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SEAWAYS OF THE EMPIRE

NOTES ON
THE GEOGRAPHY OF TRANSPORT

BY

A. J. SARGENT, M.A.

PROFESSOR OF COMMERCE IN THE UNIVERSITY OF LONDON

SECOND EDITION

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PREFACE

WHILE the general scheme of the first edition of this book has been retained as far as possible, a large part has been rewritten. Statistics have been brought up to date and many new sections added; others, for which sufficient material no longer exists, have been necessarily modified or omitted. The organisation of world trade-routes has been subject to rapid and revolutionary changes in recent years. The opening of the Panama Canal, the economic collapse of Russia, the increasing use of oil, the rise of new commercial policies, and the widespread effects of the Great War have all contributed to profound changes in the geography of transport. A fresh treatment of world routes is therefore necessary, the more so in that the material for study is less complete and less accessible than at the time of publication of the first edition.

Among others who at various times have aided with advice or criticism, I am indebted to many of my former students and also more particularly to my colleague Mr. W. Tetley Stephenson, who has, in addition, kindly read through the proofs of the present work.

A. J. S.

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NOTE ON DIAGRAMS

The purpose of the diagram sketch-maps is to show, at a glance, and in broad outline, the movement of British shipping, in a single year, on the main routes to and from the United Kingdom. Something is necessarily left to the imagination, since any attempt to depict, on a reasonable scale, the indirect voyages which provide the links between the outward and homeward movements and adjust the balance would only confuse the picture. The method of lines is adopted, since it is far easier to count these than to measure by eye the breadth of a narrow band. For the sake of simplicity, also, minor ports and routes have been omitted; such details can be given only by figures or by diagrams of considerable elaboration, and the diagrams are to be regarded only as approximate representations of the figures given in the text. The scale of diagrams 1, 2, 4, 5, 7, 8, 9, is uniform. In the cargo diagrams 3, 6, 10, owing to considerations of space, 10 is approximately on one-fourth the scale of 3 and 6. In diagrams 3, 6, 10, the cargo and shipping scales are so adjusted that the relation between the heights of the black and white columns indicates the proportion of actual load to the theoretical capacity adopted for the whole group of ships on the route.

Shipping figures are net register tonnage in all cases; cargoes are estimated roughly in measurement tons of 40 cubic feet, unless weight is indicated. The letter "m.," following a number, is short for "measurement" *not* for "million." Millions are indicated simply by the decimal system. Thus, 1·5 m. tons=one and a half million measurement tons, whereas 1·5 tons=one and a half million tons (weight).

The term "steamship" throughout includes motor ships.

SEAWAYS OF THE EMPIRE

CHAPTER I

SOUTH AFRICA

A MAP, common to many of our atlases, shows the World on Mercator's Projection, the British Empire coloured red, and many fine lines drawn in various directions across the seas. These lines represent, more or less accurately, the courses followed by ships, and figures may sometimes be added, giving the distances between the larger ports. This, as a rule, is the extent of the information which the map gives as to ocean routes, though diagrams are also used to give further general ideas as to the trade carried and the comparative importance of the routes. Importance is a word conveniently vague; and, since figures of values are most readily obtained, there is a natural tendency to use such figures for purposes of comparisons of routes. The result is likely to be an extremely inaccurate or misleading picture, since cheap and bulky commodities have a significance in the world of transport out of all proportion to their value. The mass of the world's trade to-day consists no longer in luxuries but in the necessaries of daily existence; such trade has become possible only through the development of shipping and railways in the latter part of the nineteenth century. The atlas fails to give any clear idea of the real volume of goods

carried over the routes marked and of the conditions of such carriage.

The investigation of the organisation of shipping routes is a special branch of the Geography of Commodities, and the full treatment of the subject involves alike the conditions of production and the conditions of transport by land and sea. We shall, for the most part, confine our attention to a small portion of the problem—that is, the geographical and economic conditions of transport by sea.

It has been our national habit, in the past, to accept the presence, in the United Kingdom, of goods gathered from all countries and selling in our markets at a moderate price, as part of the natural order of the Universe. As supplies of tonnage were always more than ample for our purposes, the question of the economical employment of shipping was merely a matter for the shipowner, as affecting his profits; and though wasteful methods might sometimes rouse individual interests, the public as a whole remained unconcerned. The experience of the late war forced us to realise that, in the face of a shortage of tonnage, the economical employment of ships, in the working of routes is not merely a matter for the shipowner or the expert but is of vital concern to our pockets, our comfort, and even our existence. We have been learning, slowly but thoroughly, that the essence of modern trade lies not in payment nor exchange but in transport. A bushel of wheat, ten thousand miles away, is not in the market, and, for all practical purposes, might be on another planet. The problem confronting shipowners is, broadly, to carry the maximum possible of goods in a given quantity of shipping space and in the

least possible time consistent with economy of working. The last, as we shall see, is an important qualification and varies in significance according to the type of vessel employed. A further qualification must be made for human goods—passengers. The character and direction of the great trade routes of the world result from the operations of the shipowner as applied to the various commodities of commerce. Both production and transport of such commodities are determined largely by geographical conditions, but our main concern here is with transport, more particularly as affecting the British Empire. We will begin by considering a centre of shipping which is not within the Empire, and for statistical reasons we will glance for a moment at the past.

In the year 1912, nearly 7,000 steamships, representing an aggregate of some 16,000,000 net tons, are recorded as entering the two main ports of the Canary Islands, Las Palmas and Santa Cruz de Tenerife. Of this vast tonnage, more than half was under the British flag. In the remainder, nearly every European flag was represented; Germany was easily first, followed by Spain, Norway, France, Italy and Austria-Hungary. This little group of islands, in part barren, with an area about twice that of the County of Kent and a population of half a million, had a shipping movement ranking it among the great ports of the world.

Some of these ships may call at both ports and so be recorded twice over. The Spanish Government issues no statistics, while the figures collected by our own officials are far from clear on this point; but when every possible correction is made, including that for the piling up of the figures through the repeated visits of small vessels en-

gaged in the local trade, the total traffic is remarkable and well worth analysis. We must remember that we are using only the records of a single year, and this, as strict statisticians warn us, is a somewhat dangerous method. Unfortunately, the method of averages would obscure the very facts on which we wish to throw light; so that we must be content to accept the risk with the warning. The year 1912 was abnormal in the Canaries. There was fierce competition in the local coal business; best Welsh was selling at a loss to the dealers and almost as cheaply as at Cardiff, so that many ships were attracted which would not usually call here for bunker coal. So we will take a round 12,000,000 tons as representing the normal movement of shipping in the Canaries before the war.

Only a small part of this movement can be accounted for by local conditions. The trade of these islands is peculiar and not without interest. The people have devoted themselves to certain special forms of agricultural production, so that the needs of their ordinary life must be supplied by the import of miscellaneous foodstuffs and manufactures; while the needs of the many visitors, attracted by the climate, must be satisfied in the same way. The total amount of cargo space, however, needed for such purposes is insignificant. On the other hand, there are the special agricultural exports, bananas, tomatoes and potatoes, the last two mainly to the United Kingdom. More than half the bananas still come to our markets, but there is a large and growing trade with France, Spain, and Germany, a trade of sufficient importance to employ vessels of a special type. We find the bananas entering our great food inlets, the Mersey and the Thames, but most of the ships carrying cargo from

this country to the Canaries clear from the ports of South Wales and the Tyne. Their cargo is coal, the one commodity imported in any quantity into the Canaries. In 1912, the total was about 1,250,000 tons weight, a quantity above the average; but if we consider 1,000,000 tons as the normal yearly consumption of British coal at the Islands before the war we shall be near enough to the facts. In periods when the British coal industry is disturbed, supplies may be imported from Germany or the United States.

We will write our 1,250,000 tons as 1·2 or 1·3, for two reasons: in the first place, we save unnecessary figures; in the second, we avoid the false appearance of accuracy where none exists. The statistics of trade and shipping, with which we deal, are at best merely approximations, and we must allow ourselves a wide margin of error. It is unsafe to base any argument on small differences, especially in a single year. If we write 1·25, the significance of the 50,000 is not great; the figure merely indicates that the quantity lies between 1,200,000 and 1,300,000, and probably not very near to either limit.

The coal imported into the Canaries is not needed for local industries; there are none; it is destined to supply the bunkers of steamships calling. The carrying of the coal in bulk is not confined to British ships; Norwegians are active in this as in all trades which must be worked economically. Even with the addition of coal, the amount of shipping needed for the local trade is not great. The larger part of the tonnage entering Las Palmas and Santa Cruz merely calls in transit to regions beyond; so that the full meaning of these ports will only become plain by the analysis of the working and destination of this great stream of passing ships.

Unfortunately, for our purpose, even British statistics of shipping using these ports are no longer published; so that we can only infer, by indirect means, the total volume of this stream, either passing or calling to-day. The coal loaded into bunkers in recent years seems to be only half to two-thirds of the pre-war quantity. If we include Madeira, an alternative calling-point for ships on this route, we may say that the volume of coal bunkering business in 1927 was little more than half the pre-war average. The depression in shipping may partly account for this, but there is a new element in the situation—oil. Though fuel oil is available at the Canaries, it is to oil supplied elsewhere that we must look as the real competitor with British coal at the Islands. We will return to this point later. For the moment, let us consider the Canaries broadly as a port of transit and a junction point of ocean routes.

The Canaries lie roughly fifteen hundred sea miles from the English Channel, on the route to the South Atlantic, and three times that distance from the River Plate or South Africa. A Great Circle,* from the mouth of the Channel, clearing Cape Finisterre and the shoulder of Africa, passes through or close to Las Palmas, Grand Canary. Here, too, is a junction at which an important branch from the Mediterranean converges on the main line, while minor branches connect with the neighbouring coasts of Africa and Spain. Madeira lies slightly west of the main African route but nearly on the Great Circle to Pernambuco.

About eight hundred miles to the south-west, and

* A Great Circle passing through any two points on the surface of the Globe marks the shortest distance between those points.

farther out from the coast of Africa, but well placed on the track from New York to South Africa, lies another island group, that of Cape Verde. In products and population it ranks much below the Canaries, and its coal trade has been always much smaller. The coal is farther from its source, so that the price is higher. In 1912, exports of British coal to the group amounted to ·25 tons; in 1927 this trade had almost disappeared.

The main influence controlling the coal trade of the Islands is to be found in the demands of the South American traffic. Thus, the failure of the maize crop in Argentina, in 1911, by diverting ships to other markets, affected the coaling business at Las Palmas; while, in 1913, a coal-war on the River Plate, by cheapening coal there, reduced the sales at St. Vincent. The route followed by steamships is practically fixed; but they may coal at various points on that route, partly according to the price of coal, partly according to the conditions of the cargo market and the space available for bunkers. A ship naturally takes in only as much as of the higher priced coal as will carry it to a cheaper coaling-point; so that coal at the Canaries is likely to be used in the main by ships on their homeward journey to Europe.

A very large part of the great stream of traffic to and from the Southern Hemisphere passes through or near the Islands; but not every ship calls. The total traffic, both ways, of steamships under the British flag, to and from South America, West and South Africa, and Australia, amounts, on a rough estimate, to 13-14·0 net tons in the year. Of this total, half to two-thirds may call at the Islands, more on the homeward than on the outward voyage. Let us follow first part of the outward traffic.

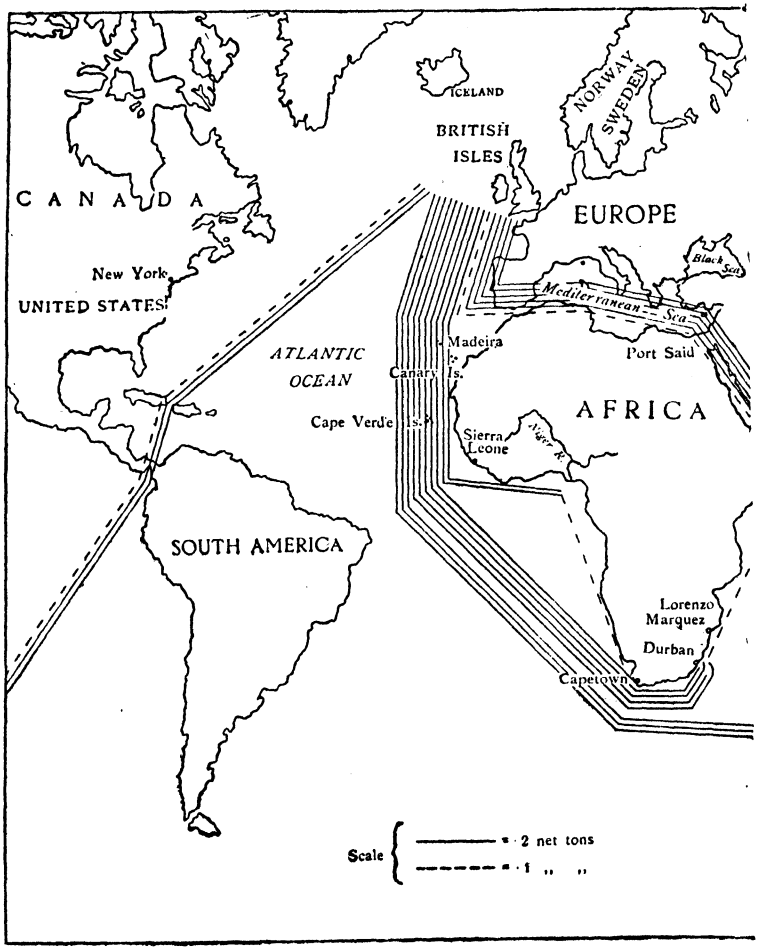
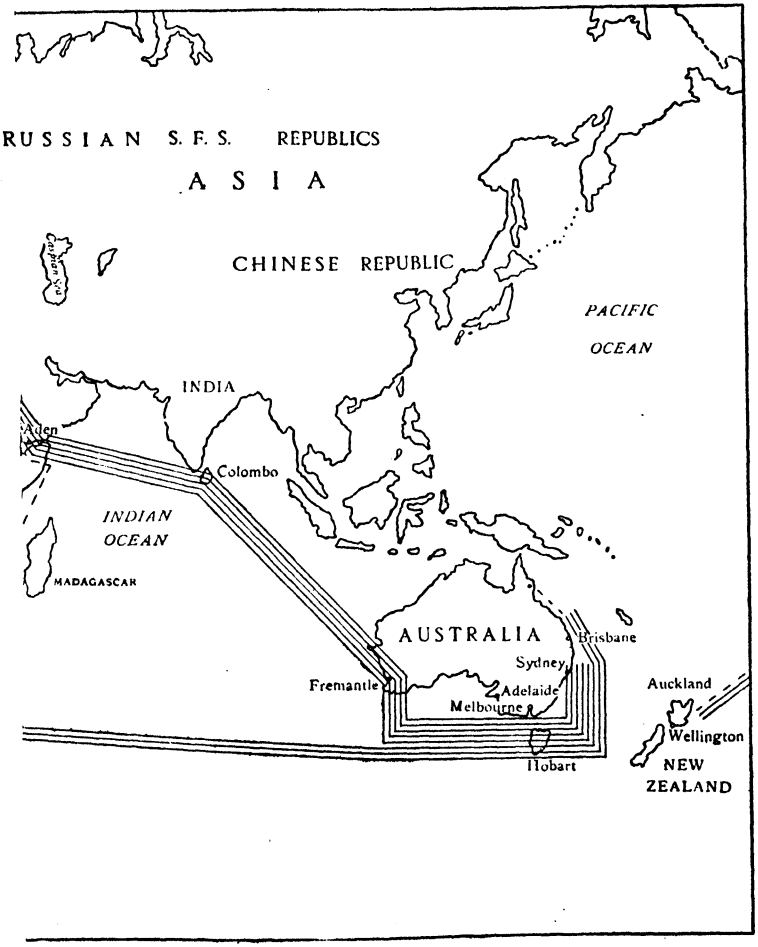


FIG. 1.—SOUTH AFRICA AND AUSTRALASIA:



BRITISH STEAMSHIPS, OUTWARD.

South of the Canaries the main stream divides, one branch making for the River Plate, while the other, after throwing off a branch to the West Coast of Africa, makes for the Cape of Good Hope and beyond. The Cape stream is joined, in the neighbourhood of St. Vincent, by a smaller flow of traffic from the eastern coast of the United States and Canada.

Let us look more carefully at this stream to the Cape. South Africa, like the Canaries, is a calling-station for the large number of ships which skirt its shores, *en route* for more distant lands; but the region from Capetown to Lourenço Marques is also a terminus, with its own special and independent traffic; it is not a mere intermediate station on a main through line. Of this terminal traffic, a small part finds its way through the Suez Canal, in connexion with the ports of the East African coast; while a smaller part is linked with the trade of the West Coast. The mass of the traffic is direct, or viâ the Islands, to Capetown, Durban, or Lourenço Marques as terminal points. According to our official statistics, in 1927 about 1·5 net tons of British ships cleared for West and South Africa carrying cargo of some kind from Great Britain. In addition, about ·1 tons were cleared in ballast on this route. On the other hand, the entries with cargo were only 1·2 tons, and a small quantity in ballast. Unfortunately for our purpose, the figures for West and South Africa are combined in the published statistics, though the former is an independent market. We must therefore be content with estimates, though we know that most of the shipping is bound to and from South Africa. It is clear, however, that a large mass of tonnage fails to return by the same route. We find this

confirmed by South African statistics, and we find also a similar lack of balance in the shipping, mainly foreign, moving between South Africa and western Continental Europe. Here is a definite fact for which we must seek an explanation, and this lies clearly in the work which the ships are doing. All ships come back ultimately, but not on the routes by which they left. The whole is balanced, but not the parts. To understand the movement of the ship we must consider its relation to cargoes or passengers carried.

A ship is nearly as costly to run empty as full; so that, if paying cargo is available only in one direction, it must be charged a higher rate to cover the cost of the complete voyage out and home. This would be true, invariably, if all ships were tied, as railway waggons in this country, to more or less fixed lines; but a ship is more flexible; since the sea is free to all, it may return by the most devious routes, carrying intermediate cargo on the way. Not all ships, however, are equally flexible. The tramp wanders at will over the face of the ocean, going wherever profitable cargo is to be found at the moment; the liner, even when mainly carrying cargo, is tied to certain routes and times. Most tied is the fast passenger and mail boat, which must go and return on the shortest course and keep to its sailing times regardless of cargo. If a ship returns direct, in the absence of cargo it must receive more in one way or another for the outward service, if the whole voyage is to show a profit. Let us consider the South African route in the light of these ideas.

The problem before us is to discover how far our ships trading with South Africa are profitably employed, or, in other words, what amount of cargo is available in both

directions, in proportion to the carrying capacity of the whole fleet. The problem is less easy than it seems. In the first place, a ship may be built for passengers as well as for goods, and its cargo-capacity is thus a reduced portion of its total tonnage. Again, the ship may be adapted for a special type of cargo, as meat or oil, and so may not be available on the complementary voyage for goods of every kind. Finally, even a pure cargo boat may run to regular ports and at regular intervals, thus reducing its real carrying capacity, since it is unable to wait or to change suddenly its ports-of-call in order to provide for the varying quantities of goods coming forward.

Even apart from such qualifications, how is the carrying-capacity of a ship to be estimated? The net ton of a merchant ship is a space measurement of 100 cubic feet, and the net tonnage of a pure cargo ship is the number of such units of 100 cubic feet which are supposed to be available for carrying cargo; but the goods carried are measured in tons of 20 cwt., in metric tons, in quarters, sacks, barrels, loads, often merely in numbers or values. Moreover, the shipowner may charge by weight or measurement, and *his* measurement ton consists of 40 cubic feet. Lastly, a ship, economically laden, may carry a great deal of heavy deadweight cargo combined with much measurement cargo of a lighter kind, and we must find some formula to combine the two, since both are occupying and paying for available space in the ship's hold. A ship loaded to the hatches with iron ore would sink; with a similar load of feathers she would be unstable; but there are innumerable possible combinations of light and heavy goods according to the type and build of ship.

We can only base our estimates of profitable employment on the available *space* occupied, assuming that, in the case of mixed cargoes, the shipowner so adjusts the relative quantities as to make the most of the full carrying-capacity of his ship.

What then is the capacity of a steamship of a given tonnage, solely devoted to cargo? If 20 cwt. of some commodity occupies 40 cubic feet, or less, it is clear that the ship could carry 2½ tons weight for every net shipping ton of 100 cubic feet; in other words, a 2,000-ton vessel could load 5,000 tons deadweight. If 20 cwt. occupies more than 40 cubic feet, she can carry less deadweight; but, apart from the question of stability, she can still load 5,000 tons of measurement cargo. This is simple arithmetic, but does it correspond with reality? The standard may be reached on a particular voyage by an economically built tramp, but it does not follow that all ships of the type, on all their voyages during a twelve-month, will be able to obtain full loads. At the other extreme are the specialised passenger ships, of huge size but with relatively small cargo-capacity; and in between are all grades of mixed cargo and passenger ships, of varying speed and construction, together with the growing class of those ships built mainly with a view to one kind of cargo.

Let us assume, for working purposes, that every ship ton of 100 cubic feet will carry, on the average of all voyages during the year, 80 cubic feet, or two measurement tons of cargo; that is, the theoretical capacity of our 2,000-ton ship will be 4,000 measurement tons. This may be too low for routes where tramps prevail and there is much bulk cargo, as it is certainly far too high for a

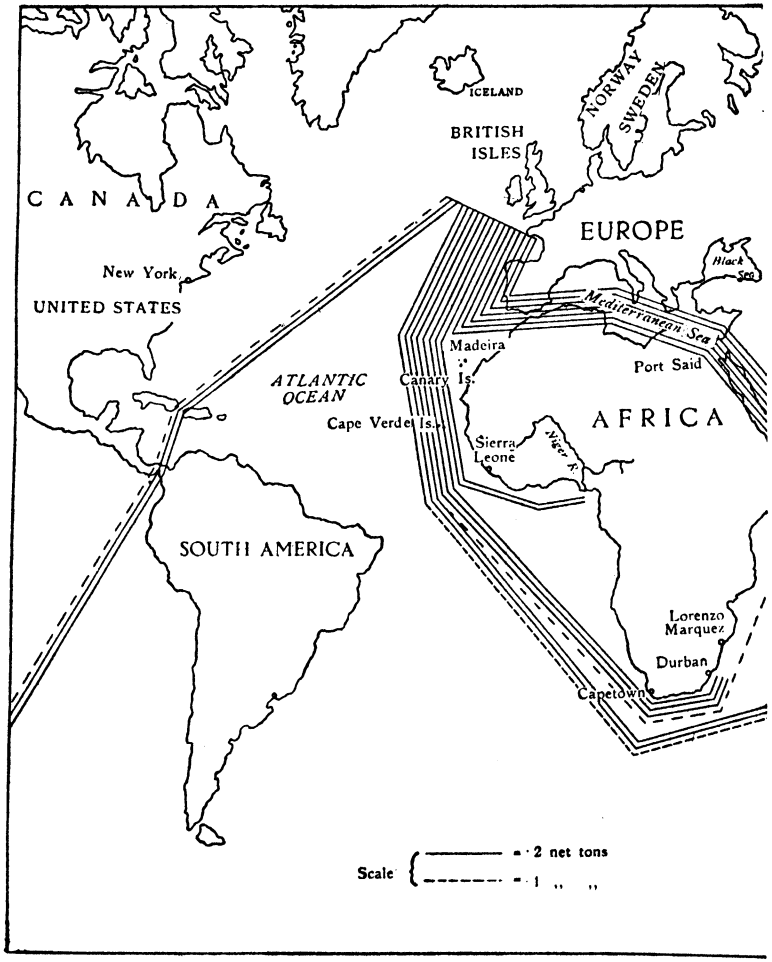
great passenger route, such as the North Atlantic; but it can readily be adjusted to suit special conditions, and it is easy to calculate. Our real theoretical ship's load is x times its net tonnage, x varying for every type of ship and every combination of cargoes or of cargoes with passengers; but as some standard is necessary for comparison, we assume that $x=2$ for the whole of British merchant shipping taken together, on the great world routes, counting all voyages for the working period of a year.

These ideas may now be applied to the analysis of the South African traffic. In 1927, the United Kingdom exported to British South Africa about ·3 tons of heavy goods—mainly iron, steel and machinery, with a little cement and coal—together with a large quantity of textiles, boots and miscellaneous manufactures of a light kind which occupy much space and pay high rates, though their total weight, as measured in tons of 20 cwt., may not be very great. Let us assume ·45 measurement tons in all, to be carried by about 1·2 tons of shipping, nearly all British. In addition, there are passengers and mails, but we will not attempt here to calculate the space which they require. We will call the relation between the actual cargo carried and the assumed maximum our load-index. The cargo is ·45 m. tons, the theoretical capacity is 2·4 m. tons, the load-index is therefore about ·19; that is, the ships are carrying in a year only 19 per cent. of the possible load of an average group of British cargo steamships.* The figures are difficult to interpret since West

* If we make a very rough allowance for passengers, on the basis of the cubic space allotted to those of each class, this index is raised to ·31, while that for the homeward voyage becomes ·54 instead of ·40.

and South Africa are not separated in our shipping statistics, while further doubt is introduced by the inclusion of Lourenço Marques for shipping purposes with India, but we may safely put the index at not more than ·25 for British ships. We must, however, remember that much of the space is devoted to passengers and that much of the cargo is of such a kind that it can pay fairly high freight rates, while some allowance must also be made for goods carried on Government account; but we shall find the figure useful for purposes of comparison. We are dealing here with a traffic which is worked by liners rather than by tramps, and we are justified in assuming that the whole traffic, in passengers and goods, on the double journey, results in a profit to the shipowner, otherwise he would not continue to run ships and increase their number on the route. Ocean lines are not worked for purposes of philanthropy, but to pay dividends. Let us look, then, at the return traffic.

Our bulky imports from South Africa consist of large quantities of maize, wool, wattle bark and sugar, together with minor pastoral and agricultural products such as hides, fruit and cotton; the total is in the neighbourhood of ·70 m. tons. If we put the homeward tonnage of shipping at ·9 net tons, then the load-index becomes ·40 and the return voyage gives better employment for tonnage, though the index is still rather low. We may note, here, that a very considerable error in our estimate of the movement of shipping would not affect the general conclusion. The volume of imports and exports on this route is evidently ill balanced. If we go back fifteen to twenty years, we find the same lack of balance, but in the opposite direction; the outward traffic was the larger.



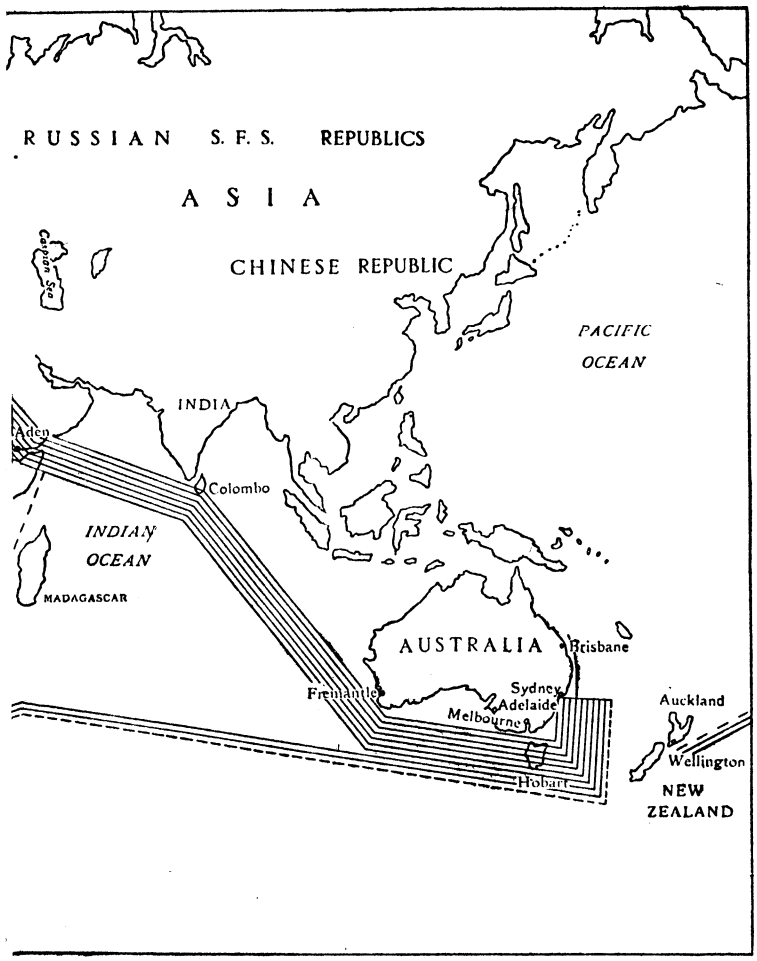


FIG. 2.—SOUTH AFRICA AND AUSTRALASIA: BRITISH STEAMSHIPS, HOMEWARD.

The cause of the change is to be sought in the economic condition of South Africa—in the slowing down of the demands of the mining industry and the increasing export of agricultural produce, more particularly wool and maize. A country with a large agricultural surplus, unless it imports coal on a large scale, has naturally a greater volume of goods to send to industrial Europe than to receive from that area.

The South African market is interesting to-day and in the past, since it well illustrates certain peculiarities of the shipping business. The quantity of cargo carried both ways seems small in proportion to the capacity of the ships, as we shall realise more fully when we examine other routes. There is a marked lack of balance in the volume of cargoes out and home over a year, while much of the homeward cargo is irregular, owing to its seasonal character. In consequence, South Africa, in the past, has provided a critical instance of the difficulty of adjustment between the interests of shipowners and producers or traders; though the problem involved is world-wide.

The needs of passenger and mail traffic, and the increasing demand in the business world for certainty and regularity in the carriage of goods, result in the sailing of more ships than can be economically employed, in view of the character and amount of cargo available. If the movement of goods is ill balanced, the freight on outward cargo must make up for the loss or lower profit on the homeward voyage, or *vice versa*. This is true of all means of transport, in similar conditions. Here, we must take account of types of ships. In a free market, there is nothing to prevent a tramp loading, at rates profitable to itself for the particular voyage, and then dis-

appearing from the route; since the tramp is under no obligation to provide either a regular or a return service for goods or passengers. If a portion of the trade were carried in this fashion, certain producers and consumers would benefit; but, as the traffic remaining for the regular ships would be smaller and less profitable, freight and passenger rates would necessarily be increased, if the regular service were to continue. Regularity, frequency and certainty, like other advantages of modern commerce, must be paid for, and South Africa is a good illustration of the fact. The same is true of our home railways, though the truth is not always recognised by their critics. To exclude the irresponsible ship, the liner companies combine, and by various means obtain a hold over the trader and a partial or complete monopoly of the carrying trade on the ground that on this basis only is it possible to provide regularity and frequency, and at the same time work the route at a reasonable profit. Hence much material for public inquiry by Parliamentary Committees or Royal Commissions. Unfortunately, even Royal Commissions are unable to alter the essential facts of Geography, and it is on these that the conditions of the carriage of goods by sea ultimately depend.

So far we have been considering the most important section of the shipping serving South Africa, that connecting directly with Great Britain and carrying goods to and from that country. The picture, however, is far from complete, and we must now take our stand in South Africa and investigate the routes converging on that region from every direction. Although the trade with Great Britain is almost entirely under the British flag, many foreign ships call at South African ports in con-

nexion with the working of other routes; but it is impossible, statistically, to keep track of these. The main stream of British shipping, as recorded in South African statistics, is from Europe; about 1·7 tons from Great Britain, and ·1 from the Continent. In addition, a few ships arrive viâ Portuguese West Africa. Moreover, about ·3 tons cross the Atlantic from the United States and Canada. It seems then that about 2·0 tons of shipping reach South Africa from the Atlantic side, though not all carrying cargo for South Africa. Some are in ballast, others merely calling on their way eastward. On the return, the clearances to Great Britain are about 1·5, with ·1 to the Continent. About ·25 tons return to the United States, either direct or by way of South America and the West Indies. Making some allowance for traffic by the east coast route, we have about ·25 tons on balance which arrive from the West side but leave by the East. The figure is somewhat larger, over ·3, if foreign ships are included.

How far do South African statistics give a clue to the disposal of this surplus tonnage? They are difficult to interpret, since Lourenço Marques, though really a port of British South Africa, is not included. If we turn to South African connexions with the Indian Ocean region, we find entries from British India ·3 tons, as against ·4 clearances, and in addition ·15 clearances to foreign Asia. Here is possible employment for the ·25 tons surplus, returning to Europe probably by the Suez Canal. We may perhaps trace the remainder to Lourenço Marques and Beira, since there seems to be a balance of tonnage outward to these ports from British South Africa.

To appreciate the shipping figures we must consider the movements of cargo from and to South Africa on

the subsidiary routes. From continental Europe, in addition to minor manufactures similar to those of Great Britain, there are considerable quantities of soft timber coming from the Baltic region. This increases the volume of outward trade on the whole route but does not affect the employment of British ships from the United Kingdom. Some wheat arrives from Canada and Argentina, with flour from the former and coffee from Brazil. From the United States are imported petroleum and motor spirit, and some manufactures. These, together with manufactures from Great Britain, are the main cargoes arriving by the Atlantic routes. Most of the wheat and flour imported, however, comes from Australia, and there is in addition a large quantity of rice from Burma and south-eastern Asia.

Thus bulky cargoes arrive from the East as well as from the West; but we have seen that the balance of movements of shipping is eastward. This is due to one commodity, coal, of which the export is more than 1·5 tons, or about half the total volume of South African exports. This trade is shared about equally between the western Indian Ocean—that is, India, Ceylon, and the Red Sea ports—and Dutch or British Malaya. The flow of ships corresponds to the flow of coal and renders South Africa a vital factor in the trade relations of the Indian Ocean. The development of coal in South Africa, in its early stages, checked and ultimately abolished the export of British coal to that market for the purposes of transport. In its present stage, owing to low costs of production, the coal of Natal and Transvaal is competing with British coal moving by the Suez route into the Indian Ocean, and is thus affecting the employment of shipping on that route.

We may note here that, in spite of its agricultural developments, South Africa is still a heavy importer of staple foodstuffs. If these imports were reduced, the volume of exports in proportion to that of imports would show a further increase, with a corresponding effect on the shipping position. Already South Africa is ranged with the great agricultural areas which usually provide a volume of exports greatly in excess of that of their imports.

We noticed above a branch from the main route, serving the West African ports. If we group together these ports, from the Senegal to Angola, and regard them as a single market, we find that imports from this market into Great Britain—oil seeds and their products, and cacao, largely from the Gold Coast and Nigeria—amount at most to ·4 m. tons, whereas the exports—coal, cement, salt, iron and steel, with a moderate quantity of cotton goods—are more than ·8 m. tons. The excess is due to one element, coal, which accounts for about three-quarters of the total volume of British exports to this area. Much of the coal is consigned to Portuguese West Africa. The outward load-index is naturally higher than the homeward, and there is a surplus of tonnage, probably of the smaller tramp type, which might find a market in South Africa where conditions are reversed. An outward cargo of coal, then a voyage in ballast, followed by a further bulk cargo, is a normal form of movement in the coal trade. In this particular case, we have no exact information, in the absence of separate navigation statistics for the West Coast region. It is possible that some of these ships return direct in ballast to British ports, while others carry cargoes to the Continent. A rough estimate of the load-index

for all ships on the route gives about ·8 on the outward and ·5 on the homeward voyage, the former figure being due to the many full cargoes of coal. The figures may be higher, but the proportion seems to represent fairly the general situation in the West African trade.

We started out to discuss the geography of a trade-route; we have found that we must consider the technical working of the ship and of groups of ships. A railway line, without rolling stock, is simply a mass of steel and timber, though it indicates certain possibilities of traffic; an ocean route, without reference to ships, is a mere abstraction, a line on the map without meaning. The route is not even a fixed line, but is subject to wide variations; the ship creates its own track for the time being, and the direction of the track is in turn determined by the character of the ship as a working machine and the availability of cargo. The last is almost entirely a matter of economic geography, in the full sense of the term. If a considerable number of ships, during an appreciable period of time, follow the same track, for similar purposes, we are justified in marking that track as a trade-route; but we must remember that each route has its own special character and that our lines on different parts of the map have not the same meaning. The routes have not the fixity of the railway track, but are liable to changes even from one year to another, with the variation in crops and seasons, as well as to slower changes depending on the gradual development of the regions which they link together.

We may now begin to realise the grounds for our representation of ocean routes, not as thin lines on the map, but in rough quantitative form, as so much tonnage and so much cargo moving from one port or region to

another during the period of a year. We are dealing with material things, not with abstractions, and the more we aim at reality, the more difficult and complicated shall we find the expression of the facts. The geography of movement is far from being as simple as is often represented.

A preliminary investigation has brought to light certain principles or facts which recur, in one form or another, in every part of the world. A group of islands, in themselves insignificant, and subject to foreign control, are found to be of vital importance to British shipping, partly owing to their position in relation to the main steamer tracks, partly as convenient depôts for bunker coal. The supply of coal for bunkers is largely a matter of price, and this in turn is closely related to the question of distance from the coal-fields and cost of transport. The geography of position is thus subject to economic modifications, and every new discovery of fuel changes a whole group of distance relations. The change, in recent years, from coal to oil fuel, a change still in progress, may affect either the direction of routes or the economic working of the coal cargo business. As the change affects all the great routes, we will consider this question later.

Again, the movement of ships and the variation of freight rates are not to be treated of in terms of mere distance; the amount and character of the cargo available, the type of ship and the nature and efficiency of the services rendered, must all be taken into account. The most vital problem involved in the employment of shipping and the profitable and economical working of a route is that of the balance between outward and return

cargoes. The want of balance, in a particular region, is the main determining cause of the indirect return voyage adopted by a large amount of tonnage.

Finally, the ultimate determining element in the employment of shipping lies in the sum of the geographical conditions of each region in relation to those of other regions of the World, though the effect of such conditions may be modified greatly by economic or political policy on the part of individuals or Governments.

CHAPTER II

AUSTRALASIA

We have seen how coal, as cargo, is an important element in the trade of South Africa with the Indian Ocean; but coal for bunkers is at present far more important, since it concerns every ship passing or calling at South African ports. At Durban, we find Natal coal, very cheap; at Capetown there is sea-borne coal from Natal, not so cheap. Welsh coal has now disappeared from this market, though at one time it had a monopoly and gave employment to a considerable number of tramp steamers bringing it from Wales. In 1912, the amount exported from the United Kingdom to South Africa was only about ·05 tons weight, as compared with nearly ·7 tons in 1902, the year when the trade reached its maximum, and with ·2 tons as early as 1882. According to official figures, a total of 1·8 tons was supplied to steamers in South African ports in 1927, so that the bunkering business remains very large, in spite of the advent of oil. The greater part was shipped at Durban, the rest mainly at Capetown or Delagoa Bay. The coal was partly for ships sailing from South Africa to the United Kingdom or western Europe; but it is also of vital importance to the traffic to and from Australia.

Capetown is the halfway house between the United Kingdom and Australia, the only convenient coaling-point on the long outward voyage. Hence in former days it was necessary to move British coal to this point,

and the coal was necessarily dear. South African coal, selling cheaply at Capetown, has entirely changed these conditions. It is true that, in steam-producing power, this coal is inferior to Welsh by some ten to fifteen per cent., but the lower price more than compensates.

The development of South African bunkering at the expense of Great Britain increased the importance of the region as a centre of trade-routes, but the relative importance of the Australasian route viâ the Cape has tended to decline in recent years. To understand this, we must consider the total movement of shipping between Great Britain and Australasia. There is a choice of routes to Australasia—round the Cape, through the Suez Canal or by Panama—and there are no accurate figures distinguishing the proportion of traffic which moves by each route. The total outward movement of British steam shipping to Australasia is, in round figures, 2·1 net tons; of this, perhaps twenty to twenty-five per cent. goes by way of the Cape, and the percentage seems still to be falling. In 1913, this figure was much higher, and we must look for the cause of the change. Of the remainder, the Australian traffic is worked mainly by Suez and that of New Zealand by Panama. We may estimate rather less than 1·0 tons to Australasia viâ Suez and rather more than ·5 viâ Panama, mainly bound for New Zealand. The Panama Canal has affected Australian relations with Europe slightly, in that it makes possible a " round the world " voyage; but its chief importance is in relation to the New Zealand route, since New Zealand is now approached from the north-east instead of the west and is no longer a pendant to the Cape route.

The return traffic from Australasia is even more

difficult to trace than the outward. The total of British shipping entered at the ports of the United Kingdom was 2·4 tons, that is ·3 more than the clearances; to this we must add a net entry on balance of ·1 foreign ships, to get a clear view of the traffic. It is evident that we receive more than we dispatch in the Australasian trade, and the surplus shipping probably comes for the most part by way of Suez from Australia.

Let us now examine the two lines of traffic to Australia, and ask on what principle the division may be made. There is a natural tendency to settle the matter off-hand, by a mere comparison of geographical distances as measured on the Globe; but it must be remembered that the purpose of a ship is to carry passengers and cargo, and that the chief ports of the World are not always arranged conveniently along a series of Great Circle routes. For the ship, as a commercial proposition, and not a machine operating *in vacuo*, the longer way round may be the more profitable. The profit is determined by the character and quantity of passengers and goods to be carried—in other words, by ultimate geographical conditions.

As commonly stated, the distance from London to Melbourne, in sea miles, is about a thousand miles less by the Suez Canal than by the Cape. But the chief purpose of a ship using the Canal route is to pick up overland passengers and mails in the Mediterranean. This involves divergence from the shortest course, and there is also loss of time in traversing the Canal, which is equivalent to an increase in distance. In fact, the supposed advantage in distance tends to disappear; and if allowance be made for these divergences and delays,

the advantage may be found to be slightly on the side of the Cape route. Moreover, the amount of the Canal dues, about 5s. 6d. per ton, must be taken into account in estimating the total cost of the voyage. On the other hand, though the route offered only one important calling port for passengers, and no profits on cargo, yet there was a marked development in Australasian traffic viâ the Cape in the early years of this century. To appreciate this fact, we must consider the history of the merchant steamer as a working machine.

The first result of the opening of the Suez Canal was to divert from the Cape route a considerable amount of the growing Australian traffic, especially on the return, in the matter of imports into the United Kingdom. The steamer of those days was not well fitted for long voyages without re-coaling, or for encountering the heavy seas and winds of the Southern Ocean; in fact, if she carried enough coal in her bunkers for a long voyage, she would have little room left for ordinary cargo. The Canal offered more points-of-call, coaling-stations at shorter intervals, and better weather conditions. Moreover, the really important traffic at that time was with India, where the advantage of the Canal over the Cape route is at its maximum.

The diversion of traffic to the Canal was accelerated by the rapid substitution of steam for sail in the British mercantile marine. On the Cape route, the sailing ship had a great advantage in the favourable Westerlies of the Southern Ocean; and here was one of the last strongholds of sail on the great routes of the World. The conditions for the steamer are now changed. The modern cargo vessel, of better construction and with more efficient

engines, extracts a greater amount of work than its predecessor out of a ton of coal and needs a smaller proportion of its total available space for bunkers. It can steam a far greater distance without re-coaling and it is much less affected by adverse weather. As a consequence, the saving of the Canal dues is sufficient inducement for cargo boats to use the Cape route. Again, advantages are gained by the employment of larger and still larger ships, as only a large steamer can give both speed and great carrying-capacity combined with economy in working; so that some of the ships in recent years trading to Australia were of a draught too deep for the Canal. Though the Canal has been deepened steadily, the ships have tended to keep ahead of its capacity.

Let us now analyse more closely the Australian routes. In 1912, of the total number of steamers outward-bound by the Cape to Australia, over three-quarters touched only at Capetown; on the return, less than a third called there, and most of these had called already at Durban. How is this to be explained? Let us examine the globe. The shortest route from Capetown to Melbourne or Hobart would be along a Great Circle from Cape Agulhas; but, as this would carry the ship too far south, into dangerous waters, the usual course, passing near the island of St. Paul, represents a compromise. To coal at Durban would involve the loss of three or four days, as an offset to a saving of 7s. to 8s. on the price of a ton of coal; so that most ships seemed to find it cheaper on the whole to take in coal at Capetown and then set a course for the south-east corner of Australia, and so on to New Zealand. Ships using the Canal might take the direct course through the Indian Ocean, by way of the Chagos Archipelago, or

more probably would diverge to call at Colombo ; in either case they would strike the south-west corner of Australia.

The division of the return traffic is determined by conditions partly geographical, partly economic. The two chief Lines serving New Zealand followed formerly the sailing route, round South America, and, after touching for coal at the River Plate, joined the homeward stream through the Atlantic in the neighbourhood of the Canary Islands. The main traffic in both directions is now viâ Panama, though the South American route still remains as a possible economic alternative for the return voyage.

Of the large quantity of tonnage returning direct from Australia, about three-quarters is to be credited to the Suez route. This is due partly to economic considerations. The regular arrival of Australian wool is important from the point of view of market organisation, while regularity, in former days, was not a striking characteristic of the Cape route; though the steamer of to-day is capable of both speed and regularity on that route, in defiance of weather conditions. Many ships, however, still return by way of South Africa, though not always on exactly the same course through the Southern Ocean as on the outward voyage. A weak-powered steamer is unable to face the full force of the Westerlies, while even the most powerful ship must either burn more coal or take more time than on the voyage eastward. A more northerly, though longer course, traverses a zone of better weather. None the less, either in time or in cost of running, the return is more expensive than the outward voyage, and the economic disadvantages are greater on the return than on the outward route. This argument may not perhaps apply fully to ships carrying wheat to Europe, since the

ship serves as a warehouse as well as a vehicle of transport, but even in the case of wheat the tendency to-day is to deliver the cargo to land-storage as quickly as possible. The geographical conditions which prohibit the return of sailing ships by the Cape must be taken into account even by the latest product of engineering science. The modern counterpart of the legend of Van der Decken is to be found in the coal bill of the steamer. A more northerly course brings the ship near the latitude of Durban; and we have seen that, as a matter of fact, homeward-bound ships tend to bunker at that port rather than at Capetown. Thus the conditions of navigation in the Southern Ocean are not without influence on the commercial growth and competition of the two great rival South African seaports.

Such is, broadly, the movement of British steam shipping to and from Australasia. Now we must consider the work which it is capable of doing and how much it finds to do. Of the total mass of British shipping, 2·1 net tons outward-bound to Australasia, about 1·6 tons has Australia as its final destination; while the remainder, rather less than ·5, goes to New Zealand. Most of this tonnage is of the regular liner or cargo-liner type; the foreign tonnage on this route is negligible. Let us examine first the Australian trade.

The mass of our heavy exports to this, as to most distant markets, consists of manufactures of iron and steel, machinery, and large quantities of paper and chemicals; the whole occupying about three-quarters of a million tons of shipping space. Adding to this our large export of textiles and miscellaneous manufactures, we may estimate a total of about 1·0 m. tons of goods for the ships

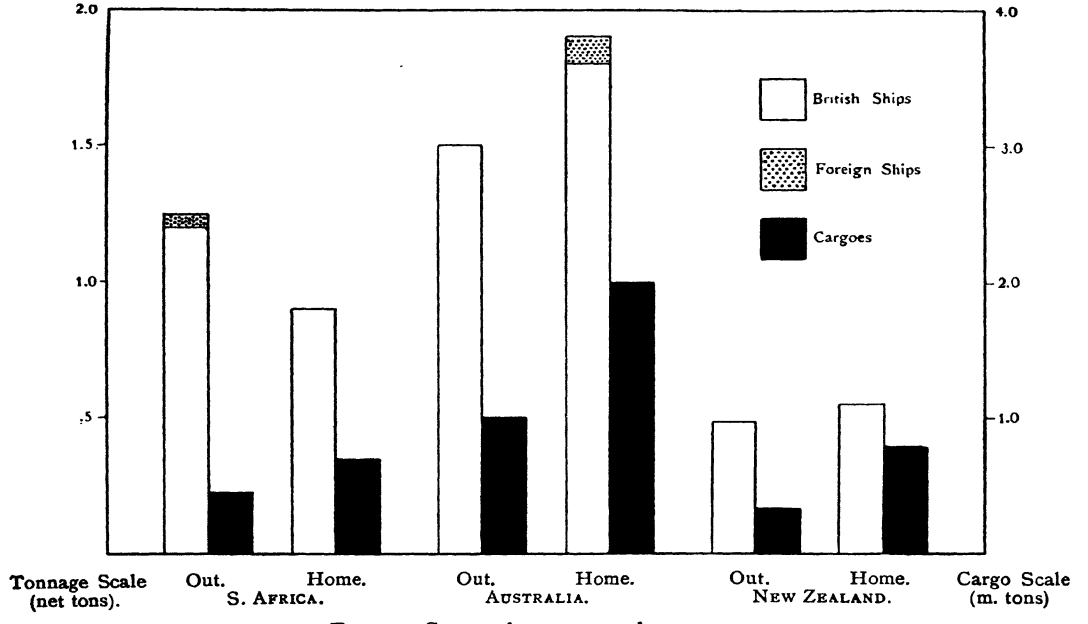


FIG. 3.—SOUTH AFRICA AND AUSTRALASIA.
All ships with cargoes, outward and homeward.

to carry. Even with allowance for the reduced cargo-capacity, due to the passenger and mail traffic, it does not seem that the exports from the United Kingdom to Australia provide very profitable employment for the shipping on the route. The load-index is about ·32,* which may be compared with that of ·25 for South Africa.

We must not, however, ignore another source of profitable traffic. Australia imports from continental Europe a considerable quantity of miscellaneous manufactures, together with timber, pulp, paper and matches from Scandinavia. Much of this cargo is carried in British ships, but it is not possible to estimate the extent to which such traffic might raise the index for ships cleared from British ports.

The only source of Australian imports in any degree comparable to Great Britain is to be found in the United States, which in 1927 accounted for over a quarter, by value, of the total imports into Australia. Though the timber and part of the oil may come from the west coast of that country, much of the trade is from the east coast, through the Panama Canal. There is also a trade, by this route, with eastern Canada, from which motor chassis, rubber goods, paper and agricultural machinery are imported in moderate quantities. Formerly, such of this trade as existed passed round the Cape or through the Suez Canal, in the latter case not seldom transhipped through ports in Great Britain.

In 1927, over ·4 net tons of British shipping and about

* With correction for passengers, as in the case for South Africa, the outward index becomes ·43 and the homeward index ·56.

·1 tons of American are recorded in the Panama statistics as in transit from Atlantic or Gulf ports of the United States to New Zealand and Australia. The cargo carried in the British ships amounted to about ·5 tons weight, and that in American ships to about ·1 tons. In addition there were about ·1 tons of Canadian ships from Halifax or Montreal with about ·1 tons of cargo for Australia. The route is thus predominantly British from the point of view of shipping.

The return cargoes from Australia are mainly bulky goods, or else products such as meat and fruit which are handled in specially fitted vessels. The foodstuffs alone, chiefly wheat, flour, meat and sugar, amount to over 1·4 m. tons, to which we must add over ·5 m. tons of wool, cattle-products, ores, metals and timber. As in the case of South Africa, there are few minor miscellaneous manufactures. The load-index works out at about ·53, and about five per cent. only of the traffic may be credited to foreign ships. This suggests that the conditions of employment are more favourable on the homeward voyage. Here again we must take account of passengers. The total number of passengers for the Commonwealth, in 1927, departing from the United Kingdom, was about 50,000, while the arrivals were only 16,000. Thus, on the outward journey, if we regard the employment of shipping as a whole, the emigrant traffic compensates, to some extent, for the deficit of goods. The number of third-class passengers carried outward is much greater in proportion to the tonnage than in the case of South Africa, while the balance is in the right direction.

British ships are not by any means confined to the direct trade with the United Kingdom. Western Europe de-

mands certain Australian products, notably wool and ores, and our ships carry much of this trade. Some ships may go direct to foreign ports, others may call first at ports in the United Kingdom; but the proportion so calling cannot be calculated. In short, apart from agreements and limitations adopted by the great steamship organisations, the North Sea and the Channel constitute a single area from the point of view of shipping, and it is hardly possible to isolate the shipping movement of a particular port by any method of compiling statistics. The Australian trade figures may give some further indication of the division of traffic. In 1926-27, the imports into Australia from the United Kingdom were valued at £68·0 million, and from western Europe at about £18·0 million; on the other hand, the exports to the United Kingdom were £48·0 million, while those to western Europe were about £43·0 million. These figures include the precious metals, and are only a rough, a very rough, index to the quantity of the goods; but it is clear that the homeward traffic to the Continent may provide considerable additional employment for our shipping, even after deduction is made for the carrying-capacity of our foreign competitors. This is small, since foreign tonnage is engaged mainly in the trade with North America and the Far East.

The return traffic by Panama from Australia to North America is not so heavy as the outward; it consists mainly of wool, hides and skins to the United States, and the same to Canada with the addition of sugar and butter. Only about ·05 net tons of shipping, mostly under the flag of that country, are recorded as bound for the United States, with less than ·03 tons weight of cargo, and about

·09 net tons under the British flag for Canada, with about ·07 tons of cargo. This is far smaller than the outward traffic, so that there is less employment for shipping. We must, therefore, look for the ships elsewhere. The British ships from Europe to Australasia, mainly New Zealand, roughly balance at about ·45 net tons each way, with about ·4 tons of cargo each way, but slightly more on the homeward route.

Australia is more than a terminus of ocean routes from Europe and the United States. In addition to its large trade with New Zealand, it has developed important connexions with Japan, the East Indies, and South Africa. Imports from Japan are chiefly silks, with some other textiles and minor manufactures and timber. The return traffic in wool, wheat and metals is more bulky and important; it is carried mainly under the Japanese flag. There are considerable exports to South Africa of wheat, flour and hard timber, and a smaller return trade in maize and fish. Moderate amounts of tea and rubber come from the Indian Ocean, in return for flour, meat, butter and preserved milk; but the chief commodity employing tonnage is coal. The coal of New South Wales is to be found normally in Malaya, the Philippines, East Indies, and Pacific islands; the total quantity exported as cargo in 1926-27 was about ·8 tons. Formerly, large shipments were made to the west coast of South America, but these have ceased with the rise in the consumption of oil in that region.

Australia has evidently a much greater bulk of exports than of imports, so that it is natural that a considerable tonnage of shipping, from various quarters, enters in ballast, particularly from the Indian Ocean. There is

also a large clearance in ballast, but we must remember that the oil-tanker returns in ballast after entering with cargo, while the tramp picks up a return cargo when such is to be found. Much of the Australian traffic, however, is controlled by liners, and the statistics are difficult to interpret.

New Zealand has a heavy local traffic with Australia, but its relations with Europe may be treated apart, since it offers an important market for our manufactures and has much to send to us in return. Moreover, the traffic route, in its working, is to-day even less connected with Australia than formerly. As might be expected, the goods exported from the United Kingdom to Australia and New Zealand are of the same character. The total quantity to New Zealand may be estimated at ·33 m. tons; and to this must be added exports from continental Europe, which are carried almost entirely in British ships. This gives a load-index of about ·33 for the outward voyage. The homeward loading, mainly of meat, wool and pastoral products, exceeds ·8 m. tons, and the load-index is about ·74.* The trade is carried entirely in British ships. The homeward is heavier than the outward traffic in goods, but the opposite is true of the passenger business. In 1927, about 9,000 passengers are recorded as leaving the United Kingdom for New Zealand and only 3,000 as returning. This movement may compensate to some extent for the lack of balance in goods. Complaints as to high rates of freight have been freely made in the past by the merchants of New Zealand; the lack of balance in cargoes, the number of ports from which the cargoes must be collected, and the distance of the country

* Corrected for passengers the indices are ·39 and ·77.

from its chief markets may have some bearing on these complaints.

New Zealand also has important connexions across the Pacific with the continent of North America. Over ·1 net tons of British shipping are entered and cleared on the "all red" Vancouver route. Moreover, we find ·15 tons of British ships, together with ·1 tons of American ships and some Norwegian, coming from the west coast of the United States. The clearances to the latter region, however, are only about ·1 tons in all, since New Zealand has little cargo to send in return for the large imports of timber and oil.

From eastern Canada come another ·07 tons of British shipping, with some Dutch, together with more than ·1 tons British from ports in the eastern United States. The clearances to this region also are much smaller than the entries, less than ·1 tons of British ships, largely in ballast. In return for considerable imports of iron and steel, machinery, oil, motor-cars and miscellaneous goods, New Zealand sends to this market very moderate quantities of hides and skins, butter, wool and flax. The mass of the exports of New Zealand comes direct to Great Britain in British ships. On the import side, trade from Great Britain, in 1927, was valued at £21·0 million, that from the United States at £8·0 million, and that from Canada at £2·7 million. This is a partial measure of the relative importance of the routes inwards. On the other hand, exports to Great Britain were £37·0 million, to the United States £2·7 million, and to Canada £1·7 million. The movement of shipping on the routes shows some correspondence.

The Australasian region, in spite of its small population,

is an important market for British goods, since the trade per head of the population is unusually large. It offers, in return, heavy cargoes of foodstuffs and raw materials, together with valuable and specialised kinds of goods, as meat and butter, mainly for the markets of the United Kingdom. The region also imports considerably from North America and exports to the Continent of Europe, in both cases largely in British ships. The trade with the United Kingdom is carried on, for the most part, by regular boats, and is therefore to some degree expensive. The expense is increased by seasonal variations in the amount of goods coming forward for transport; Australian wool, which occupies much cargo space, shows a marked seasonal movement, the greater part arriving in the United Kingdom between November and May. Regular ships and irregular cargoes do not agree. In an earlier edition load-indices were worked out for the year 1912; a comparison with those for 1927 seems to indicate a larger increase in tonnage than in goods to be carried on the Australian and South African routes. If this be so, the result must inevitably be either higher freight rates or lower profits.

The route, especially by the Cape or across the Pacific, presents wide expanses of ocean, with few coaling-ports or ports-of-call; so that its development and working have been closely connected with the improvement in the type of the ocean steamer.

Experts tell us that, within somewhat wide limits, the larger the ship the greater the economy of working. They tell us, also, that the higher speed demanded by the methods of modern commerce, for goods as well as for passengers and mails, can only be obtained, at a reason-

able cost, by increasing the size of the ship. This increase involves greater length, and more especially greater draught. Hence, on the Cape route, a great development in the size of merchant ships, even of those adapted purely for carrying cargo. The growth of the ship is limited by the capacity of the harbours which it visits; how then is this capacity to be measured? The only satisfactory standard of measurement, for a modern port, is the depth available at practically all times and seasons. The element of time is so important, in the handling of traffic to-day, that a port accessible only during part of the twenty-four hours to the largest ships which use it may be severely handicapped in the competition for trade. A large number of the great ports of the world have at present an effective minimum in the neighbourhood of thirty feet at low water; this gives a useful basis for comparison. The draught of the ship must be less by three or four feet, according to local conditions. The large modern steamer is not well adapted for scraping the bottom or lying on the mud; it must always have water under its keel.

Let us now apply this standard to the Australasian route. Capetown harbour has berths available of thirty-six to thirty-seven feet, but any considerable deepening would be costly. Durban has now thirty-seven feet in the entrance channel; it has been deepened rapidly in recent years; but the depth on the bar is not entirely effective, since considerable allowance must be made for the action of the waves in dropping down the ship's keel. There is also a difficulty due to the narrowness of the entrance channel. The depths in a canal or river estuary and in the open sea are not to be measured by the same standard. East

London and Port Elizabeth belong to a lower class of ports, consisting of those with a depth of twenty to twenty-five feet; in fact, Port Elizabeth is merely an open roadstead for large ships.

Fremantle, Albany, and the outer port of Adelaide, come within the thirty-foot group; even Melbourne can have no higher place, since the greater nominal depth, over forty feet at Port Phillip Heads, is discounted by the great " scend " due to the heavy swell rolling in at certain times from the south-west, and by the effect of local currents. Here again we find that the broad climatic conditions of the Southern Ocean have a direct bearing on the economic working of shipping. The conditions at Melbourne are of more than local importance, for Melbourne is the key to the eastern coast of Australia; a ship which is unable to call here will find its trading capacity seriously restricted. On the east coast, Brisbane and Newcastle are ports of the second class, while Sydney and Hobart alone have an effective forty feet. Hobart has lost its importance as a port-of-call, on the route to New Zealand, while its cargo movement is limited by the size of Tasmania. Wellington ranks almost with Sydney, while Auckland could easily reach the same standard of depth; the rest of the New Zealand ports fall well below it. We may, then, subdivide our first class into two groups, that which is near an effective forty feet at low water, and that which is nearer the thirty-foot minimum. The tendency is for the latter, by progressive improvements, to approach the former in capacity.

The problem of the adaptation of the steamer to the port or the port to the steamer is not peculiar to the Australasian route; but the growth of the size of ships, the

comparatively small number of ports concerned, and the conditions of inland transit, have combined to make the problem critical in this area. The ship, aiming at economy combined with speed, tends to increase in size up to the limit of harbour accommodation. Some harbours have enjoyed from the first good natural conditions; others, urged by competition, have created facilities at heavy cost. Trade makes the harbour as often as the harbour makes the trade. Improvements are often progressively costly; the work of dredging and keeping clear each extra foot of depth in a channel is not infrequently on an increasing scale. Whether the expense is shown directly in the form of harbour dues imposed on ships entering, or whether it is obscured by inclusion in the general tax accounts of a country, makes no difference. In the end, the trade of the country pays. Where the cost of improvements is apparent in the form of harbour dues, we see at once that the lowered cost of transport of goods, due to the economical working of the larger ship, may be offset by higher dues, if the improvement of the port is carried too far. Moreover, owing to physical conditions, only a limited number of ports can attain great depths at any cost which their owners are likely to incur. If the traffic concentrates on these favoured ports, there will be need of heavy transhipments and the risk of congestion on certain lines of inland transport. The trader is concerned with the total cost of transport of goods from producer to consumer, not merely with that portion represented by payments to the great ocean Lines; there is no advantage to him in the possible lowering of rates on one part of the journey if this is balanced by delays and higher costs due to transhipment or handling at the port or on

the railway. The great ports may gain, but at the expense of their smaller neighbours; from the national point of view this may, or may not, be an end to be desired. The ship itself, in so far as it is limited to a few large ports, loses something of its efficiency and flexibility; sufficient cargo, in the ports visited, may not always be available for full and profitable loading. Moreover, we must not treat one section of a route, or even the route as a whole, as an isolated fact; we must take account of terminal ports in Europe, and also of the possibility of transferring a ship from one route to another. Too much specialisation to suit particular conditions is not without its peculiar risks.

The most economical size of steamships must vary on different routes, according to the needs and character of the trade in all its bearings; so that no fixed standard can be set up. The tendency towards great size, the narrow shipbuilder's point of view, without reference to other elements in the cost of transport, may, like the increase in speed, result in a higher total delivery-cost for the goods. Speed has its advantages, which must be paid for, but even these advantages can be bought at too high a rate. Apart from possibilities of economical working, size is of no great advantage, except perhaps for advertisement or national boasting; it is a luxury, and the present generation has not too much capital to spare for the provision of luxuries such as steamers of forty-foot draught and upwards. Not many Port Authorities are economically in a position to endorse the statement of the engineer of one of the great ports of the Southern Hemisphere: "We intend to be an up-to-date port, whether it pays or not!"

In the Canary Islands, coal appeared in a simple form, as so much material dumped down at a point convenient to steamers calling. South Africa illustrates the twofold effect of the development of a local source of supply, in attracting steamers both by the provision of coal for bunkers and by the prospect of cargoes in bulk. In Australia, a terminus of routes, the most important effect of the coal is to be seen in the growth of an export trade, in various directions, and a corresponding employment of shipping to some extent independently of the main traffic with Europe.

The Australasian routes also illustrate, in a sufficiently marked fashion, the effects, direct or indirect, of weather conditions on modern shipping, both in the actual courses of steamers and in the survival of sail in competition with steam. The comparative simplicity of the routes, the scarcity of harbours, the great expanses of ocean to be traversed, the character of the cargoes, and the unity of political and commercial control, all contribute to enforce the importance of the problem of the large and economical steamer, fitted for the carriage both of cargoes and passengers. The whole region has developed, in recent years, on the basis of the liner rather than the tramp.

CHAPTER III

INDIA AND THE FAR EAST

THE Suez Canal is an important factor in the Australian traffic, while the movement through it to and from East and South Africa must not be entirely neglected. For the rest of the traffic, between Europe and the Indian Ocean, the Canal is the only route which we need consider.

To the present generation, the Canal is so much part of the natural order of things that we are prone to forget its comparative youth and to ignore the profound changes which it produced, in a short period of time, in the organisation of ocean shipping and the trade of the World. Let us go back for a moment to the days of our great-grandfathers, when Egypt was independent of Europe, and steamships were still an experiment, distrusted greatly by old-fashioned patriots.

In the thirties of the last century, Parliament was much concerned about the question of steam communications with our most important colonial possession, India. So, in 1834, we find the inevitable Committee, reporting on the question of steam navigation with India, and another Committee, in 1837, dealing with the same subject. The chief alternatives were the Cape and Suez routes; but the overland, by way of Mesopotamia and the Persian Gulf, was not without its advocates. The problem was mainly technical: Could a steamer carry enough coal for the voyage across the Indian Ocean; could she, with a speed of some six knots, force her way westward from

Bombay against the South-West Monsoon; and how could she be coaled on the voyage by the Cape route? The experts differed greatly on these points, but there was a general agreement on the opinion that a steamer could not carry cargo in addition to the necessary coal.

The shipowners disproved the statements of the pessimists, not by argument, but by experiment. A steamer of the East India Company's service made trial trips to the Red Sea, and, by 1837, arrangements were being made for a monthly service between Bombay and Suez. Dr. Dionysius Lardner, of Encyclopædia fame, was prominent in the controversy; he distinguished himself by advocating the building of steamers of the great size of 1,000 tons and 250 horse-power. The official engineers naturally proved to their own satisfaction that this could not be done. Lardner had other practical notions. He pointed out that coal could be supplied at 10s. per ton f.o.b. in England, while its price at Socotra was 60s.; at the same time, many ships were in the habit of sailing to India in ballast. The obvious economical course was for these ships to carry coal to the Indian Ocean, and this might be done for 15s. per ton if a good market for coal were created in that region. An alternative method, suggested by others, is not without interest. Coal could be carried, practically as ballast, by ships sailing to Alexandria; thence it would reach Cairo by river, and finally be transported by camel-back across the desert to Suez. It was calculated that the total laying-down cost at that port would be about £3 per ton.

According to Lardner's estimate, by the Suez route, properly organised, Falmouth might be reached from Calcutta in something over fifty days, of which six would be

taken up by the journey from Suez to Alexandria and thirty by that from Calcutta to Suez; this would represent a saving of half of the time occupied by the voyage round the Cape. There would be a similar saving in cost. He calculated that the first-class passenger, instead of paying £120 for the trip in a sailing ship, could be carried to India for about £40. The saving would apply to over 3,000 passengers who used the Cape route annually.

While Lardner and others were writing and talking, a certain Thomas Waghorn, a person of considerable energy and resource, was occupied on behalf of the East India Company in making journeys by the Suez route, of which he had been one of the earliest pioneers. He had met, at first, the usual fate of the pioneer; he was laughed at, as a visionary, by stay-at-home "practical" people, while his suggestions were received by government officials with distinct coolness. None the less, he persevered, and in 1845 succeeded in delivering letters to Bombay in the extremely short time of thirty days.

The facts were too strong for the critics; by the early forties, a considerable traffic was developing by way of Egypt. The journey, however, was hardly likely to attract the mere tourist. The traffic seems to have been worked by an English company, with a monopoly. For the modest sum of £15, the traveller, on the 170 miles from Alexandria to Cairo, had the privilege of occupying a plank on the deck of a primitive river steamer and of washing in the ship's bucket. A certain quantity of indifferent food was thrown in, without extra charge. Mohammed Ali, as a wise ruler, annexed the monopoly and greatly reduced the charges, apparently still leaving a margin of profit. The eighty-mile stretch from Cairo

to Suez was even less comfortable; the travellers were packed, six or eight together, in a dogcart, at a fare of £12; though the alternative camel or donkey was relatively cheap, until the Transport Company cornered the market. An interesting comment on the situation is to be found in the fact that the British Consul at Cairo was, according to contemporary statements, both contractor for transport and agent for the East India Company and the P. and O. shipping company—a combination of functions not without parallel in our diplomatic history.

The growth of trade was steady, in spite of the difficulties of transport. According to a contemporary French estimate, the trade of the port of Suez, in 1856, amounted in value to £2·5 million sterling, of which two-thirds was transit trade between Europe and Asia. In addition, a sum of many millions in silver, largely in the form of five-franc pieces, was forwarded by this route to India, while some 17,000 pilgrims and 5,000 European passengers passed through the port. The increase was very rapid at this time, owing to the establishment of a regular service by the P. and O. mailboats between Suez, India, and the Far East, and the completion, in 1857, of the desert railway from Cairo to Suez.

While this overland traffic was growing, one man with imagination and foresight was contending with stolid and unintelligent conservatism, with the result that, in 1854, the Concession for the trans-isthmian canal was signed. With the history of the Canal as an engineering work, the difficulties encountered and overcome, the financial, political and international questions involved, we are not here concerned. The inquisitive reader can easily satisfy himself from the official histories, the

Parliamentary Papers, and the many contributions, good or otherwise, of journalists and pamphleteers. For our purpose, the only important question is that of the effect of the opening of the Canal to commercial traffic in 1869 on the character and direction of shipping and trade.

The effect of the cutting of the Canal, as measured in mere distance, was to shorten the voyage to Indian ports by four thousand miles, more or less, or over a fortnight's steaming for the fastest vessel of those days. For the Mediterranean ports of Europe, the gain was greater. The Canal, however, was merely a ditch, long and narrow. As an offset to the gain in distance, though a single ship, with a clear course, might effect the eighty-mile transit in twelve to fifteen hours, the conditions were far less favourable for a group. In the early seventies, transit was fairly rapid; but, as the tonnage using the Canal increased, so did the time lost in passing. Moreover, the Canal was available only in daylight; so that the average time of transit rose, by the year 1883, to nearly fifty hours, while this might be extended to three days if a ship grounded in the channel.

The Canal had already exceeded the expectations of its projectors and was too small for its work. This great increase of traffic, over fivefold between 1872 and 1882, took place in spite of the fact that the Canal was distinctly an expensive luxury. The dues and tolls amounted to over ten francs per ton, and the Company claimed to calculate the taxable freight space on principles entirely favourable to itself. Even to-day, the Suez Canal net tonnage, on the basis of which the dues are levied, is considerably higher than the tonnage as calculated by the various maritime Powers whose ships use the Canal.

The delay and expense roused the shipowners and merchants, more particularly those who had doubted the possibility and denied the value of the project. There was the usual indignation meeting at the Cannon Street Hotel, and a scheme was mooted for a second canal, as a way out of the difficulty. The scheme came to nothing; but the ultimate result of the agitation and of a series of negotiations was seen in the adoption by the Company of a policy of steady improvement, together with a lowering of rates. The chief improvement of the moment was the lighting of the Canal, together with the authorisation, in 1887, of navigation by electric light, which increased greatly the capacity of the Canal by rendering possible the journey by night. Improvement in depth and width provided for larger steamers. A depth of 26 feet, in 1869, with a bottom width of 72 feet, had been increased, by 1908, to about 33 feet, allowing a ship's draught of 28 feet, with a bottom width of nearly 100 feet; while, by the end of 1914, a depth of about 36 feet was available through the greater part of the channel, and several ships with a draught of 30 feet actually traversed the Canal. In 1927, the maximum draught recorded by any vessel was slightly under 32 feet, but over ninety per cent. of the total tonnage passing through was still under 28 feet draught. A draught of 32 to 33 feet seems to be the likely maximum for the next few years. In the meantime, the passing-places have been enlarged and increased, and, in the near future, the Canal should be of such width throughout that the tie-up will be avoided. The completion of the scheme will increase greatly the capacity of the waterway and provide for the needs of shipping, of moderate size, for many years to come. By January, 1912, the rates had

been lowered to 6·75 francs per ton, with a reduction of 2·50 per ton for ships passing through in ballast; while in January, 1913, the full rate was down to 6·25.* By this date, also, the average time of transit had fallen to a little over sixteen hours. In 1927 it was 15 hours 6 minutes.

In 1882, some inquiring person in Parliament asked for information as to the effect of the Canal on British trade and shipping. The Board of Trade set out to investigate, though the data available were no more satisfactory then than at present. According to the estimate then worked out, of a total of about 2·0 tons of shipping entering our ports, in 1880, from the East and Australia, a little over forty per cent. came through the Canal; while of the 2·8 tons cleared, a little under forty per cent. used this route. Of the goods carried, about half our imports from, and rather less than half our exports to, India and China were viâ the Canal, while the proportion of imports from the Far East alone was considerably greater. The tea and coffee from India, with most of the cotton, took the shorter route; while jute, rice and some of the cotton still came by the Cape. Australia was, naturally, less affected, only seventeen per cent. of our imports and less than two per cent. of our exports using the Canal. This proportion, however, was growing rapidly, since an independent estimate for 1887 assigns a third of the total Australian traffic to the Canal route.

We thus have a rough measure of the diversion of traffic effected in the course of ten years. The diversion was not merely a matter of routes; it was intimately bound up

* The rate was raised to 7·25 under the war conditions of 1916. From January, 1929, rates were 6·90 francs (gold) and 4·40 francs (gold), respectively; or 5s. 6d. and 3s. 6d. sterling.

with the substitution of steam for sail. The tonnage of sailing ships trading with the East showed a rapid decline in the seventies. This revolution, which was bound to come, was hastened by the fact that the Red Sea was hardly a possible route for the sailing ship owing to the prevailing winds.

So much for the shipping. The effect on trade and commercial organisation was even more widespread and important. Briefly, the Canal gave a strong impetus to the export of Indian produce to Europe, particularly to Mediterranean ports. Between 1870 and 1880, the direct trade with France, Italy and Austria, especially on the side of exports of Indian products to these markets, showed a great increase, while that with the United Kingdom showed a relative decline. In the same period, the export of rice from India doubled, while the increase in wheat was even more marked, since the conditions of the Cape route were not favourable to its carriage. The export rose from a few thousand tons weight, in 1870, to nearly ·4 tons in 1881; and, though fluctuating greatly, reached more than double this total during the eighties. The great increase came after 1876, when the effect of the improvement in design of steamers and engines was making itself felt. Jute, oil-seeds and tea show a similar movement; while, in the other direction, Russian petroleum found a ready market in India, the import rising rapidly and steadily to over fifty million gallons in 1890.

This increase in trade was partly conditioned by internal changes and progress in India itself; but the rapid rate of growth was undoubtedly due in the main to improved means of transport and intercourse with Europe, while the internal development of India was

greatly influenced by its greater accessibility to European capital and energy. The greater facility of transport was reflected in the marked fall in the European prices of special Eastern products, a fall of from twenty-five to thirty-five per cent. between 1870 and 1884. The fall was seen also in Australian wool, though to a less degree.

The producer in India and the consumer in Europe benefited; but many British merchants and shipowners took a somewhat pessimistic view of the probable results of the new route on their special interests. The shortening of the journey necessarily involved the use of less tonnage to carry a given quantity of goods; but the rapid growth of the trade is to be set against this temporary disadvantage. A more serious problem was provided by the hastening of the substitution of steam for sail and the consequent rapid decline in the capital value of sailing ships. The possessors of such capital naturally failed to appreciate the benefit accruing to the world in general at their special and individual expense. This, however, is one of the usual incidents to the introduction of improved mechanism in any industry. The transference to steam was inevitable, but the process was somewhat hurried by the special needs of the new route.

The merchants, too, were justly nervous as to their position. Rice, cotton and silk, coming through the Canal for the markets of southern and central Europe, were not likely for long to crowd the London warehouses. The ports of the Mediterranean gained at the expense of London, though not to the extent anticipated, the silk trade showing the most rapid change. The gain was increased later by the piercing of the Alps. The change, however, was gradual, since an old-established commercial

centre possesses great power of resistance to any shifting of its traffic; and the United Kingdom still has a considerable re-export of Eastern commodities, both to western Europe and across the Atlantic. The entrance into Indian trade of a subsidised line of Austrian steamships from the Adriatic is an illustration, on the side of transport, of the advantages of the Canal to Mediterranean countries. On the side of trade, the growth of the oil-seed business of Marseilles provides another illustration. In short, the effect of the Canal was to give a new lease of life to the trade and shipping of Mediterranean ports in general, much of it under the national flags; though the British flag still has some share, as we shall see later.

Let us look at the matter from the statistical point of view. In 1870–5, seventy-three per cent. of the traffic through the Canal was under the British flag; in 1901–5, the percentage was only sixty-two. In 1912, the British share was slightly higher, Germany being next with fifteen per cent., and then Holland with six. In 1927, the proportions were British fifty-seven, Dutch ten and a half, and German about nine and a half per cent., followed in order by France, Italy, Japan, America, Norway, Sweden and Denmark. These figures are, however, somewhat misleading, if we consider the work done by the ships. A proportion of the total tonnage, varying from thirty-four per cent. for America to over sixty per cent. for Germany and Italy, is classified by the Canal Authorities as Mail-shipping, while only nineteen per cent. of the British ships traversing the Canal come under this category. It is not perhaps without significance that British shipping so classified shows a large increase on 1912 when the proportion was only ten per cent. The mail vessel,

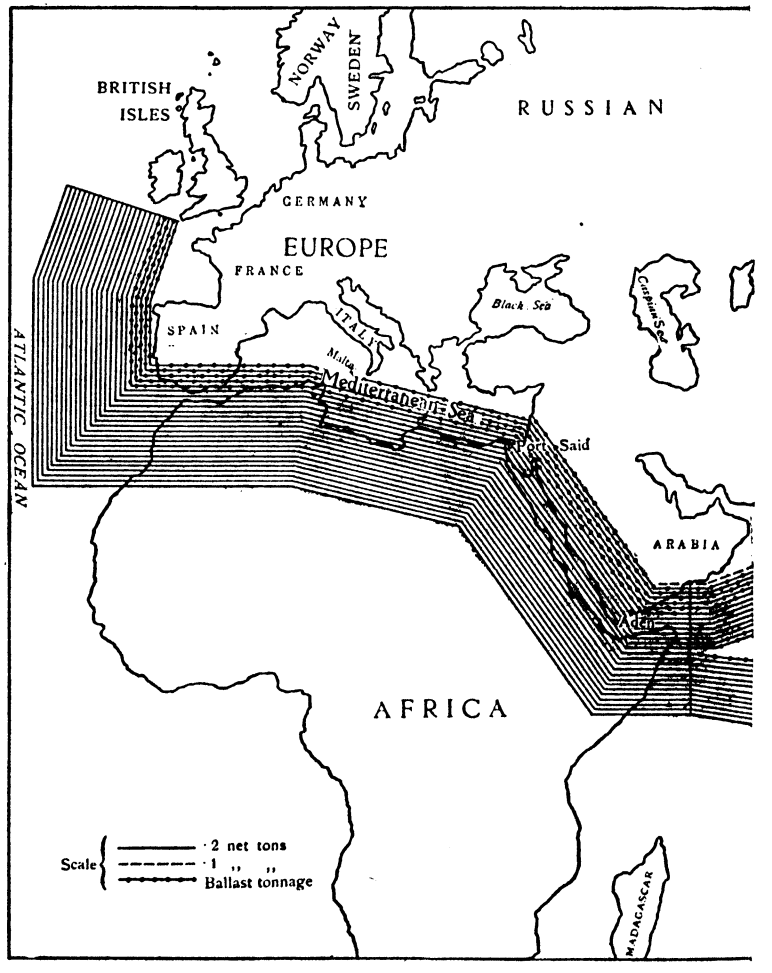
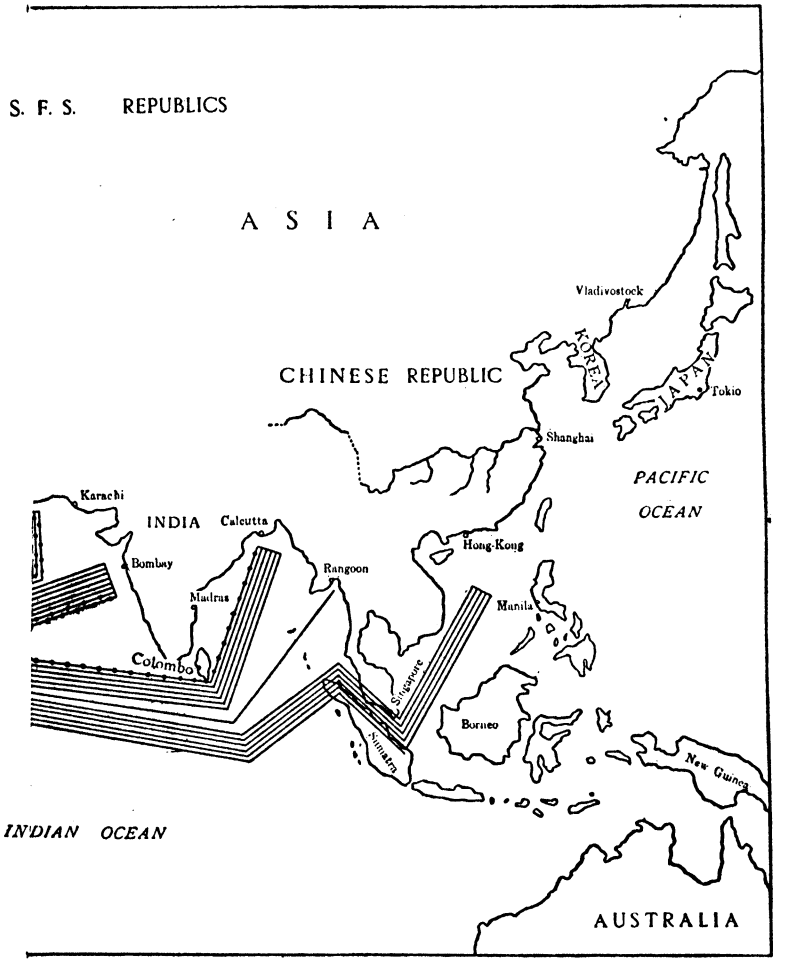


FIG. 4.—THE INDIAN OCEAN AND THE FAR EAST: BRITISH STEAMSHIPS, OUTWARD.



whether subsidised or not, is likely to be less efficient as a carrier of cargo than the ordinary merchantman. Percentages also are easy to misinterpret. The actual total increase of British shipping between 1875 and 1905 was nearly 7·0 net tons, or fifty per cent. more than that of all other flags put together.

We will now return to our analysis of existing conditions, and try to grasp the importance of the Canal to British shipping and trade at the present time. As we are going to consider the cargoes carried, we must turn first to the Board of Trade returns which provide comparative information both as to ships and cargoes.

In 1927, about 3·8 net tons of British shipping cleared from ports in the United Kingdom for East Africa, the Persian Gulf and India. Of these, nearly 1·0 tons were in ballast, that is either empty or not loading cargo from our ports. Moreover, 1·3 tons (·1 in ballast) cleared for Malaya, the islands of the Pacific, and the Far East. We have, then, to account for a total of 5·1 tons, but we must not forget the possibility of ships reaching Portuguese East Africa by the Cape and the Far East by Panama. To this mass of shipping, nearly all traversing the Suez Canal, must be added British ships bound from eastern North America or possibly direct from continental ports, together with those bound for Australia which we estimated above at rather less than 1·0 tons. According to the Canal statistics for 1927, which do not cover exactly the same ships as the British figures, over 6·0 net tons of British commercial ships traversed the Canal from north to south and nearly 7·0 tons from south to north. With the necessary corrections, there seems to be a sufficiently close correspondence between the two authorities.

The Canal figures give a total of nearly 1·6 tons of British ships in ballast, while we have accounted, so far, for only 1·1. For the remainder we must look elsewhere. Moreover, of the total of ships in ballast traversing the Canal from north to south, about three-quarters were oil-tankers, and the remainder ordinary cargo ships of the tramp type. This is in marked contrast with the conditions of 1913. The tankers are bound mostly for the Persian Gulf, and the cargo ships for India.

The tanker movement explains itself; it is the necessary corollary of the development of the new oilfields of the East: but what of the tramp tonnage proceeding through the Canal empty? We may notice, at once, that the quantity of such tonnage is only about half that of 1912. This may signify either that there is less need of it for return cargoes to Europe or that the necessary surplus tonnage reaches the Indian Ocean by other routes. In this connexion we must not forget that the difference between the southward and northward movements of British ships is still about 1·0 tons, as it was in 1912. To account for the empty tonnage we must turn to the figures of British coal trade. In 1927, Egypt imported from Great Britain over 2·0 tons of coal, a large part of which was landed at Port Said for the bunkering of ships on the Canal route. Not far away is Italy, still one of our largest markets for coal, taking between 6·0 and 7·0 tons in 1927. It is easy, therefore, to explain the presence of empty tonnage in the neighbourhood of the Canal, and this scatters in search of cargo instead of returning direct to our shores in ballast.

Thus the stream of British ships passing southward through the Canal is composed partly of ships carrying

cargoes from the United Kingdom to countries beyond Suez, partly of ships with American or continental cargoes, and partly of ships in ballast, either oil-tankers from Great Britain or ships which have already landed cargoes of coal at intermediate ports. Not all the coal is dropped on this side of Suez; a considerable though decreasing quantity is carried beyond, to Aden, Bombay, Colombo, Malaya and China. The total of British coal in 1927 amounted only to ·55 tons weight, as compared with ·75 tons in 1912. The coal trade beyond Suez has always been small compared with that in the neighbourhood of the northern end of the Canal and has tended to decline with the development of alternative supplies in the Indian Ocean and the Pacific. In 1912–13, of a total of ·65 tons imported into India, mainly Bombay, only ·16 tons came from Great Britain, as compared with ·7 tons in 1890; the remainder was credited to South Africa, Australia, and Japan. Though the year was abnormal in the coal trade, the tendency is plain. In 1926–7 we see the full effect of the stoppage in Great Britain: the normal ·10 tons of the years immediately preceding drops to ·01, and only recovers to ·05 in 1927–8. Australia almost disappears from the tables, and South Africa is left as the main source of coal imported into India.

Having looked at the stream of British ships passing through the Canal, we will now try to follow out sections of that stream beyond Aden. Deducting ships with cargoes for East Africa, the Persian Gulf, Aden, and Red Sea ports we may estimate approximately 2·65 net tons of British ships bound for India, Ceylon and Burma, that is to the chief markets of the Indian Ocean. These are carrying mainly British goods, but possibly also con-

tinental or American goods shipped viâ ports of the United Kingdom or picked up *en route*. Such are, manufactures of wool, raw cotton, wine, vegetable oils, canned fish, and machinery, the whole amounting to only about £1·25 million in value from ports of the United Kingdom, as against an export of British produce of about £85·0 million.

Let us consider the main factors in this total of our exports to India, Ceylon and Burma. Over a third, by value, consists of cotton piece-goods, and another quarter of manufactures of iron and steel and of machinery. Other large items are cotton yarn, chemicals, electrical goods, tobacco, railway vehicles, motor-cars and cycles, woollens and artificial silks, and miscellaneous manufactures of every kind, together with beer, spirits and minor foodstuffs. Salt, coal and clay provide considerable bulk cargoes of a special kind. The mass of this material is bound for peninsular India, since Burma takes only about a tenth of the total. To this mass one important addition must be made, that of coal carried to Ceylon, and perhaps a small part of other exports to that market not carried in passing ships.

We see the total value of the market from the point of view of the manufacturer and seller in Great Britain; but what of the shipowner's point of view? How far are these cargoes profitable to carry? Here we must necessarily depend to some extent on estimates, as we need for our purpose not values but quantities, and quantities expressed by the same unit, the measurement ton of 40 cubic feet. If we estimate this enormous mass at 3·75 measurement tons we shall probably be within the mark. Not all goods are carried by British

ships, but the foreign share in this market is small and seems to be limited mainly to German ships. Assuming that these have a fair share in the general trade, we have about 2·75 net tons of shipping of all kinds to carry the above goods. This gives us a load-index of about ·68,* or somewhat higher if we allow for continental goods carried. This is a fairly high index, but we must note two facts, first that the index is considerably lower than in 1913, when it approached ·80, and secondly that the index is raised by the movement of full cargoes of coal on the route. None the less, it compares favourably with that on many other routes.

The division between the different parts of India is also not without interest. Of the total, Bombay, including Karachi, takes about forty per cent. by value, Madras about ten per cent., Burma about ten per cent., and the Calcutta region about forty per cent. The great concentration of trade in two regions, east and west of the peninsula, is here indicated, and the relative unimportance of the south and of Burma as markets for British goods.

So much for the trade of the India area. The trade of Dutch Malaya is largely carried in Dutch ships, but much of that of British Malaya is carried by passing ships bound for more distant regions, particularly for the Far East. The British tonnage carrying cargo from Great Britain in 1927 to Malaya and the Far East was rather under 1·2 tons, and of this we may perhaps credit at most 1·0 to the Far East proper. To this must be added at least ·25 tons of foreign shipping, largely Japanese, cleared from our ports to the Far East. So we may have about 1·25 million tons of shipping to do the work of the

* With allowance for passengers, about ·72.

routes beyond Singapore and some of the work of Malaya. The traffic to China and Japan amounts to about ·9 m. tons; to this must be added that of Siam and the Philippines and a portion of that of British Malaya, the whole perhaps amounting to about 1·25 m. tons. On this estimate, the load-index for all ships, on the assumption that the foreigners take their due share, works out at about ·5 for the route. It is not surprising that the index is much lower than that for India, and the index for China and Japan is probably lower still. The economic condition of China, and the element of competition introduced in recent years by the rise of Japanese shipping, are two reasons for the decline, as compared with 1913, in the profitableness of this route for British shipping. There is a third reason. In 1913, American goods for Japan and China travelled mainly viâ Suez; they now use the Panama Canal, and they are handled largely in American ships.

How are these cargoes made up ?

Exports to the Straits Settlements amount in value to about £11·4 million, cotton piece goods, iron, steel and machinery, and tobacco being some of the more important constituents in the total. To this must be added £3·25 million of similar goods consigned to the Malay States, or, in all, a round £15·0 million to British territories. Some share may also be allowed of the £8·0 million exports to Java and other Dutch possessions in this region.

On the Far Eastern route China accounts for £14·5 million, Japan for £15·0 million, Siam £2·0 million, French Indo-China £·3 million, Philippines £1·2 million, so that the whole of this region beyond Singapore is

considerably less than half the value of India as a market for British goods, and in the carriage of the goods the shipping on the route appears also to be less profitably employed.

Now let us look at the character of the goods exported to beyond Singapore. Except for tobacco, beer, spirits, and a little coal, exports to China are mainly classified as " manufactures." About a third by value are cotton yarns and manufactures, about a third woollens, and about a sixth iron, steel and machinery. Of the miscellaneous remainder, only dyes and colours are of much individual importance.

The Japanese trade is somewhat differently constituted. Nearly a third consists of iron, steel and machinery, and nearly another third of woollen and worsted yarns and manufactures. Cotton goods are relatively unimportant and outclassed by chemicals such as ammonium sulphate and others, which together amount to over fifteen per cent. of the total value of the trade. There are differences here due to the different organisation of the two countries. Siam is a market for cotton, iron and steel and machinery, and the Philippines for some cottons and machinery. There is a certain resemblance in the outward traffic both beyond and this side of Singapore, but the Indian market is far more important, whether measured by its total demand, or demand in relation to population, or the variety of its needs. It is, moreover, more in the control of British shipping than the markets of the Far East; there is no competition from the Panama route, and the shipping on the outward voyage seems to work with greater efficiency and therefore at a higher average profit.

Now let us consider the other side of the shield—the return voyage. We estimated a total of nearly 7·0 million net tons of British steamships moving northward through the Canal, and nearly all carrying cargo of some kind to the markets of the Western world. Not all of this cargo, however, is destined for Great Britain, though it may be carried in British ships. We are concerned for the moment with India and the Far East and will attempt to isolate in these statistics the ships carrying cargoes to Great Britain from these regions. The task is difficult, owing to the nature of the figures available. If we deduct the traffic from the Persian Gulf, mainly oil-tankers, and that from Australia and East Africa, we are left with rather less than 4·0 million tons for India and the Far East. Of this India with Malaya accounts for about three-quarters and the Far East for the remainder. Of the Indian total, a considerable part has for its final destination the ports of western continental Europe and the United States. This estimate is confirmed by Indian statistics, though unfortunately they are not calculated for the calendar year. We noted above a surplus of nearly a million tons of British ships moving northward through the Canal. This difference between movements north and southward is not peculiar to British ships; it is characteristic of all tonnage using the Canal and arises, as we shall see later, from the essential nature of the traffic. It is closely related to the movement southward of ships in ballast. The tramp tonnage in ballast through the Canal and from points beyond, such as Aden, is bound mainly for the western side of India. India also is mainly responsible for the excess of tonnage carrying cargo northwards; but from what quarter can

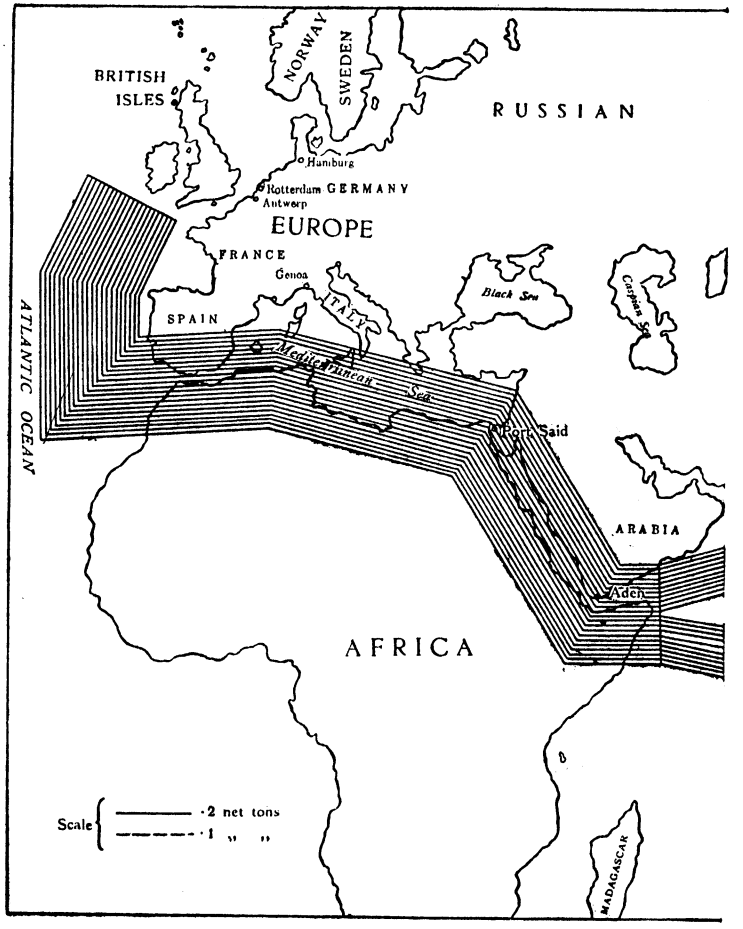
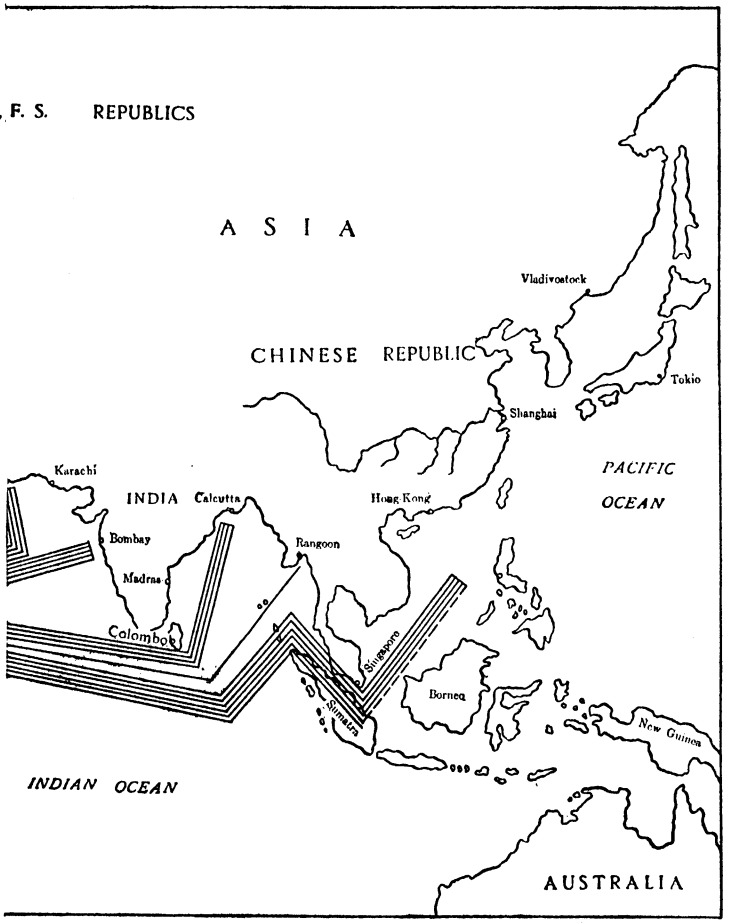


FIG. 5.—THE INDIAN OCEAN AND THE FAR EAST: BRITISH STEAMSHIPS, HOMEWARD.



this tonnage reach the Indian Ocean? Ultimately only viâ the Cape or viâ Panama. We have noted before the stream of ships with cargoes of coal from South Africa to Colombo or Bombay. For the rest we may look to ships bringing cargoes, largely coal in normal times, from Australia to Malaya and India. These may have reached Australia from Europe either viâ the Cape or viâ Panama, and we may be able to check this movement by the Panama Canal statistics. We may find also, in these statistics, ships recorded as bound from the Atlantic for the Far East, but not returning by the Canal. There is also a certain amount of tonnage carrying coal from Japan or China to the Straits which might be available for handling Indian cargoes. So we see that even beyond Suez the movement of coal is not without importance in the organisation of the main route to Europe.

In the above estimates, the movement of tanker tonnage to and from the Persian Gulf has been excluded. It is specialised tonnage, not available for general purposes, and though an important addition in recent years to the traffic through the Canal, it has not affected the general conditions of the trade with India. This was and still is carried on by liner and tramp vessels, the latter being of greater relative importance on the homeward than on the outward route. This, again, is due to the contrast in character and quantity between outward and homeward cargoes. We must now consider these cargoes in relation to the means of transport.

Though the proportions of the various streams of traffic converging on the Indian Ocean may vary from year to year, their general stability depends on the character of the products of the southern Hemisphere and the Far East;

together with the distribution of coal in relation to the needs of industry and transport beyond Suez. We are therefore justified in treating the movement of shipping to which these conditions give rise as a fairly permanent element in the organisation of the route to the East. Changes, however, are in progress. Persian oil has already upset the balance in a particular commodity; and the substitution of oil for coal in transport may have an indirect effect on the movement of coal as cargo and therefore on the employment of shipping. Up to the present, this effect is not sufficient to produce any large change in the conditions of traffic on this route. Another and perhaps more vital change is in progress, with the rise of industry and the consequent change in economic organisation in the Indian area; but this, too, is hardly yet to be traced in the general statistics of traffic. It is offset by developments in other directions, as a comparison of the figures for 1927 and 1912 shows. Broadly, the region still receives manufactures and coal from Europe and supplies in return raw material and foodstuffs, though it is not without significance that India is now finding a market for certain of its manufactures in the Mediterranean area.

As an index to the general movement, let us now look at the movement of goods from India and Burma to Great Britain. The main cargoes consist of grain and rice, raw jute, oil seeds and oil cake, manganese ore, tea, and minor agricultural products. With the exception of rice, these are the products of India proper. The volume of this traffic may be estimated at upwards of 2·5 m. tons. There are also the tea and minor products of Ceylon to be considered; but these may be handled by passing ships

which are not confined to the Indian route. Malaya also sends about ·3 m. tons, largely rubber; but this trade we have excluded for the moment. If we attempt to isolate the trade of India and Burma with Great Britain we arrive at a load-index of about ·67.* It is possible that our division of shipping between the routes is at fault; but if we take, as a basis, the trade of the whole Indian Ocean, including East Africa, Sudan, and Malaya, but excluding the oil from the Persian Gulf, we arrive at a figure between ·70 and ·75, so that our estimate for India seems reasonably accurate; the index seems to be in the neighbourhood of ·70, perhaps rather below than above. The shipping figures on which this estimate is based include some foreign tonnage, mainly German. A similar calculation for 1912 gave an index of nearly 1·0, so that the employment of shipping on this route seems much less economical than formerly. The tonnage is greater in proportion to the cargo available. It is possible that some goods which formerly passed through our ports are now carried direct in British ships to the Continent, but this would not affect our conclusions as to the working of the direct route, since the tonnage on that route has not been reduced proportionately.

Let us now turn to the continuation of the route, beyond Singapore, and consider the cargoes available. We have to find employment for nearly 1·0 tons of British shipping and ·4 tons foreign, largely Japanese. The bulky imports into Great Britain from this region are the bean and its products, from China and Japan, in the latter case originally from China; with eggs and a little tea and silk from China, and miscellaneous pastoral

* With allowance for passengers, about ·69.

or agricultural products; rice and rice meal from French Indo-China and hemp from the Philippines. The total, on the assumption that all comes by the Suez route is only about ·75 m. tons. Even if we allow for cargoes from Malaya picked up *en route*, the load-index is only about ·3, on the assumption that the foreign ships carry their share. This is much lower than the outward index. and there was a similar contrast in 1912. Apart from the bean and its products, China and Japan have little to send to us, and tramp ships arriving at these countries are likely to come southward in ballast or carrying coal from China or Japan, and seeking cargoes for Europe in Malaya and the Indian Ocean. Moreover, traffic to and from the Eastern side of the United States, formerly viâ the Suez Canal and often through European ports, now prefers the route viâ Panama. From these figures we may appreciate the fact that the homeward trade from this area, before the day of the soya bean, provides one of the earliest illustrations of agreements among shipowners to prevent unprofitable competition among a large number of ships for a small quantity of goods. The commercial importance of the great land-mass of eastern Asia has been greatly exaggerated from early times. The chief trade, to-day, is with the peninsulas and islands; and, apart from developments in Manchuria, Japan and the Philippines, it is not a very serious item in our calculations of the employment of shipping.

We have now a measure of the value of the Suez Canal to the Empire expressed not merely in distances, or the movement of shipping, but in the combined movement of shipping and goods. We are justified, in view of the figures above, broad estimates though they may be, in the

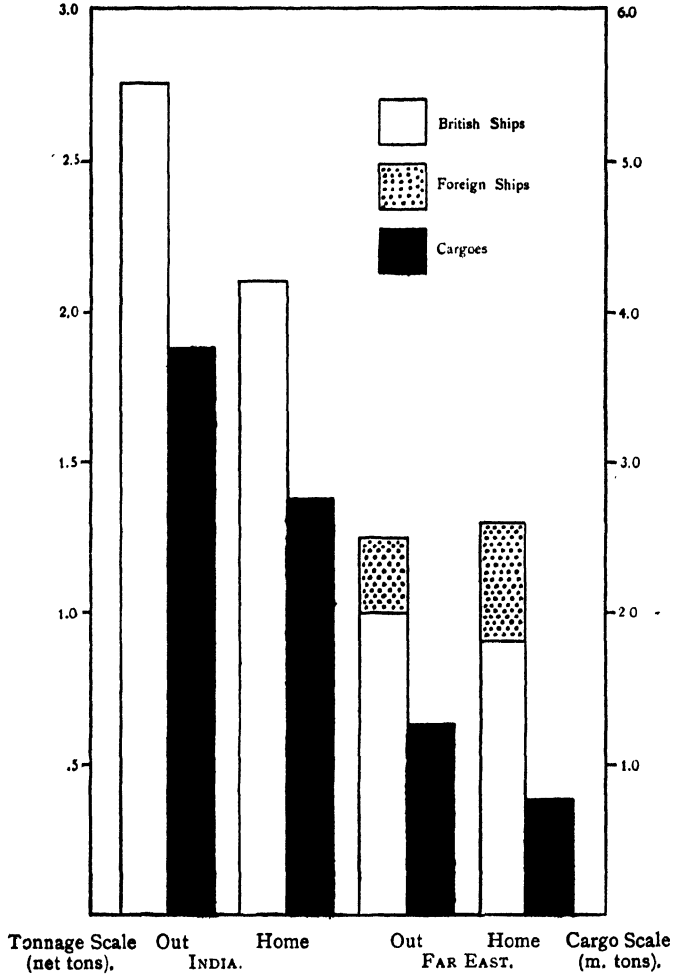


FIG. 6.—THE INDIAN OCEAN AND THE FAR EAST.
All ships with cargoes, outward and homeward.

statement that the region of the Indian Ocean is not only the central fact in our Eastern trade but is also essentially related to the working of the traffic both around the Cape and beyond Singapore. At the same time, though the United Kingdom has a large share of the trade and a still larger share of the transport business, Indian products also find their market in continental Europe. British ships engage also in this traffic; so that, though the Canal is of great importance to the trade of the United Kingdom, it is of even greater importance to the trade of India and to British shipping, which has almost a monopoly of the carriage to the United Kingdom and a large share in that to continental Europe.

The Indian Ocean differs from the regions so far considered in that it provides, on a vast scale, and in great variety, the bulky raw materials and foodstuffs needed for the support of the industrial areas of Europe. In proportion to the total movement of traffic, the passenger element is of minor importance, while most of the commodities exported are naturally fitted for handling by tramp steamers. Though the consumption of European goods in India is large, the mass of the traffic is homeward, from the Indian Ocean to Europe, and, in consequence, the problem of outward cargoes is found on a large scale. It is partly solved by the method of the indirect voyage and the transport of coal to India from the southern Hemisphere; but this movement is not large and depends for its permanence on the extent to which native Indian supplies of fuel can be developed. In default of coal, many ships must arrive in ballast, and the Indian Ocean is a great collecting area for empty ships seeking employment. The real importance of

coal in the trade of the region lies not so much in the direct import as in the export from the United Kingdom to the Mediterranean which gives employment to shipping on part of the route. It is a special solution of the problem of balance of cargoes.

The importance of the Indian area is great, as measured by the sum total of its export and import of commodities, but the trade per head of the population is small. A slight increase per head would add enormously to the total volume, and the conditions for such increase lie particularly in India proper. Comparatively slight changes in methods of production, with moderate improvements in internal transport, when applied to an area of vast productive capacity and population can produce effects of great moment in the matter of overseas commerce and the employment of shipping. The progress of Indian trade, during the past generation, has been rapid; its future may perhaps transcend the possibilities contemplated by the most optimistic supporters of the scheme for the Suez Canal.

So far we have considered the route mainly in relation to the trade and shipping of Great Britain; we will now attempt a sketch of the total work of the Canal as a factor in world transport and the main connecting link between East and West.

In the year 1927, the Suez Canal figures record a total of approximately 29·0 million tons net of shipping as using the Canal. This tonnage, however, is based on the Canal rules of measurement, which profess to estimate the real cargo-capacity of the ships for purposes of tonnage dues. The net tonnage as given in national statistics of the various shipowning Powers may be taken as less by

about twenty per cent. To arrive at the basis of commercial traffic, a further deduction from the total of about three quarters of a million tons must be made on account of Government ships and warships, mainly British. The gross total is divided in a curious fashion, about 13·6 tons going from north to south and 15·4 tons south to north. Fifty-seven per cent. of the total tonnage is British; then come Holland and Germany with 10·5 per cent. and 9·6 per cent., France and Italy with 6·2 per cent. and 5·2 per cent., followed by Japan, United States, Norway, Sweden, and Denmark in order, the last being credited with 1 per cent. only. With deductions for Government ships, the Canal still remains British in respect of at least half of its commercial tonnage movement. There is a further qualification to be made in regard to the general figures. The southward moving stream contains nearly 2·5 tons of ships in ballast, three-quarters of these being oil-tankers, bound chiefly for the Persian Gulf, and a large part of the remainder tramp ships for India.

The Canal figures tell us broadly how this tonnage is distributed beyond Suez. They credit about 9·0 tons to India, and nearly 6·0 to the Far East; about 3·5 tons each to the Persian Gulf and Australia; 3·0 to Dutch Malaya, and 1·7 to the east coast of Africa. As these figures are reached by adding together the outward and homeward traffic, they provide only a general measure of the importance of the various routes. We can arrive at a more precise measure by considering the goods carried.

The total outward traffic is estimated at rather more than 11·0 million tons weight, and the homeward traffic at about 18·5 million tons. The largest item in the outward cargoes is iron, steel and machinery, about 2·5 tons.

India is the chief destination, taking over a third, but Japan, Dutch Malaya and China are also important markets. Next comes railway material with nearly 1·0 tons. Of this India takes a half, while East Africa, Dutch Malaya and Japan account for most of the remainder. Coal, mainly British, accounts for about ·65 tons; while cement, salt, textiles, refined oil, pulp and paper, vary from ·55 to ·30 tons each. Refined sugar is credited with ·2 tons, and the remainder, about 4·0 tons, comes under the heading miscellaneous and includes everything not included in the schedules above.

There is no definite information as to the origin of this group of commodities, but, except for oil and a few manufactures and some cotton, the countries of western and central Europe are clearly the main source. The destination of a large section of the trade, that from Great Britain, has been discussed above. It is evident that certain of the commodities listed above are fitted to be carried as whole cargoes in tramp ships, others are more suited to liner traffic; but there is no sharp line of division and much overlapping. Even coal is not always carried on this route as a " sole " cargo. The markets for which these commodities are destined can be found only by an elaborate and difficult analysis on the lines of that applied above to goods exported from Great Britain. We shall not attempt it here.

For the movement from south to north, considerable information is available as to the origin of the goods, but, apart from British statistics, little or none as to their specific destination. They are largely agricultural and pastoral products, and their sources are fixed by their physical characters. Let us consider, again, this 18·0 tons.

Cereals with nearly 3·5 tons weight head the list, but the term is conveniently vague and tells us nothing. The bulk of the trade is in wheat, 1·6 tons from Australia and ·3 tons from India, mainly Karachi; together with rice, 1·3 tons in all, two-thirds from Burma and the rest from French Indo-China and Siam. The remainder consists of barley, ·25 tons, mainly from the Persian Gulf, with some maize from East Africa and elsewhere. As western Europe is a common market for these products, we will not attempt to follow them.

Nearly as important as the cereals is the great class of oil seeds, rather over 3·0 tons weight. The term again is vague, and we must make a rough analysis. The soya bean and bean oil from Manchuria head the list with 1·2 tons. Then come, with about ·75 tons each, the ground-nuts of the Far East and India, and the copra of the coasts and islands of the Pacific and Indian Oceans. The rest, cotton seed, linseed, etc., take their rise largely in India.

A third group, about 3·2 tons weight, is that of mineral oils. About half of this oil is in the crude state and destined for British refineries. Of the total of all kinds, 2·9 is from the Persian Gulf, about ·2 from the Dutch Indies, and ·1 from the oilfields of Suez. Here is the employment for the tanker tonnage which we saw going southward in ballast. There is still, as we saw above, a flow of refined oil products southwards through the Canal, but it is no longer the main movement and it may be expected to decrease still further in the future.

Rather under 2·0 tons each in aggregate weight are the metal and textile groups, but the elements in them vary greatly in relative value and commercial importance and

must therefore be separately considered. Of the metals, manganese ore, with 1·0 tons, is the chief; its origin central India and the Sinai peninsula, its destination the steel works of western Europe or possibly of the United States. Of much smaller bulk, but of vital importance, are the zinc and lead concentrates of Australia, somewhat under ·2 tons each, and about half this quantity each of tin and pig iron. The last is new and the outcome of the recent industrial development of India. The zinc and lead are largely for continental markets, Belgium and Germany; the tin for Great Britain and the iron for Mediterranean countries.

The remaining northward traffic of importance belongs to the vegetable world. The textiles include 1·3 tons weight of jute and jute goods from Bengal, ·3 tons of Australian wool, ·28 tons of raw cotton, mainly Indian, and ·15 tons of hemp, especially from the Philippines. Cane sugar, in all about ·5 tons, from Dutch Malaya, the Philippines, Queensland and Mauritius, rubber, ·6 tons, from Malaya, British and Dutch, and Ceylon, together with ·4 tons of tea from Ceylon, India and Java, complete the list of important vegetable products.

We have accounted for 17·0 out of 18·5 of our tons of goods: the remainder consists of miscellaneous products not coming under our main headings, such for instance as frozen meat from Australia. The bulk of this traffic is bound for western Europe, the Continent taking a large share of some commodities; there is also an important traffic to the United States in jute, manganese, sugar and rubber. In view of the above figures, we are now in a position to form some estimate of the significance of the

traffic in the commercial relations of the Western world with the various countries either beyond Suez or beyond Singapore. The division, however, of the traffic between the various countries of Europe is beyond the scope of the present work.

CHAPTER IV

SUEZ AND PANAMA

We have discussed the Suez Canal as the factor controlling the routes from Europe to the Indian Ocean, the Far East, and in part those to Australasia; we must now turn to the Panama Canal and consider how far it has diverted traffic or affected this control. To what extent must we re-arrange our routes, or rather the quantity of shipping moving along them? Once again we must beware of hasty generalisation in terms of mere distance; we must remember that the ship is a machine, carrying goods and passengers and working for a profit. We must examine the map carefully, but with no less care consider products and markets.

The map shows the line of longitude 180° E. or W. of Greenwich passing through the extreme north-east corner of Asia, the Aleutian Islands, and Fiji, and just missing the north-east corner of New Zealand; in other words, as a matter of longitude, the whole of the region which we have discussed lies nearer to the United Kingdom by the east than by the west. The actual routes, owing to the lie of the land, are more devious and therefore longer by the east; so that we must rearrange our ideas in terms of the approximate distance steamed. We must deal with actual routes rather than mathematical lines.

In actual steaming distance, Sydney is about 150

nautical miles nearer to Liverpool by Suez and Colombo and the ports of southern Australia than by Panama and Tahiti; that is, the true equidistant line, in the Southern Hemisphere, instead of lying just east of New Zealand, is near the coast of eastern Australia. On a voyage of over 12,000 miles we may ignore a few score miles and for all practical purposes consider the coast between Sydney and Brisbane as on the margin of indifference for the two alternative routes from the United Kingdom. The choice of route is likely to be decided by considerations other than distance, such as length of voyage between coaling-stations, the price of coal or oil, availability of cargo, weather—all factors dependent ultimately on geographical conditions. South and West Australia are evidently nearer to Liverpool by the Suez route, while New Zealand is about 1,000 miles nearer by way of Panama and Tahiti, and still nearer by the most direct route across the Pacific It is possible that one route may be adopted on the outward and another on the homeward voyage, but this would be determined by the special conditions of the trade. We shall return to this point later, but first let us complete our survey by considering the northern Pacific.

Yokohama is the natural terminus of the traffic to the Far East viâ Singapore, and Yokohama lies slightly west of longitude 140° E. In spite of the detour round southern Asia, Yokohama is about 700 miles nearer to Liverpool by Suez than by Panama, the latter route being rather over 12,000 miles in length; while the voyage to Hongkong or Manila is over 4,000 miles shorter by Suez. It is clear that the effect of the Panama Canal on the traffic of the Asiatic region to the south of Hongkong is hardly worth consideration, at any rate from the point of view

of western Europe. There is, however, another point of view. Let us consider the stream of traffic from the eastern coast of North America which formerly rounded the Cape to Australia and the Indian Ocean or traversed the Suez Canal to the Indian Ocean and the Far East. Sydney is over 3,500 miles nearer to New York by way of Panama and Tahiti than by way of St. Vincent and the Cape; while Wellington is some 5,000 miles nearer by Panama than by the Cape, and 2,500 nearer than by the Straits of Magellan. Thus, eastern North America gains greatly in its intercourse with Australasia. The routes by the Cape and by Panama are alike in that each has only one region of call for intermediate cargo and each traverses wide expanses of ocean lacking in supplies of fuel; though this latter fact has lost much of its importance with the advent of oil-driven ships.

Conditions in the northern Pacific are less simple. Hongkong is roughly equidistant from New York by Panama, San Francisco and Yokohama, or by Suez and Singapore. The same is true of Manila. The line of indifference for New York thus lies between Hongkong and Manila; all regions north of that line are nearer to New York by way of Panama. For ports between New York and New Orleans, which are passed on the journey southward from the former, the gain is evidently greater, and the line of indifference approaches Singapore. In short, the effect of the new canal is to bring the eastern seaboard of the United States much nearer to central and northern China and to Japan, but not to change its relations with the Indian Ocean. It is now possible, however, for shipping to reach the Far East or the Indian area by the one route and return by the other.

Except in the case of New Zealand, the new canal, in the matter of shortening distances, has not affected in any marked degree the shipping relations between western Europe and eastern Asia or Australasia. The most important change is in the relative position of the eastern seaboard of North America. This is a change of considerable moment to us, since it is the eastern manufacturing region of the United States which competes in exports with the manufacturing regions of western Europe. So we will now compare the two regions, keeping for the moment to the consideration of mere steaming distances.

Let us regard again the stream of ships which we have noted as formerly crossing the Atlantic from the New York area and rounding the Cape on the way to Australia. To reach Sydney, with calls at Adelaide and Melbourne, these ships must steam 1,500 miles farther than those starting from Liverpool and using the Suez Canal; in fact, the Suez route is effectively as short as that by the Cape even for New York. The Panama Canal has reversed this position. The distance is now 2,400 miles in favour of New York, or a total gain to that port of nearly 4,000 miles, or over a fortnight's steaming for a ten-knot cargo boat.

In comparing the two routes, the Cape and Panama, we must not forget to deduct the Panama Canal dues from the amount saved on the voyage through the reduced steaming distance. This would amount, perhaps, to the cost of running the steamer for a fortnight. The deduction for Suez Canal dues is about the same. None the less, the gain by the new route remains considerable. Adelaide is now rather nearer to New York than to Liverpool, but we may take it as marking our point of indifference

for ships coming by the east or the west, from the two competing ports. Australia, east of this point, is now nearer to New York than to Liverpool; whereas, formerly, the whole of Australia was 1,500 miles nearer to Liverpool, and ships from both sides of the North Atlantic approached Australia from the west.

The case of New Zealand is more complicated. The voyage from Liverpool to Wellington, eastward by the old Cape route is about 13,000 miles; the Panama Canal shortens this to about 11,500, or rather less if the steamer does not touch at Tahiti; but here again we must not forget to correct for the Canal dues. On the other hand, New York to Wellington, by Panama and Tahiti, is under 9,000 miles; so that, on the shortest route, New York has an advantage of 2,500 miles, practically the breadth of the Atlantic. It is clear that, in the markets of eastern Australia and New Zealand, the new canal gives a decided advantage to the United States, as estimated simply in terms of distance, in its competition with the manufactures of western Europe.

Let us turn now to the northern Pacific. In its intercourse with eastern Asia, the eastern United States, under the old system, was at a disadvantage, as compared with Europe, measured by somewhat less than the breadth of the North Atlantic. Hence the transit trade through the great exchange-ports of Europe. Shanghai is now about equidistant from New York by Panama and Liverpool by Suez; that is, the point of equality for the two competing ports lies in the neighbourhood of the mouth of the Yangtse. Yokohama is now nearer to New York than to Liverpool and still nearer to the cotton-ports of the United States. Hongkong is, as we have seen,

equidistant from New York by either route, while south of this the Suez route is the shorter even for New York. Thus, the eastern seaboard of North America is now on an equality with western Europe as regards its intercourse with the mainland of eastern Asia, while, in the case of Japan, it has a slight advantage. As the distance relations between New York and the Indian Ocean have not been affected, the conditions of competition in the export trade to this region remain the same.

So far we have considered the problem of the Canals merely in terms of distance—a vital but not the only factor involved in the determination of the movement of shipping. Before dealing with the other factors, we must express our routes not only in figures but as actual lines of movement on the Globe ; in other words, we must have the complete geographical surroundings before examining the economics of the question. The routes from Panama cross the great waste of the Pacific, and have therefore a simplicity which we do not find in those skirting the great land-mass of the Old World.

Four Great Circles provide the key to the understanding of the steamer lanes past and present of the Pacific. From New Zealand to the Horn, the shortest route, just as that from the Cape to Australia, would carry the ship too far south, into dangerous waters. The ordinary course follows in part a line of latitude and in part a Great Circle. There is practically no land in the Pacific on this route, and the first calling-point for the ship is Montevideo; here coal, in the past, not cargo, was the determining fact, since South America, as we shall see later, is already provided with more than enough tonnage of the type needed for its exports to Europe. This route, owing to conditions

of wind and weather and to the absence of intermediate cargoes, is essentially a return route for fully loaded ships. It is now little used, owing to the advantages of the route by Panama.

Of primary importance, now, is the Great Circle route from Wellington or Auckland to Panama. This passes close to the Galapagos Islands, and, far out in the southern Pacific, the little French island of Rapa. This island was considered at one time as a possible coaling-point and alternative to Tahiti, in the Society Islands, which lies off the course to the northward.

Next there are the connexions between the North and South Pacific. The Great Circle from Vancouver to Fiji passes through the Sandwich Islands; and at Fiji the all-red route branches off to Auckland or Sydney. This is the usual route, though the shortest course to Sydney from Vancouver would carry the ship, westward of Fiji, through the New Hebrides. The route from San Francisco to New Zealand differs little from the Vancouver route, and would pass near to Samoa; but Tahiti, slightly to the eastward, provides an alternative. Tahiti, moreover, as we have noted, is not far from the Great Circle routes from Sydney and Auckland to Panama. So we find that the scattered islands of the Pacific, which we commonly neglect in our geography, may have considerable importance as points-of-call on the trans-Pacific routes connecting North America with Australasia; their importance decreases as the range of steamers increases, but to us they are useful as indicating on the map the position of important routes on the broad expanse of ocean.

The route crossing the North Pacific, like that to the Horn, is not, in its shortest form, affected by the attrac-

tion of islands as calling-points. It is, perhaps, destined to be the most important of all, and must be examined with some care. If we trace out on a globe the Great Circle from Panama to Yokohama, we may be surprised to discover that it crosses the Isthmus northward, to the neighbourhood of Colon on the Caribbean. We may follow it across that sea to Texas, and then to a point near the northern boundary of the State of Oregon, where it again strikes the Pacific. From this point the Circle sweeps round by the Aleutian Islands and finally approaches Yokohama from the north-east, though Yokohama lies slightly south of San Francisco in latitude. Thus, the shortest route between Panama and Yokohama, which lie both on the same Ocean, is partly by land. The actual route is by way of San Francisco, following the American coast and passing near Salina Cruz, the terminus of the Tehuantepec railway. We will therefore transfer our attention to San Francisco.

The shortest route from San Francisco to Japan is north-west, joining the Great Circle from Vancouver in the near neighbourhood of the Aleutian Islands; but, especially in winter, the somewhat longer voyage, south-west from San Francisco and then along a line of latitude, is preferred, since the northern course carries the ship into the teeth of the Westerlies. The course from Vancouver is along part of the Circle from Panama to Yokohama. Our charts show the outward as rather farther north than the homeward course, and a slight difference between winter and summer; the maps showing ocean currents and the direction and strength of the winds in the neighbourhood of the islands at the two seasons may perhaps suggest an explanation.

If we continue our Great Circle past Yokohama, we find that it skirts the coasts of Asia and brings us ultimately to a point between Hongkong and Manila. Thus, the shortest way across the Pacific is to go round, as our distance figures have already shown. As a matter of fact, Manila is about the same distance from Panama either by way of San Francisco and Yokohama or by way of Honolulu and Guam, that is, across the breadth of the Pacific. This seems to contradict our previous statement. The explanation lies in the fact that the course by San Francisco is not a true Great Circle, and therefore not the shortest possible. The difference between the various routes is not more than 500 miles, so that other conditions are likely to determine the choice. Cargo ships from New York are likely to adopt the round voyage —Panama, San Francisco, Yokohama, Shanghai, Hongkong, Manila—owing to the great advantage of calling at these ports *en route*, since the only considerable quantity of cargo on the southern route is sugar from Hawaii, on the return voyage to the United States. We have noted already that eastern Asia is not a source of very heavy cargoes, so it is possible for ships to go out by Panama, with cargoes from eastern North America, and to return through the Indian Ocean and the Suez Canal, picking up on the way raw materials and foodstuffs for Europe.

We are brought once again to the problem of competition between western Europe and eastern North America, in relation to the routes sketched above. We must expect to find that many ships which at one time used the Cape route from the New York area to Australasia will prefer that by Panama. The saving in distance, and therefore

in expense, is likely to be more than enough to offset the loss of South Africa as a calling-point. These ships are carrying American goods to Australasia, and the cost of carriage, and therefore the selling-price, ought to be reduced. The extent of such reduction depends partly on the weight of the Panama Canal dues, together with the cost of fuel for the whole voyage. There is American coal at the start, and again at Colon, which is thus to some degree the equivalent of Port Said. At Panama there is also American oil. Any reduction on the cost of carriage will affect competition in the Australasian markets. Some of the American goods exported to this region, such as kerosene, timber, tinned fish, do not compete with the products of the United Kingdom or do not use the Canal; but a large part, such as iron and steel, machinery, leather and rubber goods, textiles, and miscellaneous manufactures, do so compete. A reduction of freight rates should tend to increase the advantage of American goods in this competition.

On the return journey, the economic conditions are somewhat different. Australian imports of merchandise from eastern United States are about three to four times the exports to that region in value. We find in these exports fair quantities of wool, hides and skins, etc., but not enough to employ all the ships on the return journey. The saving in distance will not alter the essential conditions of exchange. Ships outward-bound from New York to Australia may approach from the east instead of the west; but, in default of direct return cargoes to the United States, they must adopt the round-about voyage, through the Indian Ocean, loading goods for Europe and crossing the Atlantic in ballast. The trade of eastern

Canada with Australia does not seem to offer compensation for the want of balance with the United States, since the imports into Australia from Canada, though small relatively, are also three to four times the exports in value.

We have still to consider the possibilities of New Zealand, which lies on the new route from the United States to Australia and therefore can be worked in conjunction with it. The imports into New Zealand from the United States are about three times the exports to that country in value, while about four-fifths of these imports compete with similar goods from the United Kingdom. The return trade in wool, hides and skins, butter and flax, is not sufficient to employ the available ships, and these may load for Europe, or seek other sources of return cargo in the islands of the Pacific or the Indian Ocean. The trade is mainly in British ships, and, as we might expect, the direct entries from the United States by far exceed the clearances.

Our next object is to compare the Panama Canal with the Suez as a factor in the world's trade, on the basis of the traffic in 1927, its origins and destinations. We have already touched on this incidentally in relation to British trade with Australasia.

The total net tonnage traversing the Panama Canal in both directions in 1927 was 28·6 millions. This is on the basis of Panama Canal measurement which is roughly comparable to the similar Suez Canal measurement. Of this total over 8·0 was under the British and over 11·0 under the American flag. This is in marked contrast with the Suez figures.

As in the case of the Suez Canal, the movement of

shipping was not evenly balanced : over 15·0 was from Atlantic to Pacific and over 13·0 from Pacific to Atlantic. Of the 15·0 tons, nearly 6·0 were in ballast, over two-thirds of the latter being empty oil tankers. The figures for British ships only were approximately 4·7 and 3·7. This is on the Panama measurement, but on the British system we may say that about 3·8 net tons of ships entered the Pacific but only about 3·0 left by this route. The most likely exit for the remainder was the Suez Canal, where the character of the movement, as we have seen, was reversed.

The explanation of the movement of shipping is to be found in that of cargo. Of this, 8·4 tons only were carried from Atlantic to Pacific, as compared with 20·7 in the opposite direction. Here is, at first sight, another parallel to the conditions of the Suez Canal, but the comparison must not be pressed too far, since, while the whole of the Suez traffic is international, a large part of that by the Panama is American intercoastal.

Let us consider first the broad distribution of the traffic as a whole. Of the traffic from Atlantic to Pacific, two-thirds, approximately, originated in the United States and only a quarter in Europe. Except for a little from eastern Canada and South America, the remainder may be labelled " local " to the Caribbean and Central America. The total stream of traffic divides on reaching the Pacific: about forty per cent. to western United States, twenty per cent. to Asia, fourteen per cent. to South America, and seventeen per cent. to Australasia, the remainder, about ten per cent., being local. Of the stream of traffic to western United States, three-quarters is merely American intercoastal ; that is, about a third of the traffic

originating in the eastern United States is national and two-thirds international.

Let us now examine the much larger traffic, that from the Pacific to the Atlantic. Though the share of the United States is not quite so great, it still predominates. The percentages of the traffic are, from western United States sixty, from South America twenty-two, from Canada eight, from Australasia three, and from Asia two and a half. In other words, the traffic in this direction originates for the most part on the American continents, while the trans-Pacific movement is of distinctly minor importance. On reaching the Atlantic, nearly sixty per cent. of this traffic is directed to the eastern United States and about thirty per cent. to western Europe. Of the traffic originating in western United States, about two-thirds is merely intercoastal. We may then say, broadly, of the Panama Canal in relation to the United States that it is of about equal importance in the home and foreign trade of that country. It has an important national, in addition to its international, aspect. In this it differs vitally from the Suez Canal. Even from the purely international aspect, the Canal carries to the Pacific considerably more traffic from the United States than from the whole of Europe. In the reverse direction, it is true, nearly twice as much traffic is bound for Europe as for the United States, but over half of this traffic originates on the west coast of the latter country. The conditions of the Panama Canal are clearly peculiar and can be understood only by some analysis of the actual goods carried in both directions.

Let us consider first the 8·6 million tons weight of goods carried from the Atlantic to the Pacific. Of this

2·5 million are iron and steel, machinery and railway materials, but half at least of this is intercoastal. Of the remainder, about ·3 tons are shipped from the United States to the Far East, ·15 tons to South America, and ·05 tons to Australasia; while European exports are represented by ·15 tons to South America, ·15 tons to Australasia, and ·20 tons to the United States and Canada. Miscellaneous manufactures, not specially defined, account for another quarter of the trade. Nearly half of this, again, is intercoastal, and the rest is made up of United States trade to the Far East ·15 tons, to South America ·13 tons, and to Australasia ·22 tons; while Europe sends nothing to the Far East, ·20 tons to South America, ·15 tons to Australasia and ·10 tons to west and north America. Again we notice that the trans-Pacific route is unimportant, relatively, for European trade.

The other half of the trade can be dealt with in terms of specific commodities. Of about ·6 tons of refined oil from the United States traversing the Canal, ·25 tons are destined for Australasia and ·26 tons for the Far East; of American phosphate, ·10 tons are forwarded to the Far East and ·05 tons to Australasia. Other important American exports are ·35 tons of cotton to the Far East, ·1 tons of sulphur to Australasia, ·1 tons of ammonia to the Far East, and ·1 tons of automobiles and accessories to Australasia. The only European trade of any volume, in addition to the items mentioned above, consists of ·12 tons of cement to South America and a little to North America. The figures are based on the fiscal year 1926–27, but give a sufficiently accurate picture of conditions in the calendar year 1927, as the totals are almost the same.

The picture of trade from Pacific to Atlantic is widely different, but more easily grasped, as it consists largely in the movement of a few bulky raw materials and foodstuffs, with fairly defined sources and destinations. The largest item, over a third of the total by weight, is oil in one form or another, mostly from the western United States. Crude oil alone amounts to 4·0 million tons. Of this 2·5 tons are intercoastal, ·25 from the United States to Europe and ·35 from the United States to Canada. In addition, South America sends ·3 tons to the United States and the same quantity to Canada. The remainder moves locally in the Canal region. Of the 3·0 million tons of refined and fuel oils from the United States, two-thirds is intercoastal, ·7 is destined for Europe, and the rest is distributed locally in the Canal zone, the West Indies, and eastern South America. So far as the oil traffic is concerned, the main interest is American and more particularly that of the United States. Europe is concerned, directly, only to a minor degree, though some of the oil after passing through the east coast refineries may ultimately cross the Atlantic.

Next in bulk is lumber, with over 3·0 million tons. Two-thirds of this, again, is United States intercoastal, while in addition Canada sends ·4 tons to the United States and nearly ·1 tons to eastern Canada. Europe receives by this route only ·15 tons from the United States and ·1 tons from Canada. There is also a small trade with the West Indies and South America.

The other bulky raw materials using the Canal are iron and tin ores, copper and nitrates. The iron ores of South America, 1·4 million tons, are entirely for the United States, while the 1·2 tons of nitrates from Chile

are about equally shared between that country and Europe. The like is true of the ·2 tons of South American copper, while Europe receives also some copper from the western United States, together with some lead from Canada and tin concentrates from Bolivia. More important perhaps to Europe is the growing movement of grain: ·7 tons of wheat from Canada and the same from the United States, together with ·25 tons of barley from the latter country and ·1 tons from South America. Europe also receives ·2 tons of sugar from South America by this route. The Canal, then, has ousted the Cape Horn route in the trade between Europe and Chile or Peru but at the same time has brought the eastern United States much nearer to these markets.

There remains an important item in the American trade, about ·7 tons of canned, fresh, and dried fruit and ·2 tons of canned fish from western United States. About half of this trade, again, is intercoastal and the remainder for Europe.

We have considered above the more important items entering into the commercial intercourse of the two sides of the American continent, and can see, broadly, how the predominant share of the United States is constituted. We have noted also her exports to the Far East and Australasia. There remains the return trans-Pacific trade, which is relatively small. Apart from a few miscellaneous goods from the Far East to the United States, together with sugar from Hawaii, it consists in the main of ·1 tons of wool from Australasia, mostly to Europe but a little to the United States, and about ·25 tons of " cold storage " goods, meat, butter and cheese from New Zealand to Europe, a traffic which formerly

used the South American route, a route little inferior to that by Panama.

We are now in a position to estimate the importance of the Canal to Europe, that is mainly to the United Kingdom, and to the United States. It provides Europe with a somewhat better route to South America than the Straits of Magellan, and offers what is in effect a new connexion with west and north America and more particularly Canada. Its most important function, however, is to facilitate the movement of bulky goods between the eastern United States and the western coasts of both North and South America. It provides eastern North America also with a much improved and shorter route to parts of the Far East and most of Australasia, but only affects, on any considerable scale, the intercourse of Europe with New Zealand. In the last case, though there is some gain, it is not excessive. The Panama Canal seems to be as definitely American in function as the Suez Canal is European.

We began our survey of the effects of the new canal by a comparison of distances, as measured on the Globe; we are now in a position to realise, to some extent, the many conditions which may modify conclusions based on the argument from mere distance. The problem, simple at first sight, grows in complication and difficulty with every closer approach to concrete facts. The geography which avoids the concrete, and is content with generalisations, stops short of its full and proper development, and is but an unsatisfactory instrument of investigation.

CHAPTER V

NORTH AND SOUTH AMERICA

WE will now turn our eyes from East to West, from the Indian Ocean and the broad Pacific to the narrow Atlantic. Here we shall find not only the greatest movement of shipping but also the most marked contrast between the conditions of the outward and homeward voyages. We must remember that on the west side of the North Atlantic both industry and agriculture are well represented, while the Atlantic regions of Central and South America are agricultural or pastoral and producers of raw materials.

On a large scale, from the point of view of the organisation of shipping, the Atlantic is one and indivisible, just as, on a smaller scale, the North Sea and the Channel. The full meaning of this statement will appear later. Let us begin with the simple facts and figures. In 1927, nearly 8·9 tons of steamships under the British flag cleared with cargo from ports in the United Kingdom for the eastern and southern coasts of the United States, together with eastern Canada and Newfoundland. To this tonnage moving westward with cargo must be added about 2·4 tons in ballast. New York, with Boston and Philadelphia, receives eighty to ninety per cent. of the total cargo and passenger traffic from the United Kingdom, while Galveston and New Orleans, with the Gulf and southern Atlantic ports are the destination of two-thirds of the tonnage in ballast.

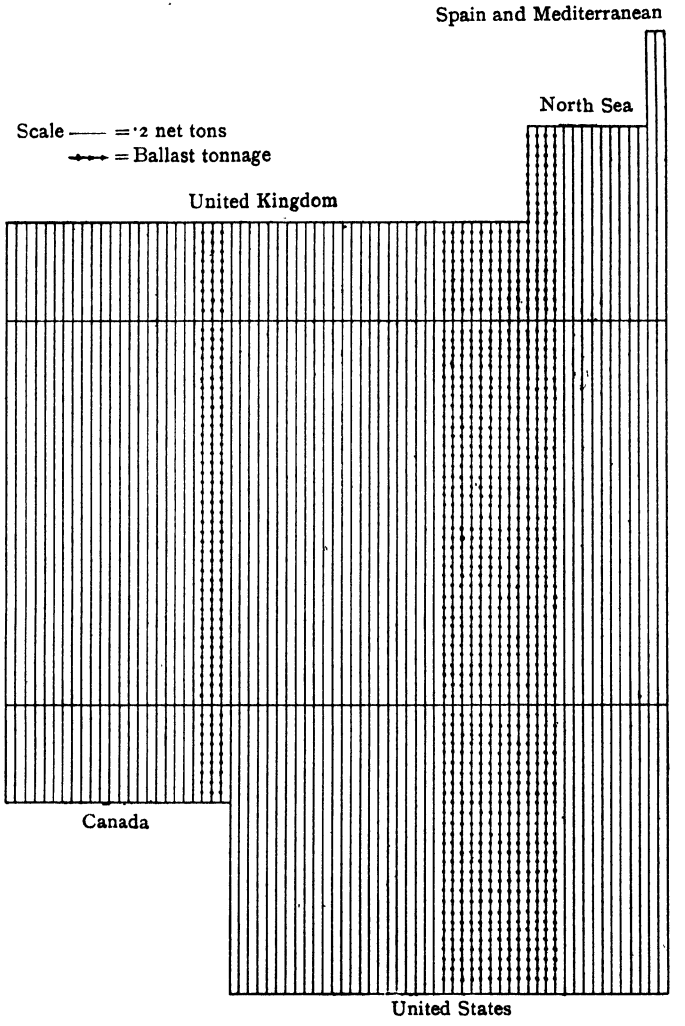


FIG. 7.—NORTH ATLANTIC.
British steamships, outward.

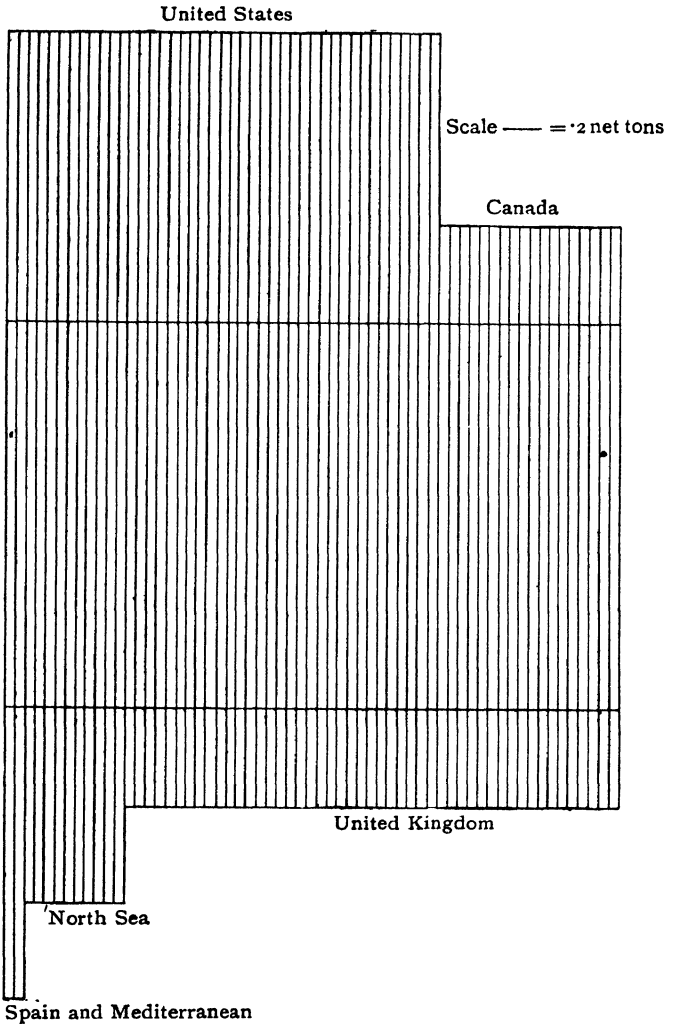


FIG. 8 —NORTH ATLANTIC.
British steamships, homeward.

This is far from representing the total activity of British shipping in the North Atlantic, since we must take account of ships carrying cargo of some kind from continental ports to the United States. The quantity is difficult to estimate, since we must correlate three groups of statistics, American, Canadian and British, while each of these has its own peculiar difficulties. The total movement of British shipping from continental ports to the United States may be estimated at about 1·8 tons, of which about a quarter is from the Mediterranean, the Spanish Peninsula and France, and the remainder from the North Sea. With the addition for Canada of over 1·25 tons, we may estimate a total westward stream of over 14·0 tons with cargo and in ballast. The tonnage entered at our ports, mostly carrying cargo, is 10·7, and to this must be added about 2·7 tons bound for the Continent with cargo.

We seem to have lost about ·75 tons of British ships in the western Atlantic, that is they fail to return direct either to Great Britain or to continental Europe. The conditions are a reversal of those of 1912, when about 1·0 tons returned from North America to Europe of which there was no trace in the direct westward stream of traffic. We may look for part of this balance in the South Atlantic, while part of it may find an outlet through the Panama Canal and arrive in Europe after going round the world. We have noted above that over ·75 tons of British ships, from all sources, traversed the Canal from Atlantic to Pacific but failed to return by that route.

Let us now examine the figures for continental Europe more closely. The countries which show, in their relations with North America, a much larger inward than outward movement of tonnage with cargo are Germany,

Denmark, the Netherlands, France and Italy. The reason is clear; these all depend on America for large quantities of foodstuffs, raw materials or special manufactures, while the United States, owing to its own industrial resources, aided by a high tariff, takes in return comparatively small quantities of European manufactures. It is to this double character of American economic organisation that the peculiar character of the shipping movement of the North Atlantic is mainly due. North America has a surplus of foodstuffs and raw materials, in addition to her manufactures; continental Europe has for the most part a surplus only of manufactures, which do not occupy so much tonnage space. Hence the smaller outward clearances of shipping with cargo, and the correlative fact that, from the countries mentioned, as also from the United Kingdom, there are large clearances westward in ballast. The import trade of Canada, where the conditions of exchange are rather different, is not large enough to affect seriously the general balance in the North Atlantic.

There are certain exceptions to the rule as to the exchange relations of the United States with European countries. In spite of her own vast resources, North America imports from Europe and the Mediterranean large quantities of some raw materials necessary for her industries. Such are the wood-pulp of Sweden, Norway and Finland, the iron ores of Sweden and North Africa, pyrites from Spain, china clay and anthracite from Great Britain, manganese ores from the Caucasus, and fertilisers from Germany. These provide many full cargoes moving westward, but the balance is still weighted heavily in the other direction: North America sends to Europe a far greater volume of

goods than it receives from that region. We can give more precision to this statement by an examination of the statistics of the United Kingdom, which will tell us broadly what goods are carried by the ships in the two opposite directions.

The export of British products to the United States may be estimated at 1·0 m. tons, two-thirds consisting of clay, coal and minor raw materials, and the remainder being miscellaneous manufactures. To this, however, must be added at least another ·25 m. tons, consisting of such goods as wool, cotton, rubber, tea, and the many minor tropical and subtropical products collected in our markets. Exports to Canada and Newfoundland amount to about 1·6 m. tons, over half of which is coal; so that the total moving westward from Great Britain on the North Atlantic route is well under 3·0 m. tons. The load-index,* corrected for foreign ships, works out at about ·13, so that the total mass of shipping is loaded only to an eighth of the theoretical capacity which we have assumed. It is true that we must make an enormous deduction from the available tonnage for the repeated voyages of the great mail and passenger boats, since their cargo-capacity is comparatively small; but, as a similar deduction must be made on the return voyage, the comparison between the outward and homeward movements is not vitiated. A further correction must be made for the emigrant traffic from Europe, which gives additional employment to outward-bound shipping and compensates to some degree for the lack of cargo. The outward passenger traffic to the United States and Canada from the United Kingdom

* Corrected for passengers, the outward index becomes ·27 and the homeward ·70.

amounted, in 1927, to about 270,000, while the homeward traffic was only about 170,000. Whatever the unknown x which we apply as a correction, the index for westward-bound ships remains extremely low, and the direct voyage must be to the last degree unprofitable, so far as the carriage of goods alone is concerned.

The return cargoes from the United States and Canada amount to over 16·0 m. tons, of which about three-quarters may be credited to the United States. This figure, however, is abnormal, as it includes a large quantity of coal forwarded to Great Britain in consequence of the stoppage in British production in the previous year. The load-index, with allowance for foreign ships, works out at ·60, but as many of the foreign ships calling do not land much cargo at our ports, the index for British tonnage may be in the neighbourhood of ·65. This seems low for a route on which vast quantities of bulky goods, such as grain, oil, cotton and timber are carried, and it would be lower still if we omitted coal; but the figures give some idea of the correction to be made for the great number of passenger liners. In any case, the great contrast between the outward and homeward loading remains, and the westward goods traffic by itself is likely to be unprofitable. Apart from statistics of trade, the vast stream of ships in ballast is sufficient proof of the unfavourable conditions of transport. On some of the trade-routes, our heavy surplus of coal for export gives an advantage to the United Kingdom over continental competitors in the outward loading of ships; in the North Atlantic this advantage hardly exists, though a moderate export of anthracite has developed in recent years.

The employment of homeward shipping, from the

United States and Canada alike, is due primarily to the transport of vast quantities of grain and flour, with smaller quantities of timber, pig products, sugar and metals; while, in addition, from the United States we import nearly half a million tons weight of cotton, enormous quantities of mineral oil, much oil-cake, copper and lead, together with iron, steel, machinery, and miscellaneous manufactures. The same is true of the Continent. As against this, Europe sends to North America very moderate amounts of raw materials and miscellaneous manufactures. In the light of these facts, the want of balance between outward and homeward cargoes in the North Atlantic and the unprofitable character of the westward voyage may be readily appreciated.

Is it possible to change these adverse conditions so as to approach nearer to a balance in the movement of goods across the Atlantic? The answer to this question involves the consideration of the character of the goods moved. An increase in our export of manufactures and perhaps coal to Canada is possible; to the United States it is hardly likely. The balance can perhaps be redressed more readily by a reduction of the movement eastward. Where can such a reduction be looked for? The surplus of foodstuffs available for export from the United States will doubtless continue to decrease; but, in so far as compensation is found in Canada, the employment of shipping will not be affected seriously. The balance may also be affected, to a minor degree, by a reduction in our imports of manufactured goods from the United States; but the two chief items in which changes might be wrought are the important raw materials, cotton and mineral oil. The import of these commodities alone into the United

Kingdom requires over four million tons of shipping space. The further substitution of supplies from the Old World would alter favourably the character of the movement across the Atlantic, since the cotton and oil-producing regions of the Old World offer, as a rule, far better markets for our products than the United States, and therefore better conditions for the exchange of goods, in which lies the essence of economical transport.

So far we have considered only the employment of British steam shipping and the needs of the trade of the United Kingdom, but we must also have some idea of the relations of North America with Europe as a whole. In the year 1927, we find recorded by the United States a total entry from Europe, of steamships under all flags, amounting to 24·5 net tons. About a quarter of this was in ballast. The clearances, nearly all with cargo, were about 23·5 tons. Strictly comparable Canadian figures are not available, but those for the year ending March, 1927, show a similar, though smaller, excess of entries from Europe. The surplus of tonnage must have returned to Europe by other routes, either by the South Atlantic or around the world, since the movement by Panama to and from the West coast seems roughly to balance. These figures sufficiently indicate the general character of the North American trade: in the heavy homeward traffic it resembles that of India, but it is sharply contrasted both in the absence of the heavy outward movement of manufactures and coal on the route and in the exceptional size and importance of the mail and passenger traffic. In one respect it is peculiar. The normal traffic in passengers is to and fro; but the emigrant traffic to North America, involving a net move-

ment westward of over a hundred thousand passengers in the year, is rather to be compared to the export of coal in its effect on the balance of shipping.

Our next task is to give reality to our route by locating it on the chart in its physical surroundings. We must realise, in the first place, that Canada is on the way to the United States. The distance from Liverpool to New York is just over 3,000 miles; from Liverpool to Halifax it is about 500 miles shorter. Moreover, Halifax lies on the shortest sea route from Liverpool to New York, though the route actually used by the great trans-Atlantic companies is slightly longer and does not touch Halifax. Montreal is distant from Liverpool about 2,800 miles; while Port Nelson, on Hudson Bay, is also slightly nearer to us than is New York. Thus the interior of Canada, in summer, is actually nearer to us than much of the eastern coast of the United States. A globe will show that the Great Circle from Cape Clear to New York passes near to Halifax, and thence partly over land. It is a parallel to our Great Circle from Panama to Yokohama.

The trans-Atlantic, like the trans-Pacific route, varies its position, though from a different cause. Owing to the danger from floating ice, the route lies farther south in spring and summer than in autumn and winter; but all routes knot up in or branch off from a small area south-east of Cape Race, in the neighbourhood of the "Banks." A Great Circle, from the north-west corner of Ireland to Colon, taking us through the Windward Passage to Jamaica, passes near to this knotting-up point. To reach New York, we must branch off from the Circle, but the difference to Colon direct or by way of New York is only a matter of a few hundred miles, so

that we may consider New York as for all practical purposes a calling-point on the route from this country to the Panama Canal. Now we may understand why the breadth of the Atlantic, or something less, represents the gain to New York, in its intercourse with the Far East, through the opening of the Canal. Instead of diverging to New York, we may continue from the knotting-point on a Great Circle which skirts the coast of the United States, passing the important coaling-point of Newport News at the mouth of Chesapeake Bay, together with the Atlantic cotton ports. The conditions are the reverse of those on the Suez route, where the ports of the United Kingdom are within reach of the traffic between America and the East. We have noted already some of the results of this reversal.

We have still to deal with a small line of traffic which follows in part the old sailing route to North America, that by way of the West Indies and the Caribbean. This route belongs essentially to the North Atlantic, since the Caribbean is equally the terminus of the routes which skirt the American coast southwards. The movement of British steam shipping with cargo to the West Indies and the Central American mainland amounts to about ·7 tons, while the return traffic is more than double. There is, however, an outward movement of nearly 1·0 tons of ships in ballast, so that there is a rough balance of total tonnage in each direction. This large proportion of tonnage in ballast must be related to the type of cargoes carried. Some of this traffic may be worked on a semi-circular route, the voyage terminating northward at New York or Montreal and the ships returning again by way of the Indies. Much of the island trade is inevitably

with the neighbouring mainland, rather than across the Atlantic, and British ships take their share in what may almost be termed a coasting-trade of the American area. This semicircular route is a variant of the much older sailing route, which was across the Atlantic by the south, taking advantage of the Trades, then northward along the coast of America, and then eastward to Europe by the northern route, with the aid of the Westerlies, thus completing the circle. There is the same kind of circular movement in the Atlantic as a whole at the present day, but on a much larger scale. It is a movement of steamships, and depends, as we shall see when we deal with South America, not on conditions of weather but on the availability of cargo in different parts of the area.

Our export of goods to the West Indian area, amounting to some ·4 m. tons, is of the usual character ; about a quarter consists of coal. The load-index is low, only ·27, with allowance for foreign tonnage. The return traffic in oil, sugar, bananas, asphalt, and miscellaneous vegetable products may be estimated at about 3·5 m. tons, bananas occupying much of the space and oil giving full cargoes. This gives a load-index of about ·85, after allowance is made for foreign shipping. The homeward traffic, as so often, seems to be the more profitable. The smaller island traffic is difficult and somewhat costly to work, since many small parcels of cargo must be picked up from various ports, with consequent delay and expense. In the conditions of the organisation and distribution of traffic the route differs somewhat from the great trunk lines which we have discussed ; the nearest resemblance to some of the conditions is perhaps to be found in the West African trade. Our figures, too, deal only with the

trans-Atlantic trade ; a full picture of the transport conditions must include the local relations with the neighbouring continent of America. The imports into the United States from this region include large quantities of bananas from the mainland of Central America, with smaller quantities from Cuba and Jamaica ; sugar in large quantity from Cuba ; coffee from the mainland ; cacao beans, oils and asphalt from Trinidad ; oil, copper and lead ores or metals from Mexico, with much iron ore from Cuba. Canada also imports sugar from the West Indies on a considerable scale. The exports from the United States consist largely of coal, oil in various forms, flour and meat, with many miscellaneous manufactures of iron, steel, textiles, and clothing. The export of coal and coke alone, to the Caribbean area, especially Cuba, Panama and Mexico, amounts to over 1·5 tons weight, while the import of sugar from Cuba is over 3·25 tons. Competition in the coal business is affected by relative distance, while we have no oil nor foodstuffs to export ; hence our inferior position in the markets of the Caribbean.

The interchange of goods, and therefore the movement of shipping, between Europe and South America is in marked contrast with the interchange between Europe and North America. This statement, at first sight, may give us pause. Both continents receive our manufactures, and we often emphasise the fact that they supply us in return with large quantities of grain and meat. Where then are we to look for the contrast ? Let us examine the South American trade before attempting to answer the question.

In the first place, to obtain a general view, we must add together the figures for Brazil, Uruguay, and Argen-

tina. In 1927, about 4·3 tons of British steamships cleared from our ports for South America, thus interpreted. Of this total, about twenty per cent. was in ballast, that is, either empty or not carrying British goods. On the other hand, the tonnage entered from the same area amounted only to 3·1, of which some eight per cent. again was in ballast. Here we have nearly 1·25 tons of shipping, which must either go outside the Atlantic, after discharging cargo in South America, or must return to our shores from other countries within the Atlantic area. The movement of foreign ships from our ports is similar; the clearances are double the entries.

How can this great contrast between the outward and homeward movement be explained? Let us consider the cargoes carried. In round figures we may estimate our total exports to the area as 7·5 m. tons, and our load-index, adjusted for foreign competition, is about ·75, This is unusually high for a long export route, but the cause is not far to seek. About eighty-five per cent. of the total carried consists of coal, which normally provides full cargoes in bulk. Iron, steel, machinery and some cement account for the remainder of the heavy cargo, and there are the usual minor manufactures, more particularly textiles. The return traffic, largely cargoes of grain and meat, with some linseed and wool, amounts to about 6·3 m. tons; and, if we allow for a small quantity of foreign shipping engaged in the trade, the load-index is about ·90. Nearly all the cargo is from Argentina.

The South American traffic is peculiar, in that, on the outward as well as on the homeward voyage, the ships are largely engaged in carrying bulk cargoes and economical loads. The movement in ballast, in so far as it is

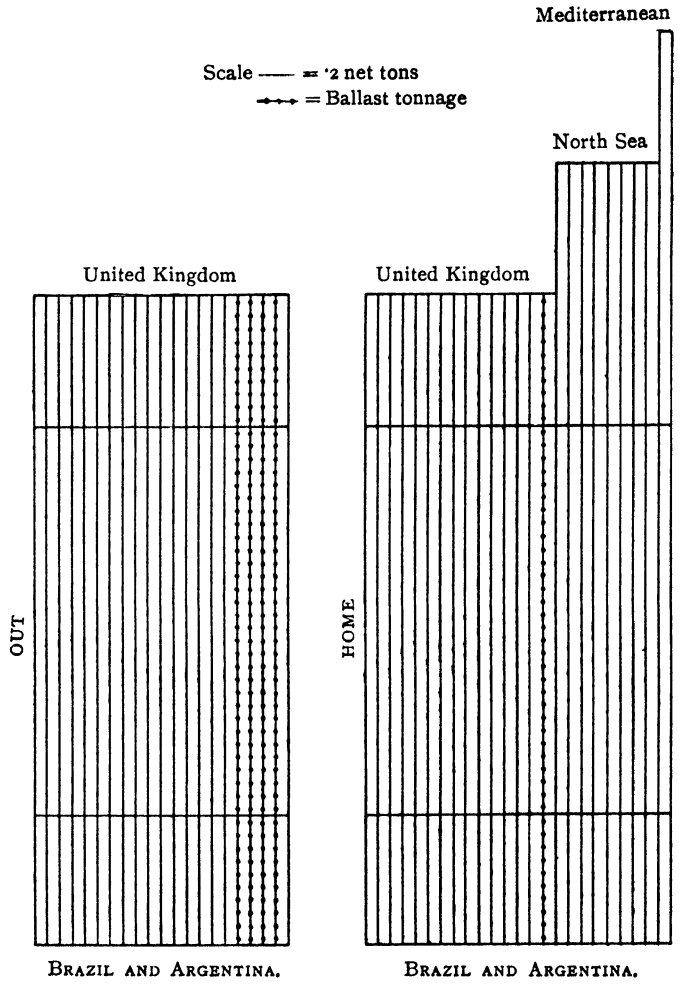


FIG. 9.—SOUTH ATLANTIC.

British steamships, outward and homeward.

real, and not merely a figment of our statistics, may be accounted for by the seasonal character of the Argentine export trade. It is not possible to have on the spot, in every month in the year, exactly the amount of ships needed to move the goods coming forward. Coal may be produced at a uniform rate, but not so crops. If there are too few ships at any time, and rates are high, ships may go out from Europe in ballast; if there are more ships than cargo to fill them, or, what is perhaps more likely, if there is too much cargo for the capacity of the port organisation, ships may be compelled to return in ballast. The North American grain crops tend to come forward at a more even rate, partly owing to better internal market organisation. Possibly the much-abused speculative dealers in the wheat markets may claim a little of the credit for this.

The outward movement in ballast is somewhat large and has increased in recent years; this is due to something more than lack of organisation. The displacement of British by American coal, or of both by oil in these regions, together with the growing European demand for Argentine products, tends to increase, relatively, the volume of homeward traffic and the demand for tonnage. The surplus of 1·25 tons noted above is permanent, in so far as it depends on the essential character of the trade. This surplus may seek other markets where return cargoes to Europe are to be found, but a large part clears from South America with cargoes for European countries other than the United Kingdom. We shall trace it ultimately to our shores by way of continental ports.

Our exports to Brazil amount to nearly 2·5 m. tons; of this, however, about eighty per cent. is coal, the

remainder being made up of iron and steel, machinery, cement, textiles and minor manufactures. On the other hand, the imports, chiefly raw sugar, cotton and cotton seed, bananas, with a little rubber and meat, amount to well under ·2 m. tons. Great Britain is not a market for the chief Brazilian export, coffee, and imported no manganese ore from Brazil in 1927. Evidently the ships carrying coal outwards will not find return cargoes in Brazil.

If we turn to the River Plate we find far different conditions. Exports to Argentina and Uruguay amount to nearly 5·0 m. tons, of which about eighty-five per cent. again is coal or coke. The imports of grain and flour, meat, wool, linseed, raw sugar and minor products are about 6·5 m. tons. Here is possible employment for some of the surplus coming from Brazil, though we must not forget that tonnage specially adapted for cold storage is not fitted for carrying coal in bulk. If we eliminate cold-storage traffic, we find that the space requirements of coal outwards and grain and other tramp cargo homewards to Great Britain are about equal; but there remains the traffic to continental Europe, with no corresponding outward movement. This may provide for the combined Brazilian and Argentine surplus of tonnage not returning direct to Great Britain. There is, however, an alternative: part of this surplus might move northward to the other great source of eastward moving cargoes, the Atlantic coast of North America. Let us see if the statistics of the United States give any assistance in this matter. These record ·4 net tons of British ships entered with cargo from Brazil and the River Plate and nearly the same amount in ballast, as against 1·2 cleared, all with cargo.

The entries with cargo are equally divided between Argentina and Brazil, while the tonnage in ballast is entirely from the River Plate. The net result is to leave in the South Atlantic another ·4 tons of British shipping seeking employment, so that the total which must either return to Great Britain in ballast or viâ continental ports is now nearly 1·7 net tons. Figures for all ships on this route show a similar movement, and it seems that the volume of exports from the United States to Brazil and Argentina is greater than the volume of imports from these countries. Let us consider the factors in this trade, eliminating oil which is carried southward in tank ships which return for the most part direct to the United States in ballast and do not affect the balance of movement of that type of ships which we are considering.

The main constituents in the southward traffic are ·6 tons weight of coal to Brazil and Argentina, large quantities of flour to Brazil, together with machinery and manufactures of all kinds to both markets. In return, we find coffee, cacao beans, rubber and manganese ore from Brazil, together with moderate quantities of wool, hides, linseed and quebracho from Argentina. The difference, though not excessive, seems to be in favour of the exports, and we find, if we consider all ships on this route, that there is also a considerable excess of clearances, though not so large as that in British ships alone.

There remains still another comparatively small flow of shipping to be dealt with, before our review of the Atlantic traffic is complete. About ·6 tons of British steamships cleared in 1927 from the United Kingdom with cargo for the west coast of the Americas. Two-thirds of these were bound for Chile, Peru, Ecuador, and

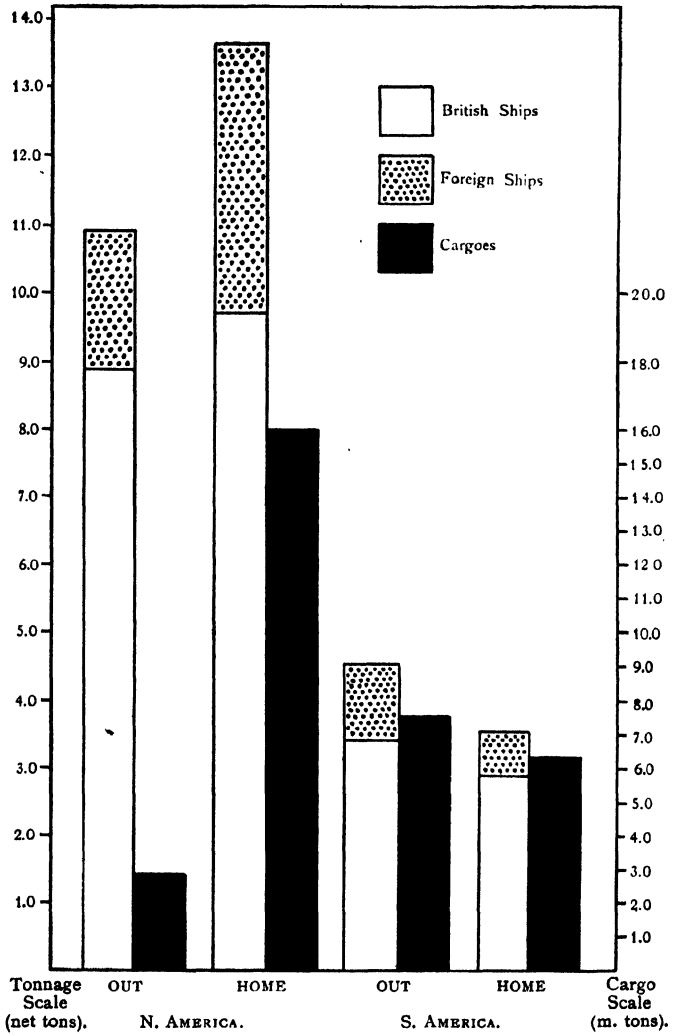


FIG. 10.—NORTH AND SOUTH ATLANTIC.
All ships with cargoes, outward and homeward.

Central American States; the remainder for the Pacific coasts of the United States and Canada. In addition, about ·7 tons were cleared in ballast, nearly all to North America. The entries are ·8 from North and ·4 from South America, and the odd ·1 tons, which fail to return direct, are likely to be found carrying cargo to continental Europe. Nearly all the above are viâ Panama, since steam has now replaced the former sailing traffic round the Horn.

Our exports to Chile amount to about ·25 m. tons, of which coal constitutes over half, and the rest is made up of iron and steel, machinery and textiles. The export to the remainder of the west coast of Central and South America is only about ·15 m. tons, and the load-index for the three South American States works out at about ·4, after correction is made for foreign ships.

Now let us look at the shipping which carries return cargo to the United Kingdom. Our chief imports from this side of South America are cotton, nitrates, sugar and metals, with some grain from Chile and bananas and coffee from Central America, the whole not far short of ·8 m. tons; while the shipping entered is ·5 net tons. This gives an index of ·8, double that for the outward voyage.

The combined stream of traffic to and from the western coasts of North and South America is now controlled by the Panama Canal. Valparaiso is 1,500 miles nearer to Liverpool by Panama than by the Straits of Magellan, and even vessels with full cargoes of coal or nitrates seem to prefer the Canal, in spite of the dues. The North American trade, under the influence of the Canal, shows a marked growth, and over the whole region the Canal has hastened the disappearance of the sailing ship.

We have discussed above the relation of the Canal both to the local trade of the American continent and to the intercourse of America and Europe with Australasia and the Far East. Let us now consider, with the aid of a globe, the stream of shipping between Europe and South America.

All routes, both South American and African, knot up in the neighbourhood of the Canary Islands. We started our survey by tracing a Great Circle from the Channel to the Canaries; a continuation of this will just miss the shoulder of Brazil and then carry us along the coast of our South American area, while a Great Circle through Madeira will carry us to Pernambuco. Thus the Island group lies on the natural route not only to South Africa and Australasia but also to eastern South America and formerly to the Pacific.

The position of the Islands has an economic as well as a physical significance. We find that a considerable portion of the wheat and maize exported from Argentina is not for a fixed destination but "for orders." The same is true of grain ships from Australia coming by the Cape. Ships, too, are cleared for Las Palmas or Tenerife, their ultimate destination being left uncertain. The Islands are in telegraphic connexion with all the great European trading centres, and the cargoes can be directed to the markets where there is the best demand at the moment. Moreover, as we have seen, in the Islands the ships will find stores of coal, to carry them to their destination, at a much lower price than in South America.

Tonnage statistics are no longer available for the Canaries, so we will look back to 1913. In that year, the tonnage calling, in transit homeward to Europe from

Brazil and the River Plate, was about double that calling on the outward voyage. A ship with a full load of coal outward may steam direct to her destination; while, on the return voyage, there is every inducement to call at the Islands, both for orders and for bunker coal. How far the adoption of oil fuel and wireless may affect this position, it is impossible to estimate.

We will now try to put together a complete outline picture of the tonnage movement in various directions across the whole Atlantic. Taking our standpoint in the United Kingdom, we find that the total clearances, in 1927, of steamships under the British flag to the Atlantic coasts of North and Central America together with the West Indies and the Caribbean were 12·9 net tons. The entries from the same region were about 12·3, leaving a balance of ·6 which did not return to our shores direct. Moreover, there is a small quantity of tonnage in ballast from the Canaries and West African area which crosses the Atlantic westward in search of cargo, after dropping its load of coal. Let us estimate a rough total surplus of ·75 tons for the North and Central Atlantic. To South America the clearances were 4·3, the entries only 3·1, leaving some 1·2 tons to be accounted for. So, we have a grand total on the west side of the Atlantic of nearly two million net tons of British steamships in the American trade which we have traced westward across the Ocean, from the United Kingdom, but which do not seem to return direct to our shores.

The picture is not yet complete. We must add to this total British ships proceeding to South America direct from continental ports and therefore not recorded in our statistics. The figures available to-day for such

ports are not sufficient to provide any estimate of the total of British shipping so employed; it merely increases the surplus available, and that surplus, in view of the North American figures discussed above, must be employed in South American trade with continental Europe and more particularly in the River Plate section. The western Continent draws largely on South American products, and British ships still have a large share in the trade. We can trace this shipping indirectly in our statistics, although these now combine regions which have little in common. From Europe north of the Straits of Dover we find an excess of entries over clearances of British ships of about 3·5 million tons, while the excess in "ballast" tonnage only is considerably larger. We may conclude from these figures that this quantity of shipping, though ultimately originating in ports of the United Kingdom, reached the ports of the North Sea from foreign countries, carrying cargo for the Continent. To the extent of at least 3·5 tons we may assume that the term "ballast" implies empty of all cargo. These ships have returned to our ports to bunker and to load cargoes, more particularly coal, for the voyage across the oceans. We have thus some idea of the working of the round trade of the Atlantic as illustrated in the traffic of the North Sea. It accounts for part, at any rate, of the westward-moving surplus in that region. There is, as we shall see, a similar circuit in the Mediterranean traffic, though less marked than in the period before the Great War.

We must be careful here to note that we are dealing only with the net result of the movement of all shipping, not with the movement of individual ships. The western

Atlantic is a great reservoir, fed by streams of shipping from the United Kingdom, the Continent and Mediterranean. In this reservoir, groups lose their identity, and each return stream may be made up of ships from any or all of the outward streams.

So the circulation is complete, and we arrive at a rough balance, on the assumption that the mass of ships leaving our shores must return within a reasonable period of time; in other words that the tonnage movement out and home must balance, not for a single route, but for the whole system of world routes. Our figures are necessarily arbitrary, for any selected period such as the calendar year, since ships may leave in one year and return in the next. We are dealing in static terms with dynamic conditions; but on the whole our results will not differ greatly whether we select a year ending in December, March or June. The density of traffic on a particular route may vary considerably from month to month, with the variations in local conditions, but the traffic for a whole year as compared with another shows considerable stability. Our load-index is not affected by the monthly changes, except in so far as the supply of tonnage at any moment is badly adjusted to the amount of goods coming forward. The index for the year represents not the actual loading of a ship or group of ships, but the average result of both good and bad organisation and loading on the route.

It is this stability, over a fairly long period, of the traffic taken as a whole, which enables us to assign a special character to a trade route. It is founded on the sum total of the geographical conditions of a region throughout a year, and such conditions on the whole change but

slowly, whereas the conditions from month to month may offer sharp contrasts. A very weighty geographical fact, such as the failure of the harvest over a wide area, is needed to upset seriously the volume of traffic on one of the great trade-routes. We can readily allow for such special facts when once we have fixed broadly our normal conditions.

We may regard the North Sea and the Channel as the great Clearing-House of British shipping both on the eastern and western routes. We have seen, in the case of India and the East, how ships leave the ports of the United Kingdom with manufactures and coal and return with food and raw materials to continental ports. The Atlantic traffic illustrates the same movement on an even larger scale.

On all the great ocean routes the passenger traffic is a disturbing element in our calculations ; our load-index is in part an indication of the conditions of the carriage of goods, in part a measure of the relative importance of passengers and goods in the shipping business. As a broad general rule, we may assume that the business of transport pays, and that loss on goods must be compensated for by gain on passengers, or *vice versa* ; so that the index must be used with caution, especially where the passenger movement outward and homeward shows great inequality. North America offers the most striking instance of the dominance of the passenger element, while in parts of the Indian Ocean and of South America it may almost be ignored. A complete and satisfactory index would involve an elaborate investigation of the space requirements of passengers on various types of ships and routes. By assuming a maximum load of only two

measurement tons for every net registered ton of shipping, we have already applied a general correction, and by noting the relation of passengers to goods on various routes we have a further corrective. In the remaining area to be considered, the passenger element, with certain exceptions, is of distinctly minor importance, and the index as calculated will be found to provide a fairly direct guide to the employment of shipping in the carriage of goods.

CHAPTER VI

THE EUROPEAN COASTING TRADE

WE have seen how one of the most important streams of British shipping passes through the Mediterranean bound for the Indian Ocean. On the way, it picks up a considerable quantity of intermediate traffic, especially in the form of passengers and mails, while, at Port Said, it is joined by an overflow of ships in ballast, ships which have already carried the coal vital to the organisation of the industries and commerce of the Mediterranean area. We must now treat this area as an independent unit, not forgetting, however, its relations with the Oceans outside.

As we draw nearer to the shores of the United Kingdom, we no longer find the comparative simplicity of the distant ocean routes. Conditions of exchange become more complicated ; it is more difficult to track out the movement of shipping, since the work done is spread over a wide group of countries, and alternative routes are many ; statistics are more difficult to interpret, while foreign competition in transport is at its maximum. We must be content, therefore, to draw in somewhat broad outline a sketch of our mercantile activity around the coasts of Europe, though we are helped greatly by the fact that the key to much of the movement of our shipping lies with the one commodity, coal, which we supply in quantity to European countries.

In the Mediterranean, the coal trade goes far to explain

the whole. If we take coal as our guide, we start inevitably with the consideration of Italy, since Italy is, next to France, our largest single market for coal. Here is a country with a population about equal to that of England and Wales, a country developing industrially and commercially, but lacking in the sources of mechanical power. The vigorous utilisation of her water-power and of her small supply of lignite still leaves Italy dependent largely for her industries and transport on external supplies of coal. For about half of these supplies Italy draws on the United Kingdom; the remainder comes largely from Germany, with smaller quantities from the United States, France and the Saar.

In 1927, our export of coal, coke, and manufactured fuel to Italy amounted to about 7·0 tons weight; to this must be added a fair quantity of iron, steel, and machinery, with some chemicals, clay, miscellaneous manufactures and fish. Let us put the total at a round 9·3 measurement tons, of which about ninety-six per cent. was coal. Much of this coal was carried in foreign ships, especially Italian and Greek, with some Norwegian, Spanish, French and German. Italy belongs to the central and eastern Mediterranean area, and the total cargoes to this area, including Italy, amount to about 13·6 m. tons, of which coal constitutes ninety-three per cent. In dealing with a region where the traffic is so largely in coal, that is, with tramp rather than liner tonnage, we may perhaps alter the basis of our calculations and assume the full capacity of two and a half measurement tons for every net ton of shipping; otherwise we shall find these ships carrying far more than the maximum. On this basis, the load-index works out at about ·97 for the whole group of ships,

the high figure being due to the large proportion of full cargoes of coal. On our original basis, the index would have been 1·2. Of the total tonnage, about forty-six per cent. was under the British flag. We must make a

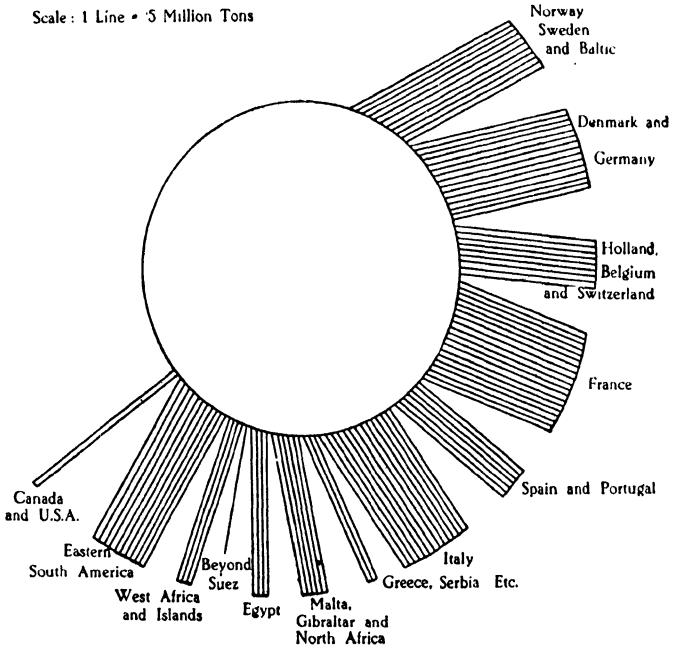


FIG. 11.—EXPORTS OF COAL FROM THE UNITED KINGDOM.
(Including the coal equivalent of coke.)

note of this, since we are concerned mainly with the work done by our own ships.

We see, then, that the coal trade with Italy alone is as large as that with the whole of South America, though it can be worked by fewer ships, since the distance is less

and more voyages can be completed in the year. We must, however, qualify this statement by asking, how do the ships return, and what cargoes are available for their employment? Let us consider the return traffic from this region to the United Kingdom. The total entries of steam shipping in the direct trade are only 2·5 net tons against a clearance of 6·0, while, of this total, forty per cent. is in ballast. Evidently there is an utter lack of balance between outward and return cargoes. Italy has very little to send us in exchange for our exports to her. We receive small quantities of minerals, such as sulphur and marble, with fair quantities of fruit, vegetables, wine and minor agricultural or pastoral products, and a few special manufactures; but we must not forget the possibility of some of these commodities being forwarded indirectly, by rail from northern Italy. Half of our imports from Italy in 1912, as measured by value, reached us through Belgium and France. More important, as providing cargoes, are the cotton, cotton seed and oil cake of Egypt, with the grain and oil of Rumania or Russia. These, with dried fruits from Greece and Turkey, oranges from Palestine and some timber from Serbia, provide return cargoes approaching 3·0 m. tons. Ships returning with cargo are fairly well loaded, but only part of the outward tonnage is so employed. About 1·0 tons return in ballast, as we have seen, while 3·5 tons disappear. We shall find these carrying products of the eastern Mediterranean to continental ports, going through the Suez Canal in ballast, or possibly bringing to our ports cargoes from the western Mediterranean area.

We will now consider the western Mediterranean as a possible source of cargo for the surplus tonnage available

from Italy and the eastern portion. Unfortunately, here our shipping statistics fail us. The figures include France, with its vast Atlantic and cross-Channel traffic. Except for Marseilles, this traffic has nothing to do with our connexions with the Mediterranean. By a geographical contradiction, Madeira and even the Azores are included with this area for statistical purposes, while the Canaries are assigned to the West African region. In the absence of tonnage statistics, let us turn to the goods and consider the conclusions to be drawn from their movements.

Our exports to Malta, North Africa, Gibraltar, southern Spain and Portugal amount to about 7·6 m. tons in all. Spain and Portugal take a few manufactures, but ninety per cent. of this total is coal or coke. On the other hand, the imports do not seem to exceed 4·5 m. tons. There are the ores, phosphates and esparto of the African coast regions and the south of Spain, the fruit and vegetables of Spain, with the pit-props and cork of Portugal. If we include Madeira and the Canaries we merely increase the unbalanced outward movement of coal. Here, then, we find conditions similar to those of the eastern Mediterranean, that is a surplus of outward as compared with homeward cargo ; and it is clear that the homeward voyage is the less profitable on the whole and that some of the ships are likely to return in ballast. The whole Mediterranean traffic has thus a common character ; there is a lack of balance of cargoes out and home so far as Great Britain is concerned. We must not, however, forget the Continent. The North Sea ports are heavy importers of ores and grain, and here is work for part of the surplus of British shipping which carries coal outward but fails

to return direct to Great Britain. We can find indications of this movement in the statistics of those ports, which show a marked excess of arrivals over departures in the Mediterranean trade, though it is not possible to determine the share of British shipping in this trade.

In one respect the Mediterranean trade has changed for the worse: the Black Sea has lost much of its former importance as a source of return cargo. The pre-war movement of goods westward from the Black Sea may be estimated in a normal year at a total of not far short of 12·0 m. tons. The greater part of this was of Russian origin, and the economic collapse of southern Russia has reduced this trade to a small fraction of its former volume. It was the return grain and ore business of the Black Sea region which formerly provided the most profitable opportunity for ships taking cargoes of British coal to the eastern Mediterranean. The export of manufactures to this region was never important from the point of view of the employment of shipping. Even in 1912, a year of poor trade and war conditions which led to the temporary closing of the Dardanelles, about 2·5 net tons of British shipping left the Black Sea well loaded with cargoes for western Europe, mainly for the Continent. The Dardanelles, in 1913, might be placed in the same class as the Suez Canal, as a great artery of homeward traffic for our Merchant Navy, though a much larger proportion of the outward traffic was in ballast, since the Black Sea could not compare with the Indian Ocean as a market for our products.

Though British coal is the main source of supply for the Mediterranean, some coal reaches it from Germany and even from the United States. The only effect of this,

in so far as it is carried by sea, is to increase the surplus of tonnage seeking employment, except in so far as these countries may draw equivalent return cargoes from this region. The essential character of the route remains unchanged, and only a real recovery in the Black Sea area can improve its organisation and restore its former profit and importance for shipping.

We have been dealing briefly with one wing of the coasting trade of Europe. This coasting trade is centred in the North Sea, while the other and smaller wing is to be found in the Scandinavian and Baltic area. This area, unlike the Mediterranean, is not worked as part of the great ocean routes, for reasons both physical and economic, and the character of the trade as a whole has suffered no drastic general change in recent years. On a relatively short route, such as this, we must not expect to find such a careful balancing of cargoes as on the longer ocean routes. A short voyage in ballast may be cheaper than a long wait for a return cargo.

The region is vital to British industry. From the interior of the Baltic comes a large part of the timber necessary for building and mining, with the addition of pulp and paper from Sweden and Finland and ores from Sweden, the whole amounting to well over 10·0 m. tons. Norway supplies over 2·0 m. tons of pulp, timber, ores and granite. Of a different type, and handled differently, is the traffic in bacon, butter, and eggs from Denmark and Sweden. Against the westward movement of coarser goods, we find an eastward movement of over 14·0 m. tons of coal and coke, of which about one-third enters the Baltic and the remainder is distributed along the coasts of Norway and Denmark and in the region of the Elbe. The quan-

tity forwarded to the Baltic is less than formerly, owing to decreased demands from the Russian area and the growing competition of coal from the Silesian field. The route, however, remains one of great activity in summer.

In the shorter North Sea traffic, coal becomes of minor importance. Holland has increased her output greatly in recent years, while Belgium is nearly self-sufficing, and both are within easy reach of Westphalian coal by rail and river. None the less, each takes from Great Britain over 2·0 tons weight of coal, mainly for bunkers or special purposes.

The vast interchange of manufactures and minor foodstuffs in this area is largely a packet traffic, independent of world-routes, and it is impossible to correlate the tonnage movement with the volume of goods carried. Only the westward movement of ballast tonnage, which we noted above, has a real significance as the last section common to many of the great world-routes. It is not possible to separate in this movement the local from the long-distance trade; we can only be sure that in this vast flow are recorded most of those ships which leave Great Britain on the main routes of the world but fail to return by the same.

Traffic from the Baltic to Finisterre or Gibraltar is part of the coastal traffic of Europe, with its own ships and its own methods; it is based on many short routes worked by small units. South of the Channel, coal is still the basis of outward traffic; over 8·0 tons weight are distributed to French ports from the Channel and the Seine to Bordeaux, with about 2·0 tons to the Atlantic ports of Spain and Portugal, a quantity comparable to that forwarded to Norway, Denmark and the Elbe. In return

there are the ores of Spain and Normandy, with the pit-props of Portugal and the south of France. The trade of the Channel, however, resembles that of the North Sea, in the vast interchange of manufactures and minor foodstuffs. Beyond Gibraltar, the trade of the Mediterranean region is still mainly coastal, but it is also related to the Suez route in its working. The Mediterranean route is, moreover, comparable in part to the longer world routes—Odessa and New York are equidistant from the North Sea—so that in its organisation it is likely to differ somewhat from the shorter Baltic routes. Both wings, however, of the European coast trade are centred on the North Sea and the Channel, and into this central pool flow most of the ships carrying goods from the margins of Europe or the margins of the world. They are loaded inwards largely with bulky goods, foodstuffs and raw material: the only bulk cargo outwards in large quantity from this region, either coastwise or on the long routes, is coal. Without it, the organisation of the routes would suffer a vital change.

* * * * *

We have discussed the organisation of trade-routes in terms of coal—coal as motive power and coal as an important element in the economical working of cargoes; we must now consider possible modifications in the routes due to the new motive power—oil. We are not concerned here with the general problem of competition between oil and coal, but merely with the effect of that competition on the organisation or direction of trade-routes.

We know that oil fuel has already displaced coal in a large number of ships owing to the various advantages which it possesses, as compared with coal, more particularly in ships carrying passengers. How far, then, is this change likely to be reflected in the working of the main routes? The most obvious and easily traced effect is to be seen in the reduction of the coal-bunkering business in Great Britain and the United States, and at some of the coaling-stations on world routes. The last involves also a corresponding reduction in the coal carried as cargo, and may therefore affect the balance of cargoes and the economical working of a route. The result may be a larger proportionate movement of ships in ballast outwards, involving higher costs for the return voyage, which must pay, in this case, for the outward voyage also. Coal, however, is not carried only to coaling-stations, for bunkering ships; much of it is intended for inland transport or for use in industry, and oil will affect this section of the trade only in so far as it ousts coal on land. In the last case, we must take account of oil in the form of petrol—that is, in effect, the competition of road and railway in the inland collection and distribution of passengers and goods. In this connexion, we are concerned not with the general problem but only with the circumstances of those countries which depend for their industry and transport on supplies of coal from overseas.

We look, naturally, for the most conspicuous effects of oil, to the American continent, its chief home. Western South America, to-day, runs mainly on oil; the large cargoes of coal which formerly arrived there from Great Britain and Australia are no longer to be found.

On the other hand, there is still a large outflow of heavy cargoes from this coast to eastern North America and to Europe. This outflow tends to increase with the further development, now in progress, of the natural resources of the region.

On the eastern side of the continent, Argentina is increasing both her native supplies and her import of oil, and to this cause must be assigned part of the decrease in the exports of British coal to the region. In so far as coal is thus displaced, the balance of cargoes is affected for the worse; and, if the result is a rise in freight rates on Argentine grain to Europe, the economic gain to the whole country by the substitution of oil for coal is less than it appears to be at first sight.

In the traffic of the North Atlantic, the effect on cargoes carried is not to be found; oil merely reduces the coal-bunkering business at either end of the route, since the actual movement of steam coal along the route is negligible. We will turn therefore to the routes of the old world, where we are nearest to the sources of coal and farthest from those of oil. On the South African route proper, the movement of cargo coal to Capetown has long ceased. There remains still the short-distance movement to the Islands, which concerns mainly the American routes, and the exports to the mainland of West Africa. The conditions of traffic in the latter area do not seem particularly to favour oil. In South Africa, oil on the long route traffic may affect the local bunkering business in South African coal; it may also affect the export of coal to a port such as Colombo. That port lies on two of the longest world routes, and may therefore become an important oil-bunkering point,

though at present it deals only in coal. It is, moreover, placed favourably in the zone of distribution of the most important eastern oilfield of the future. The course of exports to a port such as Bombay may differ, in so far as the coal is intended for internal use.

On the Mediterranean section of the eastern route, owing to the decline in exports from the Black Sea region, there is a heavier balance outwards of British cargoes of coal and a larger return in ballast than before; the substitution of oil for coal at the coaling-ports must go a long way before the balance of cargoes to the region is reversed, although oil has produced already a definite impression on the export of coal for bunkers.

The largest movement of British coal, as we have seen, is to the neighbouring coasts of Europe. In this region, generally, the delivery cost of coal is at its lowest as compared with that of oil, and the largest proportion of the coal moved is for purposes of industry or inland transport; so that here the charges resulting from the use of oil are likely to be smaller, proportionately, than along the great ocean routes. In this very region, however, another rival to coal is particularly formidable. Scandinavia, Finland, Switzerland, France and Italy are all developing their resources of "white coal" to the utmost. Part of this development implies a reduction in the demand for coal from overseas; and though it is possible for increasing industry to absorb both forms of power, none the less British coal tends to become of less relative importance in the total economic activity and total movement of commodities in the region.

The chief advantage of oil, as compared with coal, in relation to the carriage of goods by sea, is that it provides

greater power in smaller bulk and does not compete with cargo for stowage space. The former advantage is at its maximum in the case of the internal combustion engine, though the main use of oil at present is to raise steam in boilers. Oil has the wider range and therefore its substitution for coal will tend to reduce the importance of intermediate fuelling stations on the long routes. On the other hand, the main stations are likely to remain as at present, since oil is transported as readily as coal to any point at which it is needed.

It is not possible to calculate the extent of the substitution which is in progress on the various routes, but comparison of the storage capacity of some of the ports which lie away from the sources of oil gives some indication of the future as estimated by the oil interests. We may reasonably assume that tanks are intended for use. Figures for ports close to a main source of supply, whether of coal or oil, have little significance, since in such cases storage on a large scale is unnecessary, and the amount stocked is no index to the total handled over a period.

If we divide our ports very roughly into three classes, we find that in South America Buenos Ayres and Rio are in the first class, each with a capacity well over half a million barrels. Buenos Ayres, on the basis of normal stocks, is also in the first class for coal, while Rio and Montevideo are in the second class. The last is also in the second class for oil, with a capacity of more than a quarter of a million barrels. The remaining ports on the east coast stock very little coal, and may be ranked as second or third class in oil capacity. The ports of the west coast, as we have seen, depend, with the exception of Coronel, mainly on oil, and are

in the second or third class; while Honolulu, far out in the Pacific, has, as we might expect, considerable stocks both of fuel and Diesel oil. In the Panama Canal zone, Cristobal at the Atlantic end and Balboa on the Pacific are ports of the first class, the former for coal and the latter for oil. The figures above illustrate the growing dominance of oil on the east side of the South American continent as well as on the west. Farther north, oil is stored at various convenient points in the West Indian islands, while on the mainland of North America the supply for transport is unlimited on both east and west coasts.

Turning to the routes of the old world, we start with Southampton and Liverpool, two first-class oil-bunkering ports. Other British and continental ports stock smaller amounts. If we follow the South African route, we find both oil and coal in very moderate amounts at Las Palmas and St. Vincent, while Capetown ranks only in the third class for oil, though still in the second class for coal. At the end of the route, Sydney and Wellington rank as second class for oil, while Melbourne is of much less importance. Auckland has large stocks of coal, while Sydney is near to the Newcastle field and can readily obtain any quantity required.

On the other route round Africa, Algiers is an important coaling-port of the second class, while Oran seems to be in the same class for oil. Genoa is still in the first class for coal and Marseilles in the second, while both are in the third for oil. Port Said, the key to the whole route, is one of the world's largest fuelling points, both for coal and oil, though the importance of the former is declining.

Beyond Suez, the ports of the Indian Ocean still depend mainly on coal. Except for Rangoon and Calcutta, their storage capacity is negligible, on the world scale. Even Singapore is only in the second class, while Hongkong and Yokohama are well below it. Singapore and Shanghai, on the other hand, are among the chief coaling-ports on our world routes. Up to the present, coal seems still to be the dominant source of power on the routes of the old world.

Between the conditions described above and those which formed the basis of a former edition, lies an interval of only fifteen years; yet this short period has been marked by almost revolutionary changes in world transport. The Panama Canal has modified profoundly the geography of distance; more particularly, it has made a vital change in the world position of the Atlantic seaboard of North America. Moreover, in the general distribution of shipping, the canal offers an important alternative for tonnage converging on the Indian Ocean and leaving by way of Suez. Europe is affected mainly in its relations with the western side of the American continent. On the other hand, though the Suez Canal has gained somewhat at the expense of the Cape route to Australia, its general relations with the Indian Ocean and the Far East have remained stable, except for the diversion of some American traffic with the Far East, and the new and important movement of oil from the Persian Gulf to Europe.

Fuel oil is responsible for another revolution in transport. The change is still in progress, and the future is uncertain. The advantages of oil over coal, as at present envisaged, rest on certain assumptions as to relative prices. If it barely pays under present conditions to

instal oil instead of coal in a ship of a given type, it will pay no longer if oil becomes relatively dearer than coal, not for a short period but permanently. As to the future movement of the price of coal, in so far as it depends on physical conditions, we can make some forecast. The resources even of the older fields are to be measured not by scores of years but by centuries, but the price of oil twenty years hence is to the last degree uncertain. World consumption is still growing rapidly; how will the old and new fields meet the demand? There is no need to imagine a real shortage in that period, still less to fear that the world will run dry; but it is possible that the average costs of raising a ton of oil to the surface may tend to increase, owing to causes purely physical. This is a problem of geography, in the broader sense of the term, and in view of the present state of our knowledge a forecast can be little more than a guess. Price is not the only important factor in the competition. There seems to be more room for economies in the use of coal than in that of oil. Increased efficiency is equivalent to lower cost, and such improvements as powdered coal for ships may decrease considerably, in the future, the relative advantages of oil.

A third change, or rather group of changes, affecting ocean transport is bound up with developments in important areas producing bulk cargoes. The change in South African conditions is noteworthy, and bears the marks of permanence; in Russia it is political rather than economic, and there may be a return to trade in its former shape. There are evident possibilities in other parts of Africa, in India, South America, and even in China; but changes are likely to be slow rather than

revolutionary. The only basis of a forecast in such cases lies in a detailed geographical and economic study of the various regions, a study beyond the scope of the present work. The main lines of movement about the world seem to have attained, in their general character, a certain stability, though they are always subject to sudden interference arising out of the political or economic policies of nations. Human effort can improve on natural physical conditions; it can also refuse to profit by the advantages which they offer. With the latter form of effort, however, geography is not concerned.

So much for the goods to be carried. There remains the general mechanism of transport, and here we find a significant change. On nearly all routes the calculated load-index is lower in 1927 than in 1913. The volume of shipping seems to have grown more rapidly than that of goods and passengers to be carried. The increase is greater than is suggested by statistics. Owing to higher average speed and quicker handling at terminals, a given quantity of tonnage can perform more work than formerly in the same period of time. An excess of shipping, in normal times, may be due to miscalculations on the part of shipowners as to the prospects of trade; but such miscalculation tends to provide its own corrective. Much of the present excess, however, may be assigned to "political" causes, to the building and running under the national flag of ships which fail to pay as economic machines.

For the increased capacity for work due to higher speeds, the world of commerce itself is largely responsible. Capacity is increased but not fully utilised, and the result is loss to someone. Quick delivery in small units is often

unnecessary and usually more costly than slow handling in bulk. The commercial world is ever demanding " improved facilities," and on the ocean routes the liner is displacing the tramp. The result is to be seen in higher costs and generally lower load-indices. On the sea there is no legislation and control to transfer the burden from the goods carried to the carrier or elsewhere, though this may be done temporarily by subsidy to special groups of ships. The shipping of the world will not be run permanently at a loss, and in the end the penalty of extravagance is paid by the consumer of goods in the form of higher delivery prices, or by the producer in the form of contracted markets. In the face of the present acute competition, the effects of waste are likely to be felt most severely where initial costs of transport are necessarily high, as in the long ocean routes which serve the Empire.

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