, and of 15 per cent. in the case of iron and steel.

BELGIUM.—"With a view to the development of the traffic along the Belgian lines of railways preferential rates are very largely granted by the Belgian Government, who now (1898) own four-fifths of the whole railway system of Belgium. Very great reductions are made in favour of all kinds of merchandise destined for Belgian ports, and these, no doubt, have very much contributed to the enormous increase which has taken place during the last few years in the shipping trade of Antwerp. These rates are mostly calculated on a differential scale; the cost of transport decreasing per kilometre in proportion with the distance carried. . . . A series of special fixed tariffs has also been arranged with certain regular lines of steamers and also with other European countries for the direct transit of goods in order to encourage as much as possible their export as well as their import through Belgian ports."

DENMARK.—". . . A grant made to the United Steamship Company of Denmark for establishing a bi-weekly service for the carriage of dairy-farm produce between Esbjerg and Grimsby destined for the Midland markets of England. The Inspector (of the Department of Agriculture) states that the agricultural interests desired that the weekly service from Esbjerg to Grimsby, which has been carried on by the United Steamship Company for the last six years should be doubled and that for this purpose a grant of 75,000 kroner (£4,166) was voted in the current year's (1898) budget. This route is now placed under Government supervision and in addition to the new bi-weekly service from Esbjerg to Grimsby it is stipulated that the company shall provide for the careful treatment of the goods. The ships on the lines are being fitted with refrigerators suited to the different descriptions of goods carried. A reduction of 20 per cent. is also made in the former freight rates. For the future the rates are to be: for one ton of butter, 16s.; for one ton of salt meat, 12s.; for one ton of fresh meat, 18s.; for one ton of eggs, 20s.; for one ton of fresh fish, 14s. It is expected that by this arrangement perishable goods destined for the Midland Counties of England will be conveyed *via* Esbjerg in greater quantities than heretofore, and will reach the consumers in better and fresher condition."

With respect to the railway rates of Denmark, the same report gives details and says : " Your lordship will observe that many articles useful to, or produced by, agriculture are carried at a low rate, and I understand that these rates have been specially adjusted with a view to the assistance of the agricultural interest, although they cannot be termed preferential as against the products of other countries inasmuch as the charges are lowered in certain ratios to the distance carried up to 180 kilometres (about 112 miles) after which distance no further diminution is made in the rates."

FRANCE.—" The bounties given on French shipbuilding and on navigation equalled about £400,000 annually from 1890 to 1898. The Government controls railway rates and occasionally suggests certain modifications of rates."

GERMANY.—" In Oct., 1884, the Minister of Public Works addressed a letter to the Railway Council in which he laid down the conditions under which preferential tariffs should be and had been granted on the State railways. These are—

" (1) To assist agriculture and industry by granting cheap rates for raw material or subsidiary material.

" (2) To assist German manufacturers in competition with foreign importers at home and to assist German export trade abroad.

" (3) To assist German in competition with foreign ports.

" (4) To look after the interests of German railways and waterways in competition with those of foreign nations."

Dealing with the rates in existence the report says that " the exceptional or preferential tariffs fall under several heads of which the principal are as follows—

" (1) Exceptional or preferential tariffs, the object of which is to enable German goods to compete with foreign goods in Germany and abroad. . . ."

" In order to enable German ports to compete with the French, special tariffs are given to goods imported to Austria, Italy, and Switzerland through German ports. . . ."

" Special rates are also given to keep the traffic from passing from German to the French or Austrian lines. . . ."

A detailed table of rates in operation in Germany is prefaced by the following sentence—

" It will be seen that the local rates are 200 per cent. higher per kilometre than the preferential rates to the North Sea ports."

A BRITISH CONSUL'S LETTER.—Extract from a letter under date 23rd April, 1904, from Mr. Ralph Bernal, H.M. Consul at Stettin: " In comparing freights to and from Germany it must be remembered that the German State railways grant preferential rates on many goods sent from the interior to the coast and abroad. Thus, German coal from Silesia to Stettin pays 74 to 77 pfgs. per 100 kilos ; British coal from Stettin to Silesia pays 106 to 110 pfgs. Freight for coal, Konigsgrube to Stettin, mks. 7.35 per ton; Stettin to Konigsgrube, mks. 12.40. Similar preferential rates are granted on other goods to the detriment of the competing British product, the higher freight acting practically as an extra import duty."

APPENDIX V

TON MILE AND PASSENGER MILE STATISTICS

THE following is an example of the extent of the various uses to which ton-mile and passenger-mile statistics can be applied—

Ton Miles ÷ length of line = average density of freight traffic.
,, ,, ÷ tons carried = length of haul.
,, ,, ÷ shunting hours = ton miles per train hour.
,, ,, ÷ train miles = average load per train.
,, ,, ÷ wagon miles = average load per wagon.
,, ,, ÷ weight of coal consumed = coal per revenue unit.
Passenger Miles ÷ train miles = average number of passengers per train.

Such statistics should include the following—

1. Ton mileage = tons × miles conveyed.
2. Passenger mileage = passengers × miles conveyed.
3. Train ,, = trains × ,, ,,
4. Wagon ,, = wagons × ,, run.
5. Carriage ,, = carriages × ,, ,,
6. Engine ,, = engines × ,, ,,
7. Train load ,, = ton or passenger miles ÷ train miles.
8. Wagon load = ton miles ÷ loaded wagon miles.
9. Carriage ,, = passenger miles ÷ carriage miles.
10. Engine ,, = ton or passenger miles ÷ engine miles.
11. Engine hours = train hours and shunting hours.
12. Ton miles per engine hour = ton miles ÷ engine hours.
13. Tonnage of goods.
14. Number of passengers.
15. Density of traffic ton or passenger miles ÷ mileage of line open for traffic.
16. Average length of haul per ton or per passenger.
17. Average number of wagons per train = wagon miles ÷ train miles.
18. Average number of carriages per train = carriage mile ÷ train miles.
19. Average rate per ton mile = total freight receipts ÷ ton miles.
20. Average fare per passenger mile = total passenger receipts ÷ passenger miles.
21. Average receipt per train mile = total receipts ÷ train miles.
22. Cost per ton mile.
23. Average cost per passenger mile.
24. ,, ,, ,, train mile.

APPENDIX VI

TABLE A

PART I. MAXIMUM TOLLS AND WHARFAGE CHARGES

SCALE I

APPLICABLE to all articles comprised in the classification, except cannel, tap mill forge and coal cinders, coal, coke, culm, and slack.

In respect of Merchandise comprised in the under-mentioned Classes, except as above.	MAXIMUM TOLLS.				Maximum Wharfage Charges.	
	For the first 3 miles or any part of such distance.	For the next 10 miles or any part of such distance.	For the next 10 miles or any part of such distance.	For the remainder of the distance.		
	Per ton per mile.	Per ton per mile.	Per ton per mile.	Per ton per mile.	Per ton.	
A.	d.	d.	d.	d.	d.	A.
Division 1 A (Except Division 1) and B C (Except Timber)	0·50	0·50	0·25	0·25	1·50	Division 1 A (Except Division 1) and B C (Except Timber)
	1·20	0·75	0·25	0·15		
	1·20	0·85	0·50	0·25	3	
For Timber	1·30	0·95	0·55	0·35	3	For Timber
1					3	1
2					4	2
3	1·45	1·00	0·60	0·40	4	3
4					4	4
5					4	5

Division 1 of Class A comprises the following articles: Basic slag, unground gaslime or gas purifying refuse, gravel, limestone in bulk, manure (street, stable, farmyard) in bulk, night soil, slag or scoria (blast furnace) and stone and undressed material for the repair of roads, lime, gas water, refuse, and rubbish, to tips, and ashes.

Part I, Maximum Tolls and Wharfage Charges. Scale 2. Applicable to cannel tap mill forge and coal cinders, coal, coke, culm and slack not intended to be *bonâ fide* and exclusively used and consumed at a district work under the provisions of Section 20 of this schedule. On the part of the canal between Farmer's Bridge at Birmingham and Whittington Brook, including the Digbeth Branch—

Maximum Tolls per ton per mile, 1d. Maximum Wharfage Charges per ton 1·50d.

On any other part of the canal—

Maximum Tolls ton per mile, 1·40d. Maximum Wharfage Charges per ton, 1·50d.

Notwithstanding anything in this Schedule the toll in respect of cannel, tap mill forge, and coal cinders, coal, coke, culm and slack, to which Scale 2 is applicable, shall not exceed ninepence per ton for any distance except when conveyed by the way of the Birmingham Top Level to any part of the canal in Birmingham, or when conveyed to or from any other canal in Birmingham by the way of the Birmingham Top Level, in which case the toll shall not exceed ninepence halfpenny per ton for any distance, but the said toll of ninepence or ninepence halfpenny shall be in addition to the special charge authorised by this schedule for the Netherton Tunnel.

APPENDIX VII

CANALS OF THE SHROPSHIRE UNION RAILWAYS AND CANAL COMPANY.

PART I. MAXIMUM RATES AND CHARGES.

Applicable only to the canals of the Shropshire Union Railways and Canal Co.

In respect of Merchandise comprised in the undermentioned Classes.	MAXIMUM RATES FOR CONVEYANCE.				Maximum Station Terminal at each end.	MAXIMUM SERVICE TERMINALS.				
	For the first 10 miles or any part of such distance.	For the next 10 miles or any part of such distance.	For the next 10 miles or any part of such distance.	For the remainder of the distance.		Loading.	Unloading.	Covering.	Uncovering.	
	Per ton per mile.	Per ton per mile.	Per ton per mile.	Per ton per mile.	Per ton.	Per ton.	Per ton.	Per ton.	Per ton.	
	d.	d.	d.	d.	s. d.	s. d.	s. d.	d.		
A	0·90	0·80	0·70	0·60	3	—	—	—	—	A
B	1·15	1·00	0·90	0·75	3	—	—	—	—	B
C	1·50	1·40	1·25	1·00	6	3	3	1	1	C
1	1·65	1·50	1·30	1·10	9	5	5	1·50	1·50	1
2	2·10	1·90	1·75	1·40	9	8	8	2	2	2
3	2·60	2·20	1·75	1·65	1 0	1 0	1 0	2	2	3
4	3·00	2·75	2·20	1·95	1 0	1 4	1 4	3	3	4
5	3·60	3·25	2·80	2·25	1 0	1 8	1 8	4	4	5

APPENDIX VIII

MARKET PRICE OF COAL AT CARDIFF AND THE TYNE IN 1913 AND 1914.

MARKET PRICE OF COALS FROM 1ST JANUARY, 1913, TO 31ST MARCH, 1914.

These figures are taken from actual contracts.

		Best Cardiff Steam Shipment Cardiff.	Best Durham Steam Shipment Tyne Dock.	Best Northland Steam Shipment Tyne.
1913	1 January	18/6 to 18/9	16/–	15/– to 16/6
	15 ,,	19/– ,, 19/6	15/6 to 16/–	15/– ,, 16/–
	1 February	19/– ,, 19/6	15/– ,, 15/6	15/3 ,, 15/6
	28 ,,	19/– ,, 19/6	14/6	14/6 ,, 15/–
	8 March	19/6 ,, 20/–	14/9 to 15/–	15/–
	25 ,,	19/6 ,, 19/9	16/– ,, 16/6	16/–
	1 April	19/6 ,, 20/–	16/–	16/– to 17/–
	15 ,,	20/6 ,, 21/–	16/–	15/6
	1 May	21/6 ,, 22/–	16/–	17/–
	13 ,,	——	15/6 to 16/–	16/6 to 17/–
	2 June	22/– to 22/6	15/–	15/– ,, 15/3
	18 ,,	20/6 ,, 21/–	14/– to 14/6	14/9 , 15/–
	1 July	20/6 ,, 21/–	14/– to 14/6	15/– ,, 15/6
	15 ,,	20/6 ,, 21/–	14/– ,, 14/6	15/– ,, 15/3
	4 August	20/6 ,, 21/–	14/– ,, 14/3	15/6 ,, 15/9
	20 ,,	20/9 ,, 21/3	14/– ,, 14/6	15/6
	1 September	20/6 ,, 21/–	14/–	14/6 to 14/9
	15 ,,	20/– ,, 20/6	14/6	15/–
	1 October	20/– ,, 20/6	13/6	14/9 to 15/–
	16 ,,	19/9 ,, 20/3	13/6	15/6 ,, 16/–
	1 November	20/– ,, 20/3	13/6	14/9 ,, 15/–
	16 ,,	20/3 ,, 20/6	13/6 to 14/–	14/9 ,, 15/–
	1 December	21/6 ,, 22/–	13/6 ,, 14/–	14/9 ,, 15/–
	15 ,,	20/9 ,, 21/6	14/6 ,, 14/9	15/3 ,, 15/6
1914	3 January	20/– to 20/6	13/6 to 14/–	14/6 to 15/–
	16 ,,	18/9 ,, 19/3	12/6 ,, 13/–	14/3 ,, 15/–
	2 February	18/9 ,, 19/–	12/6 ,, 13/–	14/3 ,, 14/6
	16 ,,	18/9 ,, 19/3	12/3 ,, 12/9	13/6 ,, 14/–
	1 March	18/9 ,, 19/–	12/6 ,, 12/9	14/–
	15 ,,	18/– ,, 18/6	12/9 ,, 13/–	13/6 to 14/–
	31 ,,	18/6 ,, 19/–	12/9 ,, 13/–	13/9 ,, 14/–

APPENDIX IX

PRINCIPAL COAL-EXPORTING CENTRES OF THE UNITED KINGDOM

TABLE SHOWING PERCENTAGE OF THE EXPORTS OF COAL FROM CERTAIN GROUPS OF PORTS TO THE TOTAL EXPORTS OF COAL FOR THE WHOLE OF THE UNITED KINGDOM—

	1850.	1860.	1870.	1880.	1890.	1900.	1910.	1912.
	%	%	%	%	%	%	%	%
Bristol Channel Ports	13·3	24·4	31·2	39·0	43·6	41·9	38·8	38·5
North-Western Ports	8·3	8·6	4·9	3·4	2·1	1·6	2·2	3·9
North-Eastern Ports	63·6	53·5	46·9	39·5	3·1	29·7	30·0	31·6
Humber Ports	2·0	3·4	4·5	6·7	1·7	9·5	10·3	10·2
East Scotland Ports	6·1	5·8	7·5	7·8	11·4	13·1	10·5	9·2

The figures for the years from 1850 to 1900 are extracted from a similar table in a paper on Coal Exports submitted to the Royal Statistical Society by Mr. D. A. Thomas on 19th May, 1903. Those for 1910 and 1912 are compiled from the Annual Statement of Trade of the United Kingdom.

APPENDIX X

TABLE SHOWING THE DEVELOPMENT OF THE PRODUCTION AND EXPORT OF COAL FOR THE UNITED KINGDOM FROM 1855

(The figures are taken from the Statistical Abstract.)

Year.	Production.	Exports (coal, cinders, & fuel).	Percentage Exported.
1855	61,453,079	4,976,902	8·09
1860	80,042,698	7,321,832	9·14
1870	110,431,192	11,702,649	10·5
1880	146,818,622	18,719,971	12·7
1890	181,614,288	30,142,839	16·5
1895	189,661,362	33,101,452	17·4
1900	225,181,300	46,098,228	20·4
1905	236,128,936	49,359,272	20·9
1910	264,433,028	64,520,320	24·3
1912	260,416,155	67,035,848	25·7
1914	269,926,000	—	—
1916	260,488,000	—	—
1918	231,402,000	—	—
1919	[1] 232,574,000	—	—

[1] Subject to revision.

APPENDIX XI

COAL PRODUCTS. BRITISH DOMINIONS.

In thousands of tons (000 omitted).

Years.	India.	Canada.	Australia.	New Zealand.	Natal.[1]	Transvaal.[1]
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1890	2,168	3,117	3,467	637	81	—
1895	3,537	3,512	4,289	726	158	—
1900	6,118	5,158	6,385	1,093	241	451
1905	8,417	7,739	7,494	1,585	1,129	2,327
1910	12,047	11,526	9,758	2,197	2,294	3,547
1912	14,706	12,957	11,729	2,177	2,468	4,242
1914	16,728	12,372	12,644	2,312	7,831	
1916	17,531	13,139	9,969	2,293	9,288	
1918	21,055	13,588	11,125	2,067	9,457	
1919	22,109	12,325	10,697	Not available	[2] 9,979	

[1] Union of South Africa since 1906.
[2] Subject to revision.

COAL EXPORTS. BRITISH DOMINIONS.

In thousands of tons (000 omitted).

Years.	India.	Canada.	Australia.	New Zealand.	Natal.[1]	Transvaal.[1]
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1890	40	812	1,935	78	8	—
1890	53	1,204	2,253	93	82	—
1900	304	1,757	1,762	114	213	
1905	594	1,797	2,028	122	96	
1910	758	2,057	1,713	277	95	
1912	874	1,598	2,162	299		

[1] British South Africa since 1906.

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APPENDIX XII

COAL PRODUCTION. FOREIGN COUNTRIES FROM 1890.

(From the Statistical Abstract.)

Metric Tons (000 omitted).

Years.	Germany.	Belgium.	France.	Japan.[4]	United States of America.
1890	70,238	20,366	25,591	2,640	143,128
1895	79,169	20,451	27,538	4,843	175,193
1900	109,290	23,463	32 722	7,489	244,653
1905	121,299	21,775	25,218	12,008	356,451
1910	152,828	23,917	37,635	15,531	455,024
1911	160,748	23,054	38,644		450,261[1]
1914	245,482	16,714	27,528	22,339	465,860
1916	[2] 252,847	16,863	21,310	33,010	535,325
1918	[2] 261,108	13,822	26,259	28,203	615,260
1919	[3] 210,300	18,546	22,477	[1] 30,832	493,745

[1] Not official.
[2] Subject to revision.
[3] Production from fields included inside former boundaries before changed by Peace Treaty.
[4] Includes Twiwan (Formosa) and Karafuto (Japanese Sakhalin).

COAL EXPORTS. FOREIGN COUNTRIES.

(Coal, Coke, Etc.).

(000 omitted.)

Years.	Germany.	Belgium.	France.	Japan.	United States of America.
					(Long Tons)
1900	15,266	5,866		3,380	7,189
1905	18,156	5,184		2,548	9,020
1910	24,257	5,508		(1909) 2,867	13,367
1911	27,406	5,700			14,985

APPENDIX XIII

PRICES AND CONDITIONS FOR THE SUPPLY OF COAL AT VARIOUS COALING STATIONS FOR THE YEARS 1913, 1916, 1917 AND 1920 (TO APRIL 1ST).

ABBREVIATIONS.

A.	= Australian	B.	= Bengal	L.	= Large
P.	= Pocohontas	C'dale.	= Coalbrookdale	S.	= Screened
Cl.	= Clearfield	C.B.	= Collie Burn	U.	= Unscreened
J.	= Japanese	N.R.	= New River	R/m.	= Run of the Mine
L.S.	= Lump in Stream	Wt.	= Westphalia	W.	= Welsh

N.B.—Where a small figure is added after the price (*e.g.*, 6d.) a rebate is indicated, and that amount must be deducted from the gross figure.

The figures are taken from actual contracts, except those marked * which are current prices.

PORTS.	1913.	1916.	1917.	1920.
Adelaide	23/-, 25/6, 24/6			
Amsterdam	16/9 W.			
Aden	Current W.	*110/- W. to 150/-	*110/- S. Afric. to 155/-	*125/- to 135/-
Algiers	28/- W., 25/6, D.U. 1/-	*104/- to 111/-		*148/6 to 190/-
Antwerp	18/- West			
Auckland	23/-	25/-	26/6	40/9
Albany	22/-, 25/6	29/9	24/-, 23/-	30/-
Bergen	24/3 N.C.			
Baltimore	$3.12 Cl.	$3.35 Miller Vein	$5.00.	*$7.00 trimmed to $8
Barbadoes	26/- N.R. or P, 6d.	*41/- N.R. or P to 60/-	*65/- to 77/6	*120/-
Bremerhaven	20/-			
Brake	19/3 and 20/3			
Bremen	19/6 and 20/- Wt.			
Bombay	23/- Bengal, Jap., Aust., S. African	24/6 Bengal	27/- Bengal	Rs. 23
Bahia	54/6 W., 6d.	*120/- W.	*107/6 W. or Amer. 187/6	*180/- to 200/-
Buenos Aires	43/- W., 3/-	*77/6 W. to 125/-	*107/6 W. or Amer. to 187/6	*155/- to 160/-
Bahia Blanca	46/- W., 6d.	*80/- W. to 127/6	*110/- W. or Amer. to 190/-	*164/-
Brisbane	10/6, 12/-, 12/3, 12/6, 16/6			
Bermuda	38/- P. or N.R.	*54/- P. or N.R. to 77/-	*77/- to 85/-	*135/-
Batavia	43/6 W., 28/- A. or J. Natal 27/- A., 25/- B.			Fl. 63.50 alongside wharf Fl. 66.00 in harbour

PORTS.	1913.	1916.	1917.	1920.
Bunbury	—	15/- f.a.s. screened 14/- f.a.s. unscreened	15/- f.a.s. 14/- f.a.s.	22/6 screened
Charlestown	$5.35 C.C.B.P.	$3.10 Clinchfield at coal piers $4.15 Clinchfield in stream	$5.00. $6.10.	$8.50 ex lighters 6.50 ex chates
Constantinople	28/6 W.			
Copenhagen	20/- N.C.D.U.			
Colombo	42/6 W., 27/6 ded 6d.	*40/- Indian to 60/-	*65/- Indian to 77/-	*97/6 Indian to 107/6
Calcutta	Rs. 9, 15 J.N. 3 ans.	Rs. 9.6 Shaw's Nav.	Rs. 10.8	Rs. 12
Coronel			*42/6 tranco	*65/- Schwager
Chingwantas	13/9 lump, 9/9 slack	13/3 lump, 9/3 slack	19/-, 15/-	63/- lump, 46/- slack
Chefoo	17/- lump, 13/- slack	17/- lump, 13/- slack	24/-, 20/-	
Capetown	25/6	25/- Witbank	35/- Witbank	52/6 Witbank
Dunkirk	21/9 F.N.			
Dartmouth	22/6 D. (U)			*147/6
Dakar	36/- W. 6d.	*92/6 W.	*87/6 Welsh or other coal	*170/-
Dalny	14/3 No. 1, 12/9 R/m.	14/6 screened, 12/9 unscr.	22/-, 20/3	
Dairen	14/9 Fushau			
Delagola Bay	15/-Large, 14/- Nuts	16/3	25/6	41/-
Emden	19/- Wt.			
Ferrol	22/6 W.	*86/- W.	*85/- W.	
Faya	34/- W. 6d.	*72/6 W. to 107/6	*95/- W. or other to 140/-	*165/- to 170/-
Fremantle	15/3, 25/6		18/3 f.a.s. 17/3 f.a.s.	25/9 trimmed
Gulfport	$3.40 & 4.40 A.P.	$3.40		
Galveston	$6.25, P. 6.00	$6.75 N.R.	7.15 Arkansas	*$11.25
Geestemunde	19/6			
Gibraltar	26/6 W.	*68/- W. to 108/-	*95/- W. to 165/-	*155/- to 165/-
Genoa	24/- W.	*130/- W.		*175/- to 200/-
Havana	$6.10 N.R.	*$8.50 N.R. to $8.75	*$8.75	
Hamburg	16/- Northumbrian			
Halifax, N.S.	$4.50 Dom.	*8.25	$8.25	*$12.50 to $13.50
Havre	24/- W., 22/- N.C.	*65/- Thro'	*65/- Thro'	
Hong Kong	18/- Lump, 20/9 Jap.	24/6	46/-	Yen 42.75
Karachi	22/- J.N. or Des.	24/-	26/6	Bengal: Rs. 25.8 Destunghur: Rs. 26
Karatsu	13/3	14/-, 13/-	21/-, 19/9	Yen 27 and Yen 26
Kobe	16/3	17/3, 16/3	26/6, 25/3	Yen 33.50 and Yen 32.50

PORTS.	1913.	1916.	1917.	1920.
Keeling	14/6 Formosa	14/6	22/6	Yen 26.00
Kutchinotsu	15/- Large, 13/6 (U.)	14/9, 13/6	23/6, 21/9	
Louisberg	$3.50	$4.00	*$6.00	*$9.00 to $9.25
Las Palmas	32/- W.	*67/6 W. to 106/-	*86/- W. or other to 150/-	*138/- to 165/-
La Plata	43/- W., 6d.	*77/6 W. to 125/-	*107/6 W. or other to 187/6	*155/- to 160/-
Lyttelton	22/-	24/-	25/6	39/9
Lisbon	22/9	*90/-	*90/-	*160/- to 170/-
Mobile City	$3.15	$2.90	$5.00	$5.85
Marseilles	32/-, 1/-	*88/- W. to 127/-	*106/- Welsh	*185/-
Messina	27/- W.			
Malta	27/- W.	*76/- W. to 140/-	*110/- W. to 240/-	*170/- to 187/6
Mauritius	47/- W.	*58/- S. Afric. 70/-	*70/- S. Afric. to 80/-	*100/- S. Afric.
Madeira	31/6 W.	*77/- W. to 105/6	*85/6 W. or other to 155/-	*142/6
Monte Video	45/- W., 6d.	*77/6 W. to 125/-	*107/6 W. or Amer. to 187/6	*155/- to 160/-
Murovau	18/6	14/6, 13/6	22/6, 21/3	Yen 27.00 26
Moji	12/6 Jap.	14/-, 13/-	21/-, 20/-.	Yen 27.00 & 26
Manila	26/- A.	30/- Jap.	51/6 Jap.	
Melbourne	19/6	23/3		
Miike	14/6	14/-, 12/9	22/-, 20/9	
New York	$3.12 Cl.	$3.35	$5.00	*$7.00 f.a.s. to $8.00
Newport News	$3.30 N.R.	$3.10	$5.00	Govt. price
Norfolk, Va.	$3.30	$3.10	$5.00	"
New Orleans	$3.75	$3.65	$5.50	*$7.90 to $8.20
Nordenham	19/-			
Naples	27/- W.			*160/- to 190/-
Newcastle, N.S.W.	9/- Waratah	9/9	12/9	15/9
Nagasaki	14/3	14/-, 12/9	22/-, 20/9	Yen 29.50 and Yen 28.50
Newchang	16/3	15/3, 11/3	24/-, 20/-	
Natal	16/6	18/- Large, 16/6 Nuts	30/-, 28/6	1st qual., 42/6; 2nd qual., 40/6 1/6 less Nuts
North Sydney, C.B.	$3.50 Syd. Mine	$4.00		*$9.00 to $9.25
Oran	28/- N.C.	*75/- W. to 112/6	*110/- W. to 200/-	*155/- to 175/-
Otavu	15/6	14/6, 13/6	22/6, 21/3	Yen 27.00 and Yen 26.00
Plymouth	25/6			
Philadelphia	$3.12 Cl.	$3.35	$5.00	*$7.00 trimmed to 8.00
Persacola	$3.15	$2.90 F.o.b.	$5.00	*$5.85
Portland, U.K.	22/-			*147/6
Port Said	35/- W., 6d.	*96/- W. to 148/6	*120/- W. to 248/6	*172/6 to 186/6
Perim	Current W.	*110/- W. to 150/-	*110/- S.A. to 155/-	*125/- to 135/-
Penang	24/9			
Pernambuco	14/- P.L.	*85/- W. to 125/-	*107/6 W. or Amer. 187/6	*180/- to 200/-
Pulo Laut	14/-	15/1	Fl. 12.20	Fl. 35.56
Rangoon	23/6 Heilgen. Stand.	24/8	*41/6	

Ports.	1913.	1916.	1917.	1920.
Rotterdam	16/6 West.			*Gelders 85/-
Rosario	47/- W., 6d.	*80/- W. to 127/6	*110/- W. or Amer. to 190/-	*157/6 to 162/6
Rio Janeiro	46/- W., 6d.	*77/6 W. to 125/- W.	*107/6 W. or Amer. to 187/6	*167/6 to 175/6
Syra	26/- W.			
Sydney, C.B.	$3.50	$4.00	*$6.00	*$9.00 to $9.25
St. John, N.B.	$4.75	*$9.00	*$9.00	
Sewalls Pt., Va.	$3.30	$5.10	$5.00	Govt. price
Savannah	$5.00	$4.75	$5.40	*$8.50
Stettin	19/6 N.C.			
Singapore	42/- W., 28/- A.	33/- Japanese	*60/6 Indian or Japan to 67/6	*86/- Indian to 98/6
Sebattik, W.F.	14/6	14/3	17/6	43/6
St. Vincent, C.V.	36/- W., 6d.	*80/- W. to 108/6	*88/6 W. or other to 155/-	*135/- to 167/6
St. Michael's	34/- W., 6d.	*90/- W. to 107/6	*95/- W. to 140/-	*165/- to 170/-
St. Thomas, W.I.	25/- N.R.	*40/- N.R. to 50/6	*64/- to 76/6	*119/-
St. Lucia	26/-	*41/- to 51/6	*65/- to 77/6	*120/-
Santos	49/6 W., 6d.	*80/- W. to 127/6	*110/- W. or Amer. to 190/-	*170/-
Shanghai	20/9 No. 1 Jap.	20/3	34/-	86/- Kaiping Lump
Ship Island	$4.40			
Teneriffe	32/- W.	*77/6 W. to 106/-	*86/- W. or other coal 150/-	*165/-
Tongku	12/9	12/3, 8/3	18/-, 14/-	
Taku Bar	14/9	14/3, 10/3	20/-, 16/-	*68/- and 51/-
Trinidad	25/-	*40/- N.R. to 50/6	*64/- to 76/6	*119/-
Vera Cruz	$6.35			
Vigo	23/9 W.			
Wilmington	$4.95	$5.25		
Wakamatsu	12/3	13/6, 12/3	21/6, 20/3	
Westport, N.Z.	14/6	14/6	14/6	22/6
Wellington	21/6	23/-	24/6	38/6
Yokohama	17/6	18/6	30/6	Yen 38.50 and Yen 37.50
Yokosuka	20/6			
Zaandam	17/6 West.			

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