UNIVERSAL
LIBRARY

OU_166740

UNIVERSAL
LIBRARY

OUP—391—29-4-72—10,000.

OSMANIA UNIVERSITY LIBRARY

Call No. 658/L83M Accession No. P.G. 14082

Author

Title

This book should be returned on or before the date last marked below.

THE MAKING OF SCIENTIFIC MANAGEMENT

Books by L. URWICK

FACTORY ORGANISATION
with C. H. Northcott and others

THE MEANING OF RATIONALIZATION

ORGANISING A SALES OFFICE
with F. H. Cordukes and E. Ashton

MANAGEMENT OF TO-MORROW

DISTRIBUTION IN EUROPE
AND THE UNITED STATES
with F. P. Valentine

PAPERS IN THE SCIENCE OF
ADMINISTRATION
edited with Luther Gulick

COMMITTEES IN ORGANISATION

THE DEVELOPMENT OF SCIENTIFIC
MANAGEMENT IN GREAT BRITAIN

DYNAMIC ADMINISTRATION
edited with H. C. Metcalf

PERSONNEL MANAGEMENT AND
FACTORY ORGANISATION

THE ELEMENTS OF ADMINISTRATION

Books by E. F. L. BRECH

INTRODUCTION TO FOREMANSHIP
with H McFarland Davis and others

THE MANAGEMENT LESSONS
OF THE WAR —
INDUSTRIAL RELATIONS

Books by L. URWICK and E. F. L. BRECH

THE MAKING OF SCIENTIFIC MANAGEMENT
THIRTEEN PIONEERS Vol. I

THE MAKING OF SCIENTIFIC MANAGEMENT

VOLUME II

MANAGEMENT IN BRITISH INDUSTRY

By

L. URWICK, O.B.E., M.C., M.A., F.I.I.A.
Sometime Director of the International
Management Institute, Geneva

and

E. F. L. BRECH, B.A., B.Sc. (Econ.), M.I.I.A.
Consultant in Personnel Management

LONDON : MANAGEMENT PUBLICATIONS TRUST
1949

First published in January 1946 *by*
Management Publications Trust Ltd.
2 *Caxton Street, London, S.W.*1

Reprinted in 1949 *by*
Richmond Hill Printing Works
Ltd., Bournemouth

COPYRIGHT

CONTENTS

Chapter		*Page*
I	MANAGEMENT IN THE INDUSTRIAL REVOLUTION	7
II	THE COMMERCIAL ASPECTS OF MANAGEMENT	15
III	SCIENTIFIC MANAGEMENT IN PRACTICE (*i*) The Boulton and Watt Foundry (1795)	24
IV	THE PIONEER OF PERSONNEL MANAGEMENT. Robert Owen (1771-1858)	40
V	MANUFACTURERS IN THE INDUSTRIAL REVOLUTION	60
VI	THE BEGINNINGS OF MODERN MANAGEMENT J. Slater Lewis (1852-1901)	72
VII	THE ACCEPTANCE OF F. W. TAYLOR BY BRITISH INDUSTRY (1895-1915)	88
VIII	THE ADMINISTRATIVE TRAINING OF THE ENGINEER (1847-1935)	108
IX	TRAINING FOR MANAGEMENT IN THE COMMERCIAL PROFESSIONS (1880-1935)	131
X	SOME EARLY TEXTBOOKS ON MANAGEMENT (1899-1914)	147
XI	SCIENTIFIC MANAGEMENT IN PRACTICE (*ii*) Hans Renold, Ltd. (1879-1913)	162
XII	THE HUMAN FACTOR IN MANAGEMENT (1795-1943)	170
XIII	RETROSPECT AND PROSPECT	216
	INDEX	235

LIST OF ILLUSTRATIONS

To Face Page

MATTHEW BOULTON 24
(from an oil painting by C. V. von Breda in the possession of the Institution of Civil Engineers)

JAMES WATT 25
(from an oil portrait by Sir T. Lawrence)

SOHO MANUFACTORY, c. 1765 . . . 26
(by courtesy of W. & T. Avery, Ltd.)

SOHO FOUNDRY, 1796 . . . 27
(by courtesy of W. & T. Avery, Ltd.)

ROBERT OWEN 40

J SLATER LEWIS 72

DIAGRAM OF MANUFACTURING ACCOUNTS . . 79
(from *The Commercial Organisation of Factories*)

STAFF ORGANISATION DIAGRAM . . . 81
(from *The Commercial Organization of Factories*)

HANS RENOLD 162

CHARLES G. RENOLD 163

ORGANISATION CHART 165
(Hans Renold & Co., Ltd. — 1913)

MEETINGS CHART 166
(Hans Renold & Co., Ltd — 1913)

SIR CHARLES SCOTT SHERRINGTON, O M., G.B.E., F.R.S. . 194
(Chairman, Industrial Fatigue Research Board, 1918)

SIR DUNCAN WILSON, C.V.O., C.B.E. . . . 195
(First Secretary, Industrial Fatigue Research Board, 1918-1930. H.M. Chief Inspector of Factories, 1932-1940)

DR. C. S. MYERS 198
(Director, National Institute of Industrial Psychology—1918)

THE REV. ROBERT HYDE 200
(Director, the Industrial Welfare Society—1918 to date)

MISS E. D. NEWCOMB 201
(President, the Institute of Labour Management)

I

MANAGEMENT IN THE INDUSTRIAL REVOLUTION

BY general consent the history of scientific management is usually regarded as beginning with F. W. Taylor and as consisting almost exclusively of the story of the development of methods of industrial control during the fifty years since he first taught his basic principles. The lines on which thought and knowledge evolved during that period were the subject of the previous volume. But there are indications that the scientific approach to control in industry had an earlier origin, especially in Great Britain, and this second volume will deal with these earlier contributions.

By the time that F. W. Taylor first outlined his principles, Great Britain had been an industrial country of the first order for nearly a hundred years, with roots that stretched back for more than one and a half centuries. It would be natural to suppose that some form of management had developed during these many decades. An industry which was able to supply countries in every quarter of the world with such vast quantities of goods as Great Britain sold in the latter third of the nineteenth century could not have existed without a foundation of stable management. In other words, " scientific management " was not an invention, a new idea which occurred suddenly to the fertile brains of F. W. Taylor and his colleagues. It was merely the codification and restatement in coherent and logical form of the essence of a host of practices which had been developing in the best-managed factories over a very long period.

The publication of F. Slater Lewis's *Commercial Organisation of Factories*, which appeared in 1896, is one piece of evidence which supports this view. His book (which will be described in greater

detail in a later chapter) might well be called the first text-book on *Production Management*. It displays a thorough grasp of management principles and describes the application of sound management standards in a way which makes it a model of exposition. Moreover, it is clear from the context that the author had no idea that his concepts were original or that he was in any sense pioneering.

An even earlier contribution has been described in the preceding volume, in the work of Charles Babbage who was among the first to advocate in relation to industrial problems the fundamental thinking which preceded the formulation of a science of management.

There is a strong case for a search in the annals of British industry for practical evidence of the evolution of management methods in the times contemporary with or prior to Babbage himself. His pages, while full of hints and suggestions, tell little of the art of management as actually practised in the factories and workshops of the early nineteenth century. But they do point to the existence in the industry of the period of management methods to which the title " scientific " is not inappropriate.

Published records and evidence are, however, scanty. What information is available lies hidden in the biographies of the early scientists and inventors, in the annals of the first industrial families, and in the records of the few firms whose history goes back for more than one and a half centuries. There is in such records, a rich field for research and it is evident that a most interesting aspect of our economic evolution awaits development by anyone interested to enquire into the pioneers of management in the earlier phases of Britain's Industrial Revolution.

This second volume sets out some of the few facts brought to light by the very limited research that could be undertaken during a war, and presents a picture which will be to some degree new to many industrial executives. It suggests the existence of a long back-ground in the development of management, much of which has remained hidden and virtually unknown. A study of the methods of control practised in the Boulton and Watt Foundry in 1805 or described in Slater Lewis's book in 1896, suggests that Taylor was not so much a pioneer

in a completely new field, as one who made a new synthesis out of old practices. He isolated and defined the fundamental principles underlying good management in industry, principles which had been applied for many decades, but had not been fully recognised.

For this process there is a parallel in every branch of science. The builders of the pyramids were applying the principles of physics and mechanics, although no such sciences had been formulated: it fell to later minds to seek out the fundamental rules and definitions that had already been applied empirically for centuries in the arts of construction.

From one point of view this second volume is an attempt to paint a vein into the body of British economic history. It has long been customary to describe economic development in terms of scientific and technical movements. Management has been overlooked because it did not figure primarily or was not recognised as a separate factor in the active life of the industrial units which together made up the country's economic system. Only when the industrial unit became large and when the need of principles was emphasised by the emergence of problems of management did study of the executive control of industry begin to figure in the annals of economic history. That was only when the nineteenth century was fading into the twentieth.

This fact is, however, no evidence that management was lacking in the earlier period. Here and there an historian has been indirectly or accidentally aware of its significance. On occasion this approach has been stimulated by the discovery of documents and archives. The story of some of the early textile firms became known through the accidental discovery of original company records.[1] Our knowledge of the Boulton and Watt Foundry, which might well claim to be the first illustration of scientific management in action, though a century ahead of Taylor's first exposition, is due to the preservation of a remarkable collection of archives.[2]

In essence the Industrial Revolution may be described as the application of mechanical power to the production of goods. But equally important, because of their influence on the trend

of social progress, were the other changes that accompanied this development. Some of these sprang directly from mechanical methods. For instance, the need to concentrate industry in towns or districts gave rise to a process of urbanisation. Working conditions improved and there was a general rise in the standard of living.

Two among these other facets of the Industrial Revolution have a particular bearing on the history of management. Throughout the Middle Ages it was the merchants, in the form of pedlars at home and of trading organisations or companies abroad, who canalised the need for goods and provided the stimulus to production in the workshops. This position is most evident in the phase of economic evolution when it was already passing, namely, during the period of so-called "domestic industry." Those whose task it was to sell goods were coming to have closer and closer control over the means and men who were making the goods. In the cloth trade, for example, a stage was reached in which the clothier, himself primarily a merchant, became the directing influence in the manufacture of yarns and cloths.

The next stage of transition is illustrated by the life of Samuel Oldknow. Originally he spun his yarns and wove his cloth to the requirements of the London merchants and other buyers. But when his technical prowess enabled him to produce the finer counts of yarn and the more delicate lines of cloth, he became more and more able to disregard the specific requirements of the market as expressed through the merchants—or rather, the market became less and less inclined to voice its own preference and to content itself with buying whatever he could and would produce.

The second fundamental change, to which less attention has been given, may perhaps be described as an alteration in the basis of control. In the workshops of the Medieval " master," control was based on the obedience which the customs of the age required the apprentices and journeymen to give to the man whom they had contracted to serve. But in the later phase of domestic economy the industrial family unit was controlled by the clothier only in so far as it had to complete a given quantity of

cloth according to a certain pattern. With the advent of the modern industrial group in large factories in urban areas, the whole process of control underwent a fundamental revolution. It was now the owner or manager of a factory, *i.e.*, the " employer " as he came to be called, who had to secure or exact from his " employees " a level of obedience and or co-operation which would enable him to exercise control. There was no individual interest in the success of the enterprise other than the extent to which it provided a livelihood, and the " employer " had to contend in other ways with the problems of the co-ordination of the emotional forces which underlie human groups.

These two changes represent the two great problems which emerged in the twentieth century . . . on the one hand the relative position of production and marketing, and on the other the development of effective personnel management. It may be conceded that in the early nineteenth century they were not active problems in the sense that they were consciously realised. But they must have been raised and solved in the course of the century, at all events in some degree. Only so could the industries of Great Britain have made the strides that history records.

It is unfortunate that the literature of management in the early part of the Industrial Revolution has very little to say about the problems of control, especially human control. What records survive of the first factories point to an interest among the employees in their work which enabled them to accept and to comply with instructions from above. The workers felt themselves to be part of an enterprise which was contributing to the needs of the community. To that extent they were prepared to play their own part effectively in the development of production. Something of this spirit may be seen in the story of Boulton and Watt, especially after the construction of the Soho Foundry in 1796.

On the other hand, rapid industrial development, especially in the early part of the nineteenth century, was destructive of this co-operative element in control. Within two or three decades the strict demarcation between employer and employee became very pronounced in all branches of industry, and in particular in the textile trades. Two facts point in this direction. The

growth of factory legislation imposed on employers minimum standards of physical working conditions, standards which, meagre though they were, reflected an even feebler appreciation of the value of a satisfactory industrial environment. Pioneering efforts along " welfare lines," particularly in the philosophy of such men as Robert Owen, indicated the existence of a large class of industrial employees having no voice at all in the control of the affairs of the enterprise in which they worked.

Management may be defined briefly as planning, co-ordination and control. There is every argument for the belief that management in this sense must have been one of the important items in the industrial progress of the revolutionary period. The progress of the iron and steel industry after the inventions and improvements produced by Cort (1780's) meant that the individual unit in that industry had to be larger in size and had to face greater problems in relation to securing an effective flow of output from the men, machines and materials at its disposal. The increasingly widespread use of the steam engine meant the rise of an important and complex engineering industry. Though Boulton and Watt may have been outstanding in the degree of effectiveness attained in handling the management of such an industry, the nature of the problems that they had to face cannot have been exceptional. In the first fifty years after the turn of the century, complexity of administration in the iron and steel and engineering industries must have increased enormously with every decade. The growth in canal and road transport, the expansion of markets for steam engines abroad, the coming of the railways and the rapid expansion of the network of railway systems throughout the country—all these meant a call upon the resources of these industries that inevitably gave rise to a whole series of new management situations. They created an imperative need for a technique of control that would enable manufacturers to keep track of their resources and to direct their production towards the achievement of pre-determined plans, however unsystematically evolved.

Much the same development must have occurred in the textile industries. As industry became the leading economic activity of Great Britain, and led to a gathering process of

urbanisation, the consequent growth of population provided a powerful stimulus to the expansion of spinning, weaving and the clothing trades. Management problems may, however, have been less serious in these industries since the small unit remained their characteristic form throughout almost the whole of the nineteenth century.

Unfortunately, our history of the Industrial Revolution tells us little about the progress of management and still less about the attitudes of the early industrialists themselves to their problems of control. In the seventeenth and eighteenth centuries, the literature of the period gives some indication of an awareness among the merchant fraternity of the significance of methodical accounting and of the need of at least some specific training for the discharge of executive responsibilities. There are numerous handbooks which tried to teach the basic knowledge that the would-be merchant needed in order to manage his affairs effectively. But with the rise of industry, *i.e.*, the manufacturing processes, this interest seemed to disappear. There is not in the early nineteenth century anything comparable to the training literature for merchants of the previous 150 years. Some counterpart to this early merchant literature is to be found in the records of meetings of the Royal Society (founded 1662 for the advancement of inventions and technical studies), and more particularly in the records of the local branches of the Royal Society of Arts (founded 1754 for the advancement of arts and manufactures). In various parts of the country there were, besides the R.S.A. branches, local manufacturers' clubs, and there still exist documents which give some idea of the degree to which the manufacturers of a locality met together to discuss their problems. Among these there must have been problems of management—a form of training which has its present day counterpart in the Branch Meetings of the Institute of Industrial Administration, of the Works Management Association and of the Management Research Groups.

The student of the literature of management can only lament the degree to which historical records ignore the element of control in the Industrial Revolution. Popular interest centred primarily on the technical aspects of what was going on. Its

social consequences formed a second dominant feature. This is quite understandable. The human mind at this phase of our history concentrated on securing the improvements in technical equipment in the small factories of the day that would most easily yield increases in output. It was only as manufacturing units became larger that improvements in management became more powerful in securing increased output than improvements in tecnhical equipment.

In the hope of making a small contribution to an appreciation of the background of scientific management in British industry today, this second volume sets out the developments that have been outstanding at two significant periods in our history—at the opening and at the close of the nineteenth century. The earlier period presents some illustrations of management in the formative era of the Industrial Revolution. The later decades are the turning point from the older form to the "modern" phase of our economic structure.

These brief glimpses into a vast field of yet unploughed territory are loosely bound together by a study of the history of what today has become the characteristic feature of management—the leadership and control of people. In the light of contemporary thought, as the chapter itself will show, it is fitting that the outline story of management in British industry should be rounded off by the evolution of the "personnel" concept, the story of the human factor in management.

[1] *cf.* "*The Early English Cotton Industry*" *by Daniels E. Unwin*; *and* "*Samuel Oldknow and the Arkwrights*" *by Unwin*; *Hulme and Taylor.*

[2] *cf.* "*An Early Experiment in Industrial Organisation*" *by Eric Roll.*

There is no industrial counterpart to this evolving commercial interest in a technique of control. Cost recording and cost accounting would be the most obvious parallel. That the master manufacturers of even the sixteenth and early seventeenth centuries were aware of the significance of analytical cost records as a factor in control is shown by a number of illustrations that are extant. Two have been referred to in the *Cost Accountant*. One was an illustration of the principle of overhead and establishment charges as early as 1591, entitled, *A General Reportion and Order of Provision for a year for 365 days, to victual a garrison of 3,000 Soldiers—The Order for the Brewhouse.* The other was a cost statement compiled in1620 by the London Members of the Worshipful Company of Bakers, as *A Computation of a Baker's Perticular charges Ariseing uppon the Bakeing of Ten Quarters of Wheat by Weeke in London.* But one looks almost in vain for text-books or other instructive literature dedicated to the manufacturing community. A few of the merchant's books on accounting do indeed suggest that the principles and practice described are designed to serve the manufacturer, but presumably only in relation to keeping his financial records of materials bought, goods sold, wages paid and expenses met. The one notable exception is John Collins, who published in 1697, a book called *The Perfect Method of Merchant's Accomts*, which included instruction on the methods of keeping dyers' accounts, illustrated by the application of book-keeping procedure to the stages of production, *i.e.*, to the control of materials during the course of processing.[2]

After the Restoration, and especially towards the end of the seventeenth century, really rapid strides in the progress of business became apparent. This may have been partially the result of the re-settlement of the country and re-emergence of its trades after the troubled period of the Civil War, or it may perhaps have been the commercial reflection of the technical progress that was being sponsored by the Royal Society and the many amateur inventors of the period. Thus, for instance, in the fifty years between 1675-1725, there were published rather more than thirty reputable books of instruction on accounting, and many of them ran into several editions in quite a limited

period. In the main they appeared to have been written not only for large export manufacturers, but also for traders and shop-keepers catering for the home market.

One or two of these books are of particular interest and serve to indicate the lines of thinking of the business community of the period.

A small booklet by one J. Hill, first published in 1688 under the title *The Exact Dealer*, opens with the following introductory statement: "Having considered the great want of a book of universal Instruction in Trade and Management of affairs, I thought it highly necessary for the benefit of Traders and Artists of Sundry Kinds to turn my endeavours that way . . ." Later in his book, the author writes, "my main aim and drift is to admonish and direct men how to improve themselves and rise by Industry in Trading and Manageing Affairs . . . I have compiled this book chiefly for the advantage of Traders." This same book in one chapter draws a distinction between "those that manage or are the proprietors of manufacture," implying that salaried management staff as distinct from owner-management was already a recognised feature of industrial organisation.

This book had gone to five editions by 1702, and its author had also seen fit to produce *A Young Secretary's guide for Instruction in Letter Writing and Collection of Bills and Bonds and Certain Matters of Commercial Calculation.* About the same time an anonymous writer, with the initials N.H., who styled himself a "Manufacturer," had published a small book entitled *The Complete Tradesman or the Exact Dealer's Daily Companion*; this explicity catered for "Merchants, wholesalemen, shop-keepers, retailers, young tradesmen, country chapmen, industrial yeomen, farmers and others that go to Fairs." It is called *A Compendium of the whole art and mystery of Trade and Traffic*, and its contents are very much more descriptive than instructional: "Compendium" is perhaps its best description, with the exception of one chapter giving "directions to young shop-keepers first setting up," which includes "directions for well managing a Trade."

Just a few years later appeared two other interesting publications by one Edward Hatton, self-described in his first book

(1690) as " Philomathemat " and in the second (1699) as " Philomercat." The first of the two books, entitled *The Merchant's Magazine or the Trader's Treasury*, may best be described as a handbook on commercial practice intended, so the author says, for merchants and tradesmen, but " perhaps also for Schools, Banks, and other business of Mechanicks and Officers of the King's Custom and Excise." Perhaps typically of the age, its preface consists of a parade of virtues needed in a merchant. The book ran to seven editions within its first twenty years. The second book, under the title *The Trader's Companion*, was dedicated to " the Court of Directors of the English Company Trading to the East Indies," and was apparently a project sponsored by the Directors of that Company. Broadly speaking it was less a book of instruction for would-be merchants than a compendium of useful knowledge of facts, figures and similar data.

It may be argued that these books do not constitute any really important contribution to the economic development of the period. They do, however, throw a useful light on the thinking of the business community of the times. They were essentially intended for instructional purposes. They were in the main specifically dedicated to the merchants themselves or to young men taking up a commercial career. They were a witness to the business philosophy of the period—the need for definite instruction in the principles and practice of commerce. This philosophy was a necessary foundation to trading prosperity and progress. For, as pointed out in the previous chapter, the trading interests of Great Britain were at this time the dominant feature of her economic system.

One may well wonder how far the text-books published for the merchants were also made use of by those whose lot it was to produce the goods which the traders sold. It is, perhaps, significant that in the century between 1650 and 1750, there is no outstanding example of a book for the instruction of the manufacturer in the art of conducting his affairs.

In dealing with the business community of the post-Restoration period, this chapter would be incomplete without reference to Sir Samuel Morland and his calculating machine. Perhaps

typical of the wealthy inventors of the period, Morland devoted a good deal of his time and money to developing in practical form ideas for mechanical appliances, and in 1666 he was able to present to Charles II " a new and most useful instrument for addition and subtraction of pounds, shillings, pence and farthings without charging the memory, disturbing the mind, or exposing the operator to any uncertainty, which no method heretofore published can justly pretend to." This little mechanism, no more than three or four inches long and less than quarter-inch thick, was certainly a work of art, and was operated by means of wheels turned with a stylus, but there is no record that it remained anything more than a mechanical curiosity.

Sir Samuel Morland is also worthy of mention in another connection. He carried out what may well be the first known attempt to get piece work prices for his workmen. Among his technical inventions were pumps and water engines, mostly constructed for him by a London engineer. In 1681 he saw fit to issue a schedule of specifications and prices, which he prefaced with the following statement: " Sir Samuel Morland having made a final agreement with his workmen concerning his new pump and water engines, and having brought them to as low rates as they can be afforded, has thought fit for the better satisfaction of all persons concerned to publish the following schedule . . ."

As long as industry remained comparatively simple and the management unit small there was not likely to be any demand for costing or cost recording. It was, therefore, only in the latter part of the eighteenth century and on towards the middle of the nineteenth century that the subject of cost accounting was really developed. During these decades the technical developments which were changing the structure of industry were of such a character as to make greater capitalisation inevitable. In fact, the whole trend of these early phases of the Industrial Revolution was directed towards the increased application of capital to the processes of manufacturing. Illustrations are readily provided by the major trades of iron making, coal mining, the development of the steam engine, constructional engineering, and the railways. As the size of his technical units increased, and the amount of invested capital grew, the engineer found that costs

gradually became more and more important. They provided the basis on which future trade could be conducted, since they became an important constituent of estimating. The need to recover heavy overhead expenses loomed larger as a problem in the control of engineering works.

The principles of double-entry book-keeping, already well established for the affairs of the trader, began to be studied and applied in some sections of industry. For instance, the later chapters of W. Thompson's *Accomptant's Oracle* (published 1777) were devoted to the construction of manufacturing accounts illustrated through the hosiery trades. Eleven years later Dr. Hamilton published his *Introduction to Merchandise*, in which again some reference was made to an accounting procedure needed by manufacturers. But in general, as Mr. Edwards informs us in the article referred to earlier, it was not likely that these book-keeping methods were adopted by anything more than a few manufacturers for costing purposes. He quotes a passage from Dr. Hamilton's book saying : " Artificers and Manufacturers sometimes keep only a day-book and a ledger ; the former for entering goods sold or work done on credit ; the latter for personal accompts, and perhaps a cash book and invoice book." There was one firm at this time in which cost accounting was well developed, namely, the Boulton and Watt partnership which is to form the subject of the next chapter.

Curiously enough, for nearly a century after the publication of these two books, there seems to have been very little literature dealing with cost accounting. This may, in fact, have been due to the concentration of manufacturers on technical problems or to secrecy. Rightly, in the circumstances of the time, the British manufacturer did not wish to disclose the basis on which his prices were made up.

Another possible reason was the growing tendency to separate the engineering (*i.e.*, production) function from the control or accounting (*i.e.*, commercial) function, a process which became more and more emphasised as the importance of capital in industry grew. That costing was not entirely rejected during this period is perhaps illustrated by a sentence in Charles Babbage's

Economy of Machinery and Manufactures, in which he says : " It is of great importance to know the precise expenses of every process as well as of the wear and tear of machinery which is due to it."

After 1850 costing again emerged as a subject of considerable interest in industrial circles. There was much discussion and correspondence on the subject in the technical press. One particular letter that appeared in the *Engineer* for November 25th, 1870, is of interest in that it referred to the first known case of management consultancy in this country. The writer described the installation of a cost system by an outside specialist, who apparently advertised his services, and for an agreed fee brought into operation a method of controlling manufacturing costs. This letter, quoted by Mr. Edwards, apparently roused considerable interest, because on later occasions some correspondence referred to the numerous enquiries which the original writer had received from all over the country, and to which he replied by giving the name of the expert responsible for the system.

In the literature of cost accounting, the most outstanding event was the publication in 1887 of Garcke and Fells *Factory Accounting*, the combined work of an engineer and an accountant, and hailed in its day as the first presentation of the principles governing the preparation and presentation of factory accounts. What this treatise contributed to the technique of industrial management has been critically summarised by Mr. Edwards. He regards it as an " important landmark," though lamenting a certain obscurity in the definition of terms. A contemporary reviewer in the *Accountant* wrote that " the book was more theoretical than practical, and pedantic and involved, in the nature of a work on political economy."

From this date British industry became increasingly alive to the possibility of isolating and studying a technique of " production organisation and management." Articles in the technical press, papers to the professional societies, occasional text-books were all pointing to the evolution of a science of management applied to the effective control of production—at a time when F. W. Taylor was not yet known outside the U.S.A.

Basically, cost control is the tool of effective production management. Yet although principles had been laid down and interest stimulated by open discussion, the acceptance of cost accounting as normal practice by British industry was far from complete, even as late as 1914. Even after the outbreak of the Great War, officials of the Ministry of Munitions (notably Sir John Mann) had to teach the majority of manufacturers with whom they were dealing what cost accounting could mean. In the years immediately preceding the 1914 war, there is ample evidence of the deficiency in the technical journals of institution proceedings. One writer could state without raising contradiction that only a small proportion of engineering enterprises had any real idea of what their costs were, and another could give as a general description of engineering costing the phrase " right within twenty per cent."

In spite of the popularity of the Garcke and Fells publication, one general lament in the technical press was the absence of reliable text-books. This deficiency was remedied in 1914 by the publishing of E. T. Elbourne's *Factory Administration and Accounts*. Sir John Mann and his colleagues sold 10,000 copies of this book to munitions contractors. The final stage in the development of suitable tools of control in management—the evolution of control statistics and budgeted standards—only occurred after the war. But this was rather a refinement of scientific management technique than a pioneering stage.

[1] *A particularly useful book, for instance, is* R. *Brown's " History of Accounting and Accountants," published* 1905.

[2] *A very useful record of the history of cost accounting is to be found in a series of articles by Mr. K. S. Edwards which appeared in "The Accountant" in August-September,* 1937.

III

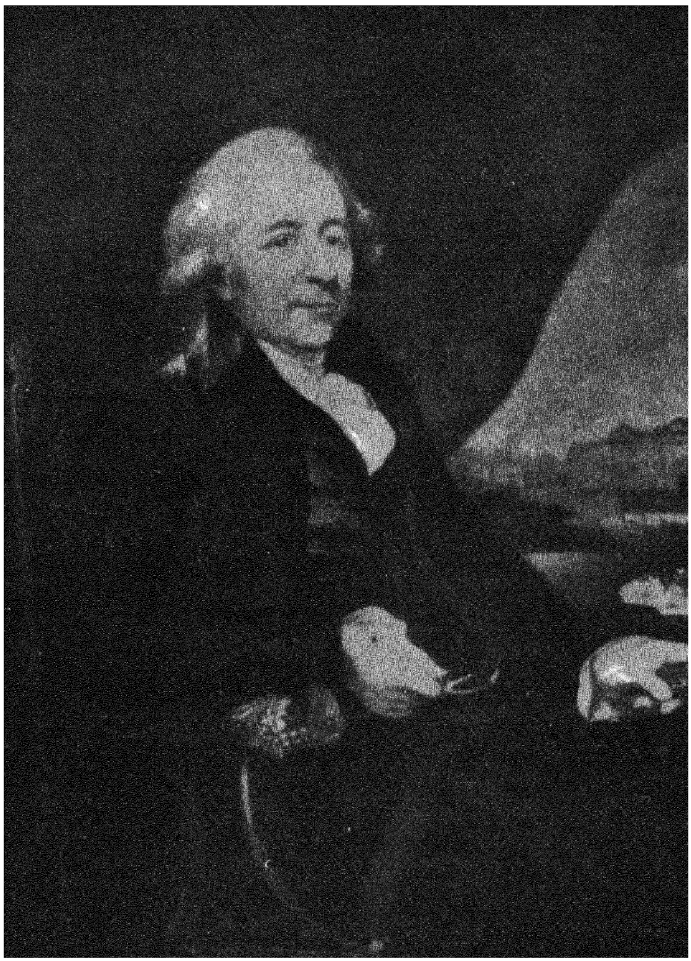
SCIENTIFIC MANAGEMENT IN PRACTICE

(i) The Boulton and Watt Foundry, 1795.

THE partnership of Boulton the business man and Watt the inventor has gone down in the annals of British economic history as one of the high lights of the Industrial Revolution. This is mainly because the partnership gave to this country the steam engine which was to be the driving power of all industrial progress in the early nineteenth century. But though the technical prowess of this firm was widely known no writer for over a century thought fit to give any attention to the organisation structure and management methods on which that technical prowess was founded. And this despite the existence of numerous, almost overwhelmingly numerous, documents dealing with all aspects of the firms' activities. It fell to Professor Roll to make the first detailed study of the management of the famous partnership and to present to the world the facts of the earliest example of scientific management in practice.[1]

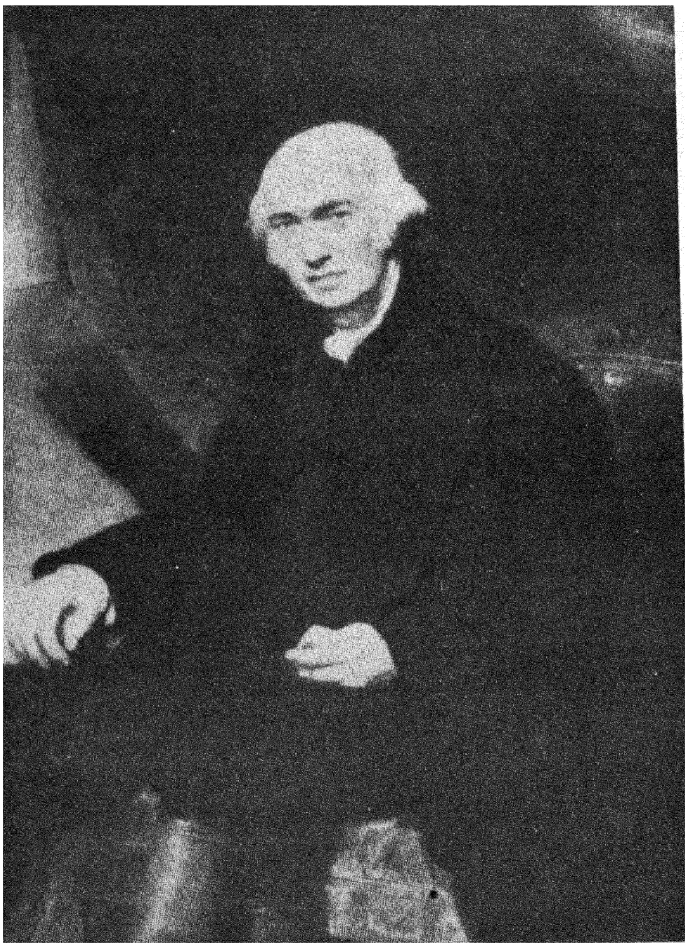
In his Introduction to this study, Professor J. G. Smith says : " Neither Taylor, Ford nor other modern experts devised anything in the way of plan that cannot be discovered at Soho (the Birmingham factory of Boulton and Watt) before 1805, and the Soho system of costing is superior to that employed in very many successful concerns today. This earliest engineering factory therefore, possessed an organisation on the management side which was not excelled even by the technical skill of the craftsmen it produced."

That Professor Roll was able to study the firm's management



MATTHEW BOULTON

(from an oil painting by C. V. von Breda in the possession of the Institution of Civil Engineers)



JAMES WATT

(from an oil portrait by Sir T. Lawrence)

methods exhaustively was due to the remarkable collection of documents that have been preserved by the Birmingham municipal authorities. Of these, many have not even yet been codified or catalogued. But the volume of detailed information that the historian has been able to build up from them is in itself a remarkable testimony to the business methods of the partnership.

One general question springs immediately from the study of the Boulton and Watt story. To what extent did the contacts of these two men with their contemporaries, and particularly with their colleagues or competitors in the engineering industry, exert any influence on the management practice of other firms? No answer to this question is possible with the published information at present available. The answer may never be found. On the other hand, it may be one of the missing links in the history of scientific management which will be filled in when the research foreshadowed in the first chapter of this volume can be carried out.

The purpose of this chapter does not call for any detailed description of the technical aspects of the steam engine or of other productions of Watt and his partner. But it will be of help in setting their management methods in proper perspective if a brief outline is provided. It was in 1763 that James Watt developed the idea of a separate condenser as an improvement on the existing types of steam engine. With the financial assistance of a friend, he undertook long and successful experiments which were needed to develop the idea into a practical proposition. After some five years of work, his friend's resources began to fail and Watt found himself forced to look round for an additional patron who would be willing to finance his experiments. He secured the help of Dr. Roebuck of the Carron Ironworks. Almost at the same time, he made the acquaintance of Boulton, in the course of a casual visit to his Soho factory when travelling back from London to Glasgow. Boulton was, at that time, a young man, and an outstanding figure among successful manufacturers in the Midlands. His factory at Soho produced a varied range of ornamental silver and ironware and had achieved a world-wide reputation for excellence of

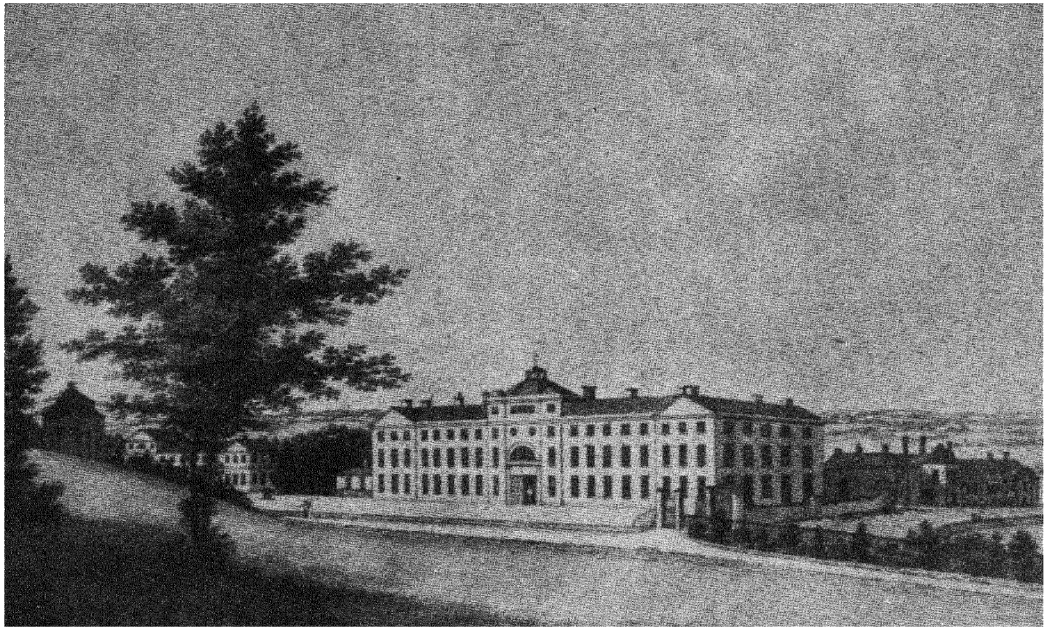
quality and artistry of workmanship, largely due to the interest and enthusiasm of Boulton himself. Boulton's personal qualities —his ambitions, education and executive ability—were at the root of his firm's progress, and they were to play also a very potent part in the later association with Watt.

Mutual contacts and interest during the next seven years, and the failing fortunes of Dr. Roebuck, eventually led to the establishment in June, 1775, of the partnership of Boulton and Watt. It was supported by a twenty-five years' patent granted by Act of Parliament and giving a monopoly in the manufacture of the improved type of steam engine in England, Scotland and Wales.

From the management point of view the first twenty years of this partnership were very much less important than the following ten. In the earlier period the firm was really one of consulting engineers and steam engine designers. In the main they dealt with the coal mines of the Midlands and the North and the tin mines of Cornwall, in common with certain similar contractors from the countries across the Channel. Their primary work was essentially the designing of steam engines for pumping purposes and though they did manufacture certain key parts, the partnership's principal activity was skilled supervision of erection. Many of the mining companies were in fact well accustomed to erecting their own steam engines and the revenues of the engineering firm came mainly by way of royalty for use of the Watt design.

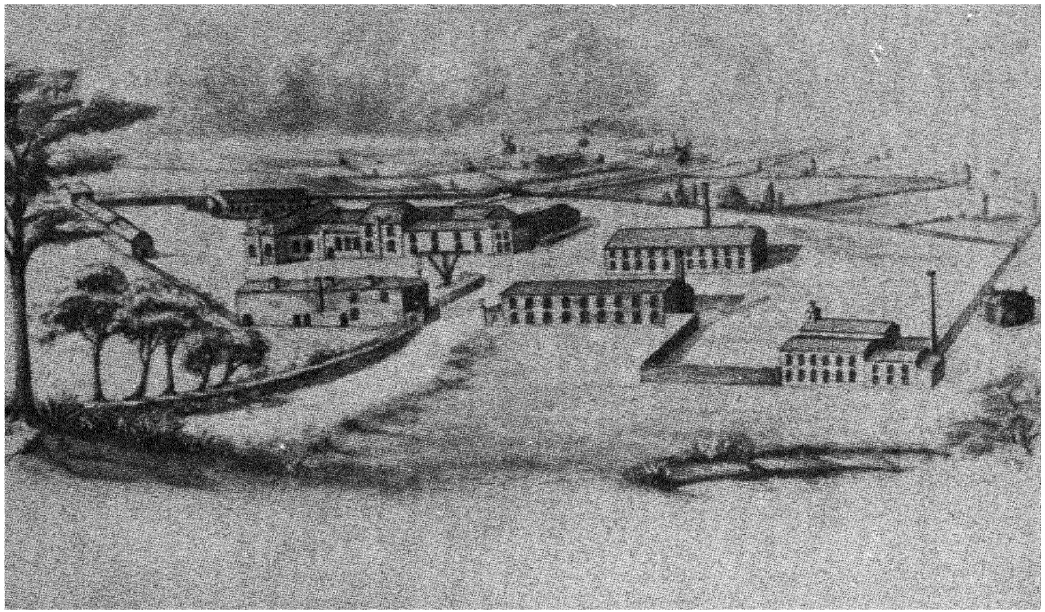
In 1786 came a technical improvement that was to alter the whole basis of the undertaking. In that year Watt succeeded in evolving a practical design for a steam engine capable of rotary movement. This brought an entirely new field and a fresh range of customers within the firm's compass, namely the textile mills, especially in the cotton industry.

This change of customers was of great significance from the point of view of the development of the Boulton and Watt partnership. First and foremost was the fact that in dealing with the cotton spinners, they were contacting customers not in the habit of using steam and quite unaccustomed to the technicalities of the steam engine. Most of them were also well supplied with



SOHO MANUFACTORY, c. 1781

(by courtesy of W. & T. Avery, Ltd.)



SOHO FOUNDRY

(by courtesy of W. & T. Avery, Ltd.)

capital resources. This meant that in the main they wished to purchase ready-built steam engines outright, rather than to pay royalties for a design and meet their own costs of erection. In consequence there had to be a change not only in the form of the business and in its price policy, but also in its manufacturing acitivities.

As the market for the new steam engine expanded it would be increasingly necessary and increasingly profitable for Boulton and Watt to manufacture the greater part of the engine components within their own organisation. Up to this time they had relied to a very large extent on outside suppliers, a policy which time and time again had led them into technical difficulties, long delays and similar hindrances. The alternative policy could not be pursued without radical change in the basis on which the firm was built. But finally, in 1795, the decision was taken. Boulton and Watt decided to build their own factory for the manufacture of steam engines.

While the factors already described were at the base of this decision, another consideration was a potent influence. In five years the original patent for the steam engine would expire. The growing technical strength of similar enterprises, frequently based on leakage of ideas through village inns to which Boulton and Watt's employees resorted, would mean severe competition once their monopoly of the Watt engine ended. By making all parts of the engine under their own direct control, the partners could secure both a high degree of technical accuracy and a lower level of production costs, both of them advantages calculated to improve their relative position in the industry.

It was in the new factory (the Soho Foundry, as it was called)[2] that scientific management came into its own. The selection of the site showed considerable forethought. The original Soho works had no communication by water, and road transport of large engine parts, especially cylinders, would have been a difficult matter. Consequently a canal site was chosen. This new site was in fact about a mile distant from the parent factory, the Soho Manufactory. Remarkable foresight seems to have been shown in the planning of the new foundry, even to the extent of providing for extensions that were not in fact realised

until several years later. In his study of this phase of the development of the firm, Professor Roll refers to the lists of machinery that had been prepared and that was being installed in part in the first phase of the building. There are memoranda that show, in detail, descriptions of the machinery required as well as instructions for its installation and " sundry articles wanted for the completion of the new, and later of the old machinery at Soho."

The list of the machinery that had been installed by 1799 makes remarkable reading in the light of popular conceptions of industry in the earlier phases of the Industrial Revolution. The following items are included : " Wharf ; foundry cranes ; moveable triangular crane ; engine ; blowing apparatus ; piston lathe ; shaft lathe ; wharf drill ; two drills in the fitting shop, two lathes in the same, wood lathe and grind shop, two lathes in the parallel motion shop, together with all their connecting machinery." A contemporary record says of the partners, that " they have applied the power of steam to the boring of cylinders, pumps and so on, to drilling, to turning, to blowing their smelting furnaces and whatever tends to abridge human labour and obtain accuracy."

Although there had been careful pre-planning in the choice of site and the mechanical lay-out of the foundry, this principle was carried even further in relation to operational lay-outs, process specifications and the like. It is not going too far to say that the planning of the new factory was based squarely on flow of work requirements. A number of documents are in existence which show that a modern expert in production control would find little to criticise in the planning methods which in principle are those current today. Such limitations as he might note were those imposed by the more restricted field of technical knowledge available at the time.

The four principal documents concerned are the following :—

(1) " *Arrangement of Soho Engine Manufactory*, 1801." This gives a list of the shops, the operations performed in each, their relative situation and communications. It also lists all the machines required in the production

processes, with their respective uses. Among the information given in relation to each machine is a statement of its known speed and proposals regarding new speeds which were evidently intended as a standard.

(2) and (3) "*Specification of the Fitting of Engine Materials and the Shops where it is to be done*," *December*, 1801. This gives a complete list of all the sub-assemblies and components of the engine together with full details of all the operations in sequence. A further column gives the machinery and shop for each process. In other words "this paper provides a complete list of all the production processes and fixes a definite standard regulation on the part of the management, thus relieving the workmen of the larger part of their independence and individual responsibility."

(4) "*Arrangement of workmen and distribution of work at Soho Foundry*," *September*, 1801. This gives a detailed list of the jobs assigned to each workman or small group of workmen; "there can be no doubt that this list was intended to supply a fixed standard job for each workman."

It is clear that Boulton and Watt had a very shrewd conception of the fundamentals of scientific management, especially as applied to the pre-planning of operations, the routine of work, the breakdown of operations and the like.

Their experience with the steam engine business in the mines had impressed upon them the importance of a policy that provided ample supplies of spare parts. Transport difficulties between Birmingham and Cornwall and the breakage of parts while the components of the engine were in transit or after the engine had been erected, were both factors which might have constituted a serious threat to the reputation of the company's products and service. Boulton had thus been compelled to provide for stocks of at least certain spares and components, a policy which would have been impracticable without some degree of standardisation. Indeed standardisation as a defined policy seems to have been well to the fore of Boulton's mind. As early as 1782 we find him

writing to Watt that " the difficulties of building engines could be overcome by making a pattern-card of them," and he thought they should confine themselves to standard types and sizes.

Document (4), described above, seems to indicate that there were equally clear concepts in the minds of the partners on the specialisation of work. Professor Roll is convinced on this point : " Essentially each man did specialised work ; and it is safe to assume that the division established in September, 1801, would be carried out more and more strictly as the manufacturing side of the business developed."

This aspect of the Foundry's work brings out another important feature of management, the question of labour supply. In the early years of the enterprise, when engine design was the main business of the firm it suffered considerably from shortage of skilled labour. In fact, it was a regular part of the duties of one or two of the senior employees to go to various parts of the country from time to time to try to find suitably trained and experienced men. At the time of the opening of the Soho Foundry this problem became both more acute and, in view of the development planned by the partners, even more important. Some help accrued from the closing of another well-known iron works which threw several skilled men out of employment. But relations between the Wilkinsons, the owners of the plant concerned, and the Soho Foundry were somewhat strained. This fact delayed the engagement of such skilled men as were available. The only alternative open to the partners was to train their own men for themselves. One of the key tasks in the first year or two after the new Foundry was opened was the training of skilled labour to Boulton and Watt standards of accuracy in workmanship.

It is also of interest to see how the firm secured the executive personnel that made development possible. It is clear from the sketch already given that Boulton himself was an organiser, executive and industrial leader of the first rank. But by the time the new foundry was in course of erection both he and Watt were getting on in years. They were still active and keenly interested in the Foundry. On the other hand competing interests were gaining ground. Boulton was enthusiastic about a new

coining mill that he was developing. Watt was already beginning to look forward to devoting his later years and the greater financial stability he had acquired to purely experimental and academic pursuits. Fortunately for the continued progress of the enterprise, the sons of the partners had already reached an age when they could be trusted with the management of its affairs. They brought to it not only the training and guidance they had already received from their fathers but the impetus of an infusion of new blood. In fact it seems that the energy of Messrs. Boulton and Watt junior was largely responsible for the rapid progress of the constructional work of the new Foundry, and the progressive outlook of younger men provided the motive power so essential in launching a new phase of activity. Roll records that " The great development which Soho made after 1795 is bound up with the names of Matthew Robinson Boulton and James Watt, Jrs., and it is to them that all credit must be ascribed. Combining a thorough education in the gentlemanly pursuits of the time with an early training as practical engineers in all stages of production, they brought to the task of organisation an entirely new outlook." This is perhaps the clearest evidence available of the advanced stage to which scientific management was carried in the Boulton and Watt partnership. Few twentieth century firms can yet claim to have recognised that " the development of a new generation of executives " is one of their main responsibilities, or to have allowed them to assume responsibility with such happy results.

Some indication has already been given of the firm's personnel management from their approach to the problems of labour supply and development. Technical training became a definite item of policy. It was indeed the only means by which they could secure the increasing degree of skill necessary to the design and manufacture of the improved steam engine components. Watt himself remarked on this as early as 1786, saying : " We must have more men and these we can only have by the sole process of ' breeding ' them." Professor Roll comments that " during the early years of its existence, Soho became the training centre for skilled workmen, and the laboratory for new processes."

As the factory grew, the partners felt that they could encourage

greater keenness on the part of their workers by the introduction of some method of " payment by results." The task of devising the schemes was by no means easy, but every effort was made to achieve a satisfactory basis. The following description deals with the determination of incentives for cylinder borers :

" In order to compute a bonus it was first necessary to find the average time taken for the different sizes, and here the difficulties were great. There was, first of all, the average time calculated from the actual time records by dividing the total time taken for each size by the number of cylinders of that size bored. The times arrived at in this way are set out in column four of the table for cylinders. This method was unsatisfactory for obvious reasons. The times were not necessarily the same for each cylinder of the same size owing to differences of a technical nature ; nor did they vary in direct proportion to the different sizes. In order to bring the figures more nearly in proportion to the real times an attempt was made to combine the two dimensions of the cylinders, the diameter and the length. These two, the first in inches and the second in feet, were multiplied and the result was called ' surface ' ; but this new factor was, of course, only a figure which would vary in direct proportion to the surface. It was then possible to arrive at a new set of average times for each size on the basis of this new factor ; but this, as an explanatory note to the table states, was also found to be unsatisfactory, since ' the times of facing the cylinders and some other parts of the operation are not in the ratio of their diameter and length.' A new theorem was therefore substituted. To the ' surface ' was added 72 and the total thus obtained when divided by 30, gave the number of days which the job ought to take. By multiplying the number of days by 5 the gratuity in pence is found for each particular size of cylinder. The same method was used for calculating the bonus for air pumps, but here the rate was only 3d per day instead of 5d. It can hardly be said that the method ultimately adopted was scientifically satisfactory or that it overcame all the difficulties in the way of finding a correct measure for the time each job ought to take.

Today, the industrial psychologist and the scientific manager maintain that they can, by the aid of careful study of time and motion, ascertain scientifically the time necessary for any particular operation. The method adopted at Soho was limited by many technical imperfections; but its motives and the calculations which led to it are surprisingly in advance of the age, for it must be remembered that machine production was then in its infancy. It cannot, therefore, be called a rough and ready one; and the firm was apparently satisfied with it, for a final table was drawn up, setting out the gratuities varying for each size from 9d. to 4s. 1d. for air pumps and 1s. 8d. to 11s. 4d. for cylinders."

There were other noteworthy items in the company's scheme of personnel management. Boulton himself had apparently been particularly interested in the welfare of his employees and had striven to maintain working conditions at a high standard. It is recorded that as the sons became responsible for management the personal touch with employees began to diminish. But the factory was still, in all its branches, under the direct supervision of the owners and personal contact was, therefore, not lost. There is indeed evidence that the old spirit survived. The custom of giving Christmas presents to all employees was maintained. For 1799 a very long list is in existence with presents ranging from 5s., 7s. 6d. and 10s. 6d. in clothing, books or other articles for apprentices, to 10 guineas for clerks, journeymen, fitters and moulders. The average workman's wages were usually raised at Christmas by 1s. per week.

Outstanding among the welfare activities was the sickness benefit scheme organised under the name of "The Insurance Society belonging to the Soho Manufactory."[3] The essence of the scheme was a general contribution from all employees to a fund, from which agreed sums of sickness benefit would be payable. An elected committee of employees had full control of the society, and among their tasks was an obligation to "visit the sick every day in their turns, or in default shall forfeit sixpence to the box." The committee also had powers to make special grants in time of sickness to employees who were not

eligible for admission to the Society under its standing Rules. A strange element among the Rules (though unquestionably pertinent) was Item XXIV, which ran as follows: "As it is for the health, interest and credit of the men, as well as masters, to keep this Manufactory clean and decent, it shall be deemed a forfeit of one shilling to the box, for anyone found guilty of any indecencies, or keeping dirty shops, which indecency, etc., shall be adjudged by the committee, and the forfeit made, either more or less than one shilling, according to the greatness of the indecency, etc."

In the field of general administration, the same high standards are noticeable. One feature has already been emphasised—the training and development of the new generation of chief executives in the persons of the sons of the founding partners. And the same readiness to delegate authority is found in the use made of staff employees. Roll quotes the growing use made after 1782 of "supervision by delegates, foremen and clerks; and the partners' time was less taken up by the details of office routine. They began to interest themselves more and more in broad questions of economic policy."

This made possible the high degree to which the partners developed forecasting as a practical tool in the management of the enterprise. To a very great extent the whole plan for the building of the new Soho Foundry in 1795 was founded on a clear conception of the different situation that would confront the company when Watt's patent expired in 1800. To the sons as they took over control, records Roll, "it was evident that their position after 1800 would no longer be different from that of other manufacturers. They, too, would have to fix sale prices to include the manufacturing profit, and since, in most cases, the buyers of engines already paid a certain sum in addition to the cost of materials, it became merely a question of changing the method of computing this sum; and, as a matter of prudent business policy, this change was introduced before it had become an absolute necessity."

Forecasting was carried to its logical conclusion as the basis of production planning. "For some time previous to the drawing up of the plans (*i.e.*, for extending the factory and production),

elaborate statistical records had been kept and these continued for some years after the establishment of the new regime. From the tables showing the value of goods sent out from Soho, together with the proportions of those made outside for the years 1791 to 1794, it is clear that some thought had been bestowed on the problem of estimating the prospective production . . . Thus after some idea of the desired productive capacity of the plant had been reached, the problem of organising the production processes was tackled from the technical point of view. The requirements in the way of machinery were ascertained, together with the shops in which it was to be housed, and the men who would be required to work it."

No account of the general administration of the firm would be complete without some reference to control records. It will have been realised from many of the quotations that very full figures were maintained. This applied to sales and accounting data as well as to technical facts. An illustration of the costing methods adopted is found in a document entitled *Calculations of the Cost of Fitting*: *Cooper and Anderson's Engine*, 1801.

COST CALCULATION

COOPER AND ANDERSON'S ENGINE

	£	s.	d.
Total number of days: 170			
Charge for men's time	20	15	11
Charge for use of tools	3	16	10
Charge for use of machinery	8	16	3
Total amount, exclusive of percentage ...	£33	9	0

Inferences:

	£	s.	d.
Total time 170 days: Amount of charge for do. ...	20	15	11
=2s. 5d. per day			

	£	s.	d.
Amount for use of tools for 170 days ... ... = 5½d. per day, or 18½ per cent. on amount of men's time	3	16	10
Amount of use of machinery for 170 days ... .. = 1s. per day, or 43 per cent. on amount of men's time	8	16	3

Application:

	£	s.	d.
Wm. Harison's charge for the total fitting, turning, boring and labour, exclusive of packing ... ... £20=400s. 2s. 6d.=160 days.	20	0	0
Charge for use of tools, say 6d. per day on 160 ...	4	0	0
Charge for use of machinery, say 1s. per day ...	8	0	0
Charge for weighing and loading	1	10	0
	£33	10	0
Plus 40 per cent. ...	15	0	0
	£48	0	0

or, say £45 os. od.

The significance of this amazing experiment in the general history of Scientific Management cannot be exaggerated. No better summary of the main points which it raises can be given than the following extracts from the final pages of Professor Roll's careful study in which he has presented the results of his most detailed research to the executives of our own day :—

(1) " The first impressions of an account of the experiments in business organisation carried out by this firm tend to evoke a desire to revise the general belief in a comparatively recent introduction of such experiments which have lately been invested with all the glamour of a science. It is commonly supposed that problems such as those of

scientific works design, subdivision and specialisation of labour in conformity with the greater use of machinery, more accurate methods of wage payment, keeping of records and of systems of cost accounting did not arise until thirty or forty years ago during the era of what is termed the ' new industrial revolution.' Mass production, with its use of automatic machinery, is made responsible for a revolution in industrial methods with social repercussions equally or even more profound than those of a hundred years ago. The history of Soho does not encourage such generalisations; and even when it is admitted that Soho was an exception—although the lack of evidence regarding other enterprises may be due merely to the absence of records—the presence of experiments in scientific management shows that these are not exclusively a product of the era of mass production, but were apparent from the very beginning of machine industry."

(2) " The procedure adopted to solve problems of organisation and administration was, taking them one by one, in no way different from that laid down by management experts at the present time; and the cause necessitating changes was then, as now, mainly economic."

(3) " Of all the causes which led to the changes brought by the new century one deserves to be emphasised again before this summary is concluded, namely, the sudden transformation of a state of monopoly into one of competition. The menace of it was the most powerful external factor leading to efficiency; and from it the factor of personal ability received its strongest impetus. The analysis of the figures showing the trading results although in many ways inconclusive, does at least substantiate that point emphatically; for as long as the business of the firm was mainly that of collecting royalties the manufacturing side was carried on at a loss. This had to be remedied when with the expiration of the patent,

> the income from royalties ceased, when the production was concentrated at Soho, and when this production had, moreover, to stand the strain of competition. It is not easy in retrospect to divorce economic from personal factors; but at least it can be said that problems arising from similar causes did, in essence, find the same solution as they would find today if they commanded the same degree of personal ability."

In its setting as part of the history of the pioneers of scientific management, this study inevitably raises even more questions than it answers: Was the management at Soho an isolated instance in a time of intense industrial change? Did it maintain its high standards over two or three decades without exerting any influence on the affairs or minds of customers and other contacts? And if the Boultons and Watts played, as they did, an active part in the gatherings of contemporary industrialists, could they avoid imparting to other executives the germs of advanced management methods?

For the present there is no certain answer to these queries. But the "history of management" is a comparatively untilled field, and there is no doubt that further research will yield some discoveries of the greatest interest.

[1] *Professor Roll's study was published in* 1930 *under the title "An Early Experiment in Industrial Organisation"* (*Longmans, London*). *The present chapter is based almost entirely on Professor Roll's book and the many quotations are drawn from that source. The authors feel that no apology is needed for the many and lengthy quotations extracted; in fact, they hope that these extracts will encourage readers to go through for themselves the detailed analysis Professor Roll has undertaken.*

[2] *Mr. A. K. V. Crale of the Avery Historical Museum has kindly supplied the authors with the following note on the original Soho Manufactory belonging to Boulton and the Soho Foundry which he built when in partnership with Watt. The two establishments are frequently confused.*

"Soho Manufactory was built by Boulton by the side of Soho Pool in 1762 *and was extended and brought to the condition shown in the illustration in* 1765. *Here the partners made the few parts of their engines which they supplied in the early days.*

The principal business remained that which Boulton had inherited from his father, that of 'toy' making, and in later years he extended it considerably by the introduction of new lines. The Manufactory continued to be operated after the retirement of the original partners in 1800, *at first by their two sons, and, when M. R. Boulton died in* 1842, *by James Watt Junior. When he died in* 1848, *the Factory was closed, and after parts of it had been let to various manufacturers for a few years it was demolished completely about* 1863.

Soho Foundry was built in 1795, *and opened early in* 1796 *with some ceremony. After the deaths of M. R. Boulton and James Watt, Junior, the engineering business was continued at the foundry by Gilbert Hamilton, H. W. Blake and others, under the trading name of James Watt and Co. In* 1896 *the foundry and business were acquired by Messrs. W. & T. Avery Ltd., who still occupy the premises, and maintain the trading name of James Watt and Co., as a subsidiary.*"

[3] *Professor Roll gives a photostat of the Society's Rules as the frontispiece to his volume. This is dated* 1792.

IV

THE PIONEER OF PERSONNEL MANAGEMENT

Robert Owen, 1771-1858

ALMOST every movement of social and humanitarian reform in the later decades of the nineteenth century has been traced back in some measure to the ideas and ideals of Robert Owen. Some writers have gone even further, attributing to Owen's stimulus and endeavours the major political changes in the middle years of that eventful period.[1] This last claim is questionable and the first sometimes exaggerated. But attempts to preserve moderation which appeared to belittle his accomplishment would be unjust to the memory of a truly great man.

Curiously enough Owen is never mentioned in connection with the aspect of his work in which he was most distinctively a pioneer. In addition to all his other activities he was also a practical, competent and successful industrial executive, and a very early exemplar of modern personnel management. Generations ahead of his time, he preached and practised a conception of industrial relations which is, even now, accepted in only a few of the more progressive undertakings.

Moreover, personnel management was the only field—with the possible exception of education—in which Owen's pioneer work included successful practice as well as fervent precepts. That does not imply that he should be thought of as an idealist and a talker. He was essentially practical. He would have been as incessantly and untiringly active in the prosecution of reform in any direction—better methods in education, the organisation of community life, factory law, poor law—as he was in personnel management and as he tried to be in the development of Trade

ROBERT OWEN

(by courtesy of the National Portrait Gallery)

Unions. But he was born out of time. In the heyday of the scramble for promotion of profits and priority of place through application of the new mechanisation, industry—and the cotton industry not least—had little time for the man whose ideal of life put responsibility to the community above the service of self. From the first mild interest in a young man with strong ideas—who certainly had a flair for making industry pay! —contemporary opinion passed through successive phases of tolerant amusement, suspicious distrust and, finally, powerful opposition. It was in the years 1815-19, the period of the fight for factory law reform, that the real contemporary opinion of Robert Owen showed itself at its plainest: opposition then was not only powerful, but organised, unscrupulous, irresistible and, inevitably, successful.

It is in fact, only a comparatively short period in Robert Owen's long life of eighty-seven years that belongs to the history of management, the period of twenty odd years between 1800 and 1828 when he was in executive control of textile mills, for a short while in Lancashire but chiefly at New Lanark. His earlier career is, however, of interest in the light that it sheds on the Industrial Revolution. Study of the years in which Great Britain became the "Workshop of the World" has followed a traditional pattern which has focussed attention almost exclusively on the technical basis of progress. The inventors have been represented as the originators and leaders of that tremendous development: the technicians have been accepted as the mainspring of each advance. But in the case of the Boulton and Watt partnership it was the executive ability of Boulton that created the conditions in which Watt's scientific genius could be applied with success. So again, in textiles, Robert Owen showed that competent and sound management was the key to success and progress. He was not in any sense of the term a technician, nor was he, despite his later considerable wealth, a financier. He was essentially a skilled organiser and manager, gifted with those personal qualities which are always the basis of industrial executive work of the first order.

He came from quite an ordinary middle-class family in Montgomeryshire. His father was a saddler and iron-monger,

and local postmaster at the little market town of Newtown on the Welsh border. He was the sixth of seven children and very soon showed himself as extraordinarily precocious. He said of himself in later life : " I was, before seven years of age, fond of reading all books which came in my way, and thinking of their contents." Throughout the ten years of his childhood at Newtown, reading was his greatest hobby and he seems to have devoured everything that came his way—history, poetry, novels and even religious controversy. This studious bent brought him into frequent contact with the more intellectual people who attended the local Methodist church, and who, consequently, played a part in developing his keen and active mind. It was probably from these sources that his strong religious interest developed its main strength. Despite his later denunciation of all dogmas, and his reputation as an infidel and a materialist—he remained throughout his life deeply religious. This early indulgence in prolific reading also, no doubt, laid the foundation of his whole character in maturity. He was always self-confident, a keen reasoner, enthusiastic for any new idea when once convinced of its value, impatient with slower minds and impetuous in action.

At the age of ten Owen began his business career in the textile trade. Through a family contact he was able to start with a sound three-year apprenticeship to a retail draper in Stamford, Lincolnshire. Though offered a promising opening at the end of his training, Owen preferred to follow an independent line. He secured a post in London, in a city drapery house with active and varied connections. This gave him a very different experience of life. He exchanged the leisurely ways of a provincial market town for a hurried day of long hours, exhausting work far into the night and the loss of the leisure that, as a young lad, he had always valued so highly. After three years in London he again decided to try a new field and, this time, he went to the heart of the industry—to Manchester. Here, during an employment that lasted two years, he gained not only a wider knowledge of textiles and experience of the trade from a different angle, but also first-hand contact with many rising figures in the Lancashire cotton industry.

Thus at the age of eighteen, he had already completed a

valuable career as a junior. He had acquired a sound knowledge of textiles and their qualities, a good business training, including a grasp of stock records and book-keeping, and personal experience of arduous work in not over-pleasant conditions. The development of his character and intellect had been continuous. In particular during the years at Stamford he had had exceptionally valuable help from a genial and intelligent employer, who afforded him every opportunity for study and advancement. It is probable that by the time he left this apprenticeship, Owen's own ideas and lines of thought had taken their basic form. He records in his autobiography that "by this age my religious feelings were replaced by the spirit of universal charity—not for a sect or a party, or for a country or a colour, but for the human race, and with a real and ardent desire to do them good."

The year 1789, when he was eighteen, was the turning point of Owen's career. He was well-equipped to advance to a senior post in the drapery trade that might lead him in time to be one of the leading merchants in Manchester. But he chose a different path. Leaving his apprentice years behind, he set up with Ernest Jones his first partnership in manufacturing, and thus became an employer. Jones was a young mechanic who made the wire bonnet frames supplied to drapery stores. He was keenly interested in the new spinning machines that were then being introduced to the Lancashire trade, and was eager to launch out into building them. He had no financial means with which to make a start. But he succeeded in enlisting Owen's interest and at length put forward a proposition for a partnership. Owen was to contribute £100 capital: Jones would contribute his mechanical skill. Almost inevitably, the commercial control of the business and the management of the workshop and its forty employees fell mainly on Owen—Jones being a good mechanic, but having no knowledge of or experience in management. The partnership lasted only a few months. Jones received more tempting offers from others who could use him more profitably, and, as the terms of purchase offered to Owen included some of the machines, he decided to take this opportunity to start out independently.

In a tiny workshop with three assistants he spun yarn from

rovings bought from an equally small enterprise. This complementary scheme worked very well and soon Owen was making a profit of £6 a week and meeting with no difficulty in disposing of his finished yarn. There is no knowing to where this tiny beginning might have led, or how much more easily an independent career achieved early in life might have enabled Owen to carry into practice the many ideals that were always in later years resisted or blocked by his partners. As chance would have it, Owen saw an attractive offer for a management post in a new large spinning mills in Manchester, and, acting on the impulse of the moment, applied for it. Mr. Drinkwater, the owner of the mills, was a wealthy Manchester merchant with large export interests, but no technical skill or knowledge. Consequently, he had to rely on a manager for the control of his production. The mills were already employing about five hundred people—a fact that makes Owen's application look presumptuous if not unreasonable. Nevertheless, he got the appointment. But his own account of the interview and of its result is well worth reproducing :

" Without saying a word I put on my hat, and proceeded straight to Mr. Drinkwater's counting-house, and boy and inexperienced as I was, I asked him for the situation which he had advertised. The circumstances which now occurred made a lasting impression upon me, because they led to important future consequences.

' You are too young,' and at that time, being fresh-coloured I looked younger than I was. I said :

' That was an objection made to me four or five years ago, but I did not expect that it would be made to me now.'

' How old are you ? '

' Twenty in May this year,' was my reply.

' How often do you get drunk in the week ? ' (This was a common habit with almost all persons in Manchester and Lancashire at that period).

' I was never,' I said, ' drunk in my life,' blushing scarlet at this unexpected question.

My answer and the manner of it made, I suppose, a

favourable impression ; for the next question was :

' What salary do you ask ? '

' Three hundred a year,' was my reply.

' What ? ' Mr. Drinkwater said, with some surprise, repeating the words.

' Three hundred a year ! I have had this morning I know not how many seeking the situation, and I do not think that all their askings together would amount to what you require.'

' I cannot be governed by what others ask,' said I, ' and I cannot take less. I am now making that sum by my own business.'

' Can you prove that to me ? '

' Yes, I will show you the business and my books.'

' Then I will go with you, and let me see them,' said Mr. Drinkwater.

We went to my factory. I explained the nature of my business, opened my books and proved my statement to his satisfaction."

The salary asked for was very high for those days, especially for a young man barely twenty years old whose only previous management experience had been a handful of people in a workshop, and whose only technical competence was limited to half a dozen machines. But he had taken a plunge and went forward undaunted. He took over Mr. Drinkwater's mill at once and had to face without any assistance, or education, and even without any contact with his predecessor in office, the task of getting it into good running order as soon as possible. He wrote :

" Thus, uninstructed, I had to take the management of the concern. I had to purchase the raw material, to make the machines—for the mill was not nearly filled with machinery—to manufacture the cotton into yarn, to sell it, and to keep the accounts, pay the wages, and, in fact, to take the whole responsibility of the first fine cotton spinning establishment by machinery that had ever been erected, commenced by one of the most scientific men of his day . . ."

Owen faced this trial as he had faced a similar ordeal when he set up with Jones :—

> "I looked grave, inspected everything very minutely, examined the drawings and calculations of the machinery as left by Mr. Lee, and these were of great use to me. I was with the first in the morning, and I locked up the premises at night. I continued this silent inspection and superintendence day by day for six weeks, merely saying yes or no to the questions of what was to be done or otherwise, and during that period I did not give one direct order about anything. But at the end of that time I felt so much master of my position as to be ready to give directions to every department."

During the four years that he spent with Drinkwater, Owen was left entirely independent in the management of the mills, and almost from the outset he displayed towards his responsibilities as a manager the attitude of mind that was to be the keynote of all his industrial and social thought throughout a long and active life. Instinctively, his interest was centred as keenly on the human factors in the Drinkwater business as on its mechanical and technical aspects. He developed the machinery and improved its layout, but at the same time he made corresponding and even greater improvements in the working conditions of the employees. Throughout the four years of his management his workpeople were always well satisfied, and they learned to place in him a degree of confidence that must have been a powerful element in his success. It was probably this early experience in the management of people in industry and his own insistence in giving them good surroundings that gradually stamped in his mind his fundamental doctrines on the formation of character : "Men have no influence on their make-up—character and temperament are but the products of the physical and moral environment."

Apart from the invaluable experience that he was acquiring Owen also gained during his stay in Manchester in two other directions. First and foremost he was becoming familiar with the rising group of textile manufacturers. In fact he was gradually

winning a high reputation in all cotton circles, and in consequence received many offers of partnership. This was a period when the cotton textile industry was entering on its phase of rapid expansion owing to war demands, for war with France broke out in 1792. Many new mills were being built throughout Lancashire and Yorkshire, and the new machinery was being installed on all sides. Skill and native ability were rare, and as Owen had given ample proof, especially of the latter, the fact that his services were keenly sought after is not surprising. Two offers of partnership he received are particularly interesting, the one from Samuel Marsland—one of the great cotton-spinners of the times—and the other from Samuel Oldknow, the pioneer of fine cottons and muslins. It is interesting to speculate what might have been the result of an Oldknow-Owen partnership, linking Oldknow's high technical skill with Owen's executive ability, and both men sharing common ideals for the welfare of the people they employed.

Owen seems to have rejected these offers of partnership more on impulse than from any reasoned analysis of their advantages and disadvantages. His own firm character and unswerving ideas made it difficult for him to adjust himself to people with a more flexible outlook and ideals less rooted in high principles. Eventually, however, he did decide to leave Drinkwater, in about 1794 or 1795. He joined a partnership for the control of the Chorlton Twist Company, a group formed between a Manchester manufacturer and two of the largest and oldest-established London merchants. New mills were being erected and Owen was to be their first manager. The change throws one interesting side-light on Owen's character in that he refused to manufacture at the new plant any lines that would compete with those of his former employer, Drinkwater.

Another gain from the years that he spent at Manchester was the contacts he formed with the more intellectual elements in a progressive community. Because he had acquired a reputation of being highly intelligent and well-read he was able to secure entry to the academic and scientific circles that were springing up in the great industrial North. He was frequently in the company of men such as James Watt—inventor of the steam engine,

John Dalton—the chemist, and leading personalities connected with Manchester New College and the Manchester Literary Philosophical Society. In particular, there was Dr. Thomas Percival, whose report to the Manchester Board of Health in 1796 embodied the resolutions that were to be the core of the first factory legislation, the Health and Morals Act of 1802. Unfortunately, these many and varied contacts failed to make Owen any more amenable to other people's lines of thought—he remained completely convinced that his own ideas were right and that these alone were to be his guide.

Among the trade contacts that he made in his later years at Manchester was that with David Dale, the well-established Glasgow manufacturer. This contact laid the foundation of his future life. In the first place it gave him his wife and his home, for he married Ann Dale in 1799. Secondly, it gave him New Lanark which was to be the scene of his greatest industrial experiments. It was again an impulse that led to his acquisition of the New Lanark property, for he had no stronger basis for a visit there than a rumour that Dale was anxious to reconstruct his activities and dispose of this group of mills. Owen's inspection proved to him that its acquisition would be well worth while, though he felt that he would be moving into a district strangely different from that which he had known. Eventually, his partners agreed to the deal and in January, 1800, he took up his post as managing director of the New Lanark establishment.

The next twenty-eight years are the real story of Robert Owen as a pioneer in human management and a torch-bearer of social reform. No sweeping changes were made at once. But gradually, in the course of ten or twelve years, improved conditions were introduced one by one and the spirit of partnership between employer and worker was built up. The process was not entirely smooth going, and in particular, Owen met with difficulties from his partners. In fact, he had several successive groups of partners, being unable himself to provide the necessary capital. In each case there proved to be among them a powerful few who had little, if any, time for Owen's advanced ideas of social reform and education. It was not in fact until 1813 that he

really acquired partners with whom he could work in comparatively stable harmony.

Undoubtedly, many of the troubles were attributable to Owen's own ruggedness of character, his unwillingness to give way or to compromise, and his inability to see that, while he had social experiment as his primary aim, they had sunk their money in an enterprise for the purpose of earning a profit. Their concept of business was entirely different from his own. That he himself was completely sincere in his ambition to improve conditions of work and to develop a new form of society, purely in order to increase human well-being and happiness, cannot for one moment be disputed. He speaks, for instance, of his " government " at New Lanark, explaining many years later in his autobiography :

> " My intention was not to be a mere manager of cotton mills as such mills were at this time being managed—but to introduce principles in the conduct of the people which I had successfully commenced with the work-people in Mr. Drinkwater's factory, and to change the conditions of the people who, I saw, were surrounded by circumstances having an injurious influence upon the character of the entire population of New Lanark. I had now, by a course of events, got under my control the groundwork on which to try the experiments long wished for, but little expected ever to be in my power to carry into execution."

As a setting for the conduct of this experiment in social reform Owen had a background that was at the same time both helpful and a hindrance. On the one side he had the inheritance of David Dale's paternal benevolence towards employees at the New Lanark Mills : in fact, at the time of his examination of the mills prior to purchase, he had commented on the provision that the employer had made for his workers. But against this, he had difficulties that arose from the nature of the work-people themselves. In the main they were either agricultural workers or members of the worst type of urban proletariat. Work in the factory was thoroughly hated and regarded as

nothing more than the last refuge from starvation. The working community of the mills was mixed, obdurate and wholly unappreciative of the benevolent spirit that David Dale had shown towards them. Their outlook was reflected in their mode of life—filthy houses, drunkenness, immorality, thieving and a complete absence of any sense of responsibility.

Robert Owen's own task was two-fold. On the one hand to improve the working conditions in the mills to such a level that they could be regarded as human and just from every point of view. On the other, to institute social reform in the community of which the factory formed the centre, not only by better houses and pleasanter living conditions, but even more by re-education of the people, especially the rising generation.

It can serve no purpose to give details of the many improvements that Owen carried out in the quarter of a century in which he managed the New Lanark Mills. The process of improvement was slow but steady, carefully thought out, and so adjusted as to receive from both employees and villagers the reception most likely to ensure success. Robert Owen was a " Southerner," and an Englishman, a newcomer unknown to the district. But he inspired in his workpeople in the course of a few years a loyalty, a respect, an admiration and an affection that won him the reception of a king on his return after a brief spell of absence.

In the main, the early years were devoted to factory conditions and housing. Educational reform certainly did not begin before 1809. The earliest tasks were matters of practical commonsense, such as the cleansing of houses, the proper collection of refuse, the laying down of streets, the enlarging of houses, and the provision of additional accommodation. In the factory one of his first measures was to close the privately-constructed shops and replace them by stores owned and run by the firm itself to sell household and daily necessities of very best quality at cost price. It is an interesting reflection on the character of this austere man that among the household necessities sold at cost price he included a good quality whisky ! In the factory itself the major early reforms were the removal of pauper children employees, the advancing of the minimum working age from ten to over twelve years, the reduction of daily hours of work

to ten and three-quarters hours, the provision of proper meal facilities and services, and a general improvement in the precincts and arrangement of the workshops. He also introduced very high standards of discipline, and made use of a peculiar mechanism, "the silent monitor," which awarded a "colour symbol" for each of four grades to rate the employee whose conduct was below the required standard. "Then," he wrote in his later life, "books of character were provided for each department in which I had the conduct of each employee registered for every year they remained in my employment."

Perhaps a more important innovation, and one which has hardly yet found its place in British industry, was the right of appeal to the higher executive. "If anyone thought," said Robert Owen, "that the superintendent did not do justice, he or she had a right to complain to me, or in my absence, to the master of the mills." This encouraged a high standard, and based, as it was, upon justice, was well received and successful, as is proved by the records of discipline at the factory. There were, at first, many fourth-grade ratings, but as time passed, the greater proportion of the ratings came to be first-grade only. Nor were Owen's methods repressive. It was in fact said of him on one occasion: "I never knew of a single instance in which Mr. Owen dismissed a worker for having manfully and conscientiously objected to his measures."

Outside New Lanark, Owen was now beginning his long and active career as a social reformer, the fame of which has far outlived the reputation accorded to his success as a textile manufacturer and manager. In the small compass of this chapter it is not possible to give more than a bird's eye view of the wide-spread fields in which he found time and energy to interest himself—and in all of them, it should be remembered, too, he was playing the role of leader or pioneer, or both.[2] Very roughly Owen's other interests can be grouped into phases, though they necessarily overlap and intermingle. The first phase was the natural outcome of his own zealous eagerness for the betterment of factory working conditions: it was his agitation for the reform of factory law. From about 1815 onwards he was persistent in his appeal for new legislation, applicable primarily to

textile mills, but equally to all factories. He called for no more than the essential minima in standards of employment though in his own proposals for a Bill he did include the stipulation of independent inspection. It was definitely part of his own programme that new legislation should provide for State factories' inspectors to secure observance of the law. Briefly, the three main points that he urged were :

(1) " To limit the regular hours of labour in mills of machinery to 12 per day, including one hour and a half for meals.

(2) " To prevent children from being employed in mills of machinery until they shall be 10 years old, or that they shall not be employed more than 6 hours per day until they shall be 12 years old.

(3) " That children of either sex shall not be admitted to any manufactory until they can read and write in a useful manner, understand the first four rules of arithmetic, and the girls be likewise competent to sew their own garments of clothing."[3]

In 1819 a Factories Act was passed, yet it was but a mutilated, emaciated reflection of Owen's original proposals. He had spent most of the previous few years in London lobbying for the passage of a Bill, serving on and giving evidence to Commissions of Enquiry. But gradually he became disillusioned. The many " friends at Court " who praised his zeal proved as empty and as fickle as their homage and it was not long before Owen relinquished any hope of the achievement of reform through the ordinary Parliamentary channels. The first sign of this change in the direction of his thought was perhaps the series of lectures that he gave at a London tavern in 1817. Social reform was their theme, with particular reference to factories and the employment of children. His disillusionment, over government and manufacturers alike, led him now to outspoken criticism and when in 1819 he published his *Address to the Working Classes*, his new role was beginning to take definite

shape—a transition from the competent, humane manager into the social reformer on a broad popular programme which would secure action through political pressure.

Yet his own constructive work still went on. The educational developments at the New Lanark Schools were winning him fame not only in England, but in several European countries, and he had the pleasure of visits from prominent Swiss, French and Italian educationalists, as well as the chance of seeing their own methods at work. Similarly, the " Village of Co-operation " into which the community of New Lanark had by now developed was becoming the prototype of a new basis of social life, and Owen himself spent long periods, for instance, in the United States of America between 1824 and 1829 at the development of the most famous of these villages, New Harmony. To Owen, co-operation was more than a mutual purchase of goods for re-sale among members : he saw in it nothing less than a communal mode of life, the philosophy to which the name " Owenism " was attached in later years and which in the twentieth century reappeared as the germ of " Distributism."

Yet a third, and equally distinct phase, was that of the Trade Union movement in the 1830's. The general interest in Trade Unionism at this time was possibly a reaction to popular disappointment over the Reform Act of 1832. There had of course been a steady development of Trade Unions since the repeal of the Combination Laws in 1824 and the legislation of the following year. Owen had in fact been closely associated with Place, Hume, Malthus and others : and on the other side not a few of the earlier Unions were tinged with " Owenite " ideals, some of them being the centre of quite an active co-operative production and trade.

But in the 1830's, trade union development began to assume a rather different character. Consolidation and national unity were the keynotes. The effort of the cotton operatives in 1829 to form a single national body was repeated on a grander scale, and Owen—now perhaps the leading figure in trade union progress—brought to birth the famous " Grand National Consolidated Trades Union " (1833-34), boasting half a million members, or half of the membership of all trades unions

throughout the country. This was a short-lived venture that petered out as previous similar attempts had done, not because of any bad will or lack of interest, but probably because the task of administration was too stupendous in an age that had neither a speedy railway-borne post nor anything in the nature of a telephone. Out of the decay of this attempted national unification of the workers developed yet another political philosophy—Chartism.

Owen's career has now taken us far away from industry. Not indeed away from industrial problems, but away from daily contact with the management of an industrial undertaking. It may be safely said that Owen's career as an executive ended about 1825, and his connection with New Lanark was severed in 1828. Yet he was still to have thirty vigorous years of active life! More and more the man of affairs became the man of visions. He was a prolific writer of pamphlets, in the press and in the journals, and a persistent speaker. Nor were these later years empty and useless, far from it. He gave this period of his life to the broader problems of social reform. We may never be able to assess just how much his tireless energy, his broad vision and his readiness to reach after the ideal have contributed to the advancement of our industrial society. In addition to all these activities he had his own personal problems—his religious disputes, his troubles with colleagues and associates, born of his inflexible stubbornness and inability to see the other man's point of view.

He died in November, 1858, at the age of 87. Only the previous year he had published the first volume of his *Autobiography* and was working steadily on the completion of the second. Two weeks before his death he had addressed a public meeting and had actually journeyed to his birthplace, Newtown, the very day before he died, to fulfil a programme of public speeches. The popular formula was in his case literal truth. The grand old man had "worn himself out."

No part of Owen's active life can be called uninteresting, and any attempt to assign a comparative importance to its many phases would be invidious. But whatever the credit due to him as a man of great and novel ideas for social reform and as a leader

in the awakening of a social conscience in the England of the Industrial Revolution, he was also a pioneer of effective industrial management, and, more specifically, "the pioneer of personnel management." This aspect of his career is the one most neglected, or perhaps least known.

That Owen's management of the Drinkwater Mills (1791-5) was outstandingly successful is proved by every test. Yet Owen was neither a mechanical expert nor a textile technician. He had acquired a good knowledge of the trade and had been associated with some of the experiments in the use of Sea Island cotton for the production of fine yarns. But his success came from a different source, an inherent executive ability, an intuitive grasp of the principles of sound management and of the methods of applying them effectively. Above all, he knew how to handle his people, how to weld them into a team and to secure from them a degree of co-operation and achievement to which only the real leader can aspire.

His history, from this point of view, raises yet once again the question which to one day an answer must be found. If, over twenty odd years, the mainspring of progress in one group of textile mills was the executive ability of its manager, may not much more of the progress of the Industrial Revolution in this country be traced to effective management than has hitherto been admitted? May not a new analysis show that by no means all of the credit belongs, as is traditionally supposed, to the inventors and technicians? [1]

In the particular field of personnel management, the lines of Owen's development have been made clear in the earlier part of this chapter. He believed, broadly, in a humanitarian basis for industry: the exclusion of young children, shorter working hours, decent surroundings, adequate meal facilities, and the many other things that enlightened managers have now come to take for granted. But more important, perhaps, was the principle on which Owen based his views: in this he was more of a pioneer than in the practice which he evolved. Broadly speaking, his basic principle was that "personnel management pays"—a line of argument that has been put forward persistently with singularly little acceptance for something like twenty-five years

since it was re-enunciated in the first Reports of the Health of Munition Workers Committee (1916). As a competent manager, Owen had the practical sense to appreciate that the purely " welfare " outlook on management would neither win a wholehearted acceptance in industry, nor rally the complete adherence of the employees. Only when the employer's efforts to improve conditions has a definite relation to his whole attitude to management would the employee feel that efforts at factory reform would really be permanent and progressive. And this was essentially the foundation upon which Robert Owen built, even though he might legitimately be called a wholehearted " philanthropist " and " humanitarian."

It is well worth while reproducing at length an extract from a preface that accompanied his third essay on *The Formation of Character*. It was a message addressed " to the superintendents of manufactories, and to those individuals generally, who, by giving employment to an aggregated population, may easily adopt the means to form the sentiments and manners of such a population." The message that he sent to them was as follows :

" Like you, I am a manufacturer for pecuniary profit. But having for many years acted on principles the reverse in many respects of those in which you have been instructed, and having found my procedure beneficial to others and to myself, even in a pecuniary point of view, I am anxious to explain such valuable principles, that you and those under your influence may equally partake of their advantages.

In two essays, already published, I have developed some of these principles, and in the following pages you will find still more of them explained, with some detail of their application to practice under the peculiar local circumstances in which I took the direction of the New Lanark Mills and Establishment.

By those details you will find that from the commencement of my management I viewed the population, with the mechanism and every other part of the establishment, as a system composed of many parts, and which it was my duty and interest so to combine, as that every hand, as well as every

spring, lever and wheel, should effectually co-operate to produce the greatest pecuniary gain to the proprietors.

Many of you have long experienced in your manufacturing operations the advantages of substantial, well-contrived, and well-executed machinery.

Experience has also shown you the difference of the results between mechanism which is neat, clean, well-arranged, and always in a high state of repair ; and that which is allowed to be dirty, in disorder, without the means of preventing unnecessary friction, and which therefore becomes, and works, much out of repair.

In the first case the whole economy and management are good ; every operation proceeds with ease, order, and success. In the last, the reverse must follow, and a scene be presented of counteraction, confusion, and dissatisfaction among all the agents and instruments interested or occupied in the general process, which cannot fail to create great loss

If, then, due care as to the state of your inanimate machines can produce such beneficial results, what may not be expected if you devote equal attention to your vital machines, which are far more wonderfully constructed ? "

And again :

" I have expended much time and capital upon improvements of the living machinery ; and it will soon appear that the time and money so expended in the manufactory at New Lanark, even while such improvements are in progress only, and but half of their beneficial effects attained, are now producing a return exceeding 50 per cent, and will shortly create profits equal to cent per cent on the original capital expended in them."

In effect, Owen was preaching personnel management in its true form, with " welfare " absorbed as part of it ; that a manufacturer provides good working conditions for his employees and just treatment of them should not be something of special significance. That must logically be an essential and

natural element in effective management. Nor should "welfare" be superimposed on employees as a counterpoise to an inadequate standard of employment. If the management as a whole is really sound, all dealings with personnel will be on a high level and the gap into which "welfare" normally fits will be correspondingly narrow.

In Owen's career there were two further small points that have not so far been mentioned. Among his early reforms at New Lanark was the shortening of working hours. So that there should be opportunity for the proper use of leisure, he opened evening centres for education, amusement and recreation—thus forestalling by nearly a century the pioneering work into which Mary Follett put so many years of untiring effort in her native city of Boston.

The second incident is particularly pertinent to the moment in which we are now living. During the course of one of his visits to Europe in 1818, he decided to attend at the Conference of Powers in Aix-la-Chapelle, and to seek to present there *Two Memorials on behalf of the Working Classes*. These, through the good offices of Lord Castlereagh, he was successful in getting laid before the Conference, though one can guess what attention would have been given to this statement of Owen's plea for the determination by international agreement of minimum standards of working conditions and education. But it is interesting to note that Robert Owen can claim, too, to have been the "pioneer" of the International Labour Organisation.

No summary of Owen's writings can give an adequate picture of the ground which he covered or of the diversity of the channels of which he made use. His first published papers appeared in 1812 and thereafter the literature that he produced mounted steadily to a stupendous volume, much of it repetitive or overlapping. A good cross-section of his thought and the manner of its presentation, especially in his earlier and more constructive years, will be found in the Everyman Library Edition of *The New View of Society and Other Essays* (*Volume No.* 799).

[1] *There are many biographies of Robert Owen and studies of his work and times. In addition he has left a studious legacy in a very lengthy "Autobiography." As these*

various writings approach the man's life and activities often from their own particular angle, it is not easy to put them in any order of preference. From the point of view of Owen's contribution to industrial development the biography written by G. D. H. Cole will be found very useful. All quotations in this chapter unless otherwise stated, are from the "Autobiography" or from Cole's biography.

[2] *Cole's biography affords a useful record of these many activities and brings out quite well their relation to Owen's trend of thought.*

[3] *Quoted from Owen's essay on "The Effect of the Manufacturing System."*

[4] *Cf. cp. xiii. p. 219 as to Ure's opinion that Arkwright's reputation as an inventor was really founded on his skill as a manager. Technically he was not an originator.*

V

MANUFACTURERS IN THE INDUSTRIAL REVOLUTION

SO far this volume contains a few brief glimpses at management in industry at the time when Britain was being transformed into the " workshop of the world." It has pointed to the existence of a vast literature describing in detail the progress of the Industrial Revolution, but concerned in the main either with the broader economic aspects of the period, or with the technical developments which were in fact the basis of such momentous changes. It is to be regretted that the historians who interpreted, for instance, the records found in the premises of Messrs. McConnell & Company[1] did not adopt the " executive control " standpoint, and so afford an objective study of management in the early textile industries. Or again, the valuable record of the life and work of Samuel Oldknow[2] leaves one keenly disappointed that it throws little light on the management methods of two great pioneers in the cotton industry—Oldknow and Arkwright.[3] But from what has been written, a great deal of useful knowledge can be gleaned, sufficient to give a background which puts into proper perspective what little we do know about the pioneers of industrial management at this turning point of our country's economic history.

Broadly speaking, except among the few who have had time and opportunity to specialise in the reading of social and economic history, the picture of the events of the Industrial Revolution is somewhat hazy. The items that stand out most clearly in the minds of those who try to recall the history learned in school or university days are the series of spinning and weaving

inventions, between Kay's "flying shuttle loom" of 1733 and Crompton's "power loom" of 1789, which are the traditional milestones in the story of Britain's industrialisation. Other similar "key" dates are 1775, Watt's steam engine, or 1784, associated with Cort's processes in iron rolling. Then, usually there is a blank period till 1825 brings us to Stephenson and his railways.

Other aspects of the "Revolution" period find the majority equally incurious. Generally it is regarded as an epoch of small master manufacturers, gradually, slowly, painfully groping their way to larger size. Popularly they are thought of in the mass, a series of employers who could know their men as "Bill, Tom and Harry" and keep themselves currently informed on the state of health of their wives and children and the latest goings-on in the village. This "personal touch" is often described, sometimes with nostalgia, as the equivalent of, if not the superior alternative to, modern management.

The actual facts were more varied. Crawshay's Ironworks at Cyfarthfa (S. Wales) employed 2,000 operators in the ore works as early as 1803. Arkwright at the turn of the century had five mills each employing between 300 and 600 persons. Oldknow owned a series of mills—probably 20—in the years between 1787 and 1794.

The iron and steel industry, from the earliest days of the eighteenth century, would make an interesting study from a management standpoint. Businesses like that of the Wilkinsons or the Crowleys were nationally known in industrial circles and were able to point to long records of success and progress. True, they had a keen demand to meet in a century of wars, but without the support of effective managements they could not have carried the growth that they had to face. Nor were they the only ones. We are told by Ashton[4] of Darby, of Coalbrookdale, with capital assets valued at £62,500 in 1794; Walker Bros., near Sheffield, valued at £200,000 by 1800; the Carron Iron Works near Edinburgh, planned on a large scale (by two Birmingham industrialists) from the outset of their erection in 1760 and reaching by 1772 the status of a joint stock company with 600 shareholders and £150,000 capital. Firms of this kind were

well-versed in the art of " ploughing back " their profits. It is not surprising to find that many of the iron-masters became closely associated with the bankers or became bankers themselves. There was too—as we shall find again later—an endless making and unmaking of partnerships, including many that were founded on alliances between sons and daughters, alliances which were not always so " romantic " as to be entirely innocent of parental suggestion.

All of this points to a large-scale economic activity in the fifty years that heralded the Industrial Revolution, if we take 1800 as its turning point.

British merchants had already been flourishing for two or three centuries, strengthened by the earnestness with which they took their trade and the efforts they made to ensure its progress. The goods they had to sell, both at home and abroad, came from a flourishing " domestic industry." Only because this was on such a widespread and well-developed basis was it possible for the rapid transition to " factories " to occur, when the growing use of water-power made the household workshop no longer practicable.[5] That that transition was rapid we know only too well from the disturbed social conditions in the latter part of the eighteenth century. Another interesting reflection on the scale of economic enterprise at this period may be read in Adam Smith's *Wealth of Nations* published in 1776. The book is itself a testimony—a lengthy and comprehensive study of economic principles, arguing in every chapter the extent of the country's trade. And the nature of contemporary industry is charmingly illustrated in Smith's graphic presentation of the forty-eight processes entailed in the manufacture of a pin.

Cotton is the industry most closely associated with Britain's Industrial Revolution. It was in the main a new commodity for general consumption, and the pressure for finer yarns added impetus to technical development. The growth of the cotton trade and the multiplication of mills might almost be taken as indices of the speed with which conditions changed. Imports of raw cotton, for instance, were reckoned at 3.9 million pounds for the year 1764: but they were 32 million pounds a year, twenty-five years later.

By 1790, fine cotton spinning had become common and the industry had already been introduced in a mill (Kelly's) with as many as 400 spindles. The woollen industry, which clearly suffered from the growing competition of cotton, remained the province of the small master manufacturers, and did not in fact become a " revolutionised " industry till well into the nineteenth century.

Yet although cotton figures more prominently in the written history, even greater importance must be attached to the iron and steel industry, including engineering and the coal-mining which developed from them. To some degree the need for coal was the primary stimulus to technical developments on the steam engine. But once Watt had commercialised the rotary movement (1785), the stage was set for a vast expansion of the use of steam power in industry as a whole. This created a demand for engine-building, for mill equipment, for iron parts and castings, and for all the other varied products of the engineering shops.

Among the many problems of the Industrial Revolution on which information is incomplete is that of the motives which stimulated such a sudden flood of invention. It may be assumed that in a number of cases the stimulus came primarily from a man's technical interest in achieving a definite aim: Oldknow, his finer and finer yarns, Watt, a steam engine of greater efficiency and reliability. But it is pertinent to recall the existence of at least two organisations that were devoted to the fostering of invention and technical improvement. The Royal Society, founded in 1662, under the King's patronage, was intended for the encouragement of discussions among scientists and those with inventive leanings. It also served the very useful purpose of encouraging wealthier citizens to assist research and experiment by grants and donations. Nearly a hundred years later, in 1754, came the second body, the Royal Society of Arts and Manufactures. This organisation had a similar aim, but a rather different constitution. In particular it maintained branches in various towns and offered prizes for the invention of specified machines or appliances.[6] Frequently, the branches appear to have acted as focal points for local interest and in the period of the Industrial Revolution it undoubtedly contributed considerably

to technical progress. Attempts have been made to prove this by records of patents—for instance, the marked increase in the years 1760-1769. There was thus in existence a conscious and deliberate stimulus to invention, and presumably the means for assisting those whose originality was greater than their financial resources.

In a more general way, other local bodies played an important part in the development of industry in the late eighteenth century. Chambers of manufacturers, or similar institutions, in most of the larger towns took the place both of business men's clubs and of trade associations and provided the opportunity for agreements, the exchange of ideas, and so on. The annals of such bodies, did they but contain records of formal discussions and informal conversations, might have been rich sources of knowledge of the pioneering stages in the management of British industry. The outstanding executive personalities of the times cannot have been active participants in such gatherings without leaving some imprint on the minds of fellow industrialists. And we know from many sources just how quickly good reputations spread. Boulton was an active member of the Birmingham Standing General Commercial Committee (founded 1783), a body in which most of the important men figured prominently. Owen, Arkwright and others were frequenters of a Manchester organisation and there was also a branch of the R.S.A. established there in 1781. Ashton records the existence of "Quarterly Ironmasters' Meetings" in the Midlands, organised for purely industrial purposes, including price-fixing and production quota arrangements. A similar body also existed in South Wales.

On a rather different footing was the "General Chamber of Manufacturers of Great Britain" which flourished between 1785 and 1787, and of which Josiah Wedgwood, the pottery manufacturer, was the main-spring. This had local offshoots, but it was chiefly concerned with bringing pressure to bear on the Government in regard to the cotton tax and the Anglo-French Trade Treaty of 1786. It represented the first large-scale combination of manufacturers designed to influence Government policy in fiscal matters—but these manufacturers were

asking for free trade. They had no foreign competition to fear, and everything to gain by the expansion of international commerce.

The part played by effective management in the Industrial Revolution may also be examined from the standpoint: were the manufacturers of the times " management conscious ? " If by this is meant that they were aware of the existence of a science or art of management, the answer can only be " No." But if the phrase is used in the sense that they recognised a capacity for effective executive control, distinct from technical competence, the answer is certainly " Yes." Two men whose lives figure in this series are a sufficient witness—Boulton and Owen. Neither of them was a technician in any proper sense of the word. Both of them were acutely aware of the need for, and were capable of, building up good organisation and methods of management. Arkwright and Crowley were similarly placed. And by contrast, there were competent technical men such as Crompton and Oldknow who simply could not maintain a successful business.

It has been suggested that the prowess of the successful " managers " was due primarily to financial shrewdness. But while this quality was pre-eminent in Arkwright, a closer study even of his career suggests that it was not the most important factor in his success. And it was certainly far from true in the case of Owen and Boulton.

Many illustrations of an understanding of good management could be cited. In the case of Boulton and of Owen, ample detail has been given. A copy of Oldknow's *Mellor Mill Monthly Statement*, January, 1797, is given as an Appendix to this chapter.[7] It shows that even a comparatively poor manager had a firm grasp of the importance of cost control as a tool of management. Or again, in speaking of one of the leading units of the times, Ashton writes : " In many respects, the enterprise carried on by Sir Ambrose Crowley and his son John, at Swalwell and Winlaton, was surprisingly modern. In its integrated structure, its internal administration, its methods of ensuring industrial peace, and even in such minutiae as the provision of standardised gauges, the concern appears to belong properly to the

twentieth century rather than to the eighteenth." He also speaks of Crowley's raising himself "to wealth and influence by the superior organisation of his concerns." Among his methods of management were included effective personnel control, with a full-time medical officer.

A useful general comment on the position of management in this phase of the country's industrial growth appears in the study of Oldknow referred to above: "The recognition of the vital importance of management marks a new epoch in the use of the factory system. It was common to have a mill manager controlling for the owner . . . Young men took these posts as a stepping stone to the acquisition of their own factory." Robert Owen had been a mill manager on this basis in the earlier stages of his career. Oldknow, on the other hand, had been a warehouse manager, which again represented a common tendency in the careers of the times from trade (retail or wholesale) to manufacturing, first as executive and then as executive-owner.

The extent to which the practice of delegation of executive responsibility had developed is reflected in Chapter VI. of Book I of Adam Smith's *Wealth of Nations* (1776). In discussing the theory of profits, *i.e.*, the reward to the "entrepreneur," he examined the view that in part profits represent "labour of inspection and direction" (*i.e.*, supervision and management). He writes: "In many great works almost the whole labour of this kind is committed to some principal clerk, whose wages properly express the value of this labour of inspection and direction." Elsewhere in the same book Adam Smith gives testimony to the existence of "suggestion schemes," even if not formally constituted.

The existence of this well-established interest in sound management and its practice in a variety of undertakings leads directly to the most important question in the whole of the Industrial Revolution—if the principles of effective management were understood, why was it that hours of work were universally so long and conditions so poor? Why did Owen encounter such opposition in his fight for minimum standards laid down by law? Why was Owen, as the exponent of effective personnel

management, so outstanding? And Oldknow, as a pioneer of the "welfare" approach, so unusual as to excite special comment? To these questions we cannot at present give any satisfactory reply. They must lie unsolved, with many other problems, until adequate research into the early history of Britain's industrial management can provide an objective answer.

In this brief and broad picture of the management background of the Industrial Revolution, there is one further point that calls for comment, namely, the extent to which the industrialists of the period maintained personal contacts with each other. Hardly any of the early studies can be read without meeting several of the names already mentioned: the life of any one of them inevitably includes numerous incidents in which the others figure. And this fact cannot be referred to the local associations which the manufacturers frequented, nor, in the majority of cases, to purely business contacts. Even where such contacts were well developed there was frequently a friendly and personal association behind them.

In the case of the iron-masters, Ashton points out that many were Methodists, Quakers or Unitarians by religion and had close associations in that direction; their families frequently inter-married; they frequented each other's houses. He also records the extent to which they made and unmade partnerships —and poached each other's staffs. Both Oldknow and Owen afford a good example of a similar process in the textile industry; each of them was in quite a short period involved in numerous partnerships, often with other manufacturers. Arkwright, while he was in partnership with Oldknow from 1798, was less fortunate in his earlier contacts with cotton manufacturers. He was the victim of intense and widespread opposition to his patent on the "waterframe." On the more personal side, we find close friendships between Boulton and Wilkinson (the iron-master)—though the friendship did not prevent a mutual filching of ideas—between Watt and Roebuck (of the Carron Ironworks), between Owen and Dale (the Glasgow cotton manufacturer, and later Owen's father-in-law) and Owen and Arkwright. As between masters in different industries,

Boulton and Josiah Wedgwood were on intimate terms. Friendships in all these cases involved mutual hospitality and visits to factories and a ready interchange of ideas and plans. What in fact, was involved and the significance of the relations established as a factor in the growth of industry, may be gleaned from the historical novels that deal with life in the early days of the textile and Midland towns. But how powerful the influence of this network of personal relations was as a force contributing to the progress of the Industrial Revolution is an issue that has yet to be cleared up—a fascinating piece of research for the patient investigator. With this suggestion the account of the early pioneering periods closes. The following chapter opens half a century later. It deals with a different Britain. Yet it is a country with many features similar to those of the formative decades. And these similarities are most marked in the field of industrial and commercial management. Once again the story is one of isolated pioneers struggling against ignorance, prejudice and apathy. Comparatively speaking, they appear to make just as little headway as their predecessors of fifty or a hundred years earlier.

APPENDIX

MELLOR MILL MONTHLY STATEMENT, JANUARY, 1797

(Extracted from *Samuel Oldknow and the Arkwrights* by Unwin, Hulme and Taylor).

Spindles set up	8,464
Spindles running (average)	6,000
Cotton to the cards	15,842 lbs. 2 ozs.
Waste to the cards	4,452 lbs.
Hanks spun	340,380
Lbs. Spun	17,060
Wages Paid	£405 2s. 10d.

CALCULATION:

(USE OF MATERIAL)

		£	s.	d.
Cotton-wool to the cards :				
15,842 lbs. 2 oz. @ 2/1½d. per lb. ...		1,673	1	9
Waste to the cards :				
4,452 lbs. @ 14d. per lb. ...	=	296	16	0
20,294 lbs. 2 oz.		£1,979	17	9
Spun : 340,380 hanks = 17,060 lbs. Contingent Expenses at 1/- per lb.(*)	=	853	0	0
Balance or Apparent Gain ...	=	11	16	5¼
		£2,844	14	2¼

(SALES AND STOCKS)

		£	s.	d.
8,450 lbs. spun yarn @ 4/7d. per lb.	=	£1,943	18	2
Deduct 10% (†)		194	7	9¾
		1,749	10	4¼
8,610 lbs. spun yarn : present money‡	=	922	5	5
17,060 lbs. spun yarn	=	£2,741	15	9¼
3,234 lbs. waste at various prices	=	102	18	5
20,294 lbs. (cotton wool) ...	=	£2,844	14	2¼

The calculation should appear side by side thus :

(use of.....)	(Sales.....)
item p. 12	item p. 13
£2,844	£2,844

(*) Contingent Expenses are calculated as follows :

Hand in the Mill, per lb.	5½d.
Management, Clerk, Smiths, Joiners, etc., per lb. ...	1¼d.
Wear and Tear	1¾d.
Interest of Money	2d.
Rent, Insurance, Carriage of Stores, Postage, etc., per lb.	1½d.
Total per lb.	12d.

(†) 10 per cent. deducted as follows :

Discounts to purchases	5%
Commission for Selling	2½%
Risque of Debts and Carriage to Manchester ...	2½%
	10%

(‡) *i.e.*, held in stock and valued at (presumably) " material cost " level.

Note—The arithmetical errors in this statement appear in the original.

BIBLIOGRAPHY

A select bibliography on the development of British industry at the period of the Industrial revolution.

Author :	*Title* :
1. Witt Bowden	*Industrial Society in England at the end of the Eighteenth Century.*
2. Witt Bowden	*The Rise of the Great Manufacturers of Great Britain.*
3. Eric Roll	*An Early Experiment in Industrial Organisation.*

	Author:	*Title*:
4.	T. S. Ashton	*Iron and Steel in the Industrial Revolution.*
5.	G. W. Daniels and G. Unwin	*The Early English Cotton Industry.*
6.	Unwin, Hulme and Taylor	*Samuel Oldknow and the Arkwrights.*
7.	Adam Smith	*The Wealth of the Nations.*
8.	G. C. Allen	*The Industrial Development of Birmingham and the Black Country.*
9.	G. W. Daniels	*Industrial Lancashire prior to and subsequent to the invention of the Mule.*
10.	T. S. Ashton	*An Eighteenth Century Industrialist.*

1 "*The Early English Cotton Industry*" *by Daniels and Unwin.* 1920.

2 "*Samuel Oldknow and the Arkwrights*" *by Unwin, Hulme and Taylor,* 1924.

3 *On Arkwright v. Note* 4 *to cp. iv.*

4 *See list appended as Bibliography: the list contains among others the titles of books by authors referred to in this chapter.*

5 *It is interesting to note that Daniels and Unwin refer to the domestic system as "capitalist"—but with the capital represented in materials instead of in equipment.*

6 *Witt Bowden quotes a sentence which epitomises the policy of the Society: "On the improvement of mechanical engines, the advancement of the manufactures, and ultimately the arts and commerce of the Kingdom must in very material manner depend."*

7 *Quoted from Unwin, Hulme and Taylor.*

VI

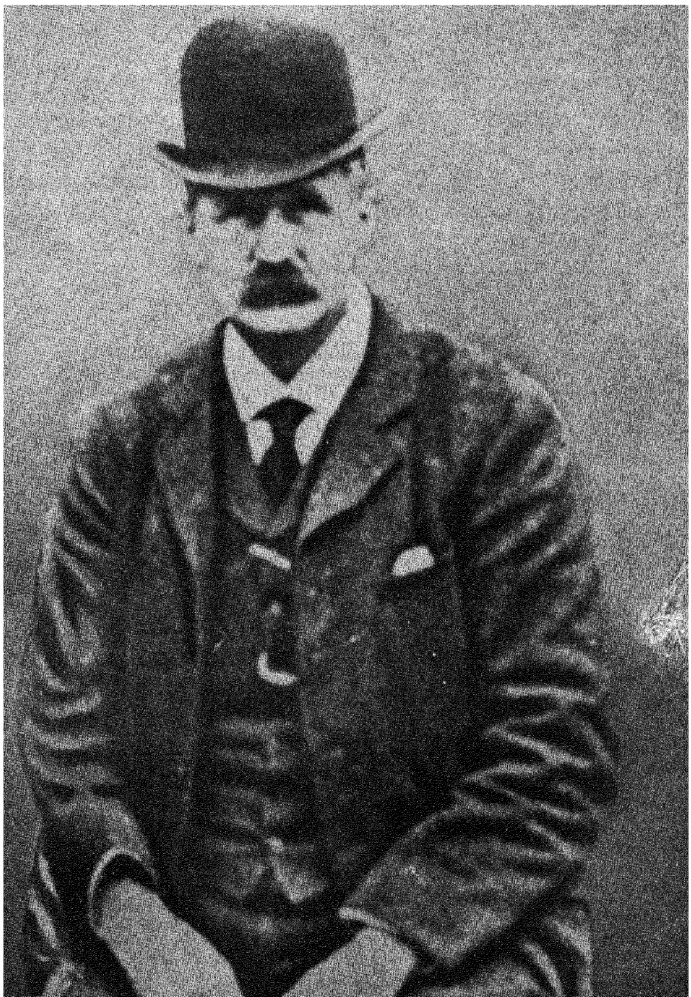
THE BEGINNINGS OF MODERN MANAGEMENT

J. Slater Lewis (1852-1901)

JOSEPH SLATER LEWIS played only a small part in the story of the pioneers who strove to make industrial management an integral part of the structure of British industry. But what is lacking in quantity is amply balanced by richness of interest. Lewis wrote one book, *The Commercial Organisation of Factories*, published simultaneously in London and New York in 1896, and hailed by the Institution of Electrical Engineers (*Memoir* 1901) as " a monument to its author and a boon to all who desire to organise their manufacture on sound commerical lines." The Mechanicals also recognised the merits of what they regarded as " the standard book " on the subject that it covered.

It was anything but typical of its time. It was too " modern," exhibiting a conception of workshop management and production control, set in a framework of general business management, comparable with the best of the text-books that our own generation has come to accept as a standard. It was superior to many of them in clarity of presentation and wealth of diagrammatic illustration. The date of publication is interesting—1896, the year after the appearance of F. W. Taylor's first paper giving an outline of what was later to become *The Principles of Scientific Management*. Lewis had probably never heard of Taylor, but he was expounding a method of management, with all its procedures explained in detail, that can well claim to be an advance application of Taylor's later principles.

J. Slater Lewis had a career than can only be described as successful but unremarkable. His life and progress were typical



J. SLATER LEWIS

of the good calibre technical men in the later years of the nineteenth century. This does not in any way belittle his contribution to industry—he is remembered for many small but important developments in the world of electricity—but it sets the character of his contribution as a pioneer of management in realistic setting. Born in 1852, in the town of Helsby, Cheshire, he went through a preliminary private education and then spent some years at the Mechanics' Institution at Manchester.

His apprenticeship (1868-1872) was spent at Norwich in the offices of a land agent and surveyor, but apparently property dealings did not absorb his interests, for he next spent several years in the coal trade. In the meantime, his early interest in mechanics was sustained and stimulated a desire to do creative work in a technical field. In 1879 he returned to his native town of Helsby and set up in business as an electrical engineer operating on his own account. These were the early days of electricity, particularly in its application in industry and the home. He had thus ample opportunity to forge ahead. Within a year his first invention was perfected, a self-binding insulator that was to find a very wide market in Europe and the U.S.A. Almost immediately he was able to visit the U.S.A. to dispose of the rights there and arrange for manufacture, and then, returning to England late in 1880, he opened up a small factory for the British market. Gradually adding other electrical lines, he was eventually able to amalgamate with a local firm making insulated wire.

In the new company he became managing director and was responsible for the erection and development of new buildings and the design of new plant, as well as the control of manufacturing activities. In 1889 he again went back to consulting and service work as an electrical engineer in Birmingham, but three years later he had joined Messrs. W. T. Goolden & Company, Ltd., London, electrical engineers, as general manager. By this time he had the invention of a number of small electrical devices to his credit. After two years he returned to the North, to open up a dynamo and electrical engineering department for Messrs. P. R. Jackson & Company, Ltd., the Salford Rolling Mills, Manchester. Within a very little while he was appointed

general manager of the entire business. It was in this capacity that he wrote his book. His final move was made in 1900, when he accepted a directorship of the Brush Electrical Engineering Company, Ltd., and of one or two electric tramway and traction companies. But it was a short-lived climax to a progressive career, for in July, 1901, he died at the early age of forty-nine. He was by then a full Member of the three Engineering Institutions (Electrical, Mechanical and Civil), a Fellow of the Royal Society of Edinburgh, and a Member of the Iron and Steel Institute. Outside industry, he was a member of the first Cheshire County Council and Chairman of its Weights and Measures Committee.

Within the limits of one chapter it is not easy to do adequate justice to a book of the character and quality of *The Commercial Organisation of Factories*. It contains 478 pages of text, with a large number of specimen forms and illustrations, a further thirty pages of appendices illustrating some of the cost accounting and book-keeping procedures, a most comprehensive index, and a back-cover pocket containing loose copies of further illustrative diagrams. The chapter titles show clearly that the book covers every phase of the arrangement of a manufacturing enterprise, including the duties of the directors themselves and the work of the general offices. Yet in the preface another twenty subjects are listed which " it has been quite impossible to include in this edition." The author's dedication calls the book : " A Handbook for the Use of Manufacturers, Directors, Auditors, Engineers, Managers, Secretaries, Accountants, Cashiers, Estimate Clerks, Prime Cost Clerks, Book-keepers, Draughtsmen, Students, Pupils, etc." A more comprehensive sub-title could hardly be imagined. Incidentally, the printing reaches a standard rare in management literature and the arrangement is exceptionally methodical and convenient. The chapters are divided into short paragraphs each bearing a serial number in large, bold type and the 165 illustrations of forms, records, equipment, and so on, carry a similar reference number to the paragraph in which their use is described. Perhaps the aim and purpose of this remarkable volume can best be given in the author's own words :

" Notwithstanding the progress of the age, every manufacturer still devises his own system of accounts, has his own books and forms specially drafted and printed and his clerks educated in methods which may be of little or no value to them in other factories. There is, in fact, no recognised system for the student to learn, and none for the schools to teach : nor are there any examinations through which managers, time cost clerks and others may receive certificates for proficiency in one universally accepted system.

Engineering, save in the matter of factory accounts, is endowed with acknowledged formulae, rules, tables, and data of every description, the acquisition of a knowledge of which the State has deemed to be of national importance, and technical schools and other State-aided institutions have come to stay ; but whether the legislature will ever recognise the exact relationship between successful engineering and scientific book-keeping, and afford the rising generation opportunities of qualifying themselves for positions where both are indispensible conditions, remains to be seen. It is beyond question, however, that the largest and most successful industrial undertakings are those where minuteness of detail and perfection of organisation have received paramount consideration : a fact which should, in itself, especially in these days of world-wide competition, make the commercial organisation of factories a matter of the first importance in every country with any manufacturing pretensions."[1]

The opening of the introductory chapter is equally interesting :

" This book is intended as a practical handbook for the use of manufacturers who wish to adopt modern methods of organisation. It is written throughout from the point of view of an organiser and manager, rather than from that of a professional accountant, and the author hopes that this feature will commend it to those who have to bear the responsibility of conducting large engineering and manufacturing undertakings."

And again :

> " The author is satisfied that it is almost as difficult to persuade those who have the responsibility of conducting large industrial undertakings that a complete and intelligent office organisation will save money, time and worry, as it was a few years ago to convince them that the use of modern machine tools was indispensable to good workmanship with cheap production. Now, however, that it has been established by experience that special machinery for each manufacturing operation, the consequent division of labour in the works, is the only economical method of production, it may be clear that the same principle should be applied to the division of labour in the office, by reducing the clerical work to pure routine. To expect this to be carried out with old-fashioned books and foolscap paper would be equivalent to expecting the production of a high-class engine by old-fashioned appliances at the same price and within the same time as one turned out by the aid of the latest labour-saving machinery."

The emphasis on the clerical aspects of management is explained by the view that " . . . many principals having had little or no experience of clerical work . . . are unable to use the necessary discrimination and their inexperience is frequently the cause of misunderstandings . . . generally at the principal's own expense."

It would be interesting to give a detailed description of the whole book. But if Slater Lewis is to receive his credit as a pioneer of management it is better to concentrate on the soundness and scientific character of his teaching and the very modern complexion of his attack on the problem. The title of the book may be to some extent misleading. Admittedly, his primary concern was with the " commercial " aspects of manufacturing, *i.e.*, with the accounting and general clerical procedures that surround the activities of the company and are intimately bound up with finance, the purchase of materials and the sale of products. But in his hands the term " commercial " takes on a wider meaning. His study in fact includes all the procedures

that are handled by what the engineering industry has come to call " the administrative staffs." Put into modern terminology, the book is an analysis of the fundamentals of industrial administration, with special reference to the control function.

The first few chapters deal with the responsibilities and duties of the senior staff of the company, handled in a very enlightened and far-seeing way, as will be shown in a later section of this chapter. At Chapter VIII, " Supplies, Orders and Invoices," the exposition and analysis of method begins and proceeds in logical sequence through 410 pages, concluding with Chapter XLVII, " Shipping." Every facet of control procedure is explained and illustrated, with a view to setting up the principles and methods of a simple but comprehensive and accurate scheme of management. The objectivity of the teaching is particularly striking, so too, is the emphasis on securing and recording facts and data. In this alone the author was emphasising an outstanding departure from current practice.

Dealing with " Estimating," he suggests an interesting basis for labour costing :

> " Each manufacturing operation, or each set of operations, should, when an estimate is being prepared, be carefully dissected and entered on foolscap paper, or in a rough estimate book. Each operation should have a reference number, which should appear upon the drawing and in the book in which the estimate is being prepared. When this information has been so extracted and checked, so that nothing may be overlooked, the prices should be added to each item. These prices should be arrived at by the manager, the estimate clerk and the foreman conjointly. Each one should write down privately his price or rate for each operation, immediately after which they should be compared and a definite figure arrived at : a very safe method being that of adopting the mean of the three rates."

But more interesting still is the emphasis which he places on the need to allow adequately for setting time. " It often happens in practice," he reminds his readers, " that the expense

incidental to the 'setting out' and 'checking' of the work is greater than the cost of the machining itself."

A special chapter on "Establishment Charges" is complementary to the study of "Estimating" and once again the treatment points to practices that in years to come were to become standard in engineering factories. There is in fact almost the first hint of the "machine hour" rate as a basis of calculation. A paragraph headed "Allocation of Establishment Expenditure" opens thus:

> "For the mere purposes of commercial book-keeping, it matters, indeed, little in which way the general and shop establishment charges are dealt with, so long as they are eventually paid for out of the profits made on the work, that is to say, it matters little whether they appear in the books as chargeable to general revenue, or are allocated to the several items of work in progress in the shops. But apart from mere book-keeping, and to meet the requirements of the management for estimating, for controlling the efficiency of production and for comparing, period by period, the relative economy and efficiency of shop administration, it is absolutely necessary to keep the accounts of prime cost (meaning thereby the actual expenditure in labour and material directly incurred in the production of manufactured goods) entirely separate from the establishment charges (shop and general), so that the naked truth as to the cost of the operations which have taken place in the shops shall plainly appear on the face of the accounts. The comparison of the costs of machines produced at intervals even of years is thus rendered possible."

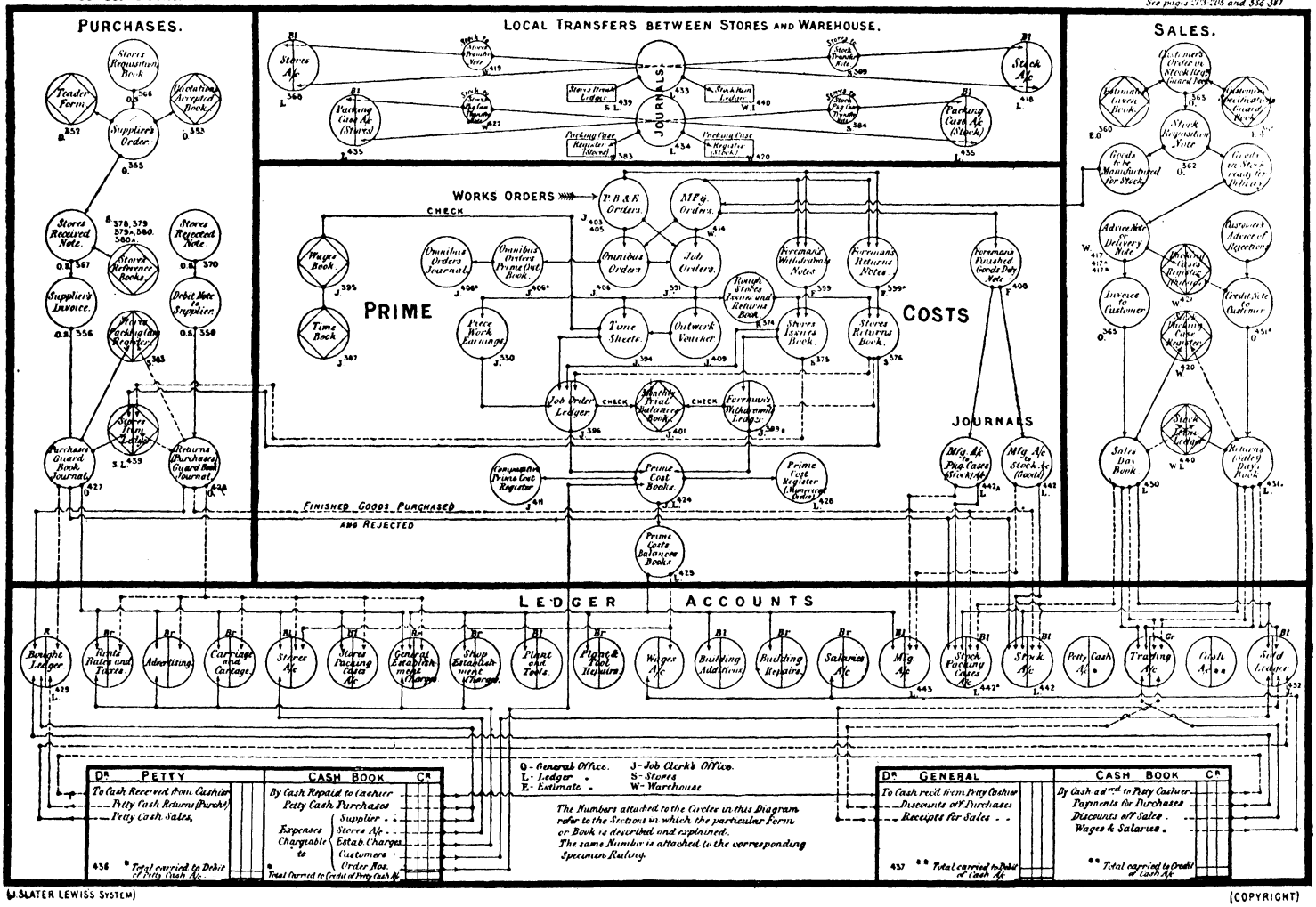
As the scheme of production and cost control is unfolded in its logical flow, following the sequence that the customer's enquiry will take as it is transformed into an order, a job ticket, a material requisition, and so on, it eventually reaches the general accountancy phase and opens up the processes of book-keeping. To deal with these in the simplest manner, Slater Lewis added an illustrative appendix of nearly thirty pages, containing

THE COMMERCIAL ORGANISATION OF FACTORIES.

DIAGRAM OF MANUFACTURING ACCOUNTS. 1896.

DIAGRAM A.

See pages 203 205 and 356 381



(J. SLATER LEWISS SYSTEM)

(COPYRIGHT)

DIAGRAM OF MANUFACTURING ACCOUNTS

(from *The Commercial Organisation of Factories*)

In the original diagram many of the circles were coloured in either red, blue, brown or green. It has not been possible to reproduce these colours, but the colours used in the diagram are indicated over the circles in question.

transactions set out in specimen sheet form. And it is perhaps in this connection that the significance of his scheme is most clearly revealed. For the whole system is an interlocking unity. So closely related are the various procedures and documents that he is able to portray them all in a single "flow chart," undoubtedly the first of its kind in British industry. Two remarkable diagrams are presented to show this feature and to make their continuous study easier. They are supplied as folded sheets slipped into the back cover of the book. How precisely and clearly they illustrate his teaching, Lewis indicates himself by a note in heavy type offering on application unfolded copies of the diagrams for framing and display.

Considering the date at which it was written the book is also surprisingly modern in its attitude towards organisation structure. In the opening pages of the Introduction there is a quotation from an American authority, Mr. John Tregoning, Superintendent of the Thomson Electric Welding Company:

> "A perfect organisation I consider an essential and vital element in securing success, in whatever form of institution we may wish to carry on, whether political or religious, mechanical or social; I contend that it is not possible to found a lasting power upon a management where systematic action is eliminated or ignored; a ramshackle condition of things is the ultimatum; and in many cases establishments have closed simply through a break-up from within of its *managing machinery*."

The author himself is equally specific:

> "The question of staff precedence is also one which deserves more attention than it usually receives, and is very often a fertile source of jealousy and heart-burning amongst employees. In no circumstances should any members of the staff be placed in positions antagonistic to one another, or given dual and overlapping control of one or more departments. It would be just as imprudent as allowing two commanders to dispute for mastery on the same ship, or as having

no degree of rank amongst the officers, or any dividing line between the duties of the steward and those of the carpenter. It is imperative that every member of the staff should have a clearly defined position, and be given to understand in unmistakable terms to whom he has to look for orders, otherwise continual bickering and consequent dis-organisation will inevitably occur. It should also be intimated to every official, particularly in the minor positions of responsibility, that they must exercise self-control and not ride roughshod over those who may happen to be their subordinates."

And the more dynamic points in organisation are not forgotten :

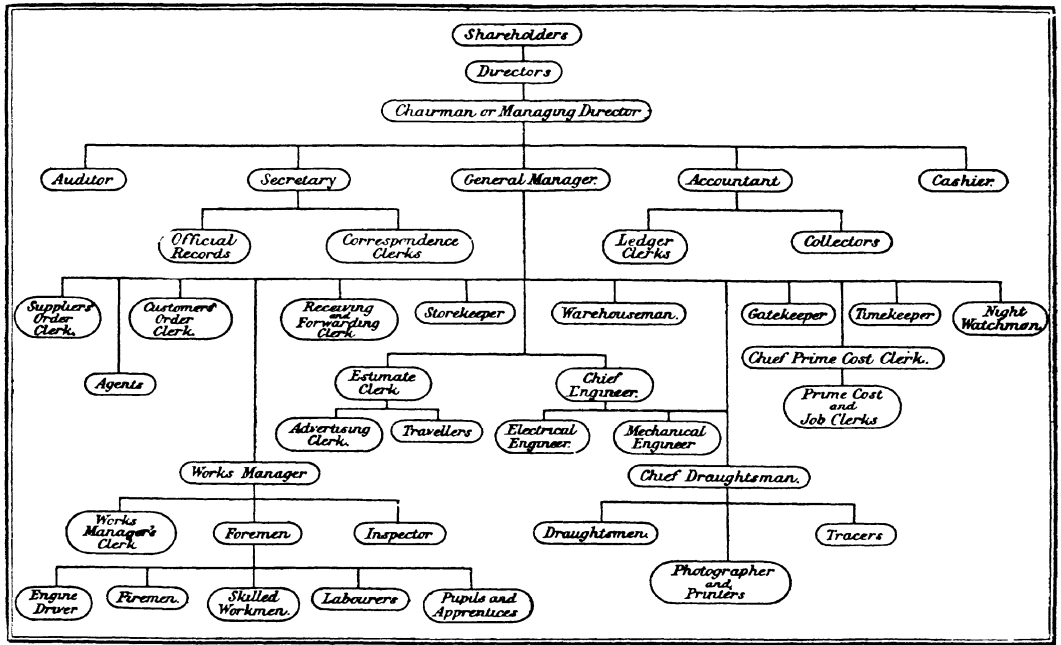
" It is obviously a most important matter that persons selected for the various staff positions should be individually adapted to the duties expected of them."

Much the same thought is repeated briefly in a later chapter :

" The works manager should take care that the responsibility attaching to every duty to be performed is clearly fixed."

Curiously enough, in view of the importance which he attaches to the subject, Slater Lewis deals with method in organisation somewhat briefly and incidentally. Among the contents of a last chapter, entitled " Miscellaneous," and dealing with such subjects as the Truck Acts, Factory Rules, Trades Unions, Unclaimed Wages, and so on, there appears a short paragraph on " Diagram of Staff Organisation," which runs as follows :

" Some officials being disposed, not infrequently, to regard themselves as equal, if not superior to men who are really their masters, it is essential to the well-being of all industrial concerns to have a definite organisation under which responsibility may not only be fixed, but the relative positions or rank of the officials clearly defined. For this purpose it is necessary to have recourse to a diagram such as Specimen 544.



London E. & F.N. Spon.

STAFF ORGANISATION DIAGRAM

(from *The Commercial Organisation of Factories*)

" The diagram should be carefully drawn in bold lines and clear letters on a sheet of drawing paper not less than ' double elephant ' size. It should then be framed and placed in a conspicuous position in the general offices.

" The diagram can of course be varied to suit particular organisations, though, as it stands, it is as nearly as possible in accordance with the general practice prevailing in this country."

The diagram referred to is the " Organisation Chart." It is interesting to note that, as far as the authors are aware, this is the first example of a modern " organisation chart " in British business literature. The fact that in a treatise so intimately concerned with every aspect of management, organisation structure is touched on so incidentally as regards method indicates how little the need for definition of formalised relations in an industrial enterprise had been appreciated by the end of the nineteenth century. A similar conclusion emerges at other points in the story of management, and there are probably quite a large number of businesses, even today, where the situation is not very different. Organisation is not treated as a question of principle or recognised method, but merely as a hierarchy which the chief executive builds up round himself and which may assume any shape dictated by his individual whim or the personalities available.

Lewis's diagram throws some interesting sidelights on the set-up of management in his time. The " commercial procedures," as he would think of them, loom large. His suggested chart is intentionally submitted to obviate misunderstandings about " authority " and so those who handle the control techniques virtually fill the picture. Little significance can be attached to the " levels " : the position of the works manager is probably due to lack of space in the width of the sheet though whether the same would hold true of the chief draughtsman is open to doubt, because any other position—given more space—would disturb the relations shown between him and the engineers.

Slater Lewis's attitude to the profession of management in general is illustrated in a number of significant quotations. In

a context already referred to, for instance, he reminds his readers that:

> "Some employers of labour entertain the idea that the 'correct' way to control a large establishment is to bluster about from one department to another. The head of an establishment should show uniform coolness and self-possession, otherwise nervousness and confusion on the part of the employees will undo all the good that might be derived from the most close supervision."

Dealing with the manager (*i.e.*, general manager) himself, Slater Lewis leaves no room for doubt as to the importance that he attached to his function, and accordingly he draws up a specification that is at once exacting and constructive:

> "The duties of the manager are of a most responsible nature, and special stress should be laid on the importance—the paramount importance—of his being a strict disciplinarian. He must be a practical man of the world, a good organiser, and, above all, must possess tact and judgment. He should be known as a man who means what he says, and who conveys the impression to one and all that he means to be obeyed. As regards the technical details of the business, he should be a thoroughly practical all-round man. He need not necessarily have an intimate acquaintance with the mathematical or other minutiae of each branch of the business, but must have a strong capacity for administrative work. He should have an instinctive knowledge of what his customers really require, and know the smartest and cheapest way of supplying their wants. He should be quite at home in modern office routine, in accounts kept by double entry, in the handling of large bodies of men, and in the application of modern machinery to all classes of engineering work. It will generally be found that those only can fill this position successfully who make completeness of work their chief and absorbing aim. The manager should bear the reputation of being firm, and at the same time absolutely impartial to everybody under

his charge, from his office boy upwards. He should always be ready to learn from anyone, and, in whatever work he may have in hand, should adopt the latest processes and methods, and carry them out in the most efficient manner. If he has to erect a new factory, he should think out every detail before he commences operations, and not wait for developments during the progress of the work. If he has no experience of his own to guide him, he should promptly seek the advice of those who have."

The emphasis on "strict discipline" here and elsewhere may give the impression that the author advocates a supervisory attitude of the stern employer type. This is far from the case. But he realises that competitive industry is a form of warfare and battles are lost by inefficiency :

"A manufacturing organisation is, in a sense, an engine of warfare—industrial warfare—hence it is obvious that readiness, efficiency and perfection of organisation must receive very careful if not paramount consideration, as against the claims of profit and dividend."

Success in warfare depends on accurate intelligence and flexibility in meeting changed conditions :

"A precise and accurate representation of daily operations and a system of registration and accounts equal to the exhaustive demands of modern industrial conditions are necessary, together with an administrative routine sufficiently pliable to give immediate effect to the developments suggested from time to time by an inspection of their results"

Like a good officer, however, he appreciates that discipline is only one factor in the equation. The other is example and care for the welfare of his men.

"Too much stress cannot be laid on the necessity for the cultivation by the manager of a brisk and healthy tone amongst

employees . . . It will repay the principals a hundredfold to consider the comfort of their employees at all times . . . A common cause of irritation in connection with the paying of wages is that of keeping the men crowding round the pay office for twenty minutes or half-an-hour after ceasing work, when by a little forethought the whole operation might be completed in less than five minutes."

Many other similar thoughts could be quoted that indicate how keenly alive Slater Lewis was to what Oliver Sheldon thirty years later called "the philosophy of management."

Almost all through his book, he gives evidence of the part that high employee morale is required to play as a foundation for the effective operation of his system. This line of thought is developed in the opening pages:

"Satisfaction and contentment are the best guarantees for the retention of an industrious and steady class of man. It is most essential, above all, that a feeling of security should exist throughout the establishment, since nothing is more calculated to unhinge the nerves and produce a feeling of recklessness and a desire to change than a constant dread of dismissal at short notice."

Or again, from the same context:

"Encouragement is in all cases an important item of policy. It is one of those inexpensive commodities which it pays to distribute pretty freely whenever a judicious opportunity presents itself. With many men the want of a little kindly recognition of their efforts leads to profound discouragement, and to habits of indifference and negligence.

"Closely allied with this is the question of promotion. Promotion other than by merit is one of those dangerous experiments which no principal with any regard to the continued efficiency of his undertaking will venture upon."

If the manager himself is to work to a high standard he must

be supported by competent and adequately trained staff. The provision of these is, in fact, one of his main responsibilities just as much as ensuring that the procedures are well planned, smooth working and not clogged by congestion of arrears or shortage of staff:

> "The manger should possess the faculty of being able to select the best men for the various duties to be performed. This is a quality of paramount importance. Nothing will be more conducive to first-class results than bright, smart civil officials, well-versed in the latest and best method of carrying out their respective duties."

Particularly interesting is the chapter on "The Works Manager.' We see in the first place that this official has not yet attained to a superior executive status. His technical qualifications must be high and the responsibility that he carries is important, but the write-up that he is given in this study reveals him as the head of the production shops, with the character and status of a department superintendent. Less than twenty years later, no writer on industrial management would have given a works manager any description that left doubts about his inclusion among the ranks of the responsible executives. Primary among the qualifications that Slater Lewis posits is "punctuality"—want of it in the works manager "is fatal to the organisation." For the rest, his qualities are technical except that he "should have a particular capacity for handling large bodies of men."

Lewis's keen insight into the realities of the management process is rather strikingly illustrated by two thoughts that he voices in this connection, for they are the prophetic version of the modern dictum that "The tone of an organisation is a reflection of its leadership at the top." The first comment is:

> "The old adage, 'like master, like man' is forcibly illustrated in the internal organisation of a factory. A master with untidy habits and who has an easy-going way of conducting his business, is sure to have untidy workmen who will not be

> particularly brisk in their movements. On the other hand, the master who is smart, active and the personification of order and method, will by force of example alone, have men about him who reflect these qualities."

And the second, in regard to factory regulations :

> " In practice very few rules are required except, indeed, in shops where there is bad management."

The Commerical Organisation of Factories is a truly remarkable book, representing an outstanding contribution in its own day to the literature available for the study of industrial management and emphasising many truths which are still too little appreciated today. What its more thoughtful contemporaries thought of it has been indicated in the quotations given in the opening paragraphs of this chapter, from the memoirs of the two Engineering Institutions. That it does not appear to have won a " popular " reputation is understandable. To describe it as a " text-book " is from some points of view misleading. Seen in the perspective of its own times, in the circumstances of the growing interest in " engineering economics,"[2] it stands in a class apart. If it is a text-book at all, it is a text-book of management, and not one of costing, estimating and workshop procedures, which were the popular subjects of the day. Had its author lived beyond the early age of forty-nine he might well have published the " Junior " companion volume dealing in greater detail with the narrower field. That he was intending to continue his publications is clear from his own note to readers, inviting their comments and criticisms and promising acknowledgment if published.

In comparison with later work it comes closest to that of E. T. Elbourne. It was a precursor in more limited form of *The Fundamentals of Industrial Administration*. The modern reader has to remind himself constantly that it was published in 1896. Set against the background of contemporary management thought and practice in the engineering industry, it is a tremendous achievement. Broadly speaking, control was then

little more than " rule of thumb," and factual information about production was regarded as superfluous. The technical press of the times was able to characterise the engineers' attitude to commerce and administration by simple denunciations, such as the often-quoted sentence from *The Engineer* in regard to costing —" Right within twenty per cent of the actual cost is regarded as a very good estimate, and one reflecting much credit on the engineer and all concerned . . ." If current industrial thought had any specific interest at all in the commerical procedures, it was only in the topic of premium bonus systems, as a means for stimulating greater output and limiting labour costs.

J. Slater Lewis won his place as a pioneer in the story of British scientific management by reason of his clear exposition of a very simple truth that has yet not been generally accepted—the fact that the management of industry is a specialised process capable of specific study, and in fact requiring such objective study as an essential condition of competence. What place he and his work take in the setting of the story will be seen in the following two chapters in this volume. It is interesting to note that at the moment when the United States, under the influence of Taylor and his associates, was about to take a long step forward in the art of management, Slater Lewis was accepted as an English colleague in the forefront of the movement. He contributed a number of articles to leading American journals in the management field.[3]

[1] "*The Commercial Organisation of Factories*," *Preface. Further quotations throughout this chapter are from this book.*

[2] *The long campaign for the training of the engineer in the commercial and managerial aspects of his profession forms the subject of a later chapter.*

[3] *e.g.* " *Works Management for the Maximum of Production* " *in* " *Engineering Magazine* " *v.* 18 *pp.* 59, 201 *and* 361. *v.* 19 *p.* 211.

VII

THE ACCEPTANCE OF F. W. TAYLOR BY BRITISH INDUSTRY (1895-1915)

IT is remarkable that F. W. Taylor, considered as a pioneer of scientific management, aroused comparatively little practical interest among contemporary British industrial circles, despite the fact that the period was one in which the engineers in this country were becoming increasingly conscious of the significance of sound works management.[1] Searches of a dozen likely periodicals yield no reference to his death or obituary comment on his work. Only *The Engineer* (April, 1915) and *The Efficiency Magazine* (June, 1915) saw fit to make any mention of his passing, and that in but a few lines of biographical comment. Though he had been a participant in joint meetings between the American and British Mechanical Engineers, and had been an outstanding figure in the professional ranks of his own country, the Institution did not include his name among its obituary notices.

During his life-time, when the full concept of scientific management was evolving, the interest displayed by British industrial and engineering circles was limited. Even as late as July, 1917, one finds H. N. Casson, in giving a series of six lectures on *Efficiency* to the staff of Messrs. Mather and Platt, Ltd., Manchester, speaking of " a man called Taylor," who was the first to apply scientific methods to efficiency and to work out efficiency methods. Immediately prior to the war of 1914-1918, there was a brief spell of active interest, but its quality and insight can be judged from the label " Taylorism " which was attached to a great deal of the discussion in the press. But for this interlude British interest remained vague, cool and distant.

The cause of this attitude can only be surmised. But it can probably be traced to the predominantly technical character of those who were responsible for management in this country. This had two consequences—the one, that management itself was not a subject claiming any high degree of time and attention; the other, that interest in Taylor the specialist in high-speed steel overshadowed acquaintance with Taylor the pioneer of management. That "scientific management" itself was not more warmly welcomed on this side of the Atlantic was due to many factors. First among them were the opposition of organised British labour and a sentimental recoil in many quarters on the grounds that this "system" was inhuman in its approach to, and treatment of, workers.[2]

Such views sprang from a complete misunderstanding of Taylor's teachings. He was little read in the original and such versions of his principles from other hands as did become available over here were not well calculated to give readers a true picture of his attitude. None of them recaptured the fervour of his outburst before the Committee of the House of Representatives, or the enthusiastic emphasis with which he there expounded his first basic principle of "a mental revolution" on the part of managers and workers alike.

It is a pity that the teachings of Taylor, Gilbreth and Gantt were not more closely associated in their published form. As was recorded in the early chapters of the first volume the three men were close associates both in their consultancy and in their teaching work. Their published work was unfortunately in strictly separate form. Gilbreth and Gantt, in writing of scientific management, emphasised precisely those aspects of "human interest" which would have won ready response in British political and social circles just before the first Great War. Had readers associated their work with Taylor's principles the idea of scientific management would have been more palatable. But unfortunately, save among a very limited group, Gilbreth was known only as "an academic apostle of motion study" and Gantt as the inventor of a chart.

The key dates in Taylor's development and exposition of scientific management are as follow:

1895 *A Piece Rate System*, his first paper to the American Society of Mechanical Engineers.

1903 *Shop Management*, a paper to the A.S.M.E. subsequently published in book form.

1906 *The Art of Cutting Metals*, a paper to the A.S.M.E.

1910 (July) Joint meeting of the A.S.M.E. and the Institution of Mechanical Engineers at Birmingham. Taylor and Gilbreth took part in the discussion.

1911 *The Principles of Scientific Management* published privately after it had been rejected by the Meetings Committee of the A.S.M.E. This was shortly followed by a public edition and by a version in instalment form in *The American Magazine*.[3]

The reaction of British industrialists to each of these events is an interesting story, though it must be told in a setting which indicates the extent and angle of contemporary interest in the problems of factory management generally.

Broadly speaking, the period as a whole was one in which management was at last beginning to get a solid grip on British industry. Primary interest tended to centre on problems of costing and cost control, and among these, especially in the earlier years of the period, the various proposals for premium bonus schemes held pride of place. The landmarks are two or three outstanding publications. The year 1887 had seen the publication of Garcke and Fells' *Factory Accounts*, the first British attempt to use accounting techniques for the systematic control of costs and operations. Less than ten years later (1896), J. Slater Lewis published his comprehensive book on *The Commercial Organisation of Factories*. The end of the period was marked by two further noteworthy books: Dempster-Smith and Pickworth's *Engineers' Costs* (1914) and Elbourne's *Factory Administration and Accounts* (1914). The intervening years witnessed the publication of numerous other more limited

and less important works on similar subjects, but greater signifinance attaches to the many series of articles that appeared in the technical journals.

For instance, *The Engineer* carried a series of eight articles on *Some Aspects of Workshop Management* from July-October, 1902 : *The Mechanical World* (Manchester) had a series of five on *The Organisation of a Small Engineering Works* in January-February, 1909, followed by a series of twenty in 1909-1910 on *Economical Workshop Production*. Running concurrently with these it published a series of eighty-two in the years 1908-1912 on *Commercial Engineering* by " A General Manager " (believed to be A. J. Liversedge). Thus the technical press was beginning to build up in its manager and engineer readers a broad general knowledge of more modern methods of management. In the main these articles were little concerned with principles. They were factual and descriptive, expounding their authors' own particular ways of dealing with shop planning, cost assessment, job tickets, drawing office procedures, and the like. Almost every series had several articles devoted to purely technical matters of machine feeds and speeds, tooling and design for certain types of operation —the features which twenty years later led to " production planning " in the engineering sense, as the basis of the task of the production or planning engineer.

Thus, at the turn of the century, the apathy of British industry on questions of management was disappearing. A century of technical concentration on the production side and of " accounting management " on the commercial side was gradually drawing to its close, making way for a new epoch in which the " sides " were to become fused and an integrated functional management to be the new principle. Not that in these years, 1895-1915, there was much in the way of practical advance on a broad front. The reports of the Committee on the Health of Munition Workers illustrated only too clearly the lamentable standard of management that prevailed over much of British industry at the opening of the war of 1914-1918. But certainly ideas on management were much more in the air and were discussed fairly frequently in industrial clubs and technical societies. Taylor's teaching was not coming to a Britain devoid of knowledge or background. It was

reception which was at fault. The industrial milieu presented an infertile soil because of scepticism and apathy—an incapacity to understand that anything other than technology was of consequence—rather than because of any active opposition or obstructive ignorance.

In 1895, when Taylor read his first paper, he was an unknown person in this country. American engineering circles already knew him and his work—hence the invitation to read the paper to the Society. But the reception it had in the States did not cast even a pale shadow over here, despite the fact that the subject of "premium bonus" was among the foremost industrial topics of the day. Of the three leading engineering periodicals, *The Engineer* (London), *Engineering* (London) and *The Mechanical World* (Manchester), only one made any reference to Taylor's paper: that was *The Engineer* which reproduced it in full in three instalments, April-May, 1896, nearly a year after it was given. *Cassier's Magazine* (better known now by its later titles *Industrial Management* and *Mechanical Handling*) printed excerpts from the paper in October, 1895, and an abridged version of it in February, 1898, as an article by F. W. Taylor under the title *A Partial Solution to the Labour Problem*. But except for Rowan's reference to the latter article in the course of his own paper on *The Premium System*, given in 1901 to the Institution of Mechanical Engineers, there is no trace of any interest aroused by Taylor's proposals.

The second paper was given to the American Society in June, 1903, on *Shop Management*. Broadly speaking, it was a full study of workshop organisation and management, expounding Taylor's particular principles and methods, including such features as the thoroughgoing use of time study and establishment of "functional foremanship." The term "scientific management" was not yet used. In fact, in his opening paragraphs, Taylor himself speaks of "the art of management" defined as "knowing exactly what you want men to do and then seeing that they do it in the best and cheapest way." It is significant of his own thought and of the extent to which he has been misunderstood and misrepresented that he goes on to say . . . "but relations between employers and men form without question the most

important part of this art." Neither of the three British technical periodicals—or rather four by this date, including, the new one *Mechanical Engineering* (Manchester) which commenced in 1898—made any reference whatsoever to the paper. Nor even did *Cassier's Magazine* review it or refer to it in any way. In fact, a fairly exhaustive search through the most widely used channels of publication in this country, including the proceedings of the leading institutions, has failed to produce any reference whatsoever to this paper, or to its subsequent publication in book form, save an indirect one in the Manchester paper in 1911. Yet by this time, the general British interest in management methods briefly described above was gaining a substantial momentum of which the technical press carried ample evidence.

With the reading of his paper on *The Art of Cutting Metals*, December, 1906, Taylor encountered quite a different reception in this country. Here at last was something that the British engineer could appreciate! *The Engineer* had an editorial on it in January, 1907, calling it "the most remarkable paper ever produced to a learned Society." Then in the following weeks the entire text was reproduced in instalments. *Engineering* for January 11th, 1907, carried a summary article outlining the paper, while both the Manchester periodicals reprinted the text in serial form early in the year: in fact, *Mechanical Engineering* published its first instalment in the issue of 29th December, 1906. Interest elsewhere was equally alive. The attitude of the Engineering Institutions is perhaps best exemplified by a comment in the Journal of the Iron and Steel Institute (Vol. I, 1907) referring to the paper as "an address that deserves to become one of the engineers' classics." Indeed one reads with a sense of keen surprise a paper given in 1908 to the Liverpool Engineering Society by Mr. H. H. Hill on *High Speed Steel* in which no reference at all is made to Taylor's experiments or findings.

The next scene forms an interesting close to the "tool steels" act. The place was Birmingham and the occasion a Joint Meeting of the Institution and the American Society of Mechanical Engineers in July, 1910. The subject was *High Speed Tools and Machines*, and there were four papers, two each by British and American members. Among the American delegates were

Taylor, Gilbreth and Gantt, though none of them was reading a paper. In the discussion, Dempster-Smith made extensive references to Taylor's technical work, particularly as published in the *Art of Cutting Metals*.

In due course Taylor rose to speak. " The proceedings of the American Society," he said, " have been burdened to such an extent with what I have said on the subject of high-speed steel and similar topics, that I feel it would be improper for me to make any further remarks on that point. I do, however, welcome the opportunity of speaking upon the far broader subject of which the art of cutting metals and the proper use of machine tools is but one of the small elements, namely, the great opportunity, as well as the duty, which lies before us as engineers of taking such steps as will, during the next few years, result in a very material increase in the output of every man and every machine in their manufacturing establishments. The importance of obtaining this increase of output is that, in my mind, it presents the only opportunity open to us, measurably speaking, of settling the great labour problem which faces both of our countries. I say without hesitation, that in the average establishments in America, not in all the establishments, it is possible to double the output of the men and the machines just as they stand now, and I believe the same is true throughout this country. It gives us the opportunity at the same time to give the men what they want most—higher wages, shorter hours, better working conditons ; and, on the other hand, to give the companies what they most need—a lower labour cost, so that they might be able more successfully to compete at home and abroad."[1]

One can imagine the sense of disappointment that greeted this opening. Dr. Taylor, the high-speed tool expert, appeared to be hiding himself behind F. W. Taylor, the father of scientific workshop management. Even more, it was almost as if he was deliberately using this unique opportunity of teaching the British engineers how much they had missed by their neglect of *Shop Management*. That the whole of his lengthy contribution—six and a half pages in the printed proceedings—was devoted to management was nothing more than the natural consequence of his conviction of the significance of management as the key to all

industrial problems. He sensed acutely that the engineering industry had more serious matters to consider than the technicalities of their machines and materials. He expressed this concern in his remark that the first duty lying upon engineers was that of counteracting and overcoming the blighting fallacy which rested upon every one of their workmen, and which was paralysing their energies, that it was to the best interests of the workmen to go slow instead of going fast, to do as little as possible for the money they were getting instead of as much as possible.

There was hardly a labour union in either of the countries which had not already enacted restrictive regulations upon those principles. Every workman, from the time that he started to serve his apprenticeship, was deliberately taught by the men who were older than himself that it was to his best interests to " soldier," as Americans called it, or to " hang it out," as Englishmen called it, instead of going fast. But what were the engineers doing to meet the problem ? With perhaps characteristic modesty, Taylor refrained from enlarging upon his own twenty years of work in the provision of an answer. He pointed instead to the efforts of his colleagues in " increasing output of their working men through a deliberate scientific study of the motions of men, followed by a time-study of their motions." He predicted that " during the next fifty years a very considerable part of the time of engineers would be spent in the minute motion study of every man in the trade." Already he could say that " motion study had been going on in the United States for more than thirty years in increasing volume, and invariably with the same result, namely an enormous increase in the productivity of man if it was properly carried out."

For the rest of his remarks he gave a summary of Gilbreth's four years of work in motion-study in brick laying—" perhaps the oldest of the mechanic arts that are now practised." What Gilbreth had done in this field was typical of what could be accomplished in every trade without exception. He called his hearers' particular attention to the two key principles : the one, that working methods are laid down and workmen trained to use them without deviation ; the other, that equipment and tools

are analysed and standardised in accordance with the best methods for the job. " Thus," he concluded, " it becomes clear that the new or scientific method calls for deliberate co-operation between the workmen and those over them, as well as for painstaking thoughtful motion and time study which must be made by those in the management, and which, in fact, is, in most cases, entirely beyond the ability and training of the workman."

As Taylor sat down, the President called on Dr. Gilbreth to speak, but he rose only to remark that he had nothing to add to the discussion. Had he sensed a coolness and lack of interest in the reception given to Taylor's contribution? What the meeting really thought remains unknown because on Gilbreth's reply the President closed the session. Mr. Brackenbury, who had read the opening paper, was called on to wind up as shortly as possible. He " entirely agreed with the remarks Dr. Taylor had made with regard to the importance of the study of the movements of men. Unfortunately," he went on, " the paper did not deal with that subject and he would very much have valued any remarks Dr. Taylor might have made on tools and machines, of which he had had such great experience. In passing, he might remark that machine-builders were studying the movements of men very carefully, and had done so for a long time. Nearly every new machine brought out had some device added to it which made the movements of the operator less, and certainly a great deal of time was saved in that way."

There is no record of Taylor having spoken at any other gathering of engineers or managers in this country.

The next few years were to witness a remarkable change in British interest in " scientific management." The doctrine became as it were popular or fashionable as a topic for the press and publishers. It was, in fact, only just at this time that the term " scientific management " itself had come into use. Drury records that it came into active use only through Brandeis, the lawyer, who used the " scientific management " standpoint in defending the shippers of the Eastern seaboard against the railways in the *Eastern Rates* case, 1910-11. Prior to that date it had been just a technical term used within the very limited circle of Taylor and his immediate associates and its appearance

in the earlier reference in *Shop Management* must be regarded as an accident. The *Eastern Rates* case was also the source of the sudden wide emergence of interest in the Taylor doctrines, and was probably among the most significant incidents in the story of scientific management, since it gave to the ideas of Taylor and his group the wide popular publicity which they had hitherto lacked.

Briefly, this occurred through the decision of Louis D. Brandeis, a public-spirited Boston lawyer, to use arguments based on scientific management before the Interstate Commerce Commission in opposing the application by the railway companies for an increase in freight rates. Brandeis subsequently rose to the highest rank in his profession, becoming a Justice of the Supreme Court. He maintained that " the practical management of the railroads was completely out of date and inefficient, and that they could save, through efficient management, far more than they could accomplish by an increase of freight rates." He quoted the experience of several companies that were being managed on Taylor principles and was supported by Harrington Emerson who claimed that the railroads had a potential economy of a million dollars a day, which could be secured through the application of scientific management.

Brandeis had apparently been interested by *Shop Management* and had made the acquaintance of Taylor himself, Gantt, Dodge, Carl Barth and others of the group supporting the movement. In preparing his brief against the Rates Application he first took advice from these men, and in fact met them in joint session in October, 1910, to decide on a formal title for their methods. *Functional Management* had been one of Taylor's favourites in his earlier years, but the group decided that the name which they had been casually using more recently should be adopted and so came the " official " title of scientific management.

The case went against the railway companies, on the grounds of their liberal earnings in past years. " The subject of scientific management was dismissed (in the decision) with the remark that it was everywhere in an experimental stage . . . but there is reason to believe that the Commission was more influenced by the testimony than it cared to acknowledge." That the

proceedings should have had an exceedingly wide and ample press report in America—and even abroad—is only natural. So, too, was the other consequence. Taylor was beseiged by requests for articles and papers, as well as by letters and visitors. But this was not the origin of the paper on the *Principles of Scientific Management*, the first draft of which was in preparation a year before the Railway Case opened. It finally appeared as a private publication circulated to members of the American Society in January, 1911, and very shortly afterwards was issued publicly both in instalment form in *The American Magazine* and as a book by Harper's in New York and London.

For British readers the first significant publication was a series of articles in May, June and July, 1911, in *World's Work* (better known by its modern title *The Review of Reviews*). The first of these was by Ray Stannard Baker, under the title *The Gospel of Efficiency—A New Science of Business Management*, and was based primarily on what Baker learned at the Railway Rates hearing. In the following three articles the editor was proud to offer F. W. Taylor's own views: "the first authoritative presentation of the whole subject, the first comprehensive account of the history of the discoveries." The substance was an abridgment of the "principles" and for the first and only time in this period there appeared in a British periodical an emphatic statement of the heart of Taylor's teaching—"but the chief and essential feature of scientific management is the change in the mental attitude of both employers and employees towards their common work."

In its August issue *World's Work* carried a reproduction of some of the criticisms that its articles had aroused. Two of these are of particular interest. *The Engineer* of 19th May, though admitting that there was a lot to be said for "Taylorism," maintained that there was far more to be said against it, and went on to denounce it as inhuman, dehumanising man, depriving him of the use of his intelligence in work and destroying all the best features of a bonus system. Three weeks later *Engineering* took up the theme, commenting that the articles contained little that was new to its own readers, but would arouse strong opposition.

Although such opposition may have been roused it did not appear to be vociferous. On the contrary, for a brief spell immediately prior to the outbreak of war (1914), it seems that there was a sizable group of protagonists. The term "Taylorism" was tending to stick, but the two synonyms "scientific management" and "efficiency" undoubtedly held the field. Some idea of the extent of the interest may be gleaned from mention of a few articles and papers between 1911 and 1913.

Cassier's Magazine printed an article by P. Ballard on *Scientific Management and Science* in 1912. *The Engineer* in the first half of 1911 carried an article and a letter on *Taylorism*. These were followed by *Taylorism Again* about a year later and *Scientific Management and Work Efficiency* in 1913. *Engineering* published a *Note on Taylor's Task-Work System* in 1911 and an editorial on *Scientific Management* a year later. The latter, which was primarily concerned with motion study, attracted a letter to the editor, followed by two notes on the same subject. *Mechanical World* and *The Mechanical Engineer*, the two Manchester papers, were more sympathetic in tone. Numerous articles and notes on the subject of management appeared during these three years. Late in 1911 "one of the foremost exponents of scientific management" referred to *Shop Management* in an article, *Systematic v. Scientific Management*.

The subject figured little in the papers to the technical institutions, although presidential addresses tended often to deal with wider issues of management or industrial relations. Outstanding in these years was the paper given by G. C. Allingham to the Junior Institution of Mechanical Engineers in 1912, entitled *Scientific Shop Management on the Taylor System*. Based on *The Principles*, the paper was a very full and fair account of Taylor's views, including the comments that "the system demands an understanding of the men" and that "proper personal relations must exist" if it is to succeed. The discussion that followed it was very mixed but on the whole not favourable, many of the adverse comments being along the lines already indicated by *The Engineer*. One member reminded the meeting of the big difficulty that "organised labour here is antagonistic" to scientific management. This paper and discussion were

naturally widely reported. About a year later, an equally important address was given by Hans Renold to the Manchester Association of Engineers on *Engineering Workshop Organisation.*

Renold had met Taylor and understood the real significance of his thought. Not only had he absorbed it fully, but had been able to mould and re-apply the principles of scientific management along lines that would best suit his own works. He could, in fact, adopt the simple standpoint of defining scientific management as " neither more nor less than commonsense tabulated and applied with tact and reason when facing the everyday problems as they arise." One thus finds in Renold's paper the first signs of assimilation—the process of adapting to British thought and conditions what had hitherto been regarded, frankly and exclusively, as an American " invention."

Two other references of about the same period are also of special interest. The first was an article in *The Nation* (now incorporated with the *New Statesman*) of August, 1912, under the title *An Essay on Scientific Management.* This gave a very fair presentation of the case for Taylor's doctrines and analysed a few of the dangers. Particular point was made of the " spirit " in which scientific management is approached and the comment added that " in Taylor's spirit, it can do little but good." Its importance, it was stressed, must not be overlooked, but a warning was given to expect strong opposition from organised labour.

In a following issue Miss Margaret Bondfield replied in a letter to the editor, pointing out that the article underestimated the dangers inherent in the system, and illustrating her argument by a detailed description of the McKee Rock Strike (American Pressed Steel Car Co.) of 1909. A desultory correspondence ensued in which the main issue was soon lost in wider social questions. A vigorous letter was published from H. Gordon Selfridge professing his belief in scientific management which he had used in his shop for years and which ought not to be obstructed by childish sentiment such as " making men like machines." He had given a copy of the original article to each of his managers.

The second source of comment was an article by J. A. Hobson

on *Scientific Management* in *The Sociological Review* for July, 1913. In principle he found Taylor's methods of value and importance to industrial efficiency and to economic progress. But they involved sacrifice by the human beings employed in industry—a loss of initiative, of individual freedom, of the use of intelligence and responsibility and a narrowing influence exerted by the subdivision of work. An analysis of the balance of gains and losses led him to the conclusion that society had a lot to gain from scientific management, and that the employee must be compensated by a shorter working day. No discussion appeared to have been provoked by this article. The whole subject was taken up at a meeting of the Sociological Society in November, 1913. Edward Cadbury read the paper on *Some Principles of Industrial Organisation*, an analysis of the case for and against scientific management. A good level of discussion followed, among the participants being J. A. Hobson, G. D. H. Cole, Walter Hazell (of Hazell, Watson and Viney Ltd.), and C. G. Renold and W. H. Jackson (both of Hans Renold Ltd.). The proceedings were reproduced in full in the April, 1914, issue of *The Sociological Review*. A few months later the *Review* carried a further article, this time by C. Bertrand Thompson of the Harvard Graduate School of Business Administration, who had had close contacts with Taylor himself. In the same issue Edward Cadbury replied to some of the criticisms that had been made against his paper.

The outbreak of war in August, 1914, as might have been expected, interrupted discussion of the subject from the academic standpoint. But the progress of the war itself and the accompanying demand for production put the substance of scientific management on the map of British industry. That story is not relevant to the present context but its final incident is of interest. Taylor died when the war was but a few months old, and though the British technical press paid so little respect to his departure, a fitting British "memorial" was erected in no less a form than an official publication—*Scientific Business Management*, a pamphlet published and sold by His Majesty's Stationery Office, issued in 1919 on the authority of the Ministry of Reconstruction as one of its series on reconstruction problems. There is, of course,

no reference to Taylor or his work in the booklet, but the principles of his teaching are the fundamental thoughts on which the text is based.

"The prosperity of an industry," say the opening words, "and of every man concerned in it is intimately bound up with efficiency of management." And the rest of the paragraph goes on to stress the importance of the "human" aspects of effective management. The whole line of thought expounded rests firmly on Taylor's cardinal principle of a mental revolution in employer and worker alike and of their mutuality of interest. Perhaps the best portrayal of the pamphlet is to say that it represents the completion of the process of anglicising scientific management. The contrast between say, Allingham's paper of 1912, and this pamphlet of only seven years later is extraordinarily marked.

Scientific management remains the same in essence, but it has matured and consolidated, and in the process it has undergone certain shifts of emphasis. *Motion Study* forms one of the sections of the booklet, so do *Labour-Saving Devices* and *Progressive Methods*; bonus schemes are also discussed. But the longest section of all is entitled *Personal Intercourse*, starting from the view that employees will look to their employer or chief manager as "a leader, educated to guide and stimulate them towards a higher standard of intellectuality and efficiency in life . . ." And this is a responsibility which he can only discharge by identifying their interests with his and deliberately seeking to build up sound personal relations. "In management itself it is decidedly advantageous to cultivate the personal interest of the workers"; one of the results accruing being that "the overhead employee cost is greatly reduced."

Such thinking is not a new addition to Taylor's presentation of scientific management. Its emphasis is slightly different. And if we take scientific management as represented by the trinity—Taylor, Gilbreth and Gantt—even the emphasis was the same. Taylor failed to recruit his following in British industry largely because he was misrepresented and misunderstood. Admittedly he met in British industrial minds a soil so pre-empted with technical issues that there was little room for the seeds of more

effective management. But the greatest opposition to scientific management was rallied round the suggestion that it was " dehumanising "—almost the negation of Taylor's real teaching and absolutely the antithesis of the interpretation of Gilbreth and Gantt.

In the underlying cause of this opposition, there is a warning of great significance for the present time. The Labour movement in the United States was, in Taylor's time, fundamentally on a " craft " basis. The greatest stronghold of these " craft " unions was the metal working industries. One of Taylor's associates was called in as a consultant to the Watertown Arsenal. He found a situation in which craft unionism had joined hands with nepotism and the jobbery which was characteristic at that date of the less reputable political circles in the United States. Not only was " ca' canny " endemic. Every supervisory post was filled by political nominees, relations, and so on. He determined to stand up to this situation, as was his duty to those who had employed him. A strike resulted and its outcome was to align the craft unions in the metal-working industries and their political lobby at Washington against " scientific management."

In the course of the struggle which followed and which led to the House of Representatives Enquiry before which Taylor gave evidence, the most extreme and violent things were said and written by the Labour side. To give but a single instance ; at an Annual Conference of the American Federation of Labour a formal resolution was submitted which referred to :

> " the hideous so-called Taylor System of scientific management. No tyrant or slave-driver in the ecstasy of his most delirious dream ever sought to place upon abject slaves a condition more repugnant to commonly accepted notions of freedom of action and liberty of person."

It must not be forgotten that our kinsmen on the other side of the Atlantic speak a language which appears to be the same as our own. But the emphasis given to words and phrases, the whole political tradition which dictates their use in controversial issues and consequently the real meaning to be attached to any given

clause, differ profoundly. There is no doubt that the immense prejudice against the idea of scientific management and the profound misunderstanding of the social attitude of the groups who initially formulated its philosophy in the ranks of British Labour was produced not by practical experience, but by the fact that they could read reports and documents formulated by Trade Union colleagues on the other side of the Atlantic. They tended to interpret such documents with a fraternal sympathy which they did not deserve and which their authors would have been the last to expect. In consequence, they formed a picture of the methods implicit in the term which was wholly mistaken and which was founded on the passionate and partial descriptions characteristic of an acute political controversy.

The methods of scientific management can, of course, be abused. They can be applied ruthlessly and for purposes of exploitation, but to describe such abuse as scientific management is no more accurate than to describe the use of poison gas in warfare as chemistry. And indeed, as has been shown, the men who were responsible for designing and developing these methods, the men who really appreciated the philosophy of the scientific approach to management problems, were as a body profoundly concerned with the human element in industry, and with raising the standard of life for the masses of the people. Nor, as the experience of Russia has shown us, can any form of government, whether it is controlled by employers on a capitalist basis, or by the mass of the workers on a communist basis, ignore the technique by which production is made more efficient and effort reduced. "Stakhanovism," of which so much has been heard in the U.S.S.R., is in fact no more than a variation of F. W. Taylor's philosophy.

The fact that so deep-seated a misunderstanding, in its effects so deleterious to the development of British industry, should have arisen because the workers on both sides of the Atlantic speak what is apparently, but not in fact, the same language, is of great importance in the light of the enormous number of problems which will have to be settled by conjoint action between the representatives of the Anglo-Saxon races in the future.

APPENDIX

A Note on the Trade Union Attitude to the Premium Bonus System, 1910.

It is doubtful whether the British Trade Union Movement was familiar with Taylor's teachings at any time prior to his death in 1915. A fairly wide search has not produced any references, and in the Special Report referred to below, Taylor is not mentioned at all by name though presumably his "system" was among those covered in the conclusions. That the trade unions were interested—and strongly interested—in the increasing development of workshop planning and piece-work schemes is evidenced by a general condemnation expressed at the 1908 Congress and by a formal resolution passed unanimously at the Nottingham Congress in 1909. The resolution ran as follows:

> "This Congress strongly condemns the modern method of increasing output by the introduction of the premium bonus system of working, regarding it as utterly opposed to the principles of trade unionism, inasmuch as it creates a form of sweated labour, and acts as a factor in increasing the number of unemployed, and hereby recommends that societies should use every effort to stop the further development of the system, also to take steps to abolish it wherever it has been introduced."

In a subsequent paragraph specific mention is made of the Admiralty and War Office establishments at which premium bonus schemes had been introduced and had apparently roused such concern that the T.U.C. Parlimentary Committee had arranged for deputations to wait on the Departments concerned in 1908.

The sequel to the 1909 resolution was the appointment by the T.U.C. of a Committee of Enquiry which collected information as to the working of premium bonus schemes from a

number of engineering and allied unions and examined individual witness from a number of localities. Eventually in 1910 a report was published, and its tenor may be judged from the following extract :

> " The Committee concur in the whole of these conclusions (see following). They are of the opinion that the premium bonus system, by encouraging individual selfishness, is demoralising to the workman. That, by destroying craftsmanship and encouraging specialisation it is harmful to the industry, which moreover is burdened by a horde of supervising officials, whose maintenance as non-producers imposes a considerable tax upon its profits ; and that further, the system is a menace to the community at large, owing to the abnormal and continuous increase in unemployment, which is directly due to its working and which is bound to become intensified as the system extends."

The conclusions were that the system was extending, but that almost all who have had practical experience of its working condemned it for the main reasons that :

(1) It destroys the principle of collective bargaining ;

(2) It is destructive of trade unionism and encourages disorganisation ;

(3) It is one of the causes of unemployment ;

(4) It leads to scamping of work ;

(5) It prevents the proper training of apprentices ;

(6) It promotes selfishness in the workshop ;

(7) It promotes workshop favouritism.

[1] *The background of the development of management at this period is described in the Report on "The Development of Scientific Management in Great Britain." presented to the Seventh International Management Congress,* 1938. *Copies are available from the Management Library, price* 2*s.*

[2] *An illustration of the contemporary trade union attitude is given in the Note appended to this chapter.*

[3] *The withholding of the paper by the Meetings Committee throws an interesting sidelight on the development of the American engineering profession. Although they had accorded a warm welcome to Taylor's earlier papers on management, a stiff resistance was growing up on the Meetings Committee at this time to the acceptance of management subjects. Taylor's paper was in their hands for nearly a year before he forced the issue by a request for its return unless it were to be read immediately. In fact this increasingly reluctant attitude of the Society's Committee was the motivating force that led to the formation in* 1911 *of the organisation that later became known as the Taylor Society. To-day the management division of the A.S.M.E. is one of the largest, if not* the *largest and most vital, of the branches into which the Society's activities are divided.*

[4] *This and following extracts from F. W. Taylor's contribution are taken from the published Proceedings of the Meeting, converted in some cases to direct form of speech.*

VIII

THE ADMINISTRATIVE TRAINING OF THE ENGINEER (1847-1935)

FOREIGN observers have remarked that one of the outstanding characteristics of the British people is their love of the " amateur." The obvious field to which they turn for illustration is sport. But this tendency is found in more serious aspects of the national life and in none more markedly than in the realm of education. The accepted philosophy of the Englishman is that " life " begins when he leaves school behind. School, college and university are things of childhood, academic preparation that leads to nothing specific, necessary evils that follow somehow in the wake of social progress. But when a boy or young man takes up employment then Life, with a capital " L," begins. He turns from theory to practice, and as he enters the office or factory he is expected to put behind him the " learning " of years and to realise that only now does he start to learn anything of use. Two particular consequences have flowed from this philosophy. The first is that British industry can find little, if any, place for the university in its development of technical research. The second is that training for industry in industry is a process still in the early pioneer stage. Widespread acceptance of the view that managers are born, not made, is a third and almost inevitable consequence of this prejudice.

Among the many interesting stories in the archives of British technical education is the evolution of the concept of " training for management." Even a war that has hammered home on occasion after occasion national deficiencies in industrial manage-

ment has yielded little sign that the need for and wisdom of specific training for management have been accepted in more than a limited circle.

The story will be considered from two angles—the struggle for the technical and administrative training of the engineer and, in the following chapter, the corresponding development in the professional education of accountants.

"I do not remember a single instance of a student being familiar with the economic aspect of engineering studies, or of one who had any idea of how to tackle a problem of engineering economics. Yet that question of economics is the fundamental problem of the engineer." That extract from a presidential address to the Institution of Electrical Engineers seems to "date"—probably the 1880's, certainly well before the end of the century. Not at all. It was in November, 1922, that Sir Frank Gill made the statement. Repeating it a few months later to the Institution's Students' Section he added that though he had expressed the thought on many occasions, he had not once been challenged.

The first chapter of the story opens in the early phases of the Industrial Revolution. Britain was acquiring a new technique of manufacture. In textiles, in iron-making, in the use of steam, technical progress was rapid and the absorption of workers into the new forms of employment thus created proceeded at an ever-creasing rate. But the first fifty or sixty years of the era of the new machinery are not very illuminating. It was the period of pauper labour and child apprentices, ugly decades of long hours and miserable conditions. Those condemned to "machine minding" and "feeding," were, like the galley slaves of earlier empires, chained to the oar. Human life counted for little besides the needs of the machines, and culture was only valued as it contributed to material ends. In the Factories Act of 1833, the physical needs of the human being in industry secured only a meagre recognition and the fact that he had a mind but the first shadow of acceptance. In those dark and dismal days the industrial environment was hardly capable of entertaining the idea of education and training. The outstanding work of the Owens and Oldknows, of Boulton and Watt and of others

mentioned in earlier chapters, were only occasional gleams in a general fog of stupidity and social obscurity.

The first real daylight came in the 1840's. General education was still primarily conspicuous by its absence. But the worst evils of " the factory system " were being investigated. And the seeds of a new sense of social responsibility were being planted in a soil fertilised by the revelations resulting from these enquiries.

That decade too, has a further significance in the present context. It was the period which saw the foundation of the Institution of Mechanical Engineers, as a body distinct from the professional Institution of Civil Engineers set up nearly twenty years earlier. With George Stephenson as its first President, the Institution was founded in Birmingham in 1847 " to enable mechanics and engineers, engaged in the different manufactories, railways and other establishments, to meet, correspond, and by a mutual interchange of ideas respecting improvements in the various branches of mechanical science, to increase their knowledge and give an impulse to inventions likely to be useful to the community at large."

It was at this time too that technical education in Great Britain was taking on the shape which has characterised it down to the present day, though as yet the plant was young and tender, hardly more than two little leaves above the soil of the black country. For those with means of livelihood up to twenty, technical training was something in the nature of a premium apprenticeship, following a grammar school education to the age of 15 and 16. For the rest, technical instruction could be acquired only here and there where circumstances had made possible the establishment of a mechanics' institute. There, after a long and arduous day at the factory, the boy or young man could learn to read and write and then to apply these tools to the study of the rudiments of technology. Mechanics' institutes had by this time been in existence for over twenty years, and one or two of the larger towns were fortunate enough to have special foundations of much wider calibre, such as Owen's College at Manchester, the Merchant Venturers' at Bristol, King's and one or two others in London. Alone in the Kingdom,

Glasgow could claim a University Chair of Engineering (founded 1840).

The story of the administrative training of the engineer is closely bound up with the development of technical training on the one side and with the progress of general education on the other. In fact, the history which is the subject of this chapter breaks fairly clearly into three periods which may for convenience be labelled " the technical," " the commercial or administrative," and " the managerial." The first two overlap considerably, and at certain stages are closely inter-related ; the third occurs only in the very recent stages of the story. This is not the place for a record of the progress of general education, but it will make both this and the succeeding chapter more significant if the few key dates of the general educational background are borne in mind. Thus in 1833 part-time schooling for very young children was introduced through the Factories Act. In 1870 came the establishment of compulsory elementary education for all children up to the age of 12. In 1889 and 1891, the Technical Instruction Acts, to which specific reference will need to be made later, carried matters a stage further. In 1900, the Board of Education was set up. In 1902 followed the introduction of State-aided secondary schools. Between 1918-1921, the Day Continuation School principle was first adopted and then suspended. In our own times came the Education Act of 1936 and the Spens Report of 1938.

Despite the immense advances in the mechanical arts of production which characterised every decade of the early industrial revolution, there is little record of technical training. Boulton and Watt at the close of the eighteenth century were outstanding because of the trouble they took in the training of their workmen.[1] But the extent to which " poaching of employees " was rife among their contemporaries is itself striking testimony to the reluctance among employers in general to undertake any responsibility for specific technical training to meet their own requirements. Slow improvements forced their way upon industry by devious ways, prominent among them being the keenness to learn of the younger employees themselves. The mechanics' institutes provided the setting and the oppor-

tunity. Thus almost from the beginning British industry imposed upon its people the strain of " after working-hours " study as the main avenue to proficiency and advancement. In a few firms day-schooling and training were given. But the fame of these few examples is evidence of their rarity.

Through the first fifty years of the prosperous and progressive nineteenth century, little headway was made—nor could it be expected when the country made no provision for universal elementary education. How could a young man learn mechanics when he had not even learned to read and write? It was only well on into the second half of the century that the problem appeared to arouse any concern. By then a reading public was growing up among the ranks of the industrialists. The Institution of Mechanical Engineers issued Proceedings from 1847. *The Engineer* was started in 1856 and *Engineering* ten years later. Between them in 1859, came the *Ironmonger*, catering largely for the foundry trades. In 1871 the Electrical Engineers founded their own Institution as the Society of Telegraph Engineers. So gradually the agencies were established through which a public opinion could be formulated.

Mr. F. J. Bramwell was among the first to voice it. Addressing the Mechanicals as their president in August, 1874, he stated that " in the absence of special training, the success of the men of the past generation was due to this, that they became engineers because they could not help it, because the taste of engineering was born with them and their very natures compelled them to follow that taste." But such a state of affairs was now past—" Nowadays men enter as a means of livelihood and not for love of the profession." They succeed still, but rather as " mere manufacturers " than as technicians. What is now needed to meet the growing complexity of the science is more specialisation and so more specialised training to achieve it.

Already some steps had been taken of potential significance. Apart from the passing of the Education Act of 1870 establishing compulsory elementary education for children, there had been the foundation of the Whitworth Scholarship (1868), provided—to quote the words of the original proposal—" for the further instruction of young men, natives of the United Kingdom,

selected by open competition for their intelligence and proficiency in the theory and practice of mechanics and its cognate sciences." In the same year the Royal Society of Arts had conducted an enquiry into ways and means of promoting facilities for technical instruction. But in the absence of local authorities empowered and financed to conduct specialised education courses, little practical progress could be expected. The Society itself followed its own initiative by establishing in 1873 a series of technological examinations to test knowledge of manufacturing processes in the cotton, silk, paper, steel and carriage-building industries. Another interesting contemporary event was the publication of three reports by a Royal Commission on the *State of Scientific Education in the United Kingdom*—though in an editorial article *Engineering* commented that there was not much of a scientific education " system " to investigate. It took a further eighteen years—and another Royal Commission—before there was any official action to further technical instruction.

At this stage, the growing interest in the training of the engineer was primarily—in fact almost exclusively—technical, with just a faint and occasional flavour of " commercial " needs in its make-up. Unquestionably, 1870-1880 was the decade of technical education, marked by an increasing pressure from industrialists for action by the appropriate authorities. What had happened to turn the tide? Professor Ayrton's remarks to the Electrical Engineers in 1892 provides the answer in no uncertain terms. Giving as his address an historical review of British engineering development, he dealt at length with the high standard of technical education in Germany, America, Switzerland and even Belgium, and added that as early as the 1870's there had been well-established study courses in applied physics at the Japanese Imperial College of Engineering. Britain on the other hand crawled painfully and slowly behind.

Many of the shrewder industrialists saw this comparison in severely practical terms. Throughout the last quarter of the century, the technical press and the proceedings of the Institutions are heavy with lament about the severity of continental and American competition, attributed primarily to other

countries' higher standards of technical education and training. Britain was losing ground in export markets because she was losing her technical pre-eminence and was doing little or nothing to regain her position. Even worse, she was beginning to find her own home market invaded by the foreign producer ! In the 1880's—a period of trade depression—the complaints became a chorus and penitence a popular fashion among engineers. " Every country competing with us gives more attention to practical education than we do." It was not a short-lived awakening, as can be readily seen from even a cursory glance through the contemporary columns of the press. Perhaps the most striking comment was a leading article in *Engineering* late in 1896, based on the theme that Great Britain had inherited a commercial success which she had assumed to be unrivalled and had, accordingly, gone to sleep. Then suddenly, about eight or nine years before, the country had woken up in the very midst of a commercial struggle of the fiercest kind. Abroad and in the United States, our competitors owned factories run by technically trained chiefs of a high calibre and were making alarming headway. Our own managers had been our pride, men " with no theory about them, but able one and all to show their workmen how to do the job ! " How sadly remiss we had been and how hard was the task of making good the arrears !

In point of fact we never did make good. The system of of premium pupils had its roots too deeply in the profession—a system which more than once in these years of struggle was labelled as " the worst enemy of British engineering." A Danish engineer giving a paper in 1903 showed how poorly British technical education compared then with that of his own country and in the same year Professor Dalby drew a similar contrast with America, Germany and Switzerland in the hearing of the Mechanicals. Professor F. G. Dailey addressing the Electricals in Glasgow maintained that " to a large extent the training is the same as it was fifty years ago—a laborious apprenticeship in the workshops : college courses are things of modern invention, and even yet they are tacitly ignored or regarded with something of contempt and disappointment." Even as late as 1915 the theme-song was unchanged—the President referring

in his address to a report claiming that " British industry would derive incalculable benefit from an increase in the number of highly trained experts." And a subsequent sentence pointed to the " intellectual efficiency of German education."

Was then nothing of importance achieved by forty years of agitation? Did almost every section of the Engineering Institutions discuss their own training year in, year out, without any material result? To some extent the agitation masks the progress. With characteristic British slowness, a scheme of technical education was gradually carried into effect. But it was not founded on any central plan; the individualistic energy of the numerous bodies concerned was the sole driving force. And in the dispersal of effort, the rate of progress suffered.

The first practical step is perhaps the R.S.A. Technological Examination Scheme mentioned earlier. In 1878, the University College of London turned down a proposal for the establishment of a Chair of Technology. But in the same year the Livery Companies of London prepared a *Report on Technical Education* which resulted in 1879 in the setting up of a City Institute for the Promotion of Technical Education—the City and Guilds of London Institute. This body took over the R.S.A. Examination Scheme and within a year had transformed it into a system of twenty-six branches each providing in three grades for the requirements of apprentice, journeyman and foreman. The response to the scheme was instantaneous and enormous: examination scripts ran annually into the thousands before many years were passed. For example, in 1893 there were 7,300 candidates sitting for examinations in fifty-three subjects.

An inevitable parallel development was the growth in college study facilities. The Institute opened its own Evening Trades School in 1880, and three years later inaugurated Finsbury College (its main training centre) as well as a Central Technical Institute for the Training of Teachers. Similar if smaller progress was being made in towns like Manchester and Birmingham. In 1889, following the second Royal Commission of 1886, came the first Technical Instruction Act, supplemented by further legislation in 1891 empowering the newly constituted county councils and county boroughs to undertake higher technical education

with the aid of Government financial assistance. At last the British scheme of technical instruction was in being and in the twenty-five years that followed until the outbreak of war there was a slow but steady growth—any faster progress being barred by the still generally deficient standard of general education. The case for education facilities had now largely lost its " news " value for the technical press. But other aspects of the subject presented themselves for ventilation. First there was controversy over the respective values of " theoretical " and " practical " training. This was succeeded by the problem of whether the college course for higher education should precede or follow workshop experience. By the middle 1890's, *Engineering* could write: " It is now fully admitted that the education of an engineer should be twofold—instruction in theory and experience in practice." And thus gradually the current interest in the problems of technical training gave place to the uphill fight to overcome the prevailing apathy about the " commercial " and " administrative " elements in training.[2]

How soon the engineering industry became aware of the necessity of a commercial training as part of the equipment for a proficient manager is not easy to discover. Earlier chapters have shown instances of a higher standard of control techniques at very early periods. But a general need for an understanding of the routines of " business " would not occur to the engineer until his firm had reached at least a given size. For firms on a smaller scale the services of a competent clerk appeared to pro vide the engineer with all that he needed. The introduction of share capital and accompanying official procedures under the limited liability legislation of 1855-1862 was to some extent a determining factor. But there seems again to be circumstantial evidence that it was the growing pressure of foreign competition that focussed attention on cost control and so on " the economics of engineering."

The earliest explicit reference that occurs in the press seems to be in the report of a paper read by Mr. J. Head to Section G of the British Association in 1874. *Engineering* reproduced most of the paper and two or three extracts are worth quoting: " Our typical engineer cannot be a true and intelligent leader of

industrial enterprise unless he has sound views in regard to economic science. I venture to assert that however much English engineers may have yet to learn of the aforementioned (technical) branches of scientific knowledge, they are still further in arrears in regard to this." The most significant point of the statement is its implied distinction between the " administrative " and the " technical " elements in the make-up of the engineer-manager : technical competence alone may suffice to make a good engineer who is to carry out his profession as a technician, but if he seeks to become a manager, " a leader in industrial enterprise," he must perforce acquire the supplementary business knowledge here referred to as " economic science." The nature of its content appears from the other extracts : " Unfortunately, those who influence the rate of increase of industrial enterprises are still largely composed of the economically ignorant . . . The accounts and book-keeping, upon which rest all sound financial and commercial operations, are often rather looked down upon by the engineering profession."

That this subject appears to have been little ventilated during the next twenty years is perhaps only to be expected in the light of what has been said about the intense agitation for technical training facilities. Here and there, Mr. Head's lone voice found an echo, but in the main the engineering world had its own primary problem in the field of training and could not spare energy for the discussion of " wider aspects " which, in view of the contemporary concentration on technical training, appeared to be unnecessary frills, properly belonging to a less noble segment of society—the commercial men. Even in the United States, it was only in the 1880's that this subject began to be discussed freely (especially following Towne's paper in 1886 on *The Engineer as Economist*).

Engineering returned to the theme in February, 1893, with a remarkable leading article entitled *The Commercial Aspects of an Engineer's Training* :

> " While on the one hand, it may be argued that there are a large number of remunerative appointments open to competent engineers in which their lack of commercial knowledge

does not entail any very serious drawback, on the other hand it must not be forgotten that what may be termed the manufacturing section of engineering offers the largest number of such appointments. It must not be supposed that the commercial knowledge here referred to is limited to what is commonly known as book-keeping; it also includes a thorough grasp of the principles and practice of prime costing, depreciation, and so on. In this age of keen competition and finely cut profits, it is needless to say that an engineer who possesses a sound knowledge of such matters is much more likely—other things being equal—to rise to the top rung of the ladder than one who does not. What chart and compass are to the captain of a ship, the costs department is to the manufacturing engineer of a works. It is the most infallible guide he can have, not only in showing him the true financial value of his present arrangements but also in shaping his plans for the future. That the value of a sound knowledge of the commercial principles of an engineering business has not been overestimated will soon be apparent to anyone who takes the trouble to analyse the qualifications of many of our successful engineers, so-called. In the great majority of cases it will be found that the predominant qualification is that of the successful business man, while the engineering ability is frequently of a very secondary order and, in some instances, almost entirely supplied by subordinates. The rigid precautions adopted by manufacturing engineers to confine all knowledge of the costs department to the staff of clerks engaged in the work renders it impossible for the young engineer to learn anything of the system during his apprenticeship. The natural result is that the great majority of young engineers are always entirely ignorant of a very essential part of their training."

By comparison with the fight for technical education, the momentum with which this subject was taken up was slow. There was nothing in the way of agitation. Rather the process was one of tentative evangelisation. Generally speaking, the engineering industry did not take kindly to the suggestion that

its higher personnel were required to understand and study "business methods." And so in the twenty years following 1894 various enthusiasts preached the gospel to an unenthusiastic profession that only assimilated the strange doctrine gradually and were even slower in appreciating its full significance. The case was furthered by the writers in the technical press on the subjects of costs and workshop management and by publications such as *The Commercial Organisation of Factories*, by J. Slater Lewis. Unquestionably, there was a growing interest in these aspects of industry. But it was not a dynamic interest; its character was quiescent, a vagrant curiosity. The impetus of war was necessary to stimulate full acceptance. How little the profession really thought of the value of commercial training may be judged from the fact that it found no place among the recommendations of a Report on the *Education and Training of Engineers* from a committee appointed by the Civils in 1906, but with representatives of all the senior engineering institutions serving on it. The committee's findings were based on 276 replies to a questionnaire.

In addition to articles in the technical press after the turn of the century, there were a few occasions on which the subject was pressed before the institutions. Mr. Nicholson, as president of the Electricals in 1901, speaking at Manchester, pleaded for the inclusion in the final year of the college course of a subject called *Economics of Engineering Design*—a field so much neglected here, although it concerns the governing factors in the everyday settlement of engineering problems. Four years later, Professor Goodman of Leeds drove home the point by reference to an analysis of past students of the University: out of 415 graduates during the past fifteen years, about a third were already primarily employed in administrative or management duties. Mr. Stubbs, the president in 1909, proclaimed that "the importance of the commercial aspect of engineering cannot be exaggerated." The Mechanicals did not raise the problem so frequently, but when it was introduced, it was with an equal emphasis. For instance the president of 1911 (Mr. Ellington) stated in his address that "I believe commercial training and experience to be desirable for all engineers. It is quite impossible for an engineer

engaged in practical work to sever himself from the commercial factor."

Another facet of the same subject that sometimes attracted comment was the study of " marketing " in relation to export trade. During the last decades of the century, the growing severity of competition directed attention to technical deficiencies attributable to inadequate technological training. Now and again weakness in distributive arrangements was also emphasised. But the significance of marketing as an independent function was little appreciated. One speaker (Mr. Webb, president of the Manchester Association of Engineers, 1898) even lamented the fact that England had now to go out to the buyers instead of their continuing to come here to us. Yet he did not omit to point out the moral—engineers need good knowledge of languages, and unfortunately " our faulty education system does nothing to provide for the class of distributors." An even more emphatic demand came from Mr. H. Wright in 1915 in an address as chairman of the Yorkshire Branch of the Electricals : " Much foreign business has gone to our competitors owing to our neglect and lack of commercial organisation in foreign markets . . . If financial reasons prevent the employment of a staff of highly salaried commercial experts abroad, then costs may be reduced by co-operative sales methods." But these few voices were little heeded until—thirty years later—the Balfour and Goodenough Committees dealt specifically with the problem of British distribution in foreign markets.

The problem of the " commercial " or " administrative " training of the engineer was never discussed as an end in itself. Earlier conceptions seemed to be concerned only with accounts and costs, but gradually they widened into " administrative distribution procedures "—and inevitably shaded off into the problem of training for management. Inevitably, because the " commercial " training sought was neither more nor less than the instruction of the engineer in the use of the tools of management.

The engineers could not begin to think positively in terms of studying management until they had first accepted the existence of " management " as a process logically distinct from the

technology of their profession. The slowness with which they came to this point was brought out in an earlier chapter. Indeed it might be argued that acceptance of this view is still incomplete. Interest in management in technical industrial circles began as a matter of procedures: first accounts and costs; then works orders and job-routing methods; then piece-work and premium bonus schemes; and then technical planning, leading subsequently to planned production control. But this last phase was a product only of the World War of 1914-1918.

Management hardly figures at all in engineering circles before 1900. The Weir and Richmond Paper to the Mechanicals in September, 1901, on the subject of *Workshop Methods: Some Efficiency Factors in an Engineering Business*, can be regarded as its first "official" recognition. From that date, very slowly, a widening interest developed. But it had made but very little headway at the outbreak of war in 1914.[3] It was in the strains and stresses of war production that the significance of management became accepted as a proven fact. Oddly enough, the passing of another twenty-five years has done comparatively little to advance the position and the outbreak of the second world war found the engineering industry as a whole hardly a step forward in the practical recognition of management as a separate function, and little further advanced, if at all, in its arrangements for training in management. The story of this development is again a record of evangelisation—the persevering enthusiasm of the few striving to stimulate interest among the many who were unreceptive and even sceptical. Once again, there were those who were prepared to listen: but their general attitude was apathetic, and seeds sown in such infertile ground do not yield a noticeable harvest.

The need for specific training for "management" appears to have been first recognised in 1903. In the discussion following Professor Dalby's paper to the Mechanicals in that year a Mr. Yarrow proposed the adoption of a "sandwich course" of college study and workshop practice as the best basis of technical training; but he also wanted a wider view taken of professional training. Prefacing his remarks with the comment that he was not asking for a workshop to be regarded

as a philanthropic institution, he maintained that "it must be apparent to all that the future prosperity of a works is dependent in a very large measure upon the efficient training of those who will take the most active part in its future management." *Engineering* took up the theme and in a contemporary leading article voiced the opinion that "modern methods are more a matter of management than of machinery . . . Modern methods of manufacture demand more and better foremen than the old system, because their essential principle is that the machine-man shall not exercise any discretion at all. The foreman has now to think for every man beneath him, and therefore it is necessary that he must be relieved of all unnecessary distractions." The obvious corollary—that engineers should also be specifically trained in management—appears to have escaped deduction and in fact remained unmentioned for another ten years.

The two or three years immediately preceding 1914 witnessed a sudden and remarkable recrudescence of interest. Papers on *Scientific Management* such as that by Allingham to the Junior Institution of Engineers in 1912 and the one by Renold to the Manchester Association in 1913, not only re-awakened technical minds to the importance of management but also rekindled the interest in the "administrative" training of the younger members of the profession. *Engineering* had a leading article in 1913 on *Training in Commerce*, reminding manufacturers that some facilities for this training were already in existence and should be used, and urging them to call for more. In April of that year, Mr. Donaldson outlined in his presidential address to the Mechanicals what should be understood by this aspect of training. It was no longer a matter merely of book-keeping and costs: "competition from abroad demands our seeing that production is organised on the highest lines of efficiency." There must be strenuous watchful management to control overheads, organising power of a high order as regards the supply of material, and corresponding competence at every point of the enterprise. "The employer must have and use the best brains in himself and in all branches of his undertaking," and so "the mental calibre of both those entrusted with adminis-

trative and executive duties and of the rank and file must be higher than it has been in the past." A very high quality of business ability is needed in administration, while the executive must be conversant with scientific principles as well as thoroughly master of all practical technical details.

These comments are of particular interest because of the distinction—now voiced for the first time—between the administrative and the executive, between the directors and the managers. This recognition in itself was an essential preparation for the instruction of managers. But as yet no voice had proclaimed that specific training in management was something within the realms of practicability. If it is possible to speak of a general opinion on a matter on which only a few are intelligently informed, it might be said that the commonly accepted view was still the one expressed in a leading article in *Engineering* in 1906, working from the thought that "to become a manager is probably the secret ambition of most youths entering engineering." What makes a manager? "Business ability and engineering skill are essential"; but there is also needed "a science of the control of men, a matter of character which can never be taught." The success of the manager or foreman, the writer argued, depends primarily on personal qualities, an ability to handle people and situations—on something that is inherent in the men "born" to be leaders in industry. Thus was formulated the philosophy that has characterised British industry almost to our own day.

By a curious irony, it was a government department that refused to be hidebound by this narrow tradition. In November, 1902, the Secretary of State for War had appointed a Committee to enquire into the supply and selection of suitable men for the management of the Royal Ordnance Factories. The Committee reported early in 1905, proposing what *The Engineer* called "a new system of education for foremen and managers, embracing the most advanced and best ideas on the subject of workshop training." Starting from the standpoint that modern developments in production called for higher qualifications in management, the Committee recommended that the ordnance factories should set up higher standards of qualifications for supervisory and management appointments. They should also

take a prominent part in current discussions on the advancement of workshop management. Evidence was taken from outside engineering firms as well as from an examination of the ordnance factories themselves and the Committee formulated their views from a wide angle.

The qualities required in the ideal manager were to be a combination of " business capacity and commercial knowledge," together with " the widest possible general education, the widest possible technical and theoretical training, and the most extensive knowledge of the trades over which he has to exercise control." For practical working purposes, " managers " were considered in two divisions : (1) a higher division—managers, assistant managers, shop managers, and " supervisors," the last being a new grade recommended by the Committee ; (2) foremen. Those in the higher division were to have university education for all grades, a broad and sound theoretical training and a three-year period of experience in the shops. But as the supply of suitable men would be very limited the Committee proposed that steps should be taken to educate them from early in their career. In particular, there should be no promotion to this higher division from the lower rank of foreman. The foremen were also to be of a better standard of education than in the past, supplemented by sound technical knowledge and a high level of competence in the relevant trades. Supplementing this there must be " proved capacity to organise and control the work of the men under them," and they were to be given special technical training at the local polytechnic.

For the training of their own higher division executives, the ordnance factories would be required to select suitable young men of the given standard of general and technical education. Their three-years' workshop experience would be gained in the form of a closely-supervised apprenticeship and they would then work for periods as assistant-foremen, foremen or assistants to managers in order to learn the work of the factories and receive their appropriate training in management. It appears that in the main the new grade of " supervisors " would be recruited from this source and would form the pool from which to draw the best candidates for higher promotion.

According to a report in *The Engineer*, the Committee were reappointed to carry the scheme into effect, though no further reference can be traced in later years as to how it actually worked out. The editorial comment of this journal was very favourable to the scheme, calling it an " admirable statement of the aims of technical engineering education." But the comment reads as if some effort had been made to present the proposals as purely technical and to minimise any suggestion that here too there was training for management. *Engineering* was rather less impressed ; it reproduced the Report and made a short comment, but its attitude suggests disdain.

The last new thought added in this field before the outbreak of the first world war came from Sir A. Trevor Dawson in his presidential address to the Junior Institution of Engineers, 1913. He took as his subject the training of the men who were to be the " staff officers of industrial works," that is, the members of the administrative and executive staff responsible for the controls of production and the operation of the procedures of management. He emphasised the importance of personal characteristics, and the need for adequate commercial training : but " most difficult of all problems is the management of men—this cannot be learned by books or lectures, but only by constant effort."

The progress of management during the first world-war is a long and painful story, too closely reflected in the experience of the second to bear detailed analysis. But there were a few developments of outstanding interest that stood out from this unhappy background. At least one is worth recording—the course of lectures organised by Messrs. Mather & Platt for members of their staff and given at Manchester in 1917 by Mr. Herbert Casson, the editor of the newly founded *Efficiency Magazine*. The subject of his course was *Efficiency*, and in introducing the lecturer at the first of the series, Mr. L. E. Mather explained that Casson would be dealing with broad principles, " not actually applied to our own business." " The organising side of engineering," he went on, " is a science just as much as the inventive side," and he ventured to hope that the lectures—in which the human element would be emphasised—might result in the creation of a stronger spirit of co-operation among

individuals and departments in the enterprise. The series covered six titles : *The Outside Point of View* ; *Efficiency—What it is and How to Apply it* ; *The Principles of Organisation* ; *The Principles of Management* ; *Planning* ; *Standardised Conditions*. The course can only be described as a remarkable pioneering event in the history of training for management.

In the post-war phase the subject was treated in a rather different light. The older versions of training in " economics " or " commerce " had disappeared. What was now urged was, explicitly and frankly, instruction in organisation and management. Closely associated with it were the question of the selection of candidates and insistence on a high standard of general education as a preliminary condition. Broadly, British industry had learned what management means; it had ceased to be interested specifically in this or that " administrative procedure " and could grasp the implications of " industrial administration or management " as a single, if complex, process resting on fundamental principles of co-ordination and control. Not that industry yet accepted management or appreciated competence in it as something distinct from technology. But the war-time textbooks had effectively taught the unity of the executive process.

For the first few years of the post-war period, there was a story of training for management within the profession of engineering as such. But gradually it merged into the tide flowing in a similar direction from the accountants and other professions and from a number of the newer branches of industry. By the middle of the 1930's, lines of distinction had become blurred and the scene was set for the emergence of a consolidated national movement. These other sides of the whole story are the subject of a later chapter, but there are still a few items in the engineers' own programme that call for particular mention.

It was the Electrical Engineers who re-opened the subject. In an outstanding address given in November, 1918, as chairman of the North Western Branch of the Institution, on the title *The Human Factor in Industry*, Dr. A. P. M. (now Sir Arthur) Fleming dealt at length and with emphasis with the problems of selection and training. " The most urgent changes are required,"

he argued, " in connection with the training of works managers. Modern conditions are such that special training is required, as modern management has a technique quite apart from the technology of the particular works managed, and this produces similarities of temperament and training among managers in different industries which transcend differences due to trade materials and processes. Managers require to be broad-minded men, capable of handling tactfully large numbers of workers . . . Questions like industrial organisation and administration, fatigue, welfare, selection and training, and trade unionism must be their special study. In Manchester a Directorship of Industrial Administration has been established jointly by a few leading firms and the University authorities for the purpose of providing a satisfactory course for present and future managers."

Three months later Lieut.-Colonel W. A. J. O'Meara took up the theme in a paper given in London. He reminded his audience how in the past education and training for the British electrical engineering profession had been built up on a tacitly assumed distinction between the " technical " and the " administrative," whereas in other countries the professional training had included the " business aspects." There was now a need for a thoroughgoing reform of our educational programme, to include provision for both aspects on an equal footing. To indicate its character and content, the speaker gave a brief exposition of Henri Fayol's teachings of the " six functions of industrial enterprise," and continued: " Instruction in the appropriate subjects dealing with the commercial and administrative problems with which the engineer is confronted almost daily should find a place in the curriculum of every engineering course in the schools and colleges of this country." Immediate action was called for to attain this aim, and it was emphasised that the study of management should not be a post-graduate superimposition but an integral part of the qualifying studies.

For the Mechanicals, the question was raised in October, 1919, in the presidential address by Mr. E. Hopkinson, who emphasised that " if we are to maintain or perhaps I should say, if we are to prevent further encroachments upon, our established position in the engineering world, mechanical engineers must give more

attention to the administration and organisation of workshops." Later in his address he argued that "administration and organisation cannot be left entirely to natural aptitude, even when combined with long experience." "There can be little doubt that in the future our shops must be managed by younger men, of more limited personal experience, than has been customary hitherto, who will therefore need to rely to a greater extent upon the experience of others, acquired through reading and lectures. These questions of management and organisation are vital matters which ought not to be left to chance, and should form part of the specific training of a mechanical engineer." It was, in fact, the Mechanicals who made the first practical move, by the establishment in October, 1924,[4] of the subject *The Economics of Engineering* within the framework of the Associate Membership Examination.

The teaching of this subject gained particular impetus from a decision of the London County Council Education Committee in 1928. Following an investigation into the standard of engineering education in the London area, the committee reported with a recommendation that adequate facilities for the teaching of *Economics and Works Management* should be provided at every senior technical institute. The adoption of the proposal meant in time a considerable expansion of study courses available. The Electricals did not take up this lead for some years not in fact until 1935 when, in collaboration with their sister Institution, they worked out a syllabus for *Fundamentals of Industrial Administration* and incorporated it in their Associate Membership Examination scheme as an optional subject under the title *Engineering Management, Organisation and Economics*. The Mechanicals adopted the more formal title as also did the Institute of Industrial Administration which had acted as an advisory partner in the formulation of the point scheme. In addition the Mechanicals revised the syllabus of their earlier subject and included it as a compulsory item under the name *Works Organisation and Management*. The year 1935 thus marked the professional engineers' formal recognition of management and of the need for its specific study.[5]

Elsewhere in the meantime, other major developments had

been taking place. The Department of Industrial Administration at Manchester, established in 1918, has already been noted. The following year, Bristol University included in their Engineering Degree Course a series of lectures on administration, costing, and so on. Before long this was a recongised feature at most of the universities with engineering faculties. In 1921 the interest within the engineering industry found a natural expression and outlet in the formation of a new professional body, the Institution of Production Engineers, specifically concerned with the advancement of the planning and organisation aspects of the industry. The membership examinations which they eventually established required primarily a thorough-going study of factory management and the movement reached its peak only just before the present war with the formulation of the National Certificates in Production Engineering. 1927 was marked by another significant event, the starting of the lecture courses and examinations for the Diploma of the Institute of Industrial Administration—professing that management was no longer the prerogative of the technically trained engineer however high his personal calibre, and testifying to the existence of a separate profession with its own principles, its own field of study, its own standards, capable of application throughout the length and breadth of industry.

To say that the story of education and training for management was now complete would be the antithesis of the truth. The story of the movement within the enginering profession was complete—not because the desired end was attained, but because the technical bias had ceased to be overwhelming. The struggle now beginning was that of " education and training for management " without restriction, the struggle for the recognition of the need for professional training and standards for management *per se*, and for the establishment of approved qualifications which would ensure for British industry a high standard of executive competence in all those to whom was entrusted responsibility for its governance.

[1] *Vide Chapter III above.*

[2] *The story of technical education was not, of course, ended. Further important*

stages in development were the introduction of the Membership Qualifying Examinations for the Mechanicals (1913) *and the Electricals* (1914) *and the evolution of the National Certificate Schemes after the last war.*

[3] *See story of the period* 1895-1915 *in the preceding chapter.*

[4] *It would be unfair to record this stage in the story without at least a passing reference to the efforts of Professor Dempster-Smith, of Manchester University. Already known for his contributions to management by the publication of "Engineers' Estimates and Economical Workshop Production" in* 1914, *he played an important role in the campaign for securing the adoption of the "economics" subject in the Mechanical Engineers' syllabus and in fact was responsible for framing the first set of papers for the inaugural Examination in October,* 1924.

[5] *As a matter of interest, it is worth recording in passing that in* 1934 *the London County Council Education Committee included "management" among the subjects in the curricula for their Summer Schools for Technical Teachers, and in* 1938 *and* 1939 *special Management Summer Schools were held. About the same time active work began on the Foremanship Study Courses for the supervisory staffs of manufacturing concerns.*

IX

TRAINING FOR MANAGEMENT IN THE COMMERCIAL PROFESSIONS (1880-1935)

IT might well be argued that " the commercial professions " are, of their very nature, part of the process of management. The history of engineering training supports such a contention. For a quarter of a century, a movement was afoot to secure for the engineer, as part of his professional qualification, " commercial " instruction. The term was used to cover competence in the procedures of management and executive control. But this use of " commercial " as contrasted with " technical " knowledge, while it was a useful early distinction, is no longer complete. Modern management uses the commercial professions among its tools as it uses engineering and other techniques. But its content is wider and deeper than any particularised commercial skill and logically distinct from any of the recognised commercial professions. This will become clear from the story which forms the subject of the present chapter, and it is certainly indicated by such a random quotation as the following, extracted from a leading accountancy journal of June, 1935 : " The general question of management has not yet received from accountants that full measure of consideration which might have been expected."

The story of the movement for the training of the commercial professions in management bears a curious parallel to that outlined in the previous chapter in the case of the engineers. In the first place, interest centres primarily on agitation for the improvement and consolidation of " technical training." When progress had been secured in this field there began a struggle

for the widening of the professional syllabus. Finally, in very recent times, a third stage is reached and pressure emerges for training in management as a specific science parallel to the existing professional fields.

In presenting this story, it is inevitable that accountancy should be taken as typical of the "commercial professions," not only because it is the oldest of them but also because other sections did not become consciously individualised until very recent times—the sales managers in 1911, the cost accountants in 1919, and the exporters in 1935. Moreover, the limited liability company has for nearly a century been the foundation of British industry and trade, and the professional work of the accountants is intimately bound up with the formalities of company affairs. The company legislation of 1855-1862 created a setting in which capital could be readily acquired for industrial expansion, subject to legal compulsion to maintain prescribed accounting records and returns and the appointment of a responsible official in the person of the company secretary. The growth of Britain's industry had been directed up to this point mainly by the inventors and the technologists, though they were frequently supported—and often indeed led—by the shrewder-minded financiers and "business men." But as a result of the new legislation, every company soon found itself in need of an added expertise to secure that the requisite accounts were prepared effectively and the prescribed procedures followed precisely. The duties of accountant and secretary often tended to be combined in the one person. The tasks were similar or closely related, and the qualifications required in the earlier decades of the new companies were exactly comparable. Yet two professions grew up—the secretaries represented by their Chartered Institute founded in 1891, and the accountants represented eventually by three accredited bodies—the Corporation of Accountants, established in Glasgow in 1854, the Institute of Chartered Accountants, London, 1875, and the Society of Incorporated Accountants and Auditors, London, 1885.

For the purposes of the present review, the professional training of the accountants may be said to have begun in 1880

when the Institute of Chartered Accountants introduced its intermediate and final examinations scheme. For some time candidates prepared for the examinations by private reading, and recommended literature was available for this purpose. Individual coaching rapidly made its appearance and eventually led to the establishment of small private schools. Parallel with this study, whichever form was adopted, there went the training provided by the period under articles. Against this background in the next two or three decades there were heated controversies about the best methods of training the accountant.

The commercial professions were more concerned than the engineers over questions of the standard of candidates' general education. The two groups were in an identical position with reference to the small numbers in both professions who were qualifying by university or similar study. But in engineering there were many avenues to competence and advancement through purely practical work, for which commerce could find no parallel. A quick-witted craftsman could acquire a high technical standard over the years despite a meagre general education. But the clerk who came to his first employment with only a modicum of the " three R's " started with a handicap which only further schooling could remove.

The fact that public education in Great Britain was not well developed in the latter years of the nineteenth century had one particular consequence for the commercial professions. It encouraged the employment of better educated foreign clerks, young men who came over from abroad often at nominal salaries, in order to get first-hand business experience and a knowledge of the English-speaking markets. The practice had grown to such an extent, even by the 1880's, that it provoked both considerable resentment and public oratory in British commercial circles : it became one of the major arguments in the agitation for better standards of commercial education. Another factor supporting the campaign was the contention, already being loudly proclaimed by the engineers, that the country's industrial and commercial efficiency was suffering from the comparatively low standards of education, and that we were losing ground to foreign competitors.

The Incorporated Accountants' Journal for April, 1894 had a leading article on *Secondary Education*, following the recent appointment of a Royal Commission. One of its proposals ran : " In settling the question, it is hoped that the practical and commercial aspect of it will not be lost sight of. Our manufacturers and our merchants are competing with those of countries where there are national systems of secondary education and they ought to be equipped in the best way for this struggle ; so also the qualifications of our own clerks and other employees ought to be such as to exclude the large foreign element that is establishing itself in our mercantile centres."

On this point, the accountancy profession was solidly unanimous, but in translating the idea of commercial training into practice the passing years brought important differences into the open. The main themes were a replica of those in the engineering industry, the camps being divided along a similar line of demarcation into the " progressives " and the " practical " men. The latter wanted all accountants trained under articles and on the job ; they could pick up their frills—useless additions of wider knowledge—in their own time. The more progressive outlook welcomed the public school boy and university graduate, and pressed for the establishment of faculties of commerce as well as properly equipped junior schools to cater for the rank and file of the clerks. Broadly, the struggle was one for the preservation of the traditional " apprenticeship " to the profession. Gradually but decisively, the forces of tradition were beaten. In the course of the struggle, the ground of controversy changed. From being concerned solely with " training for the profession " *per se*, the point of attack shifted to preparation for executive responsibility in industry and commerce, though still from the accountancy, secretarial and clerical standpoints. Eventually the " progressives " declared boldly for " training for management." But that aim is still unattained.

Before dealing in detail with the management aspects of the commercial professions, it will be useful by way of a background, to deal with a few points in the earlier phases of the struggle. The professional journals dated from the 1870's and 1880's and it is from their columns that the milestones plotting the journey

can be read, though there is little that calls for record here before 1900. Interest until then was primarily centred on the issues just outlined.

One early event of note was the formation of a sub-committee of the London Chamber of Commerce in 1888. This had as its terms of reference "*Commercial Education*," and it completed its labours by the preparation of "A Scheme of Education such as would meet the requirements of those who are entering the professions or business life." Probably inspired by the City and Guilds Technical Instruction arrangements, the scheme was based on a series of examination for commercial certificates, and study facilities were arranged at the Polytechnic in the evenings and from 7 to 8 a.m. daily. The scheme was launched in 1890, and in support of it some 200 firms, which had for years been employing foreign clerks, informed the chamber that they would from now on give preference in employment to holders of certificates.

The Technical Instruction Acts, 1889-91, provided greater opportunity for the development of study classes, though in 1896 *The Accountant* declared that the London County Council's Technical Instruction Board had "gone out of its way to institute classes for subjects which are of little or no practical use to anybody." That this may, however, have been but the muttering of a "vested interest" is suggested by a comment of a year or two later, when the editor queried why the technical institutes should teach accountancy free of charge. But in 1898 the London Chamber of Commerce also voiced some dissatisfaction with the instruction facilities available and moved a resolution at the Conference of the Associated Chambers of Commerce calling for an enquiry into the position and steps to secure improvement in commercial training throughout the country. It is interesting to note that the Society of Incorporated Accountants and Auditors gave a good deal of support to the London Chamber in these early years, both by recognising its certificates for certain exemptions and by giving financial assistance to its work for the advancement of commercial education.

In the realm of advanced instruction, the Society was the chief protagonist of university standards, claiming in an article in 1900

that " the advantages of education at a university cannot be too highly prized." It welcomed the step towards the establishment of Commerce Faculties at Birmingham and Manchester in 1902 and the London Economics degree in 1904. *The Accountant*, on the other hand, took an unfavourable view. A comment made in 1893, rejecting with emphasis a university certificate in accountancy, remained typical of its view for many years— " There is no immediate danger of universities taking up this idea . . service under articles is the only real way of training." Yet the journal did not omit to mention in 1901 the foundation of the New York University College of Accounting, the first of its kind in the world.[1]

Another major landmark before the turn of the century was the Report (1899) of the Sub-committee on Commercial Education of the Technical Education Board. This drew attention to the general dissatisfaction voiced by Chambers of Commerce Conferences and the press about the existing character of commercial instruction ; it also reported complaints from British consuls abroad. Proposals were laid down for commercial education in stages, suited to the previous education of the young men, and the claims were made that at least one public day-school ought to have a business training department, while facilities should also be available in the newly constituted section of the University of London (this refers to the School of Economics, founded in 1895).

The accountants' interest in management as such started from the same special angle as the engineers', namely, costing, a subject which figures very frequently in the professional journals in the fifteen to twenty years preceding 1914. This particular approach is easily understandable, if only because of the growing contemporary appreciation of the significance of cost control to the progress of British industry. But accountants were also beginning to see the importance of management within the units for which they were functionally responsible, a line of thought undoubtedly generated by the growing size and complexity of the " commercial " departments of industry. Strictly speaking, at this stage an accurate study of progress in the commercial professions calls for some recognition of a demarcation of

function. Accountants were becoming divided into three main groups whose interests were necessarily different :

(1) Those operating professionally were primarily concerned with the principles and techniques of accounting procedure ; their main complications arose from difficulties of income tax as the early 1900's led the country nearer and nearer to war and the finance of its preparations.

(2) Those who were employed in industrial concerns found themselves with a wide variety of clerical and " commercial " responsibilities to cover and they were becoming more concerned with cost accounting and " office management " in a general sense than with the narrower field of pure accounting.

(3) All those engaged in trade, wholesale, retail and export or import had again a wider field of interest, though accountancy might still remain the most important single element in their activities.

But to separate out these groups in the present context may be misleading and it is safer to continue to deal with the single group of " commercial professions, including accountants and secretaries," while recognising that its character is becoming increasingly complex and heterogeneous. Moreover, the professional organisations in themselves provided a good deal of co-ordination and assimilation. This is reflected in the gradual widening of the syllabuses of professional training. The Universities of London and Manchester brought into their courses in 1903 an omnibus curriculum on *Accountancy and Business Methods*, both centres operating with evening classes. In 1906, Professor M. R. Dicksee published his first edition of *Office Organisation and Management*, and four years later came *Business Organisation*.

All these developments were cracks in the defences of the traditional school. Already the strength of their case had been undermined. The controversy over the relevance of a university

education to commercial competence was still at its height, but at the same time steady progress was being made with the consolidation and expansion of the faculties of commerce, and eventually most modern universities had one. By 1913 the struggle over this point was virtually finished. Not that there was as yet universal acceptance by all members of the profession—another generation was needed to reach that stage—but by this time the unconverted tended to be comparatively insignificant. In February, 1913, *The Accountant*, previously the focus of the opposition, was complaining that business did not seek recruits from the universities systematically, while a few months before it had lamented that " the business world has given singularly little assistance to the academic world in the way of indicating its exact requirements."

Two major factors contributing to this change in outlook were the increase in the cosmopolitan character of the profession and the growing " commercialisation " of its work. The improved standards of general education, and widespread commercial instruction provided by the London Chamber of Commerce, the Royal Society of Arts, the National Union of Teachers, and the various commercial institutes, were beginning to bear fruit in the ranks of business. There were 3,500 successful candidates at the London Chamber of Commerce examinations in 1905. as well as ninety-six awards for the newly introduced commercial teacher's certificate. This meant that the senior members of the profession could look to a higher and higher standard of entrant as the years passed and had themselves to set a higher standard of achievement as a consequence.

As has been shown elsewhere, the outbreak of war in 1914 ushered in a phase of considerable importance for the development of management. In the commercial professions, its main significance lay in the development of costing and cost control. A profound metamorphosis seems to have overtaken the accountants in the five years of hostilities. Judged by the contents of their professional journals, they underwent in this period a major change in outlook. Gone are the old controversies about training : the universal theme is that the general level remains too low. By 1920 there were degress in Commerce awarded by the

Universities of London, Birmingham, Manchester, Glasgow, Edinburgh, Aberdeen and others, and in every case the studies of accountancy were supplemented by comprehensive syllabuses on *Business Organisation and Methods*. Several of the universities had appointments boards designed to help graduates to find employment in industry and commerce; by 1923 even the University of Oxford had bowed to the prevailing wind.

The new fields of interest all centred on management, for the war had taught industry that its accounts and controls are part of the process of management. The commercial professions had, as it were, become integrated with the operations that they controlled and they began to make up the leeway of a quarter of a century. A casual glance through the contents table of *The Accountant* for 1919 and 1920 brings to light titles such as *The Determination of Standards in Scientific Management* (this is an article by a " Production Consultant "), *The Planning Department in Scientific Management*, *Workers' Interest in Costing*, *Standard Factory Accounting and Organisation*, *Economical Production*, and two or three dozen others of similar character. The accounting profession had become " management conscious."

The transition is the more significant in the light of the pre-war and war period absorption in costing. Management as such had figured hardly at all as an item of interest in the professional journals, and what little attention had been given to it centred primarily on " business " management, *i.e.*, matters of shares and the counting-house in the narrow sense. Professor Oldham's paper to the British Association in 1913 on *The Science of Business Organisation* drew comments in two of the journals and one or two of the earlier books on factory management were reviewed, though mainly because of their costing interest. The possibility of a study of management, or of its inclusion as part of professional training had only once come up to the level of a conscious thought: that was in a paper given by Mr. T. D. Neal at Birmingham early in 1902, on the eve of the inauguration of the Commerce Faculty there. Speaking on the place that universities should hold in commercial training he voiced the opinion that it was " impossible to teach organisation as a class subject "; on the other hand, he felt that " capacity to deal with

the working man " was a big factor in organisation ability, and that the Faculty should be able " to make a big contribution in this respect."

In January, 1907, *The Accountant* reported an address given by Mr. H. J. Machinder, the Director of the London School of Economics, at the opening of an official class for the Administrative Training of Army Officers. He dwelt on the theme that the Army and Navy were really large business concerns; they had many elements of efficiency in common with everyday business. And if they were aware of the need for training in administration, commerce too should be conscious of it. " What the railways," he went on, " and what the City among its more enlightened representatives are beginning to feel is that administration requires a training similar to the professional trainings, and that experience—in the face of German and other foreign competition—is showing that the old typically British way of blundering into the position of a responsible administrator will no longer do." The aim of the course was to make the army officers " competent business men," not just by picking up experience but by the inculcation of principles, and they would be given the opportunity of discussing practical problems with industrial leaders of experience. In November, *The Accountant* followed up the course, explaining that thirty-one officers had taken part, of an average age of 39½ years. The course had been " highly successful "—but this comment did not, as might have been supposed, prove the springboard for a campaign for a similar course in commercial administration. Instead, the final chapter was provided by another comment in the same journal six months later about the high value of the Institute's Student Societies—" no school was better or more successful."

It was about the middle nineteen-twenties that the problem of " education and training for management " began to be canvassed seriously in professional commercial circles. Their interest was by no means exclusive. The engineering industry had first approached the subject some years before, with the papers of Dr. (now Sir Arthur) Fleming and Lieut.-Colonel O'Meara. The cost accountants, the production engineers and the

sales managers were all experimenting with the study of management appropriate to their fields. The Institute of Industrial Administration, founded in 1921, was preparing on a broader field to provide for the "professional" training of industrial and commercial executives. Acting on his own far-seeing initiative and sound judgment, Mr. B. C. Adams was already running series of lectures at the Polytechnic on *Industry* and *Management*. The London Commerce degree was well-established, with the support of the Ernest Cassel endowment (1920) and its syllabus boldly proclaimed *Business Organisation* and *Industrial Organisation* as companion subjects to accountancy and cost accountancy. In 1924 an office machinery room was provided at the London School of Economics as an aid to commerce students.

The accountants had lost their chance of becoming leaders in training for management. They remained among the audience, sceptically aloof, listening without conviction to the few enthusiasts who had read the signs of the times correctly. Writing in *The Accountant* in July, 1926, Professor J. H. Jones challenged the profession in no uncertain terms: "It has been assumed that business leaders cannot be trained in the same way as we train men for technical research—but no real attempt has been made to study the manner in which the former should be prepared for their tasks." When in 1930 the journal wrote on *Accountants as Directors*, this challenge passed unheeded. The line taken was that the accountant's professional qualifications automatically made him a good director. A couple of years later they recorded the view that "successful management is a mixture of common sense and real hard work, leavened with a peculiar set of qualities, which—for want of better words—may be called personality or strength of character."

The initiative had passed into other hands. The Manchester College of Technology (University of Manchester) had blazed the trail in 1918 when it established the Department of Industrial Administration. Various universities had included some aspects of the study of management in their Commerce degree courses. And from about 1927 a further impetus was given by successive new developments, including the launching of the Institute of

Industrial Administration professional diploma examination courses, superseding the series that had previously been running at the Polytechnic. In 1930, the house of Pitman opened up their Intensive Business Course at Marlborough Gate, designed to give a preliminary training in management to graduates or others who were destined to enter the higher ranks of commerce. In the north, the University College of Hull inaugurated a two-year diploma course in Industrial Administration, under the auspices of an Advisory Committee of local industrial and business managers. Back in London in 1931, the School of Economics set up a Department of Business Administration with the support of a group of nationally known firms, its intention being to cater primarily for the distributive aspects of management.

Parallel with these progressive developments in the educational world, interest in management was gaining momentum in other directions. Among the commercial professional bodies themselves greater attention was being given to the discussion of management subjects. The accountancy journals carried numerous articles on different aspects of the subject and the professional examination syllabuses gradually acquired a flavour of " office management " in a wide sense. Colleges and institutes provided appropriate instruction courses and special series of lectures were also arranged from time to time. In 1918, *The Accountant* published a series of thirty-two articles on *The Technique of Industrial Administration* by E. T. Elbourne, and in a leading article during the series the comment was made that " it is exceedingly interesting to watch the ever-increasing signs that the subject of industrial administration is slowly and steadily working its way to the fore."[2] Among the signs that could be noted were, for instance, occasional brief exchanges of correspondence in the press : there was one in February, 1925, in *The Times Trade and Engineering Supplement*, one in *The Times* about the middle of 1928, and another there in September, 1930.

An interesting enquiry was undertaken by the Emmott Committee, sponsored by the technical institutions between 1925 and 1928. The Committee invited the collaboration of the Federation of British Industries, and the latter's Education Committee nominated two of its members as representatives.

On their recommendation, the Federation gave the enquiry every practical support and was instrumental in getting a questionnaire widely circulated among industrial concerns throughout the country. Though dealing with technical and commercial education in a very broad sense, the questionnaire asked specifically for views on training for " the foreman, the management and the directorate." The Federation of British Industries Committee linked up an enquiry of its own along these lines and the findings showed that " there was almost complete lack of activity (in training for administration), at any rate as far as courses were concerned, with the notable exception of Manchester." Dr. (now Sir Arthur) Fleming, in discussing the Report, added that there was, however, a considerable amount of scattered work on the subject, and it badly needed focussing and co-ordinating. Accordingly, the Federation of British Industries Education Committee set to work on the preparation of a scheme. Though a report appears to have been prepared within a few months, no further advance was made. In fact, the Federation was not found among the supporters of any of the efforts at establishing study facilities for management, even in the case of the Institute of Industrial Administration : the Committee decided that it would assist that body " when it had won its spurs."[3]

Gradually, however, a small body of enlightened opinion was growing up. The point referred to in an earlier chapter had been reached—approaches from the individual angles of the engineering and accounting professions became lost in a new integrated campaign for, to use the title of an article in *The Cost Accountant* in 1930, *Management as a Profession*. It was no longer a problem of " the administrative training of the engineer " or " training the accountant in management." The issue now was the provision of facilities of training for management in every phase of industry and a campaign for the acceptance of the new profession by all branches of industry. Within the wider framework each of the professions could still make a valuable contribution. It was still significant, for instance, that Mr. R. A. Witty should tell an audience of his professional colleagues in December, 1934 : " every accountant of the future will require to know all that he

possibly can about scientific management, for, in whatever sphere he works, he has to have practical contact with and exert influence on management." But the emphasis had altered. It was no longer a question of the accountant or the engineer adding a flavour of management to an otherwise predominantly professional training. Rather there was emerging a pattern of thought which looked to the creation of a national management institute offering a field of study and qualification ranking as post-graduate and additional to any existing technical or commercial competence.

The consolidation of this line of thought can be placed most conveniently in 1933. On the 2nd January in that year, *The Times* published a letter under the title *Management in Industry*. Its signatories called attention to a manifesto, published over the names of thirty-one persons led by Mr. E. S. Byng, on the subject of *The Management Factor in Industry*. It called for a national body to sponsor and develop a British management movement, whose aims should be the advancement of executive standards and whose primary task should be the co-ordination of many efforts into a single plan for the training of managers, for the recognition, that is to say, of the status of management as a profession with its own principles and ethics, and requiring its own specific teaching on a high level. Once again the initiative proved unavailing. Two years later London was the venue of the Sixth International Management Congress, but there was as yet no national British movement to parallel those of other countries. Eventually the British Management Council was established, but before it could get down to its work of co-ordination and leadership, the needs of war had once again claimed all minds.

* * *

If the story of the accountants' part in the campaign for the recognition of management as a profession with its own field of training seems less clear-cut and specific than that of the engineers it is largely because of the different character of their professional activity. The engineers with their highly technical background needed to learn much of the routines of business and certainly

the general structure of commerce as something extraneous to their own field of work and knowledge. Not so the accountants and other commercial professions. Their everyday activity was involved deeply in the mechanisms of business and management and most of their earlier training covered automatically ground that the technical people had to cultivate by special supplementary effort. What they had to learn further in relation to industrial management—other than the science of organisation itself—lay in realms closer to the techniques of production: process analysis for costing purposes, estimating, time study and the like.

This situation emerges clearly from the two stories just concluded, and it is also the explanation of the earlier and more insistent agitation in technical circles. They were conscious of deficiencies, of being in the midst of a world they could not fully understand because it dealt in procedures, widely different from their own, and related them to a background of which they were mainly ignorant. But the goal was the same for both groups of professions, technical and commercial alike. From the outset the campaigns were related specifically to training for advancement, for the acceptance of higher responsibilities. Their common goal, in other words, was training for management. That they were unable—or unwilling—to see it in so clear-cut a form and to accord to management its due recognition as a new and distinct profession has had but one result. Industry and commerce are still governed by a generation of leaders, themselves largely untrained and consequently almost wholly incapable of passing on their empirical "experience" in a form which can help a new generation to succeed them. This common goal can perhaps be attained only when the disparate aims of "professional training," "higher education," "commercial education," "administrative training," and the like, are integrated into the single and truer aim of training in the science and art of organisation and management.

[1] *It should be noted that the problem of general education as a background to professional training was also linked up with the question of selection of new entrants.*

For instance, the controversy over public school and university education had as one of its major aspects the suitability of the products of these types of educational centres both for the needs of the accountancy profession and for commercial employment generally. In particular, the possibility of subsequent promotion to senior appointments was closely discussed. Opinion on this aspect of the problem was not only varied, but also inconsistent, and before reading any individual contribution one had virtually to know the background of the speaker himself. Perhaps the most interesting survey of the whole question was contained in an article in "World's Work" in October, 1913; entitled "Public School Man in Business."

[2] *It is perhaps an interesting point to note that one section of British commerce which has had little to say about the significance of management competence in its own field—although it claims for itself the status of a commercial profession, with a representative body of qualified members—is export trade. The Institute of Export has not so far taken any active part in the campaign for training in management.*

[3] *The Federation's Committee appears to have gone out of action in* 1931, *but the Federation did arrange a meeting in* 1936 *between representative industrial employers and the Headmasters' Conference, with a view to advising on the question of training public school boys for subsequent careers in industry.*

X

SOME EARLY TEXTBOOKS ON MANAGEMENT

(1899-1914)

THE interest in the study of management which was developing in the latter part of the nineteenth century could not become really effective without a parallel development of a literature of management as the basis of study. It is impossible to establish a causal relation between a growing attention to some particular subject and the literature of that subject without becoming involved in an argument of the " chicken and egg " variety. Those who are interested in a subject can plead that those whose work it is to issue books and periodicals do not give that subject the space it deserves. The publishers on their side can maintain with equal cogency that the interest is not sufficiently widespread to assure them the circulation which will yield a profit. It is a problem in which the ideal solution lies in an integration, a parallel development of the zest for learning and the means of learning. Unfortunately, the progress of management literature in this country in those important twenty-five years before 1914 was not such as to make it a vigorous partisan in the campaign or an inspiration to management training, though there is one notable exception to this generalisation.

As has been shown earlier, the major theme that engaged attention was costs, and bound up with it, estimating, piecework pricing and the evolution of premium bonus schemes. The technical press assisted in this phase by the publication of series of articles, sometimes by engineers, sometimes by accountants. Here in fact was a field in which the two professions were already beginning to walk hand in hand. Not infrequently these articles were subsequently reprinted in booklet form, and their

flavour was always specific and factual, indicated by such titles as *Engineers' Estimates and Costs* or some comparable phrase. To take a single illustration—F. G. Burton's articles in *Engineering* in January and February, 1894, reappeared with some supplementary sections in 1896 in the form of a smallish book (120 pages) entitled *Engineering Estimates and Cost Accounts*: it approaches its subject from a purely technical standpoint and is a simple and concise treatise on the two subjects included in the title, with the procedure involved in working out and recording. Incidently, we note that Burton was an accountant. The book was in no way outstanding; it was well received and it stands as a typical example of a number of others that in the period concerned served the incipient needs of a new branch of engineering interest.[1]

It is just this setting that makes Slater Lewis's publication on *The Commercial Organisation of Factories* outstanding.[2] Here in 1896 was a textbook of management in the full sense of the term as then understood, unquestionably a pioneer and frankly ahead of its times. His imitators were few. In fact before the end of the century it is only possible to pick out one successor as even worthy of mention, a textbook on *The Commercial Management of Engineering Works* by F. G. Burton, published by the Scientific Publishing Company of Manchester in 1899. The author was the accountant referred to above and was described on the title-page as "Formerly Secretary and General Manager of the Milford Haven Shipbuilding and Engineering Co., Ltd." (When the second edition appeared in 1905 he had acquired professional membership of the Society of Incorporated Accountants and Auditors). The title is reminiscent of Slater Lewis, and the book itself was undoubtedly a useful contribution to the literature of engineering training. But at best it can only be said to deal with certain aspects of management, its bias being to the office procedures involved in the control of production, primarily from a costing and accounting point of view.

What exactly the author had in mind can be illustrated by extracts from his own preface (first edition). "A flood of pessimism has been sweeping over this country for the last few years, and books and magazines and newspapers have been teaching that

our trade is departing to other and more progressive countries . . . It appeared to me that notwithstanding the treatises of various kinds which have appeared on subjects connected with commercial management, there was room for one which would suggest to the youthful engineer the difficulties he would encounter whenever commercial duties were thrust upon him, and offer suggestions which might assist him, without dogmatically laying down any absolute rules which must be adhered to under all circumstances. Indeed the great danger at the present time —and it is a danger arising out of the pessimism to which I have referred— seems to be reliance on rigid system and unthinking conformity to statutory or professional forms of accounts. The best method of financial book-keeping, one that admits of perfect balancing, should always be adopted, but this does not debar such variations as will fit it for the business to which it relates, or the special requirements of the proprietor or manager. There is no insuperable difficulty in making these variations if the staff be properly trained . . ." " The book is for the youthful engineer, the student and junior foreman ; the general manager who has fought his way to the topmost rung of the ladder will have already formed his own system and stereotyped his own ideas : his very personal success will be his warranty for them."

Conscious of the queries that his particular title might arouse, the author proceeds at the outset to define its scope. " The term : ' commercial management,' " he writes in Chapter 1, " is a very comprehensive one, and includes a great deal more than making office arrangements, compiling catalogues, purchasing stores and selling products. It cannot be understood without taking cognizance of tact and temper, of character and dispositions of workpeople, of situation of works, of facilities of transit and possibility of extending railway and canal connections, as well as filing of letters and making out invoices. It has its content in a profitable workshop and therefore includes everything which affects the profit and loss account, whether it be initially of a technical or commercial character. It is supreme over technic, in so far as the employment thereof is concerned ; no science, no ability, can be justified in a workshop where ruin would follow on its use : it is subordinate to technic, because no commercial management

can in these days be successful which is purely empiric in character, and neglectful of scientific deduction and knowledge." The primary responsibility for " commercial management " rests with the directors and secretary, and accordingly the rest of the chapter is devoted to an outline study of their duties, principally considered from the legal and accounting point of view. This is followed by a chapter on *The Auditor*. The remaining nineteen chapters, with the exception of two, are concerned with the principles, routines and procedures involved in the application of commercial management.

The book does not call for any detailed analysis. Bearing in mind the fact that the author was an incorporated accountant and had reached his general manager's desk through the professional route of company secretary, it is natural to find his approach to the responsibilities and problems of management laid through the avenues of methods and office practices. But he is fully alive to technical requirements. The book is frankly a textbook of practice and not a treatise on management, and as such it is straightforward, simple and very clear in its explanations: it undoubtedly proved of great value for the purposes specified by its author. Equally, undoubtedly it falls below the standard of its predecessor by Slater Lewis.

The two chapters not concerned with routines are those devoted respectively to *The General Manager* and *The Works Manager and his Duties: Dealings with Workpeople*. The former is very brief (only 5½ pages) but has some points that make it to some extent outstanding. Frequently, the author points out, this officer is referred to as the manager—" his duties cannot be defined and are limited only by the Articles of Association . . . within which he is an autocrat, controlling and directing everyone connected with the concern excepting the secretary and the auditor, and himself subject only to his directors. Every servant of the company is subject to his influence and must be more or less inspired by it. *Esprit de corps*, so necessary for successful working, will only permeate the mass of employees when it first starts with him, and no supervision, no regulations, no system can fully supply the place of it." This recognition of the significance of the leadership element in management is certainly very

interesting and it is a pity that the author did not allow such a trend of thought to develop more fully as the basis of his teaching.

Apart from the requisite technical qualifications—" it is almost superfluous to say that the manager should be a highly qualified engineer "—Burton finds it necessary to stipulate only four qualities for the successful general manager : " (*i*) the first and most important necessity is the capacity to be just . . . (*ii*) on the other hand, he must be a firm disciplinarian . . . (*iii*) he must see that all work is done to time, both in the factory and in the office . . . (*iv*) unless he has, either naturally or by attainment, the faculty of selecting the best men for the various posts, he will involve himself in much aftertrouble and probably bring some of the departments into confusion." The paragraphs dealing with this last item are significant for their emphasis on the need to preserve lines of authority in the control of staff, and at one point there is a hint of recognition of a functional basis of operation. Another interesting point is the reference to what in later times has come to be called " personal authority " : " We have all heard of an ' uncrowned king ' who ruled more autocratically than an emperor, his power being founded on the wisdom attributed to him by his subjects ; this ' uncrowned kingship ' may be found in all associations of men." Pursuing this thought Burton refers to the wisdom of consulting subordinate officers to ascertain their views—" even if he overrides their advice and follows his own opinion he flatters by consulting them." And this brief treatment of the human approach to management is rounded off by laying down as " an axiom " the principle that " promotion shall be dictated by the man's fitness for the new appointment and not conferred merely as a reward for past services."

A hint of the same outlook is given in the chapter on *The Works Manager*, but once again the author prefers to choose the particular road of procedures and factual duties rather than analyse the full significance of management. It would appear that the title *Works Manager* was something new to industry at this time. Burton suggests that " a little explanation of the title seems necessary—he is the chief of the executive departments, the officer who has to carry into actual execution the brain monitions of the mere student, to transform conceptions, designs and drawings

into actual working machines, instinct with motion and power." The qualifications postulated are almost exclusively technical, but it is suggested that experience of particular width is needed, so much so as to render " the appointment of an ordinary foreman who has risen from the ranks of doubtful benefit and sometimes positively hurtful to the firm."

Any hint of qualifications pertinent to the " leadership " function of the works manager is sought for in vain, save perhaps between the lines of the paragraphs on " factory regulations and rules." Here the significance of simple and clearly-defined rules is emphasised and the view is expressed that " the law-maker must also be the law observer, and impress his regulations on the men quite as much by force of example as by distributing them over the shop's walls." This omission of the " leadership " function is the more marked because the title of the chapter contains the sub-heading " Dealing with workpeople." The remarks covered by this reference are primarily factual: such issues as shop appointments, workmen's characters (references) and incentives to productive energy. In fact, a considerable part of the chapter quantitatively speaking, is taken up with matters under the last of these headings, including piece-rates and profit-sharing. The second edition (1905) has three significant additions at this point in the form of sections on *Functional Foremanship* (a concise explanation of the eight foremen at the Bethlehem and Midvale Steel Companies, though without any mention of Taylor), *The German-System* (" management and inspection following the military routine which they have perfected with such wonderful results "), and *Premium Bonus* (two long expositions of methods used in H.M. dockyards and in a typical commercial scheme).

Additions in other directions in the second edition are almost exclusively concerned with costs and accounts. The three main items are a new chapter on *Cost Accounts*, extended sections and an appendix on *Industrial Depreciation*, and a reproduction with commentary of the Companies Act, 1900, because of its importance to directors, despite the fact that it primarily affects the inception of companies rather than their management. But this edition also has two other features of interest. The one is its

dedication to Professor William Smart, of Glasgow University, as a recognition of the author's debt to the principles enunciated in the Professor's writings. " Though I have not been altogether successful," says the author, " in transferring your philosophical teachings into the routine language of productive commercialism, I have sought to adhere both in form and in theory to actual facts ; and I have nowhere countenanced the fallacy, now so common, that juggling with figures can produce something out of nothing."

The second point occurs in the new preface, indicating that " we may cull a lesson from the American ' business doctors.' The secret of their success lies in their bringing to bear on an establishment an independent and critical mind ; on prolonged and exact observation of the business ; and of a diversion of the costs of production into their several and most minute elements. The ' doctor ' has no predilection for the system in vogue at any works he may visit ; it is not his invention and he seeks by analytical time observances to detect its weaknesses. His services are possibly over-estimated, but he certainly can render valuable help to the management of a factory, provided he is merely a critic and not a manager, in the same way that an auditor renders services to the financial department."

Although it was several years later that the next important book appeared, its thought was available much earlier in the form of serial articles. Between 1908 and 1912 *The Mechanical World* (Manchester) carried a long series under the title *Commercial Engineering—by a General Manager*. This was A. J. Liversedge, an associate member of the Institution of Civil Engineers and a member of the Society of Chemical Industry. The collection was published in book form late in 1912, and it may be regarded, from an historical point of view, as a further stage in the evolution of management as a subject of study. Broadly the approach is jointly from that of production and of selling, and in the latter respect it definitely represents a contribution of novel character, harking back in spirit to the commercial compendiums of the merchants in the seventeenth century.

A few quotations from the preface will again serve best to indicate the author's outlook and purpose. " It is admittedly

difficult," he writes, " to teach business knowledge in any satisfactory way in school or college: to teach 'business' there is not possible. Business aptitude is either a gift or is learnt only in the office, on 'Change or 'on the road.' " " The present work, which is frankly designed, for one thing, to help the ambitious young man who wants to 'get on,' takes the reader forward into the midst of affairs; and it is hoped will be found useful in this connection, whether a man's normal or preliminary training has been mainly technical or general or specially commercial . . . but it aims in the second place to be at once a guide and a stimulus, particularly for example in the chapters dealing with the world's markets for engineering productions, to the engineering man of business aiming to conserve and fortify an existing connection or to open up new ones." " Finally, the general scheme of the work is to make a certain concentration of knowledge, which has not hitherto been attempted, in connection with one of the most important industries of the country and to present it in a concise and accessible form." This last extract is in fact the key to the whole character of the book, which for the greater part of its thirty-one chapters is concerned with submission of factual data. Costs and accounting procedures do not figure at all—mainly because, as indicated in Chapter 1, the author considers this subject to have been adequately covered by an earlier series of articles on *Engineering Estimates, Costs and Accounts*, which " as issued in book form, still appear to constitute the most complete and detailed work on the subjects treated therein . . ."[3]

Broadly, and with some truth, it might be argued that Liversedge's *Commercial Engineering* is less a textbook on management or procedures than a handbook for managers. Yet it played a part in the progress of the study of management, if only because it was the first serious attempt to deal with the marketing and selling aspects of the engineering industry. The title the author refers to as " convenient . . . but distinctly loose and vague (though) it now has the sanction of authorities in connection with technical education and will not mislead anyone engaged in the practice of an engineering business." He agrees that perhaps it is a misnomer, " the thing meant not being engineering at all, but purely business "; but on the other hand, many technically

trained engineers devote their lives to these commercial pursuits and in any case, the engineering industry is not practised " for the love of the thing or for amusement, but to make money." To clarify the position a broad definition of commercial engineering—and incidentally an explanation of the character of the book—is given as " the buying and selling necessary to, or associated with, the conduct of an engineering business." Later in the chapter this point is repeated with some emphasis : " the aim is simply to make money—profits : the entire organisation is designed and intended to make profits for the proprietors . . . the productions of the business must be sold for something more than the total cost of producing and disposing of them."

In passing, Liversedge notes that " the best-paid positions in manufacturing engineering to-day, are either commercial positions principally, or positions in which commercial knowledge and commercial ability are essential qualifications." At some length he analyses the qualities required in " the ideal manager," though primarily from the point of view of the knowledge to be acquired both in the technical and in the commercial fields. In the course of this section an interesting distinction is drawn between " management and direction," and a line of thought expressed on which even thirty years later little advance has been made—" a man quite without technical knowledge may direct an engineering business . . . but rarely can such a man expect successfully to manage such an undertaking."

This is not a book of which any detailed study need be made in the present context. Its chapters break down broadly as follows : 2-9 Direct and indirect materials ; 10-12 Direct and indirect labour ; 13-16 Facilities — land, buildings, plant, power, capital ; 17-29 Selling, markets and sales data ; 30 Organisation ; 31 Legislation. Chapters 2-29, as indicated earlier, are primarily descriptive and factual. Thus those on materials give technical and performance data of various metals, materials, fuels, and so on, and also information regarding sizes, prices, methods of use, purposes, and so on. Similarly, on labour the main contribution is descriptive in regard to apprenticeship schemes, piecework and premium plans and the like, but chapter 10 contains a few paragraphs on the handling of labour—the

executive aspects of factory discipline and the control of the cost of labour. It was pointed out above that Liversedge made his particular contribution to the advancement of the literature of management by his attention to the marketing and selling aspects. The thirteen chapters devoted to this broad subject are indeed a very full treatment. They deal with the various problems that must be faced in the organisation and operation of the sales activities. Considerable appreciation is shown of the significance of well-ordered sales promotion, though there does not appear any hint of market research. On the other hand, market analysis is discussed as a means of providing the sales department with some guides culled from the study of published home and overseas trade figures. Chapters 17, 19 and 20 might well be called the pioneers of sales management literature within the engineering industry. The factual data given in respect of selling comprise on the one hand a lengthy study of patents and trade marks and on the other very detailed surveys of conditions, trade, tariffs, and other commercial matters in all the chief export markets for British engineering products. The extent of this data can be judged from the fact that the chapters concerned fill 100 pages of closely-packed small print.

Even if, as has been admitted, Liversedge's book is not in general a textbook on management, it could claim that title in respect of the one chapter (30) on *Organisation*. In all fairness this can be only described as ahead of anything in contemporary literature in its approach to the main problem of organisation. The terms used and the outlook adopted are alike comparable with modern usage, starting from a conception of " general principles and lines upon which efficient organisation must proceed." Distinction is drawn on the one hand between " organisation " and " procedures or systems," and on the other between " authority " and " responsibility." " Organisation means merely the systematisation of working units into one operative whole : its aim is efficiency. It is not an end in itself, but a means to an end—the attainment of certain desired results with the minimum expenditure of money." Since this was the author's viewpoint, it is disappointing that he did not pursue the thought into a full science of organisation. For that one sentence contains

the germ of all that is to-day appreciated as the substance of organisation—the definition of policy (="desired results"), planning, economy of operation which implies budgeting and control of costs, co-ordination.

He did, however, take his basic thought some stages further. "The secret of successful organisation will be found to lie in the clear and definite prescription, devolution and limitation of authority and responsibility; the most highly perfected example of organisation to be found today is furnished by a ship of war prepared for action, where every unit has a definite place, a particular duty, and a certain clear responsibility." Or again: "It is of the utmost importance to bear in mind the essential and intimate relationship of responsibility to authority: where responsibility is required, authority must be given . . . and where authority is given, with corresponding responsibility imposed, the authority must be given clearly and fully. Any unit in a scheme of organisation is entitled not only to have his authority and responsibility made clear to himself, but to have all others whom it may concern fully informed in regard to it." The corollary of this is discussed at some length—that the individual entrusted with responsibility and authority must be left free to exercise them in his own way (granted that he is competent to do so), which is the essential feature of delegation. This raises the important problem of competence, and the author observed that "individuals capable of properly exercising authority are comparatively scarce . . . there are many able men who are constitutionally incapable of exercising authority, whilst many more only acquire the faculty after long training and experience."

The principles of organisation referred to in the opening remarks of the chapter are not taken to any further degree of finality than is indicated by the extracts quoted above. But it will be recognised that here at least lay the germ of most of what is contained in modern thinking on the theory of organisation. Liversedge was clearly a pioneer writer in that respect, adding considerably to the earlier thought of J. Slater Lewis. He also endeavours to translate his "principles" into practice by recognising clearly two separate sections in the organisation of an engineering business—works and office. Working from the

standpoint that " organisation is concerned with actions and with records," he runs briefly over a few points of procedure leading to effectiveness in these respects, especially in relation to handling materials and stocks and the disposition of foremen and junior foremen. On the office side he maintains that " in its administrative phase, office organisation is concerned with documents and records," and in the two pages that are devoted to these matters one may already see the first pointers to the later isolation of a clerical function concerned with all the procedures of communication.

That Leversedge's *Commercial Engineering* has never had the historical recognition which is its due can be traced to its preponderantly factual character. Contemporary works of reference necessarily decrease in value as the years pass. In the 300 pages devoted to data of contemporary interest, the ten pages on organisation principles, which were of far greater permanent value, became lost.

Burton and Liversedge may well be regarded as writers on management belonging to an " old-fashioned " school. Valuable in their own day, their writings ceased to have special pertinence as the science and technique of management advanced, especially in view of the advances made in the five years of the Great War. In the 1920's the books on management began to bear the stamp of " modern " and many of them have continued in current use down to present times—while most of them are still catalogued by the publishers as currently available. But the " modern " phase really antedated the war by a few months for the year 1914 saw the publication of two outstanding works that were definitely ahead of their time. *Engineer's Costs and Economical Workshop Production*, by Dempster-Smith and P. C. N. Pickworth (1914), was a publication in *The Mechanical World* series, and thus was a direct successor to Liversedge. It was an outstanding volume, and not only created a very good impression in contemporary engineering and management circles, but undoubtedly played an important part in the administrative training of the engineers for war needs. It was, however, specifically concerned with the engineering field, and was thus of somewhat narrower significance in the story of management literature than its

contemporary *Factory Administration and Accounts* (1914) by E. T. Elbourne, assisted by A. Home-Morton and J. Maughling. This had a more general application. The joint authorship of the work is an interesting combination—the main author being a works accountant with an engineering qualification and a post in an engineering works as deputy works manager, and his collaborators respectively a highly qualified engineer and a chartered accountant.

Elbourne's *Factory Administration* falls readily into place as the next in line of succession to Slater Lewis' *Commercial Organisation of Factories*. Both are written by managers with an engineering background, but capable of seeing beyond the frontiers of that profession. Both are explicitly intended for application in any industry and are certainly not confined to engineering. Slater Lewis wrote the first British textbook on management as a specific subject of study; Elbourne wrote the second. And in this lies another significant parallel—that both books deal with all aspects of management, including broad general principles, instead of being limited to the technical or the accounting, or some other particular aspect.

Elbourne enjoyed a big advantage over Slater Lewis from the more fortunate coincidence of time and circumstances. His book appeared just when, owing to the exigencies of war, the Ministry of Munitions was focussing attention on the essentials of factory management, and with their " guidance " sales of over 10,000 copies were secured within two years. The continuing interest in management after the war kept the work alive sufficiently strongly to warrant various new editions (the title being changed to *Factory Administration and Cost Accounts*), culminating in a special students' edition as recently as 1934. It would be unfair to give any false impression in this connection—circumstances favoured Elbourne by contrast with Slater Lewis, but his book's continued life was primarily due to its intrinsic merit.[4]

In the days of its first edition, this publication was certainly outstanding. The aim of its 600 pages was " to present an analytical study of the problems pertaining to factory administration and accounts as a whole, in such a way as to be understandable alike by the business man, the accountant and the

engineer. Previously the subject of management—more particularly works management—has been written of as being apart from works accounts, in any full sense, and especially from financial accounts." This the authors attempted to overcome by combining these various facets of administration, but at the same time they were more concerned to identify "principles rather than to enlarge upon the particular methods of any one firm." "The work as a whole may hardly be said to reduce administration to a science, but it is intended as a demonstration both of the desirability and of the feasibility of an initial treatment of every routine essential to the well-being of a factory."

From every aspect, this can be regarded as the first modern textbook of management, in the sense of the principles of sound administrative procedures as distinct from the principles of "organisation and management" *per se*. Organisation structure received brief treatment under the name of "staff organisation"—"perhaps the main problem of general administration," the author's comment: in this respect the parallel with Liversedge is curious. And the explanation is perhaps the same—that the time was not yet ripe for the specific study of the theory of organisation as such.

The further story of the literature of management is a matter of current knowledge. These earlier publications have an historical significance in line with the story of the evolution of management itself. They represent the oozing out of the spring at source and its first trickling together into the tiny brook. By the 1920's it was growing to a stream, continuous, swelling, broadening. And within ten years—to continue the analogy—it had become necessary to build the reservoir that would contain and marshal the growing flood. Thus the foundation of the Management Library about 1930 may also be regarded as one of the historical key points in the story of British management.

[1] *A second edition appeared in* 1901 *and was followed a year later by a similar publication by Burton on "Engineers' and Shipbuilders' Accounts." It is also interesting to note that in* 1896 *he had published a treatise on "The Naval Engineer and Command of the Sea: A Story of Naval Administration."*

[2] *See Chapter VI.*

[3] *Liversedge's references are vague, though at one point he actually mentions the title quoted above. He is very likely referring to Burton's articles, mentioned earlier, but one finds it difficult to resist the impression that Liversedge is purporting to refer to a series of articles (and a reprint) from his own hand. Of this so far no trace has been found.*

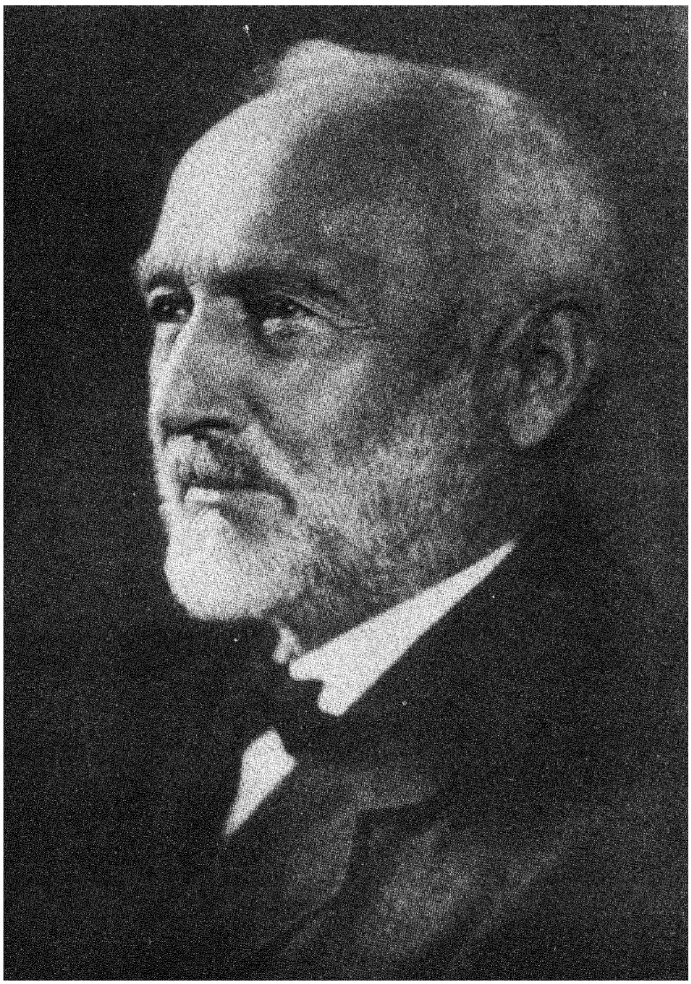
[4] *Elbourne's contributions to the advancement of management in other directions formed the subject of Chapter XIII in the preceding Volume.*

XI

SCIENTIFIC MANAGEMENT IN PRACTICE

(*ii*) Hans Renold Ltd. (1879-1913)

THE story of how Taylor's work was accepted in British industrial circles was, as an earlier chapter showed, mainly the tale of a process of overcoming apathy and substituting interest. In certain quarters there was definite opposition to what Taylor's " scientific management " was believed to stand for. But by and large positive opposition was much less characteristic of the British attitude than a complete absence of interest, a point emphasised by the discussion at the Joint Conference of the two Engineering Societies in 1910. When eventually through the pressure of war, industry became more conscious of management and recognition of the importance of effective controls began to percolate through the various levels of industrial organisation, the customary British process of assimilation was set in motion. Scientific management as practised by F. W. Taylor and his American associates could never have taken root in the soil of British industry. Its principles were undoubtedly applicable. Indeed they were essential as the basis of effective management anywhere. But the methods by which these principles were to be applied could at best be little more—if they were to succeed at all—than a very free translation from their American originals. And that is just indeed what occurred. During the years of war production, industry in Great Britain learned from the few who had taken the trouble to study, but the process of instruction was at the same time one of gestation. A British " scientific management " was the result, and its peculiarly national character in the nineteen-twenties is nowhere better



HANS RENOLD, D.Sc., J.P.

(1852 — 1943)

CHARLES G. RENOLD

exhibited than in the official pamphlet published under the auspices of the Ministry of Reconstruction in 1919. The principles had been assimilated and a new foundation for their application evolved.

That the pamphlet, a much forgotten and neglected landmark in the history of British management, was pioneering work will not be disputed—but it was not the pioneer of British scientific management. As a publication it was preceded by various articles in the technical press, and journals; in practice it was preceded by the experience of at least one British engineering firm, governed and directed prior to the war of 1914 by a man of outstanding executive ability, fortunate in having a son and successor of equal quality who has carried down to present times the reputation that was acquired so early.

Mr. Hans Renold founded his engineering company in 1879, and under his sound governance it grew steadily in size, skill and reputation. In all its policies the firm displayed an enlightened outlook, and perhaps in none more than in the appointment and development of its staff. " One great and helpful element in our organisation," said the founder many years afterwards, " is the fact that from an early date we have taken great care with young men and have established a carefully graded apprenticeship system, offering every facility for learning, and giving liberal remunerations, which are always attractive to ambitious youths. We thus secured a good supply of young men of good character very often the sons of our own workmen and foremen."[1] Moreover, many of these same young men learned " management " in addition to their technical training. One of them has borne witness to the soundness of that training—G. H. Allingham who as early as 1911 and 1912 was an accepted exponent of scientific management and an active " teacher " of its principles in his writings and lectures.

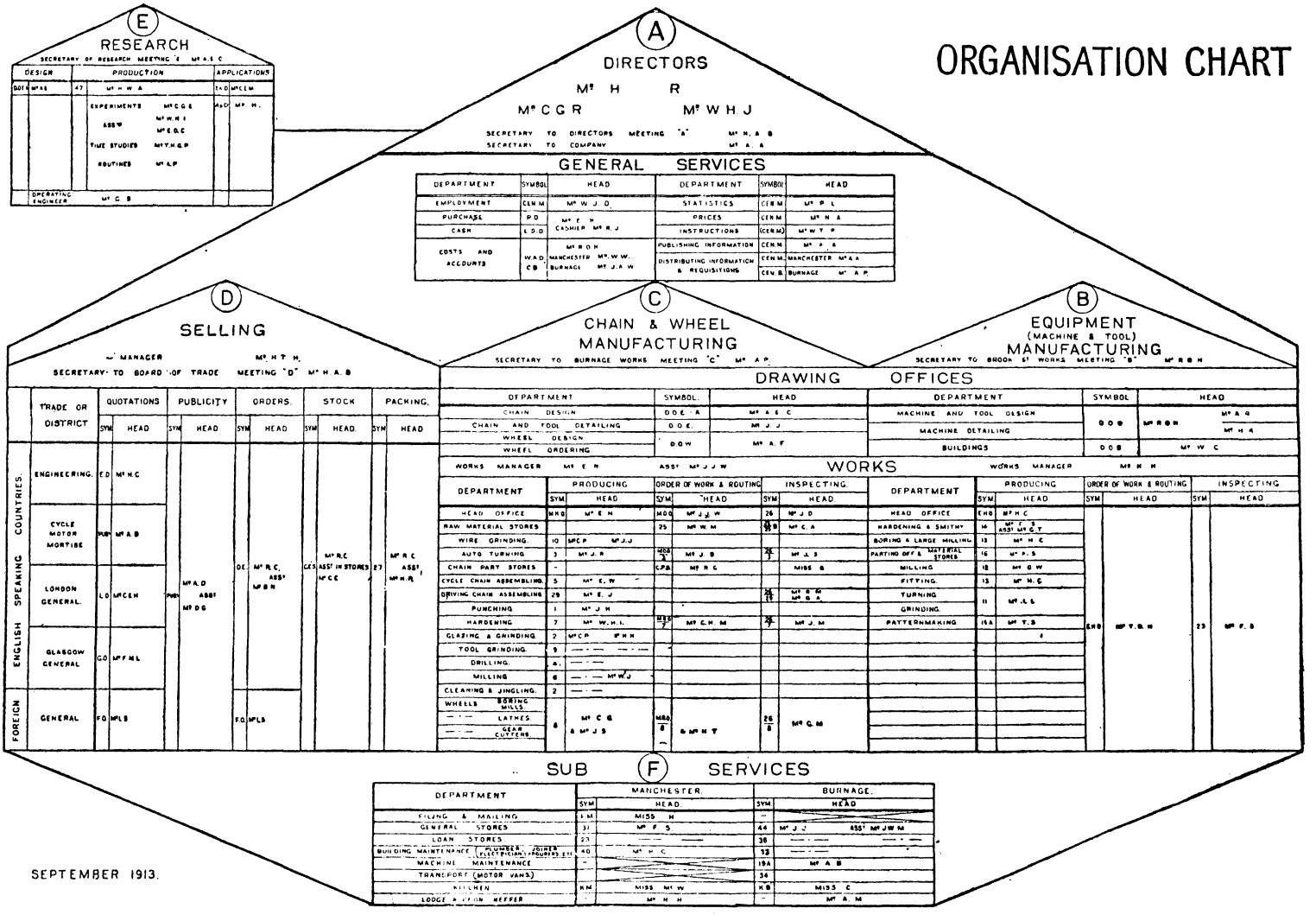
For the purposes of this chapter the history of Hans Renold, Ltd. is less significant than its organisation and procedures at the time when they were an early example of what scientifically conceived management can mean. In October, 1913, Mr. Hans Renold read to his fellow members of the Manchester Association of Engineers a paper on *Engineering Workshop Organisation*, based

entirely on his own firm and illustrated by numerous organisation charts. It was at the time employing some 1,350 men and women, occupying two works and engaged in the manufacture and sale of varieties of driving chains and sprockets in a large range of sizes. The problems of the business were summed up by Mr. Renold in referring to marketing, which he said " calls for a considerable estimating, selling, booking and forwarding staff, managed by the commercial department . . . as chains are used in almost every country where machines and factories exist." And correspondingly in production, the growing differences in sizes and character of the products called for by this far-flung market, at home and overseas, necessitated increasing sub-division and specialisation of manufacture.

These problems were met in the only way they could be met—by sound management. " For some time we have been preparing monthly balance sheets, not for the commercial department alone, but also for the manufacturing departments, and have found them of very great advantage. These monthly returns keep one constantly informed as to how the business is going, and are a great comfort in normal times, and unmistakable signposts when things are not going as they should. With a proper accountancy system the necessary indexes are constantly kept up, and the preparing of monthly balance sheets then becomes the work of a few days after the month is past. With such a system of monthly balance sheets and all the returns strictly kept up to date in the commercial, drawing and cost offices, and in the various stock, store and warehouse rooms, the preparing of the yearly balance sheet is a question of only a few days more. The stopping of work for a week or ten days, necessary with the old method of yearly stock-taking, is falling out altogether, and as is usual, a very disagreeable time for everybody is saved."

Here in unmistakable clarity is the application of a cardinal principle in management—a factual basis for the information on which all control and decision is founded. It should be noted too that the application, by the method of monthly returns and balances, is a method which even to-day vast sections of British industry have not yet learned to apply. Nor was it purely a

ORGANISATION CHART



SEPTEMBER 1913.

(Hans Renold & Co., Ltd. — 1913)

financial control, but, as Mr. Renold's own words indicate, was extended in a unified scheme to embrace manufacturing activities and stocks as well as items of expense.

The paper did not deal in detail with the company's organisation structure, but the charts displayed, as those illustrated herewith will show,[2] were so carefully prepared as to be entirely self-explanatory. Their basis was that of functional specialisation, a term even then current in the firm's terminology, and in fact expounded at the discussion by Mr. C. G. Renold, the son. Contrasting the usual basis of organisation, " resulting in a pyramidical structure, similar to an Army Corps with a general at the top," he went on to explain that the company preferred to adopt " the functional method in which they took account of the whole sphere of activity and subdivided it according to the functions which were carried out throughout the sphere instead of dividing the men . . . They had three functions which were recognised : producing, routing (or ' order of work ') and inspecting. These functions ran through each of the geographical areas." Each of these functions was controlled by a specialised head, a principle which Mr. Renold felt represented " a somewhat new way of looking at organisation problems."

Examination of the charts shows that the functional principle was carried to an even greater length than Mr. C. G. Renold's remarks indicated. It will be seen from *Plate I* that the whole scheme of organisation is itself founded on functional responsibilities. The chart is remarkably " modern," when contrasted for instance with the one prepared by Slater Lewis (Chapter VI). Supporting illustrations presented with the paper broke each of the five main sections down into their component elements, in order to show the reproduction of the principle at every stage. Thus for instance, " General Services," broadly the province of general management or industrial administration, contains among its nine executive sections such elements as :

(1) " Employment Manager : Interviews and engages all employees. Arranges apprenticeships and is responsible for general discipline. Deals with Labour Exchange, National Insurance, accidents and causes."

(2) " Purchase Department : Deals with all purchases. Files catalogues and interviews travellers. Keeps a general account of goods on order."

(3) " Statistical Department : Prepares annual and monthly balance sheet and checks accuracy of costs. Obtains all information from cash and accounts departments."

(4) " Instructions Department : Writes all instructions necessary to carry out decisions at directors' and management meetings, and indexes same in instruction book."

(5) " Publishing Department : Issues all sheets of prices, instructions and standard dimensions and practice. Issues monthly bulletin to agents."

Perhaps nowhere more clearly than in the last two items does the advanced character of the Renold management stand out—for the issue of written standard instructions and standard practices guarantee smooth-working executive control ; but the adoption of a functional responsibility for their preparation and publication is management at a level rarely touched to-day. Again and again in the examination of the charts the same high standard of organisation structure appears.

Of particular interest is the chart reproduced as *Plate II, Figure* 2, showing the five " committees " or " meetings " held as regular practice, in line with the five main sections of the organisation. The purpose that they served can best be explained in Mr. Hans Renold's own words, replying to a comment that had been raised in the course of the discussion. " I am," he said, " personally inclined more and more to the conviction that no large business can be conducted, and the best and fullest use made of the intelligence, experience and knowledge of its leading men, except it be by co-operative councils and discussions. More than this, it is only by sitting together in consultation that younger talents have a chance to show themselves, get known by their directors and the needful encouragement be given to them. The last word, of course, must always remain with the directors. There is no getting away from the fact that however strong and experienced a managing director might be, by himself, he could do little if

ENGINEERING WORKSHOP ORGANISATION.

E
RESEARCH.

The investigations of this dept, are at present mainly spread over the Chain & Wheel Manufacturing, but will later on, also extend over the Equipment Section "B" & Selling Dept. "D"

RESEARCH MEETING on Wednesday mornings. Reports on work of previous week & arranges new investigations.

DESIGN.	PRODUCTION	APPLICATIONS
Fixes Designs & Tests for:- Standard Chains & Wheels. " Chain Parts. " Raw Material. New & Special Chains New Raw Material for the various chain parts as to their - Strength - Elasticity - Toughness. Method of Heat Treatment. Suitability of Machining. Also Cost etc	EXPERIMENTS on Processes, Operations, Cutting Speeds & Feeds, Hardening Temperatures & Treatment. TIME STUDY. Applies the reward system to the various depts. The reward paid to operators, depends on how olosely they work to the schedule time for each job, which is fixed by means of motion study with a Stop Watch. ROUTINES. Plans the routines for keeping track of work and material. Designs the necessary stationery forms & cards.	1. Carries out on a Special Plant, Experiments of Durability and Strength of Finished chains 2. Plotting Charts for comparison. 3. Deals with all patent applications 4. Keeps look out on what Patents are taken out, in Chain Construction & Application

OPERATING ENGINEER. Supervises experiments required by Research Section.

Figure 1. RESEARCH FUNCTION ORGANISATION CHART

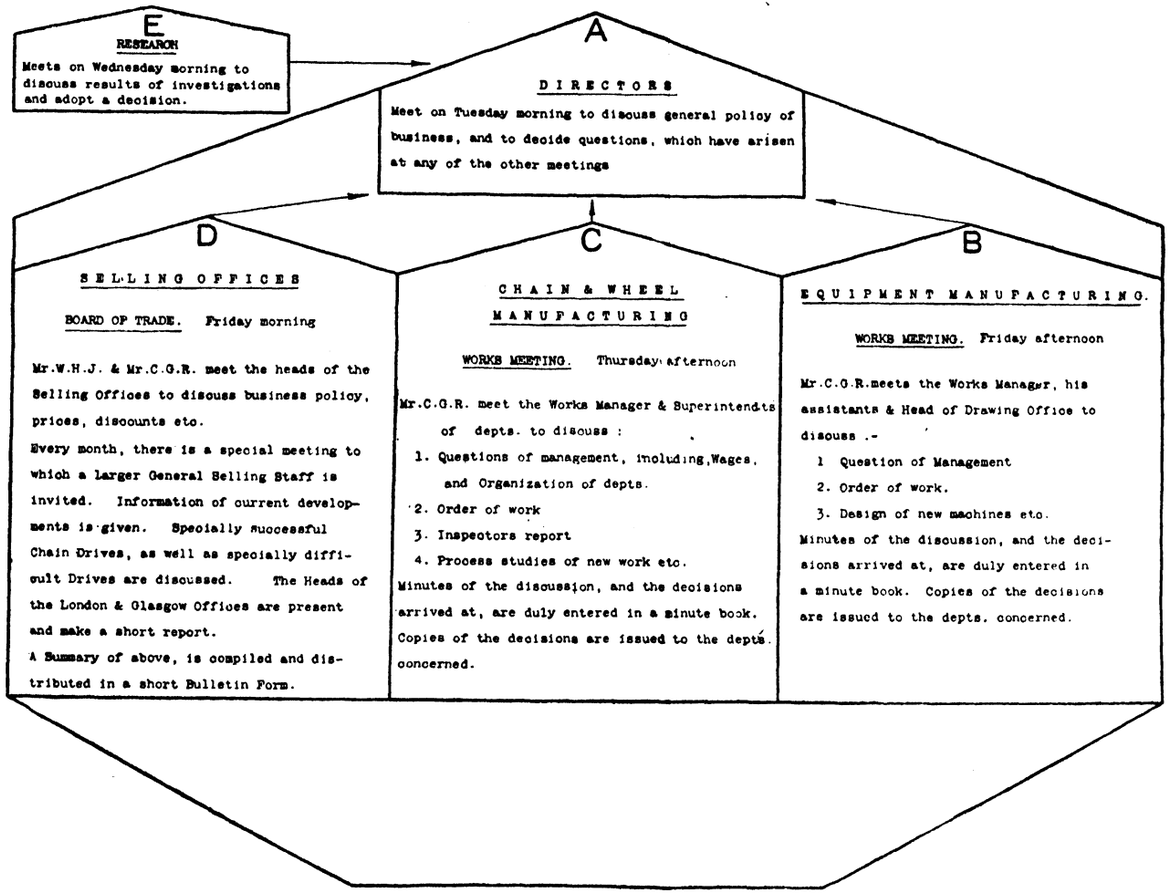


Figure 2. MEETINGS CHART

(Hans Renold & Co., Ltd. — 1913)

not ably and sympathetically supported by his co-workers. To know and to understand each other could not be done in a better way than by sitting round a table discussing and solving business problems." Broadly, then, these meetings were designed to afford a consultative mechanism among the management staff, linking up in a co-ordinated scheme with a weekly meeting of the directors themselves. In spirit, the exposition of their founder has a remarkably close analogy with the statements that have been made in more recent times—even from official sources—as to the value and significance of joint production committees.

It will be seen from the illustration that the various committees had set terms of reference and that their deliberations were duly minuted. Their scope was management within the function that they covered, and the elucidation both of results of current developments and of items in which new policy decisions were required. Thus co-ordination within the function was achieved on a basis that clearly preserved all the essentials laid down years afterwards by Mary Follett—continuing direct contact of the parties concerned from the outset of any matter raised for deliberation. And co-ordination between the meetings themselves was achieved equally well in the personal membership of Mr. C. G. Renold in all of them.

What underlay this application of effective management way back in the early 1900's was a very simple conception of its character. Systematic and successful shop management—or scientific management—Mr. Hans Renold maintained, was neither more nor less than liberal-minded common sense, applied with method, reason and tact to the everyday problems as they arose. But he had an amazingly clear perception of its significance and of the line along which it had to advance. He had had the good fortune—or the good sense—to make the personal acquaintance of F. W. Taylor and to see his work at first hand. The impression he had formed had been of a high order, but he was still able to appreciate the difficulties of others in understanding the Taylor principles at second-hand and in failing to distinguish between sound principles and an unsound application of them. This in fact was the line on which he began his paper and some of his opening paragraphs are well worth recalling.

" There is probably no large business establishment in England to-day but calls in a professional public accountant to audit its commercial books and prepare the yearly balance sheet. I may remind my audience that this was not always so. In the United States of America during the last 15 or 20 years, another kind of public profession has begun to establish itself, is growing and is made more use of year by year. It is not only used by engineering firms but by all sorts of businesses, such as railways, publishing houses and every sort of commercial and industrial establishment. The profession I refer to is that of the public business organiser."

Going on to show how this movement started with the pioneering work of F. W. Taylor, he added : " Investigations of everyday workshop operations, and tabulating the results, have shown Mr. Taylor that often a two or three times larger and better production could be obtained with a gain to both and without hurt to either man or master, provided an intelligent administration, with a reasonable and sympathetic handling of men and machines was adopted. Many of you no doubt have heard both good and bad reports about the so-called Taylor system . . . When looking more closely into these cases where unsatisfactory results were obtained, I have usually found that it was not the idea nor the system that was at fault, but the way they were handled. The underlying principles were not understood, and results were expected before the necessary preliminary spade work had been done. More often than not, when difficulties arose it was because the common respect which every man, especially superiors, owe to their fellow workers was wanting, and therefore the necessary tact for a successful management could not exist. Many masters did not sufficiently realise this, nor did they make sufficiently clear to their men the new and altered conditions under which the work now had to be done."

Mr. Renold understood the Taylor principles more clearly than perhaps any of his contemporaries, primarily because he fully realised the significance that was attached to Taylor's own emphasis on " the mental revolution of both employer and worker alike." But his own insight enabled him in the process of assimilation, to carry Taylor's analysis one stage further—

" there is no denying that the working of an efficient system requires men of tact and power to lead." Thus once again does he express a line of thought that only now—thirty or forty years later—is beginning to find any widespread degree of acceptance. Indeed he had realised instinctively one of the roots of leadership which is especially open to those to whom is given the responsibility of conducting an industrial undertaking. A few days after his death on 2nd May 1943, his son, addressing the staff and workers, tried to explain the secret of his achievement. " I think that the keynote of his whole life was a passion for good work. He enjoyed money when it came, but commercial success was of quite secondary interest. What drove him on was the joy of creation—of doing something just as well as he knew how. ' Good enough ' was a sentiment that was quite unknown to him. It might well have been written of him, ' Whatsoever thy hand findeth to do, do it with all thy might.' His relations with other people were based on this same deep instinct. He valued and respected people according to the quality of their work whatever it was, and the degree of their devotion to it. That also was at the root of his relations with his employees. He had no particular theories of social conditions or relationships. His respect went out to the good workman. He collected good workmen round him, and the mutual respect between good workmen knows no social distinctions.[3]

The influence that Hans and C. G. Renold have exerted on the development of the history of British management has been considerable in many ways, but their true place as pioneers can be measured through this brief study of the remarkable organisation that they created, a generation ahead of its time, and a truly outstanding illustration of British scientific management in practice.

[1] *From Mr. Renold's paper to the Manchester Association of Engineers. This paper has been liberally drawn on and all quotations in this chapter are extracts from it.*

[2] *We are indebted to the Manchester Association of Engineers for the reproduction of these charts.*—Authors.

[3] " *Hans Renold,*" *memorial address by C. G. Renold,* 1943. *Privately printed.*

XII

THE HUMAN FACTOR IN MANAGEMENT

(1795-1943)

WHEN the story of British participation in the second world war comes to be written in the sober light of history, the " revolution " in the management of industry which occurred in the troubled months following the fall of France will be seen as one of the most significant factors in the organisation of the national war effort. F. W. Taylor once declared that the essence of scientific management lay in the " mental revolution " that took place in the minds of employers and employed alike—but it was only in the eighteen months following the summer of 1940 that the germs of this process were injected effectively into the bloodstream of British industry. Guided primarily by Mr. Ernest Bevin as Minister of Labour and National Service, the many units of Britain's war productive enterprise were from then on persuaded, cajoled or directed to adopt within their management structure a function giving specific regard to the well-being of the personnel they employed, a function that would contribute to the expansion and maintenance of output by attention to the conditions—physical and psychological—within which the individual men and women employees carried out their daily and nightly tasks.

It cannot be claimed that rapid or outstanding headway has been made. But it can be claimed, without fear of contradiction, that a new principle has been established. The setting up of two or three canteens or the introduction of some hundreds of joint production committees are in themselves but passing contributions to the structure of industry. On the other hand the

Essential Work Orders and other Statutory Rules of 1941 and 1942 are landmarks comparable to the Factories Act of the 1840's. Underlying these more factual stages in the story there is the fundamental principle enunciated by the Minister himself in addressing the House of Commons in March, 1942: "One great weakness in British industry is the failure of employers to put personnel managers on equality with works managers in an undertaking . . . If only they would look at it from their own economic point of view, they would do it: it is just sheer stupid conservatism which prevents them failing to grasp the advantages which arise out of these new circumstances . . . I urge British industry that they should pay attention to these modern requirements in handling the human being."

That these observations were significant of something more than the Minister's personal views can be seen from the fact that they were echoed in an annual report of H. M. Chief Inspector of Factories, published a few months later: "The difficulties inherent in war-time production have brought to a head the necessity for greater attention being given to the question of staff management in all our larger factories . . . In recent years it has been increasingly appreciated that the welfare of employees implied attention not only to their physical comfort but to their mental and psychological make-up also, and that accordingly good personnel management in an establishment is the primary object to be aimed at."

The nineteenth century was for industry the era of the subordination of man to the machine. The technical considerations over-rode all others. The generation of today has inherited the evil social consequences of that warped and narrow outlook—the squalid tracts of old industrial towns, the deteriorating conditions of life for large sections of the population, the inertia of intellect and of moral initiative in many of the younger people of the poorer districts, despite all that fifty years of educational progress have been able to achieve. Yet we may hope that in 1940 Britain's industry entered a new era, that the altered principle of industrial management will be a factor making for the realisation of that deeper social progress which is the unspoken wish of all thinking men and women. In the new principle, the

machine gives place to the man, the technical to the human. Organisation and management are seen to rest on one fundamental consideration—that the subjects of their processes are not primarily the mills and the yarn, but the bodies and minds, the phyisque and the emotions of men, women and young people. Summed up in the language of the decades of pioneering struggle, the new principle recognises fully and for the first time, the primacy of the human factor in management.

Where this principle will lead to, no one as yet can tell. But a great step forward has been taken and the efforts of a century and a half have been crowned with achievement.

* * *

In a story of this kind it is impossible to select any starting date which is wholly satisfactory. Recognition of the human element in industrial organisation was a feature of Mediaeval life; thus it would not be inaccurate to begin with the days of the merchants. Again, in the early phases of the industrial revolution, the technical did not always outweigh the human and the social; and one might thus set out from the workshop conditions of the 1750's and 1760's. It is, however, practical and convenient to tie the story in with the phases of the history of management that have been briefly described in the preceding chapters. On that basis the starting date, which comes most readily to mind is the year 1795, when Boulton and Watt opened their new foundry and gave to British industry the first recorded pattern of effective management.

We have as yet comparatively little factual knowledge of the standard and methods of management during the various phases of the industrial revolution. It has in fact been possible to deal with only a few firms about which specific data have been preserved, and it seems reasonable to regard these cases as instances of exceptionally good management. Thus, while Boulton and Watt and Robert Owen may be chosen to illustrate the most advanced examples of personnel management at the turn of the eighteenth century, it must be remembered that they are by no means representative. Rather they stand out as

unusually enlightened employers, with a strong sense of social responsibility and an awareness of its relation to effective management. What was the more common attitude of their contemporaries is seen only too clearly from the social and economic history of the times. The fruitless agitations for factory law reform which marked so much of Owen's life are a constant reminder of the deplorable conditions in contemporary industry.

In their approach to personnel management and the general question of regard for the human factor in employment, Boulton and Watt were chiefly concerned with " practical " questions such as selection and training of workers, establishing systematic bases for wages and bonus calculations, specialisation of effort, and the like. The principal " welfare " provision was the sickness benefit scheme known as the Insurance Society. An earlier chapter dealt with these matters in detail and showed how an effective and enlightened handling of their employees was an essential strand in the whole fabric of their management.

Boulton and Watt were dealing primarily with skilled men of the craftsman type. In the case of Robert Owen, however, women and children figured largely among the personnel and one may thus expect to find greater emphasis on and attention to the " welfare " and " humanitarian " aspects of personnel management. Moreover, Owen was deeply interested in general social reform and accordingly his provisions for his employees were largely coloured by his views on the betterment of life in general. Yet this did not prevent him from taking an unhesitatingly practical view of the management of his people—it will be recalled that he openly proclaimed the economic advantages of looking after employees and by his whole attitude on this problem can claim to be regarded as undeniably the pioneer of personnel management.

It would be misleading to suggest that these two firms alone in these early periods of the industrial revolution recognised the significance of the human factor in management. That they were outstanding cannot be gainsaid, but there were others whose names have been handed down as enlightened employers. Oldknow, Arkwright and Wedgwood are three who have figured

in these chapters ; social historians give evidence here and there of others whose names have not necessarily been preserved. Broadly, however, the period was one in which from the human point of view the " evils " of industrial employment were its most prominent characteristic. The nature of the early factory legislation (from 1802-1833) and the type of bad practice to which it was directed are evidence of this. The employment of very young children, long hours of work, the dangers of unguarded machinery and badly ventilated workrooms, the low standard of general conditions, appalling arrangements for living and sanitation—all these factors confirmed the lack of adequate regard for the maintenance and well-being of employees.

The passing of the Factories Act of 1833 was the first great landmark in the story of personnel management. Continuing the trend of earlier legislation, it was confined primarily to the textile industries, and its application was restricted solely to young people. Its title was *An Act to Regulate the Labour of Children and Young Persons in the Mills and Factories of the United Kingdom*, and it represented a considerable advance on existing standards in several directions. Above all else, it set in motion two pieces of machinery which were to prove of the highest importance to subsequent progress—the factory inspectorate, and the system of half-time education for children under thirteen. The first four factory inspectors appointed under the Act indeed blazed a new trail. They laid the foundations of a tradition of " concern " for the advancement of human welfare in industry which has been preserved and developed by their successors through more than a century down to the present day.[1]

> " It is not difficult to imagine the formidable task set before these original factory inspectors in the enforcement of an unknown and unpopular Act at a time when men were naturally eager to make the most of the opportunities offered by the untried resources of mechanical power, unaware of the limitations imposed by nature on human endurance and callous —probably through ignorance rather than intent—to the real interests not only of the workers, but also of the industries they served."

That they appreciated their own power for good can perhaps be seen from the comments made by one of them in his report :[2]

> " The inspectors have it in their power to do much good by availing themselves of the opportunities they possess of making known, in other parts of their districts, plans for improving the comfort and conditions of the workpeople, which they have seen carried successfully into operation, for I am fully persuaded that many masters would gladly promote the welfare of their people if they knew of any practical mode of doing so. It is very natural for them to view with incredulity the practicability of plans by mere good intentions, without being supported by example ; but they will take a different view when an instance can be produced of the successful working of arrangements in an establishment similarly circumstanced to their own."

The gradual development and consolidation of a national scheme of factory legislation is a well-known story. It was another thirty-four years before any worthwhile degree of control, which was initially concerned with the textile trades, was expanded into other industries by means of the Factory Acts Extension Act of 1867. This and all the other interim stages of progress were based mainly on the findings of the factory inspectors, and the pressure which they brought to bear with the support of social reformers. In the late 1840's, the Acts had been broadened to cover all women employees as well as young persons, though the provisions were still in the main confined to hours of work and safety precautions. The half-time school system was gradually taking shape as the preliminary nucleus of a national system of elementary education, quite inadequate in scope and method, but at least a positive contribution to advancement. Prosecutions of employers were making industry realise that the Home Office Factory Department meant its legislation and regulations to be taken seriously. Thus, slowly but surely, a sense of social responsibility for the well-being of industrial employees was being developed under the aegis of the law, leading on to the beginning of the modern phase with the consolidation of the position by the Factories Act of 1878.

The period between these two great landmarks of legislation—the fifty-five years between 1833 and 1878—witnessed a number of new trends in the evolution of the human approach to management. Broadly the period was one of progress—slight, slow, painful and costly, but progress none the less. While on the one hand the area affected by the " evils " of industrial employment was being extended by the multiplication of factory establishments, their incidence was being mitigated by the minimum standards called for by the law as well as by a number of purely social reforms affecting the well-being of workers as citizens. In any reading of the history of this period, both exaggeration and undue complacency have alike to be avoided. Not for one moment must the really unsatisfactory character of factory life and its attendant circumstances be forgotten. But to pile on the horrors till the picture is one of unrelieved gloom is also misleading. The unpleasant scene has its uses even to-day as a corrective to vain national aspirations and a stimulus to the further advancement that is still needed. Let us never forget that a period of great prosperity for the middle classes and outstanding achievement in many aspects of national life was defaced by the England of " the dark Satanic mills."[3]

It is unnecessary to elaborate the detail of the prevailing conditions to emphasise one general thought. Whatever else a reading of the industrial history of nineteenth century Britain teaches, it explodes completely the fallacy of the " personal touch " in management. The growth of large concerns in the past forty years has been the cause or the occasion of advances in welfare and working conditions unparalleled by anything attempted by the typical small employer of the century before. However intimately the " small man " knew his employees, however familiar his relations with " Bill and Tom and Harry," however sincere his enquiries after their families, these modes did not prevent him, more often than not, from compelling them to work in unwholesome conditions, to put in destructively long hours, to forgo many of the benefits of civilised life, to fight for every penny of every wage increase, and to become paupers when his own negligence or parsimony left them the victims of an unguarded machine.

The middle decades of the nineteenth century were the epoch of rugged individualism. In economics, the ascendant doctrine was the hard unmitigated *laisser-faire* of Adam Smith, Malthus and Ricardo—"labour" was just a factor in production, a commodity to be bought and sold in accordance with the higgling of the market. That it was housed in a human body and impelled by a human soul were no more than accidental factors which had no bearing on its utilisation.[4] To men imbued with this outlook factory acts and regulations were an obnoxious restriction—a cost that meant just so much extra off the profit margin—and any suggestions of "improving welfare or working conditions," could only be met by refusal because they "did not pay." Unfortunately, these employers were incapable of seeing the broader and long-term view or of recalling the repeated dogma of Robert Owen, that money invested in the well-being of employees yields a return that no other form of investment can equal.

In the textile trades, and increasingly in other trades after 1860, minimum standards in certain directions were imposed by law, and it was only natural that employees should seek their own methods both of securing the establishment of minima in matters not subject to legislation and of pressing for advances where the legal minimum appeared to be susceptible of improvement. This made inevitable the development of trade unions, and in turn of employers' organisations. They, in their turn, equally inevitably, developed the "bargaining" procedure and the atmosphere of collective negotiation between organised antagonists, the "old diplomacy," which have come down to the 1940's as the traditional framework of British industry.

Trade Unions were in existence as early as 1824, but these earlier unions were of a type more approximating to a social reform league. They aimed at strength through some over-all national movement of the style of Owen's "Grand National Consolidated Trades Union," with a philosophy akin to "chartism." About the middle of the century the type began to change, and there arose the craft union of limited scope, primarily confined to the problems of a specific class of employees exercising a particular skill and setting out to secure from

employers at least a given standard of human consideration in management. The Amalgamated Society of Engineers founded in 1851 is an example of this type. It is even quite possible that it was the existence of such unions in the predominantly male industries which delayed the passing of factory legislation of general application, for the unions themselves were a safeguard of the minimum standard. By the end of the period now being reviewed (*i.e.* 1833-1878) the trade unions had become powerful bodies in the structure of the country's industry. Supported by the special legislation of 1871-75, they could claim to be—with the employers' organisations which almost everywhere sprang up as a corollary—an essential part of the mechanism for the development and maintenance of the conditions of employment in the trades that they covered. And in many instances, such conditions were considerably in advance of those prescribed by the factories acts for female employees.

In this situation, personnel management could be nothing more than a bone between two dogs. How far it went would be decided by trial of strength. And in the process there developed traditions of hardness and resistance which tended to petrify any sympathy or imagination as to management processes and to stifle constructive thinking. In the trades where collective bargaining was well entrenched, the extent to which the human factor was considered was a function of the comparative strength of the rival parties. Through the dust of conflict, it was impossible to see personnel management clearly as an essential function inherent in the very nature of effective management, a *sine qua non*.

Broadly, it seemed to be the older industries—textiles, iron and steel and engineering especially—in which the least constructive progress was made during this period. Yet even so, there were a number of instances in which a more enlightened view prevailed. Put into modern terms, there were a number of " good employers " who were putting the " welfare concept " into practical application. Several firms, for example, interpreted on a generous basis their obligations under 1833 Act for the education of their child employees. Factory schools became

increasingly common, though probably only a small proportion achieved any educational standard which would appear significant today. One or two cases are known of works doctors being appointed.[5] Other " welfare " amenities of the middle decades of the century were reading rooms, musical societies and occasional works " outings."[6]

As pointed out in an earlier chapter there is as yet comparatively little knowledge about industrial management in the fifty to seventy years after 1825, and it is thus not possible to give anything in the way of a full picture of the personnel and welfare arrangements. The pointers that are given in various historical publications do shed a little light on some of the lines of thought that were common, but they do not lead to the view that a broad-minded approach to the human aspects of management was in any way widespread. On the contrary, there is every reason for supposing that in general industrialists were prepared to go no further than the law or their work people were able to force them. What signs appear of a more advanced approach apply to only a limited group of firms with an unusually enlightened outlook. Even in these cases it will often be found that the " welfare " provisions represented extraneous services superimposed on factory employment rather than a genuine integration of personnel management with works and general management.

In other words the principle of the " welfare worker " was already being evolved—the belief that the evils of industrial employment, which were regarded as inevitable and indeed essential, should, however, be counterbalanced by the " good works " of public-spirited citizens, devoting their leisure time to extra-mural care of the factory employees. A factory might, indeed must be, a slum—human nature being human nature and competition being competition—but, the misfortunes of those condemned to such accommodation should be palliated by some district visiting.

Here and there glimpses of something different are to be seen. The firm of Wedgwood, the pottery specialists, founded in 1730, carried the well-being of their employees as a consistent item of policy throughout their history. Courtauld's, founded in 1816,

made special provision for the care of work people from quite early days, though on somewhat different lines, the bulk of their employees being women. " As early as 1852, the firm had fitted out a hostel for young girls, an institute—with a library included —and an evening school, a nursery where mothers could leave their children under care while at work in the factory and where the children were provided with a mid-day meal. They employed someone to visit the workpeople in their homes and to provide comforts in case of sickness . . . and during the winter months arrangements were made for workers to be supplied with hot soup at a penny a pint . . ."[7] In the centenary Factory Inspection Report quoted earlier, an extract from a memorandum of one of the inspectors in 1864 points to the prototype of the modern welfare supervisor—" A female overlooker, married and of mature age, is as essential to the prosperity, the good government and the moral character of such an establishment as the materials with which the workers are employed. There is no master but would find the greatest benefit and profit to himself in such an arrangement, and it ought to be a condition of labour exceptionally compulsory."

Such glimpses might well be found more frequently if more data were available about the activities and methods of the manufacturing concerns of the so-called " golden age." Management research is unlikely to revolutionise the general outline as delineated by the social historians. But the sense of universal gloom might be relieved more frequently by flashes of exceptional practice than appears in the picture painted by economists and sociologists. The middle decades of the nineteenth century were a period in which considerable interest and activity were directed to social reform on a wide basis. Many of the industrial pioneers—the Owens, the Arkwrights and the Oldknows of industry—thought as much in terms of social development as of contributing to effective management. Therefore they built and sponsored homes and houses, villages, schools, for their employees and families. And over the country as a whole there was much similar activity driven along by the enthusiasm of philanthropic " reformers."

We know, for instance, that facilities to meet the needs of

compulsory education (under the Act of 1833) were provided, to a greater extent, by employers and private school teachers than by any form of public administration. There were, moreover the many other lines of social progress in the 1830's and 1840's; the principle of local municipal government (1835), the planting of the seed of public health systems (1842 Health of Towns Act), the establishment of water supplies, postal service and street lighting. Political reform bearing on methods of election to Parliament had their counterpart in various social philosophies, especially the great chartist movement. All of these developments affected men and women as citizens and of necessity had repercussions on them as employees—if only by making them more conscious of their plight, of their needs and of their responsibilities. These stirrings of social evolution were probably the motive power behind the " new " Trade Unionism of the 1850's, just as they were at the root of the consumers' co-operative movement. They provided an intellectual environment in which the Rochdale " pioneers " of 1844 could launch their little venture as the model of a single ship that would one day be a fleet.

These activities directed towards political and social amelioration are part of the story of the human factor in industry. To some degree they deflected or actually impeded acceptance of social responsibility by employers themselves. But they contributed to and stimulated progress in industry. Equally the social developments of our own day are laying the foundations of new and progressive operations throughout industrial management.

1876-1921

THE last quarter of the nineteenth century was a period of consolidation in British industry, and one would expect to find corresponding advances in the personnel aspects of industrial management. Economically, Britain's position was undergoing a radical transformation. With the rise of industrial production

in Germany, France and America, and to a lesser degree in a number of other countries, Britain was already beginning to lose her unique hold on the title " workshop of the world." The extent to which the inroad that was being made into British export markets was permanent did not impress itself fully on contemporary minds. It will, however, be recalled from quotations in earlier chapters that many industrialists did begin to see the significance of the trends and to call for positive action to adjust the British economy accordingly. Increasing outside competition led to a gradual movement towards combines and amalgamations. These last decades of the century witnessed definite progress in the evolution of the " large firm."

Conditions of employment were still governed by the two major processes of factory legislation and collective bargaining. Each was gaining in strength and scope—the former by extension to fields of industry not hitherto included rather than by any marked rise in standards ; the latter by the consolidation of the trade union movement under the influence of the Congress (which had been formed in 1868) and the strengthened position achieved by the unions through the legislation of 1871-75. Other trends already described continued to develop as a consequence of the interest in social reforms shown by successive governments of both parties. In the 1880's the first moves to deal with the " sweated trades " followed a House of Lords enquiry ; it took another quarter of a century before this development produced positive and effective action with the formation of trade boards. 1880 saw the passing of the Employers' Liability Act, the foundation of a national system of compensation for industrial accidents. A Royal Commission appointed in 1891 to examine national industrial relations and the standards of conditions of employment resulted in the Conciliation Act of 1896. The Consolidated Factories Act of 1878 was from time to time extended by further legislation and specific regulations, leading to a new recodification in the Act of 1901. Thus the period between 1875 and the end of the century witnessed substantial progress, mainly on a national scale and fostered by Government action. The growing force of the trade union movement—especially after it began to have Parliamentary

representation in 1884—was a powerful stimulus to many of these industrial reforms.

Parallel lines of development occurred in a number of individual enterprises. Gradually in the engineering industries piecework and output bonus systems became the recognised basis of payment. Apprenticeship and the training of skilled men was another problem which attracted the energy and attention of employers with a sense of social responsibility. In engineering, as well as in other industries, schemes of retirement pensions, profit-sharing and co-partnership attracted interest, and in a few concerns rudimentary joint consultative committees were set up. A number of firms were already well-known for their progress in one or more of these directions. Research would certainly bring to light many others with a " concern " for the well-being of their employees which yielded practical experiments. There was also a substantial minority which on religious or humanitarian grounds concentrated on purely " welfare " amenities.

The analysis of contemporary management literature made in earlier chapters showed how the germ of personnel administration as an integral feature in all management, was already at work. It will be recalled that the textbooks on factory management at the turn of the nineteenth century usually stressed the importance of careful selection and handling of employees and of the maintenance of good internal relations. General managers and works managers alike were instructed or advised on the importance of their attitude to employees and of the importance of their own influence on the tone of the factory. How many executives put this teaching into practice is another question; it might be a very disheartening proportion, if we only knew. It is not likely that at this date the notion of an executive specialising in personnel questions would have been received generally with acclamation—although Hans Renold Ltd. had an employment manager in the early 1900's. On the other hand, a number of firms had " welfare workers "—either within their organisation or working extramurally.

What had already been evolved in the " theory " of personnel management can best be illustrated by the practice of one of the most advanced of the " good employers," Cadbury Brothers,

Ltd., of Bournville. Edward Cadbury published a study of the firm's methods early in the 1900's under the title *Experiments in Industrial Organisation*, but he pointed out that it was his predecessors who " more than fifty years ago conceived the ideals which have made possible the development of the experiments described." The chapter headings in this book of 297 pages, might almost be placed in the setting of our own contemporary literature—*The Selection of Employees*, *Education of Employees*, *Provision for Health and Safety*, *Recreative and Social Institutions*, and so on.

But possibly more impressive than the actual arrangements for works committees and other special facilities for the achievement of a high level of personnel management, was the spirit in which the whole scheme was conceived. Professor Ashley in his preface to the 1912 edition, states with the force of a principle : " For in the long run—awkward as the fact is from a ' purely business' point of view—human beings will insist on being treated as human beings and not as imperfect machines." The care of the human aspect of management " cannot be left to subordinates : it must be made the main concern of one of the heads of the business ; and even then, there will be large questions of policy which will need to be anxiously and laboriously considered by the whole board." Cadbury himself defines the aim as being " to develop the social sympathies and moral character of the employees, as well as their intelligence and initiative " ; this can only be achieved as long as " the conditions of work and wages offer facilities for the development of a well-balanced and healthy physical condition." The spirit of welfare work, he goes on, matters far more than the facilities provided, and the spirit must be one that imbues equally all directors, heads of departments, foremen and forewomen, as well as those who are especially responsible for the work.

Cadbury's book is a sober reminder to the generation of today that in its main substance the personnel management function of industry was already explicitly formulated, almost in detail, at least fifty years ago and has been available in published form for over three decades. It is not knowledge or example that has been lacking in industry, but the will to learn, to appreciate

and to apply: this fact was, moreover, as true also of Robert Owen's contemporaries as of the manufacturers of the 1920's and 1930's.

It is often said that the nineteenth century ended in 1914. This generalisation is particularly true of the developments under consideration. During the early years of the twentieth century the lines of progress were exactly those of the preceding twenty-five years. The national movement towards social reform issued in legislative measures covering old age pensions, trade boards and health insurance. Trade union strength showed itself in many disputes and strikes. Increasing numbers of industrial employees came under the umbrella of "negotiated conditions" through the process of collective bargaining. But doctrines of personnel management advanced slowly. The practice of giving specific consideration to the human factor continued to develop at the same hardly perceptible rate that had characterised the previous generation. Only the first move towards "professionalisation" was new—the formation of the Association of Industrial Welfare Workers (1913), which nearly twenty years later was to become the Institute of Labour Management.

On to this quiescent—almost apathetic—scene there burst in August, 1914, a war of, then, unprecedented dimensions. It brought a demand for immediate adaptation and increased production such as Britain's industry had never had to face before. Unequal to the strain, managements on all sides virtually collapsed. By the middle of 1915 it was clear that the existing industrial organisation of the country could not foot the bill which "a nation in arms" had presented. There began a long and heartrending struggle to substitute unified control and orderly procedure for the casual individualism and the elementary notions of administration which were handicapping our unrivalled resources. Britain lacked neither great industrial leaders nor a great engineering tradition: she lacked the knowledge of organisation, the statistical background and the habit of large-scale planning to mobilise them readily for war on the modern scale. The Great War, someone said, put management on the map of British industry. Of no aspect of industry is that

statement more exactly true than of personnel management. Broadly, there were three phases to the story, two of them occurring as part of the war-time effort for greater production, and the third appearing more as a post-war reconstruction proposal. All three left permanent legacies, which have since become absorbed into the main structure of personnel management.

The first was the establishment of the Health of Munitions Workers Committee in 1915, to investigate the problem of the influence of hours and conditions of work both on output and on the health of the workers themselves. In the early period of war production little attention had been paid to the human problems involved. Thousands of women were recruited who were unaccustomed to industrial work. They and the men who taught them were ready for sacrifices. Factories were hastily extended without canteens, adequate lavatory accommodation or other amenities. Tremendous hours were called for and gladly worked in an endeavour to keep pace with the demand for shells, shells and more shells. But naturally, in such conditions, production fell, instead of increasing. The Committee conducted numerous investigations and experiments in the munitions factories, and in 1916 began the issue of a remarkable series of reports which examined the whole position from the standpoint of the relations between health, long hours, fatigue and productivity. For the first time in British industrial history an authoritative body on which physiologists and psychologists were fully represented really examined the conditions of factory employment. Their general conclusion was inescapable. Attention to the physiological and psychological requirements of the worker, reasonable hours, avoidance of fatigue, adequate provision for welfare are not only socially desirable; they are economically essential. Without them high productivity cannot be achieved or maintained.

There is little evidence to show that the Committee's findings were readily applied in practice outside of the factories where their experiments were conducted. But the Ministry of Munitions undertook an energetic programme of education which was not without its effect. And, more important, a principle had been

established, and established authoritatively. No longer could any employer argue with conviction that demands for reasonable hours and conditions were merely the "fads" of self-righteous colleagues or the perverted ingenuity of trade union officials who had not enough to do. The Committee's findings established once and for all, however often the lesson might be ignored, the significance of the human factor in management, and, in the last analysis, the ascendancy of the man-element over the mechanical. Improved technical processes, higher-grade production engineering, sound routeing and output scheduling are all very important factors in works management, but they can, one and all, be nullified completely by deficiencies in the handling of the men and women who work in the shops.

The wheel of progress had turned full circle. Almost exactly a hundred years later an official committee in 1916 endorsed, with technical language and the support of statistical data gathered from carefully controlled experiments, what Robert Owen had categorically stated as his own personal experience in 1817—the principle that "personnel management pays." "I have expended much time and capital upon improvements of the living machinery," he said, "and it will soon appear that the time and money so expended in the manufactory are now producing a return exceeding 50 per cent and will shortly create profits equal to cent per cent on the original capital expended in them." In this principle lies the core of the doctrine that effective management in industry rests as truly on sound policies of personnel management as on correct procedures and methods.

The second phase of the war-time progress was virtually an extension of the Committee's work, although distinct from it in form. It was the establishment of the Industrial Welfare Department of the Ministry of Munitions (1916), under the direction of Mr. B. S. Rowntree. Pioneering or creative work was not its task, but the infusion into war production factories of some understanding of the personnel and welfare aspects of management. It was largely an unspectacular and therefore unrecorded process, relying on persuasion rather than on administration, and at its best when least noticed. It had its parallel in the work of two or three Ministries concerned with output of stores for

the second world war. The task of "educating" industry to the viewpoint of the Munitions Workers Committee proved difficult and arduous. How little certain areas of industry appreciated this teaching may be seen from the rapidity with which the "welfare" aspect disappeared from industry after 1918. The new Ministry of Supply in 1939 saw fit to begin its operations without even the shadow of a fully-fledged and highly calibred personnel management section. Ministers in 1940 repeated almost verbatim the facile exhortations to excessive hours which had brought the country to the brink of disaster in 1915

But Mr. Rowntree's work was not entirely lost. Apart from its immediate contribution to the war, it left an influence in the general structure of British industry which has continued slowly and silently to permeate over wider areas and to pave the way for further advance. It also left a valuable legacy in the shape of the Industrial Welfare Society, founded in 1918 to foster and to promote the development of the welfare aspect of industrial management. In another direction it helped to inspire the formation in 1921 of the National Institute of Industrial Psychology. When Mr. Rowntree left the Ministry he made himself responsible for yet another contribution to the advancement of the human factor in management. He initiated the conferences which subsequently became known as the Oxford Management Conferences, and which have endured to this day under the auspices of the Confederation of Management Associations. Their primary aim was to teach the essentials of effective human management to the managers and foremen who were directly in contact with the rank and file.

The third major contribution of the war period was the Report of the Whitley Committee (1917) concerned with the special problem of relations between employers and employed on a footing less traditionally antagonistic and restricted than the collective bargaining mechanism of the trade unions and employers' organisations. The proposals of the Committee—for an interlocked series of national and district councils and works committees — are matters of common knowledge and need not be reproduced here. As already shown, the works

consultative committee principle had come into British industry in the latter part of the nineteenth century, but had not yet spread over more than a very limited number of firms. The immediate response to the Whitley proposals was a rapid development of committees. Some proved short-lived; some have survived, but with a restricted vision of their functions. On the whole, though they have done a great deal in certain industries to promote a healthier atmosphere of mutal confidence and to facilitate common discussion of common problems, they have not realised the high hopes with which they were founded. Once again it was the newer industries and the more recently founded firms that showed the readier acceptance of the new movement, and who probably gained most benefit from it.

In passing, mention must be made of two contributions which have already faded from memory although they should still be regarded as outstanding landmarks in the story of the evolution of management. The one was the report published by a committee of the Garton Foundation on *Industrial Relations after the War*. It was this document which largely inspired the findings of the Whitley Committee. And it remains today, though it is too little known and too readily dismissed as ephemeral, one of the wisest and most enlightened discussions of fundamental problems of industrial relations ever issued by a group of Englishmen. Its combination of psychological insight and common sense has a modern note which is too often lacking from disquisitions on this subject, which suffer from an overdraft of enthusiasm on a balance of ignorance.

The second contribution was made in 1919 in the form of a Summer School on Industrial Administration held at Cambridge under the auspices of the Univeristy Psychological Laboratory, and organised by Dr. C. S. Myers. Its curriculum was " a study of certain industrial management problems, chiefly from the psychological point of view." It was apparently well attended, many of the participants being responsible industrial executives, and the programme put before them has seldom been paralleled in the subsequent twenty-five years. That its teachings fell so largely on barren soil—if judged by the extent to which they have been carried into practice—is but further testimony to the poor

foundation on which the war-time developments of "human management" were really based. As one of the contributors to the school put it: "We are bound to deduce that on the whole British industry is either under-managed or mismanaged."

The period ushered in by the war of 1914-1918 terminated suddenly with the industrial crisis of 1921. A country which imagined that it could solve the equally important and intricate problem of the future organisation of its public services with an axe rather than with a scalpel, was in no humour for the patient, prolonged, scientific, hopeful work necessary to establish firmly the lessons it had learned in part under the stress of war. It had been a period of intense energy, of luxuriant experiment and of some permanent growth. It had done much to further interest in and to create machinery for the advancement of personnel management. Above all it had established the principle that more scientific knowledge of the conditions under which men and women can give of their best in co-operating in industrial enterprises was possible. It had shown once and for all that it was not only possible, but desirable . . . desirable, not as a buttress to any creed or theory, but because only under such conditions can workers produce effectively and willingly, irrespective of the economic or political framework of their particular time and place.

Because it established this principle it left an atmosphere in British industry in which further growth of knowledge was possible, in which people who took their responsibilities seriously could work towards such knowledge undismayed by local and temporary set-backs. Quick growth is always fragile. And that there was much "stony ground" in British industry, the history of the next twenty years was to prove again and again. Though even the most pessimistic had scarcely contemplated that all the errors of 1914 would be repeated quite so gratuitously in 1940. Treatment with an axe has to be paid for.

1920-1940

IT might reasonably have been expected that the achievements of the war period would have served as a spring-board for the further development of post-war industry. The advances made in the years of war were the outcome of real and practical experience in the handling of management problems. Moreover, they had behind them the cumulative experience of over a hundred years of industrial progress. It is difficult to believe that the lessons bought so dearly should have been forgotten immediately and another twenty years devoted to re-learning them. But that in fact is what happened between 1920 and 1940.

The blame rests squarely on industry itself. Government action had been sound and persistent; almost as its final chapter of war control it had emphasised to industry the importance of applying management with due regard for the well-being and effective use of the men and women employed. The whole tone of the official Reconstruction Pamphlet on *Scientific Business Management* (1919) emphasised the need to reverse the old policy of ignoring the human element in production and distribution. It even included a declaration that "in management itself it is decidedly advantageous to cultivate the personal interest of the workers." Without itself stepping actively into the conduct of industrial affairs, the Government could not have given a clearer lead in concise form. The pamphlet[8] was on sale at 2*d.* a copy and must have been widely publicised, but there is no record that it had any ready welcome from industrial circles and over the greater part of British industry employers chose to ignore its recommendations.

It is a moot point whether we can yet see the history of the twenty years between 1920 and 1940 in proper perspective, even in regard to so specific a matter as the development of personnel management. But there can be no doubt as to the possibility of picking out and evaluating some leading points. Perhaps the outstanding feature of the period, which was in fact clearly known even as it was being enacted, was the divergent trend of economic development between two sections of industry,

conveniently labelled "expanding" and "contracting." For reasons which had their roots deep in the history of Britain's industrial structure, the older staple industries faced in the decades following the war a serious position, and steadily declined. The list includes the coal trades, iron and steel and the heavier engineering lines, including shipbuilding, cotton and wool textiles, and one or two others. Against this deepening recession in the leaders of Britain's former industrial prowess, there was set a marked expansion of new industries and trades catering primarily for immediate consumption—various branches of light engineering, such as the manufacture of cars, radio, electrical fittings and applicances, the rayon goods trades, prepared foods and confectionery, and a number of service trades such as retail distribution, transport and laundering.

This dichotomy in industrial experience was reflected in the story of the human factor in post-war management. The older industries, those suffering the decline, continued, as they had done before and during the war, to accept the personnel function only under duress and as the necessary obedience to legal prescription; in these circumstances, little headway was made, save in the few concerns which had long been aware of the significance of human management. In the "newer" trades, however, those that were enjoying a post-war prosperity, there was a greater readiness to accept and to build on the lessons of the war. Probably because of their absence of tradition, but even more because of the large proportion of women that they employed, these trades grew up with an acceptance of personnel and welfare management as part of their structure—a recognised mechanism of executive control. In the main, their conception of the function was limited—Cadbury was still an outstanding exception—but they contributed through the interest and enthusiasm of their personnel functional officers to the advancement of standards and the widening of scope. Most of the development work done for instance under the auspices of the Institute of Labour Management (see later) can be traced to employment managers and welfare officers in the expanding comsumers' trades. The titles just used are also indicative of the general field covered—personnel management interest and activity centred round and

went very little beyond such matters as selection of employees, employment records, welfare in physical working conditions, first aid, here and there canteens, and social activities—not that this limitation should in any way belittle the importance of what was being achieved.

By contrast the story of the older trades was a sorry one. The post-war period in fact will nearly always be thought of as one of industrial unrest. The engineering and other trade strikes of the early 1920's, the " general strike " of 1926 and the almost incessant disputes between " employers and employed," were all centred round the coal, iron and steel, heavy engineering and textile trades. They tended to overshadow in the public mind the progressive developments taking place elsewhere. Some not very successful or fruitful attempts at large-scale conciliation, such as the Mond-Turner Conferences of 1928-9 and various " joint industrial councils," figured more prominently in the press and so captured industrial interest, to the exclusion of the more significant but less spectacular achievements of personnel management within the newer trades.

The detail of this development can be seen through the four organisations which constituted its focal points, although in fact they were only incidentally participants in it. They were, to use a physiological mataphor, the brain and nerve system of the body of personnel management, supplying for it the planning and thinking, the stimulus to progressive action, the store of knowledge and the memory of past experience. But they were not part of the industrial structure and were not part of the field of growth. These four bodies are well-known to us today, but the lines of their contribution may not be generally understood, and a few notes on each may help to dissipate the confusion to which their separate identity sometimes gives rise :

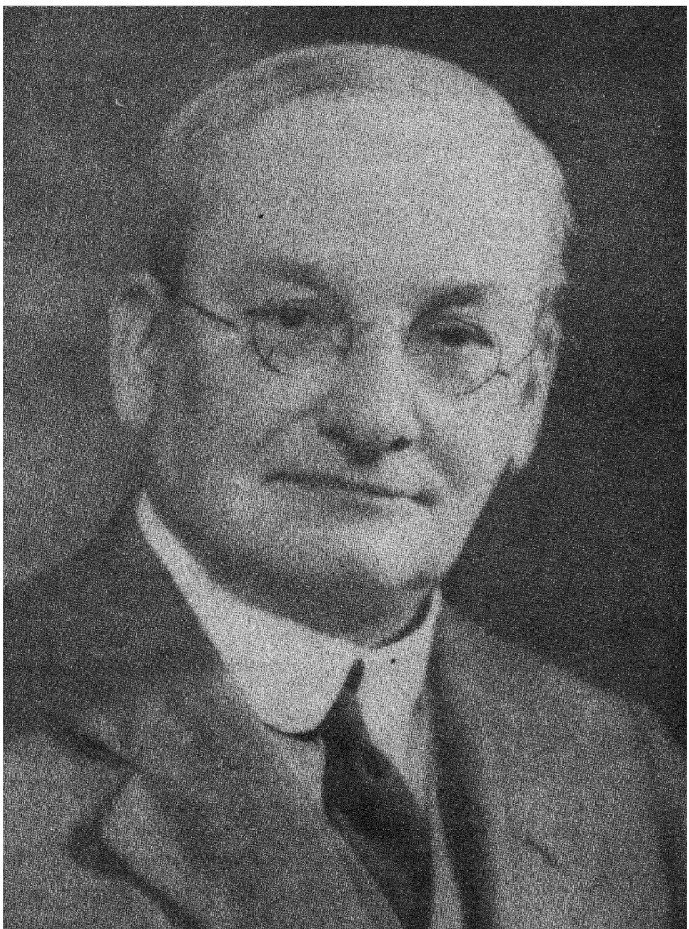
(1) The Industrial Health Research Board was an autonomous body operating under the aegis of the Medical Research Council of the Privy Council and thus directly supported by State funds. It was founded in 1918, on the basis of the experience of the Health of Munitions Workers Committee and undertook the study of the problems of

the effect of a factory environment on the physical well-being of the employee. Initially concentrating on problems of fatigue, the board subsequently widened its scope and came in time to include also the psychological consequences of working conditions. In the course of its twenty-five years of study, the Board has published more than a hundred special reports and documents, including its annual reports. As its name indicates, it is definitely a research body and its contibution to the advancement of the human factor in management has lain primarily in the publication of its findings, following intensive specific study of a given problem. Its terms of reference as modified in course of development are: "To suggest problems for investigation and to advise upon or carry out schemes of research referred to them from time to time by the Medical Research Council, undertaken to promote better knowledge of the relations of methods and conditions of work to functions of the human body, having regard both to the preservation of health among the workers and to industrial efficiency; and to take steps to secure the co-operation of industries in making widely known such results of this research work as are capable of application to practical needs." (The term "health" was substituted for "fatigue" in the Board's title in 1930 and the last modification was then also made in the terms of reference).

(2) National Institute of Industrial Psychology: founded in 1921 as a scientific association, not for profit, to promote and encourage the practical application of psychology and physiology to commerce and industry. The Institute's activities include research, advisory services to individuals and to firms, training in different branches of industrial psychology and dissemination of information on the subject through lectures, discussions, publications and the maintenance of a reference library. It is governed by a Council elected by its members who include individuals and companies.

SIR CHARLES SCOTT SHERRINGTON, O.M., G.B.E., F.R.S.

(Chairman, Industrial Fatigue Research Board, 1918)



SIR DUNCAN WILSON, C.V.O., C.B.E.

(First Secretary, Industrial Fatigue Research Board, 1918 — 1930.
H.M. Chief Inspector of Factories, 1932 — 1940)

(3) Industrial Welfare Society: founded in 1919, initially for the promotion of the well-being of boys employed in industry, but gradually widened in scope until all aspects "of industrial welfare" were covered. The interpretation of this term has been further extended in more recent times in order to include many other matters concerned with the personnel function in industry. The Society has a membership composed of firms and persons, but is more keenly interested in the former than in the latter. Its chief activities are: advisory service to member-firms on various aspects of personnel management and welfare; short intensive training and "refresher" courses and conferences for personnel and welfare officers; publication of journal, bulletins and memoranda on current functional developments and problems.

(4) Institute of Labour Management: the professional society of personnel and welfare executives and staff. Founded in 1913 as the Association of Industrial Welfare Workers; membership is entirely personal, differentiating between professional (="corporate") and non-professional grades. Standards of election to membership are formally laid down, and the inauguration of an examination scheme was hindered by the outbreak of the present war. In common with other professional societies, the Institute's chief activities are the meetings and conferences of its various branches and the publication of its journal. Until 1940 the Institute's recognised training scheme (though only applicable to women members) was a two-year course at certain universities, but since that date it has collaborated with the Ministry of Labour and National Service in sponsoring and maintaining a special three-month's training course for personnel and welfare officers for wartime needs, open to both men and women.

In the twenty years separating the two wars, the activities of these four bodies reflected the development of personnel management and inspired industry to advance its conceptions of

consideration for the human factor. Initially, interest centred in employees engaged in manufacturing and its immediate ancillary services, but increasing attention was given subsequently to clerical and sales staffs. Specific recognition of this aspect of the work was registered by the Institute of Labour Management in the establishment of the Staff Management Association. It is both invidious and unnecessary to attempt to attribute any priority or superiority to one or other of the four bodies. Their contributions can be understood most clearly by classifying them into two complementary categories. On the one side there are the Industrial Health Research Board and the National Institute of Industrial Psychology which have been primarily concerned with analysis of and investigation into the impact on the human being of his industrial environment and the interpretation of findings into policy and plans for action, especially remedial action where the results attained have been adverse. In other words, the two bodies have been concerned with the elucidation of knowledge, the application of underlying sciences such as physiology, individual and group psychology, sociology and so on to the problems of work and the formulation of methods consistent with their findings which should constitute a technique of personnel management. On the other side, there are the Institute of Labour .Management and the Industrial Welfare Society, which, while also interested in the investigation of problems, have been primarily concerned with the utilisation of knowledge. Their function and activity have been to spread appreciation of the importance of modern methods of personnel management and welfare, and to service and instruct their members by meetings, conferences, and publications through which new knowledge could be disseminated, ideas exchanged and methods discussed. They have collated experience in the application of the personnel function and so have provided a testing ground for the knowledge acquired by the research bodies, and a means of correlating it with the practical needs of the individual factory.

Measures of co-operation between these four organisations have been developed from time to time, but they have been extemporised. And it is pertinent to speculate on how much

more the human factor in management might have been developed if the three non-official units at least had been interrelated in action or actually combined in regular operation—particularly if that unity had enabled the fourth, the official body to collaborate overtly and whole-heartedly with the others, instead of having to maintain a certain discreet distance for fear of creating favour.

The Industrial Health Research Board—to take the individual contributions in the order listed above — gave an admirable summary of its work in its Eighteenth Annual Report, published in 1938 to commemorate the completion of twenty years of service. It had by then published eighty-three special reports on particular problems, and participated in a number of joint studies. As indicated above, its earlier investigations tended to centre on hours of work and other conditions inducing fatigue, with the causation of accidents as a major supplementary topic. But gradually the more positive elements in the physical and mental health of workers acquired greater prominence and the trend of the investigations passed from general environmental conditions to the individual factors bearing on healthful and effective co-operation in working processes. The year 1930 was a landmark. The Board published a report on *The Nervous Temperament*, a subject which even today has attracted the serious attention of only the more advanced thinkers in industry.

The Board's findings have been issued steadily, two or three documents each year. all of them based on intensive practical study of the problem concerned. The range of subjects is too wide and varied to be reproduced in full, but the following list gives a useful summary of the field :[9]

(1) *Hours of Labour*

(2) *Environmental Conditions* :
- (*a*) Lighting and vision
- (*b*) Heating and ventilation
- (*c*) Noise and vibration
- (*d*) Dust and toxic vapours

(3) *Physiology and Psychology of Work*:
- (*a*) Optimum loads
- (*b*) Height of working bench
- (*c*) Time and motion study
- (*d*) Effects of monotony
- (*e*) Machine work and fatigue
- (*f*) Problems of the conveyor belt

(4) *Vocational Selection and Guidance. Accident-proneness.*

(5) *Industrial Sickness and its Measurement*:
- (*a*) Sickness absence in printers, clerical workers and light factory workers, and in omnibus workers
- (*b*) The psycho-neurotic problem: its relation to efficiency, absence and environmental conditions.

To the valuable body of knowledge thus built up, and awaiting application by a new profession of personnel managers, the National Institute of Industrial Psychology was also adding its quota. Though differing in constitution from the official Board, the Institute was working on comparable material and problems. But its investigations were made primarily at the request of and on behalf of individual firms or industries. This did not in any way detract from the value of its research, though it may have meant on occasions that findings could not be publicised to quite the same extent as in the Board's reports. Grants from the Rockefeller Foundation, from the Carnegie United Kingdom Trust, and from firms and individuals, provided funds for the extension of the Institute's work and for research studies of general application. Broadly the Institute's activities especially during the first ten years of its life, can be summed up as follows: [10]

"(1) The study of workers' movements, arrangement of material, arrangement of hours of work and rest, lighting, ventilation, methods of payment, increase of interest,

Dr. C. S. MYERS

(Director, National Institute of Industrial Psychology — 1918)

reduction of monotony and worry, relations between labour and management.

(2) The study of the abilities required in various industrial and commercial occupations, and the elaboration of systematic methods, including suitable tests, so as to secure more efficient selection of employees, and more reliable guidance for those choosing their occupation.

(3) The provision of courses of training, partly by lectures and partly by applied practical work in factories and in the Institute's Vocational Guidance Section. (In this connection, it is worth recording that this aspect of its activities is associated with the University of London Academic Diploma Course in (Industrial) Psychology).

(4) Research work on vocational guidance, lighting, physical conditions and other matters pertinent to industry and commerce in relation to human reactions.

(5) Special studies devoted to the psychological aspects of marketing and selling in connection with advertising, salesmanship, design, variations in taste, and so on."

On balance, the Institute was more concerned with psychological factors than the Board, which tended to give greater attention to the physiological aspect of its field of investigation. But a more significant difference of outlook arose from the difference in constitution, for whereas the Board was working independently as a pure research body and was thus able to pursue a single subject deliberately and systematically, the Institute was operating chiefly on an advisory basis and had usually to take a more general widespread view of the problems of the particular firms for which it was working at any one time. This factor contributed to the complementary character of the investigations of the two bodies and probably increased the combined value of their respective findings.

The Institute has always devoted much of its effort to the

development of tests of intelligence and other aptitudes, for use in vocational guidance and vocational selection, in which a great deal of valuable progress has been made. In recent years the volume of general research has declined, owing to lack of funds provided for this purpose. But the Institute has continued its investigations of the problems of individual firms, in which it advises on the application to the particular circumstances of the general principles established by research. Progress is recorded in the Institute's various publications, including its journal, *Occupational Psychology*.

By the end of the twenty-year inter-war period, the Board and the Institute had between them built up a remarkable corpus of knowledge in regard to the work and reactions of the human being in industry and commerce. This had been made available for study and application as a significant feature in management. Unfortunately the response from industry and even from the ranks of the profession was inadequate to the opportunity presented. From time to time, such bodies as the Institute of Industrial Administration and the Works Management Association gave evidence of knowledge of what steady persistence in research into the human factor in industry was attaining. But they failed to make any significant contribution to the task of translating knowledge into executive action. The two specialist organisations mentioned earlier, carried the main burden of propaganda. Both of them—the Industrial Welfare Society and the Institute of Labour Management—did much to inspire and to educate their complementary bodies of members by conferences, discussions, reports and articles. Their work suffered from too great an indentity in the composition of their respective memberships. The firm that belonged to the Industrial Welfare Society was frequently the one that employed specialist labour management and welfare staffs, who in turn were professional members of the Institute of Labour Management. And except in so far as guests or visitors came to the gatherings, or non-members read the journals, both bodies tended to preach to the converted. Thus their primary achievement was the education of their members, teaching and re-teaching them what the progress of research was unfolding.

THE REV. ROBERT HYDE

(Director, the Industrial Welfare Society — 1918 to date)

MISS E. L. NEWCOMB

(President, the Institute of Labour Management)

The limitation, which was inherent in the circumstances, should not be regarded as detracting from the value of their achievement. They were steadily and increasingly making knowledge available; their gatherings attracted publicity; their members talked among colleagues and friends. If it was gradual, there was a widening of interest. A leavening process was going on which in time could not fail to affect wide sections of industry. It undoubtedly contributed to the readiness with which in 1940 industrial Britain faced with a second great war accepted the virtual imposition of personnel management. Growth in membership was far from spectacular: the professional Institute which had attained a roll of 600 members by 1918 dropped rapidly after 1921 and then began again a slow, uphill climb, which by 1931, when a new constitution was adopted, had reached a level of only 284 corporate members and 166 associates. Ten years later, even after the first impetus of the new war, these figures had grown only to 560 and 260 respectively. In much the same way, it took the Welfare Society many years before its member-firms could be counted in hundreds, and nearly twenty years before the level of 1,000 firms was reached. But in both cases, the influence exercised by these organisations outweighed their numerical strength. It is perhaps typical of the way in which sound practice evolves in this country that, prior to his accession to the throne, His Majesty the King took an active personal interest in the work of the Industrial Welfare Society.

It is not easy to measure in any concise form the evidence that interest in personnel management was gradually percolating through industry. Not that the evidence is lacking. It could be produced in considerable quantity over these twenty years. There were numerous articles in the technical press and papers to the professional and technical societies on a variety of subjects concerned with "the human factor in industry," ranging from specific topics such as employment and working conditions to more abstruse titles such as *The Psychology of the Industrial Employee*. Even in the professional accountancy journals, whose direct concern with the subject might at first glance appear remote, interest was displayed from quite early years in the post-war period and very consistently maintained. To give but a few

instances, articles on aspects of industrial psychology and welfare, or other facets of the "human factor" appeared in *The Accountant* in 1921, 1924 and 1925; *The Accountants' Journal* (*The Accountant Student*) in 1923/4, 1925/6 and 1930/31; *The Cost Accountant* in 1922/3, 1926/27 and 1927/28. Moreover, these subjects were coming to figure more prominently and repeatedly in any conferences or discussions concerned with the education and training of managers.

This increase in interest, however, did not seem to lead to any parallel vigour in application. The human factor in industry was indeed being thought about and talked about more and more. But the mental and verbal activity did not seem to materialise in increasing numbers of personnel departments: and there were few signs of any substantial changes in policy at the higher levels, such, for instance, as the inclusion of effective personnel management among the matters with which the average boards of directors concerned themselves regularly and systematically. The comparatively few firms whose names had by now become household words in the story of this development went steadily forward, but those who followed their example whole-heartedly were few. The membership figures of the Institute of Labour Management are one piece of evidence. They certainly mark a spread of interest, but a total of under 300 corporate members did not point to the existence of many personnel managers in 1930, and it took another ten years, including a few months of war, to double this figure. Six hundred firms is a very small proportion of British industry.

The twenty years 1921-1940 can thus best be described as the climax in the evolution of the theory of personnel management. There were interest in the subject and a vague goodwill, but no general recognition of its practical significance sufficient to overcome the cynicism bred of a purely hedonistic economics, or to break through the comfortable habit patterns of *laissez-faire*. In the words of a recent writer, there were few who realised that so-called "economic laws" are "in fact for the most part, exercises in deduction from the logic of an abstract society only dimly patterned upon the world we know."[11] Nor did the average

run of industrialists appreciate that modern discoveries in the biological and social sciences were beginning to present a picture of human motives and human behaviour increasingly at variance with the assumptions in which their conduct of affairs was rooted. Where they were made uncomfortable by the contrast between observed fact and economic theory, they tended to take refuge in such aphorisms as " business is business," an attempt to pretend that different aspects of life could be segregated into watertight compartments and that it was of no moment if the principles which they applied to one group of their activities were wholly inconsistent with those which they applied to another.

In suggesting that " a business deal was a business deal, they did not allow themselves to see the exciting but vicious fact that it might be a battle in a world-wide effort to restore piracy as the rule of life."[12]

The four bodies already described, whose efforts were so often parallel or overlapping, and whose inter-relations can only be defined as unco-ordinated collaboration—were building up knowledge of man amid the machines of modern industry and the discipline imposed by large-scale factory production. It was knowledge, in part physiological and in part psychological. Gradually the findings of investigators were being turned into the routines and procedures of labour and welfare management. Unquestionably the greatest contributors to this process of practical testing and application were the few among the country's large organisations who took a lead in this matter. This is further evidence of the fallacy of the myth of the " personal touch," so often cited as one of the advantages of small units. No amount of " Bill, Tom and Harry " was any substitute for the true personnel management approach that these large firms were proving to be essential to effective management in industry.

As to the content of the " personnel function " there was not, during this period, any clear-cut definition or even marked agreement. The four bodies discussed above had varying viewpoints, though the differences were more in emphasis than in substance. Certain problems stood out and were generally accepted—scientific selection of employees, attention to physical

working conditions, safety precautions and effective first-aid, adequate employee records and procedures. But on many wider issues, opinions were less unanimous, probably because this or that body was a little ahead in its thinking or that firm even more ahead in its practice. Perhaps the best summary of progressive thought and practice was that given in 1931 in a Report[13] of one of the Management Research Groups (No. 6) which had set up a Committee to study "labour and personnel relations." This Group contained a number of firms who had developed personnel management as far as any in the country: the Committee consisted of executives from such firms. Its findings were submitted under headings which in themselves represent a useful summary of the stage that advanced thought on the human factor in industry had attained:

(*A*) Relationships between employer and employed—leadership in industry

(*B*) Systematic associations:
Works councils
Interchange of information
Suggestion schemes

(*C*) Labour policy:
The labour supervisor
The engagement of labour
Training
Training of supervisors and foremen
Terms of employment
Agreement on rules
Outlines of an industrial grading scheme
Promotion
Dismissal
Incentives
Welfare
Testing factory morale

(*D*) Partnership

While these functional developments were in progress among the groups professionally interested, other events were occurring in industry which had a direct relationship with this trend of thought. Generally speaking, after the early 1930's, industrial relations in Great Britain improved considerably, perhaps as a reflection of increasing trade activity. Public interest was being directed towards industrial problems by press and wireless, and many new factories were coming into existence on an altogether higher standard of working conditions than had hitherto been customary. In 1937 came the new Factories Act, representing a very considerable advance over the existing legislation. And in the same year there was signed the historic agreement between the engineering employers and the unions establishing the principle of a paid annual holiday—a first step which a couple of years later led to proposals for corresponding universal legislation, based on the findings of the Amulree Committee.

In the meantime parallel developments were taking place in the United States of America. On the research side the progress made was more rapid and the front of advance wider. Much the same was also true of application, in so far as much larger numbers of firms took up personnel management actively and did so on a more intensive scale than many of the English concerns. Although a good deal of the American thought and practice became available in published form, it did not influence the British outlook on the human factor in management to any marked degree, or modify in any way the specifically British character of the movement on this side of the Atlantic. American experience was at times quoted or its findings added to the pool of knowledge, but British minds were always acutely aware of the significant differences between the " labour movements " of the two countries and in their respective outlook on employer-employee relations. The absence of " traditions " in the younger country was, in this instance, of considerable importance.

In one direction, however, currents were being generated in the United States which are likely to have a profound influence on industrial organisation throughout the world. The phase " are likely " is appropriate in this context, because—though they have been developing for more than fifteen years—these

forces have not as yet attracted more than superficial interest and a modicum of lip-service. Probably their significance is scarcely appreciated outside a limited and specialised circle in any country. They are not so much specific contributions to the function of personnel management as at present conceived. They indicate rather a new attitude to all management. They present a vision of the executive process as including a " personnel " factor that is its vital force, and that adds to our concept of management an element of " leadership " without which it cannot achieve effectiveness or stability.

As happened in the earlier history of the management movement with the complementary drives towards an improved method of wage payment and the unification of the engineering and economic points of view, these forces appeared in America from two quite separate sources, two influences of different character and approaching the problem of industrial organisation from a different angle, but both converging to the same vital point. The one source was the teaching of Mary Follett, in the dozen or so papers that she read between 1924 and 1928 to the annual conferences of the American Bureau of Personnel Administration, listened to and acclaimed by large gatherings of leading industrial executives. The story of her conception of management and its birth in these papers has been told in an earlier volume[14] and may be re-read alongside the papers themselves in the joint British-American Collection which have been preserved as a fitting memorial to a great woman. As no other before her, she realised the meaning of the " human factor " in management—not as a mere matter of routine and procedure but as the understanding of human emotions and their synthesis into a common aspiration, a synthesis which management must undertake deliberately, and, since human emotions grow and react constantly on each other, a task which is continuous, an aspiration which must be perpetually renewed.

Almost as she began to read her papers, the far-sightedness of a great manufacturing concern released the first waves of the other great force. It was in 1924 also, that the Western Electric Company began, at their Hawthorne plant, in collaboration with investigators of the Harvard School of Business Adminis-

tration, the initial experiment that was to lead in time to an unprecedented study of the human factor at work. Those early problems of factory lighting and the puzzling reactions which the experiments produced taught the " business scientists " who were handling them that—to quote the words of Elton Mayo :

> " Somehow or other that complex of mutually dependent factors, the human organism, shifted its equilibrium and unintentionally defeated the purpose of the experiment."

Only one solution was possible—there must be a specific and comprehensive enquiry into the human mind and emotions within their working environment. And so were launched the fifteen-year activities of the " Hawthorne Experiments." The findings have been published at intervals, but in a world of war and preparation for war, their interest has been largely overshadowed by more dramatic events. So far they have been little noted by industry in this country. But if their significance is appreciated and their implications grasped, they can do no less than revolutionise the function of personnel management and through it the process of management as a whole. Like Mary Follett's papers, they teach that " consideration for the human factor " cannot be superimposed on an otherwise mechanical management, but can only be effective if integrated into the process of management itself.[15]

1940-1943

FOR all practical purposes as far as industry was concerned, war " broke out " in Great Britain in the spring of 1940. This is not the place for any reference to the trials and tribulations of preparing for war production, although the difficulties of management in the technical sense were among the major causes of the later " human management " problems. Under Government

direction, British industry faced in May and June, 1940, a task of Herculean magnitude—to double, treble, quadruple, output of all warlike stores in the shortest possible time, and then over a long period to keep up the new high level unbroken and uninterrupted. In the immediate period of dire emergency, no other consideration than output could matter—neither hours of work, nor conditions, nor feelings. Whatever the machines and materials were capable of achieving, men and women must be prepared to achieve too. They did it. The saga of Britain's initial war effort on the production front has been told and will be told again in words to match the deed. But it was a response to crisis, a response which in the very nature of things could only be short-lived. At such a pace no human organism or organisation would hold out over more than the dire emergency, the ten to twenty weeks of the summer of 1940.

In that short period, the planning skill of government and industrial management, mindful of hard experience, wrung in sorrow from a like situation a generation before, should have prepared for a smoother rhythm appropriate to the " long haul." But here Britain made her mistake. She forgot " the lessons of the last war " ; many of those enjoying " a little brief authority " had apparently never even heard of them. She set out once more to face the strains and stresses of maintaining production on a basis that detached experiment and objective research had proved to be wholly unsuited to the most effective use of the human resources available to industry. But in this new struggle, the new strategy of total war played its part, emphasising that public opinion and public morale were vital factors in the national effort. In this war-time environment, groaning under the load of excessive hours and ill-planned routeing of material and skill the human factor in production found its voice and won by its agitation the widespread acceptance of personnel management.

It was late in 1940 that an official body, the Select Committee on National Expenditure, declared in its Seventeenth Report that " the lessons which the last war should have taught seem largely to have been ignored." Those lessons, it will be recalled, were but the simple truths of the reaction of men and women to

their work. Physiologically and psychologically, the human factor is a mechanism that tires, and long continuous hours or adverse environmental conditions, simply drag down alike the innate and instructed capacity of muscle and brain. Long hours in the end, those lessons taught, mean less output, definitely, measurably less. And, moreover, they produce cumulative adverse effects in the organism itself, a steady deterioration in capacity for work, a sapping of vitality and morale, a lowered resistence to sickness, hardship and difficulties. Thus, in fine, the speed and continuity of the machine and the conveyor belt are of little avail, because the human links in the productive chain throw the smooth mechanical gearing out of time. " The lessons of the last war " were not different from the teaching of Robert Owen—that personnel management pays, whether the dividend is reckoned in sterling or Stirlings.

The first forward moves in the second great war started with the change of Government. Mr. Ernest Bevin brought to the Ministry of Labour not only the addition to its title, " and National Service," but—more important—a lifelong experience in dealing with the human angles in production. Within a few months, aided by lieutenants drawn both from the trade unions and from the exiguous ranks of trained personnel management, the major lines in the plan were laid down. The Factory Inspectorate was taken over by the Ministry from the Home Office ; a little later its functions were widened. Orders were issued providing for the compulsory appointment of personnel or welfare officers where necessary, for medical supervision and for canteens. The next stage in the scheme was to broaden the usefulness of the Inspectorate by making a wider opportunity for the use of their professional experience and initiative. Both inside and outside the factories the activities of the Ministry were extended to " outside welfare," " Music while you Work," " shopping " facilities and the like. Early in 1941 the Essential Work Order provided the blue-print for a revolution in industrial Britain : its impetus carried progress forward to the Agreement a year later for joint production committees. There is a lot of detail to be written between these bald lines of simple statement, but it would be out of place here. The principle was

more important—a new Ministry of Labour was teaching an old industrial system the lesson that over 150 years it had stubbornly refused to learn, the lesson that it is impossible without skilled personnel management and unremitting attention to the human factor to organise men and women for any purpose where nothing less than their best will serve.

Nor was it only " teaching." The inspectors were encouraged and invited to advise and assist ; many a war-time employer or manager will be able to look back with gratitude and appreciation to the kindly aid lent by these men and women. They too were learning a lesson in industrial relations, that there is more to being a first-class official than seeing that employers observe the letter of the law : to help them to understand its spirit and improve upon its regulations is to reconcile administration and democracy. The Ministry went one step further—with the advice of the Institute of Labour Management, and the co-operation of other bodies, it was able to set up in the middle of 1941 a training programme for " personnel managers and welfare supervisors." Housed in four universities, a special three-months' course of study and practical training was conducted. A steady output of persons equipped for service in the effective handling of the human forces in industry was secured.

How extensive and revolutionary was the sum of these seemingly small developments we are not yet in a position to realise. Only when the hurry and scurry of war have disappeared and there is leisure to compare the present with the past, will it be seen what was achieved in this brief fifteen or eighteen months. For the period was no longer than that—witness the Select Committee's sixty-fourth report, published almost two years to the day after the seventeenth report quoted above. This whole document is a vindication of the Committee's earlier criticism, and one marvels that so much headway towards removing its causes could have been made in so short a time. Not that all was yet perfect and complete : but that was of small account in comparison with the acceptance of the principle. This sixty-fourth report is the British declaration of personnel management, bearing witness to its integration with the national concept of industrial management, but also pointing to the yet broader

terms in which those in control of industry must interpret the human factor in the future.

> " It has already been stated," says the report in one historic paragraph, " that maximum efficiency cannot be attained unless the human factor in production is recognised as being of at least as much importance as the engineering or research sides. Once this principle is accepted, the management, in order to ensure whole-hearted co-operation from the workers, must adopt a clear policy for all personnel and welfare matters. The functions of a personnel officer can briefly be defined as those of a specialised adviser to the management, supervisors and foremen on all questions affecting relations between the workers and the management. Personnel managers or welfare officers must be able to win the confidence of both the mangement and the workers ; they must have sufficient knowledge of the production side as well as sufficient understanding of personal problems of the workers to be able to guide the policy of the management on many general problems, and they must have authority to carry out this policy when it has been agreed."

To this broad statement of principle the Committee added full explanatory details as to its application. This detail served too as background to another similar and almost contemporary affirmation from an equally authoritative official source. H.M. Chief Inspector of Factories devoted much of his report for 1941 (published in the autumn of 1942) to an exposition of the scope of personnel management, constituting as it were a supporting memorandum to the Committee's official declaration. Several lengthy sections of the report are devoted to this theme in which the emphasis is strikingly parallel :

> " It has been increasingly appreciated that the welfare of employees implies attention not only to their physical comfort but to their mental and psychological make-up also, and that accordingly good personnel management in an establishment is the primary object to be aimed at . . . Good personnel

management is not simply a matter of appointing special officers and can often be achieved without making any addition to the managerial staff. Managerial organisation may well vary from one factory to another but the spirit underlying it is the all-important factor . . . It must be realised that however technically efficient a personnel manager may be in the administration of his personnel department, he can but reflect the outlook of his firm on personnel matters. If that outlook is not in general harmony with the modern conception of the relationships between management and workers, the most efficient personnel department is bound to fail in its main purpose."

Mr. Bevin had been the pioneer in interpreting the lessons of the new war. His contribution to the declaration, though seemingly simple, was no less important than his initial strokes. He claimed, with all the authority of his office, that the key to Britain's industrial difficulties should be sought in a failure to put personnel managers on an equality with works managers, and so to give adequate attention to modern requirements in handling the human being. It fell to him, too, to take the lead in defining what these modern requirements are. This he did, less by his own words, than by his action in convening and opening in April, 1943, the First National Conference on Industrial Health. That event was as pregnant as was the appointment of the Health of Munitions Workers Committee twenty-seven years before.

The last chapter in this long story that bridges three centuries falls to the Institute of Labour Management, the professional society of those whose lives are given to the functional service of the human factor in industry. In the Institute's journal for February March, 1943, the question was posed—*What is Personnel Management?* And the Institute invited its members to collaborate in the evolution of the answer. That answer was embodied in an official definition which reads as follows :

" Personnel management is that part of the management function which is primarily concerned with the human relationships within an organisation. Its objective is the

maintenance of those relationships on a basis which, by consideration of the well-being of the individual, enables all those engaged in the undertaking to make their maximum personal contribution to the effective working of that undertaking.

In particular, personnel management is concerned with:

Methods of recruitment, selection, training and education and with the proper employment of personnel;

Terms of employment, methods and standards of remuneration, working conditions, amenities, and employee services;

The maintenance and effective use of facilities for joint consultation between employers and employees and between their representatives, and of recognised procedures for the settlement of disputes."[15]

Two other recent additions to British literature in this field published by the Institute of Industrial Administration emphasise the same general principle:

(*i*) *A Study of the Administrative and Executive Problems in the Industrial Transition from War to Peace*: *Pt. I. Personnel Management.*

(*ii*) *The Personnel Function—the Nervous System of Management*—a paper presented to the Institute's Conference held in September, 1943, on *Management in Action.*

The lesson of all these publications is the same. The establishment of even the most efficient personnel department by itself is not enough. Such a department may well become absorbed in routines and procedures of its own which consume all its energy. It will live in isolation—possibly a "splendid isolation" but still isolation—from the main stream of the life of the undertaking. If this happens, it will fail in its ultimate purpose,

however admirable its performance of certain routine and technical aspects of its task. Personnel management, if it is to be really effective, must inform relations between superiors and subordinates wherever such relations occur throughout an enterprise. If it is to do this it must become a leavening force embedded in the structure of management itself, recognised and accepted by all concerned as inherent in the very purpose of directing the work of others. Until every single man and woman who exercises authority of any kind on behalf of an undertaking is thus "personnel conscious", the most magnificent equipment, the most liberal policies, the most elaborate provision of specialised officers will fall short of the excellent intentions of which they are an expression. In short, unless personnel management is identified with the essence of leadership in industry it can be no more than a palliative applied from without. It can only achieve its full effectiveness as a spirit inspiring all grades of management from within.

It is hoped that the writings which have been quoted and their insistence on this principle mean that it has, at last, been fully—and, still more important, widely—grasped. If so they make a fitting conclusion to this long story of the human aspects in British management. It means that at long last it is recognised that man is more than the machine, than any system. To see this fully and clearly is the first essential in the winning of mastery over the problems set by a machine economy . . . "it is not in our stars, but in ourselves, that we are underlings." That, in effect, was what Owen taught and he, above all others, was the pioneer and master of modern personnel management.

[1] *and* [2] *For a history of the Service reference should be made to D. K. Djang, 'Factory Inspection in Great Britain," and to the Report for* 1932 *of H.M. Chief Inspector of Factories. (The extracts quoted above are from the latter source).*

[3] *An interesting and balanced study is provided by A. Bryant's "English Saga" (Wm. Collins and Son).*

[4] *How ingrained was this "blind spot" in industrial thinking in general can perhaps be indicated by its recurrence—though in unblatant form—as a basis of the*

thought of such modern writers as Burton (1895) *and Liversedge* (1912). *See chapter X. Its traces can be found even today in such phrases as "business is business"—in effect a total abdication from all moral responsibility.*

[5] *and* [6] *See section 4 of the* 1932 *Report of the Chief Inspector of Factories.*

[7] *From a Courtauld advertisement in the "News Chronicle," April,* 1943.

[8] *See Chapter VII, pp.* 101 *and* 102 *above for further comments on the content of the pamphlet.*

[9] *We are indebted to the Board's Secretary for this grouping of the subjects covered by its investigations.*

[10] *Extracted from "Industrial Psychology in Great Britain," by Dr. C. S. Myers* (*Cape,* 1926, *2nd Edn.,* 1931).

[11] *H. J. Laski—"Reflections on the Revolution of our Time," p.* 13.

[12] *Herbert Agar—"A Time for Greatness," p.* 97.

[13] *This Report was not published.*

[14] *See Volume I, Chapter V and "Dynamic Administration," edited by H. C. Metcalf and L. Urwick* (*Management Publications Trust,* 1941).

[15] *The authors intend, in continuance of these volumes on "The Making of Scientific Management" to publish a brief analytical study of the Hawthorne Research findings prepared from the reports already issued, but re-interpreted in the light of the thought here suggested.*

[16] *Institute of Labour Management: "Labour Management"* (*London*) *June-July,* 1944.

XIII

RETROSPECT AND PROSPECT

ONLY a simple claim is made for the contents of this second volume, that they give a brief glimpse of the background of Britain's industrial system from a special standpoint. As the history of the Industrial Revolution, that background has been fully recorded from many points of view by the economic and social historians. But their record leaves one gap to be filled. This volume may, therefore, be regarded as a further, if slight, contribution to the total picture.

The concept of management as a specific body of knowledge and practice forming the basis of a specialised profession has begun to emerge only in very recent times. Until the science and art of management was thus recognised as a subject in itself, a discreet discipline, there was no foundation on which to build an interest in its history. Yet, that it has a long history need cause no surprise. Wherever human activities are carried out in an organised and co-operative form, there management must be found. The workshops and markets of Greece and Rome and of earlier civilisations must figure in the full story of management. They had to be organised, to be managed, just as are the factories and shops of today. It is, however, curious that this aspect of man's economic development has attracted so little notice, has been so much taken for granted, in the writings of those who have recorded the evolution of human society. The business of government, from Plato's Republic onwards, has been recognised as a subject of interest and importance which few historians have neglected. By comparison, the government of business has been almost completely ignored, though, as some are beginning to realise today, it is only another facet and a very important facet, of the same vital field of study.

These chapters have attempted no more than a sketch of a few isolated scenes and subjects in the history of the management of Britain's modern industry. But, though limited in scope, the task is not without importance. The significance of the story lies rather in its implications than in the facts and descriptions which it records.

The first point which emerges is that Great Britain has a long history of management, which antedates F. W. Taylor's work by scores of years, if not by centuries. To make such a claim implies no assertion of a nationalistic or partisan spirit; but pride in early achievement is legitimate. Moreover, it clarifies and gives depth to Taylor's unique contribution. It puts it in a setting which throws into relief its significance as a synthesis of ideas with which men had been experimenting for many generations in a dispersed and empirical fashion, but which lacked expression in terms of explicit principle or the unifying force of a clear-cut philosophy. To Taylor's insistence on the importance of a scientific methodology and his formulation of the necessary principles we owe the tardy recognition of management as a subject for specialised and separate study which has been the basis of all subsequent work.

In the second place, it is clear that British industry has made many contributions to the evolution of the principles of management. The scientific or analytical approach to the problems of manufacturing was suggested more than a hundred years ago in the writings of Charles Babbage. The principles of specialisation and continuous flow in production were elaborated even earlier, by Adam Smith. Robert Owen, a century and a half ago, isolated management as a specific activity distinct from the techniques of a mechanised industry. He too laid the foundations of all that in later times we have come to recognise as the essence of industrial relations and the social responsibilities of management. Boulton and Watt worked in a different field and with a different angle of approach. But they established the principles of modern production planning and control, and built up an industrial enterprise that as early as 1800 was a living example of the essentials of scientific management.

The third implication is of particular significance for the future

of British industry. Nothing perhaps stands out so clearly from the historical picture presented in this volume as the general neglect of management among our early great industrialists. The pioneers were not only initiators : they were outstanding, unique. Of intelligent and shrewd contemporaries they had hundreds in all the leading trades, many of them skilled and clever technicians. But they remained blind to the example of a Boulton and deaf to the entreaties of an Owen. Absorbed in the intricacies of their material problems and the rewards of a mechanised economy, they were oblivious of the very idea of management as a separate skill and indifferent to the social consequences of amateur meddling with other people's lives. Broadly speaking, the contemporary attitude of the industrial world merely reflects the precedents of 1894, 1844 and 1794. At any point in the story that bridges three centuries, the same curious parallel can be found, whether it be an Owen preaching to a mass of apathetic and uninterested mill-owners, a Horner writing of a busy industrial Midlands, or a Slater Lewis preparing a textbook that was scarcely opened by one in a hundred of the self-satisfied employers in a score of prosperous industrial towns. British industry, it seems, has not been concerned with management, has found difficulty in understanding that it exists as a subject, and has certainly never felt that it needed any special skill other than that assumed to be inherent in the acquisition of a share in ownership or a seat on a board of directors.

The story of the British pioneers of the science of management teaches one great lesson. Those who follow in their footsteps must be patient and persevering to a degree demanded by few other tasks. A modern historian has written of this country in the eighteen-forties : " a happy inability to apprehend general ideas appeared to stand between the people of England and their disturbing impact."[1] Certainly the profoundly empirical society which finds its home in Great Britain does not provide a climate favourable to the rapid development of a " mental revolution." What story could be more disheartening, more disappointing, than the long struggle for the training of the technician in management, a story that is even today only at the beginning of its first chapter ?

A fourth and final implication to be drawn from the chapters of this volume may be put in the form of a question: What contribution did management make to the progress of Britain's industry in the decades of the Industrial Revolution? Any full answer at the present juncture cannot be more than a guess. But there is sufficient evidence to suggest that the question is of considerable importance practically. It is among the many unsolved problems of social development which have a real claim to the expenditure of time and money necessary for the research which alone can give a satisfactory answer.

Did Robert Owen contribute to the progress of the Industrial Revolution? If so, it was by means of effective management—he was neither an inventor nor a technician. It has been said that James Wyatt of Birmingham invented a practical "spinning engine without hands" thirty years before Arkwright. But "he was of a gentle and passive spirit, little qualified to cope with the hardships of a new manufacturing enterprise." The main difficulty lay "in training human beings to renounce their desultory habits of work, and to identify themselves with the unvarying regularity of the complex automaton. To devise and administer a successful code of factory discipline, suited to the necessities of factory diligence, was the Herculean enterprise, the noble achievement of Arkwright."[2] So it appears that his reputation as an inventor was really founded on sound management. What of the Crowleys and the Williamses? Academically, the answer may not appear to be of particular significance. But as a contribution to the future progress of industry in this country, it is of the utmost importance to arrive at the truth. For if in fact management was among the most powerful driving forces in the evolution of industry in the early stages of a mechanised economy, and this fact becomes widely accepted, it will be recognised more readily as a vital factor in the further development of our modern industrial society. A major victory in the "battle for management training" will have been won.

* * *

The aim has been to present a series of pictures of British industry covering about a century and a half. The earlier

chapters touch on the formative decades at the turn of the eighteenth century. Historical research has fortunately preserved certain data that yield an interesting reflection of the times, illustrated in particular by the organisation and executive methods of the Boulton and Watt partnership. These were an outstanding achievement indeed, but were not so acclaimed in their own day. They may well have been parallelled, if in a less developed form, by the practice of other contemporaries whose annals have not been preserved.

As an offset to this industrial illustration, an attempt has been made to present the flavour of the merchanting days preceding the Industrial Revolution. Quite unmistakably the merchants had a good understanding of many of the essentials of effective management. Their problem was different, for they had few or none of the tasks involved in factory organisation and control of industrial staffs. But they appeared often to have had the management outlook induced by sound professional training, to have understood the essentials of planning and the meaning of market investigation and analysis. And it may, perhaps, be assumed that those who, with the so-called " domestic " system of industry, formed the temporal link between the era of the merchants and the era of the factories, carried over into their groups of " retained " workshops some of the same sense of planning and control that they knew to be the keys to success in marketing.

One of the most interesting phases of the Industrial Revolution is sketched in the chapter dealing with the customs and outlook of the manufacturers of those times—their mutual personal acquaintance, their intercourse at clubs and trade gatherings, their reciprocal hospitality, and their consequent inter-marriages. Even their widespread and unabashed " poaching " of each other's staffs was a point of contact. In this recurrent, almost continuous association, they can scarcely have failed to " catch " management practices from each other, much as they acquired technical ideas or social habits. The size factor, too, stands out when we try to look back on the individual businesses of this period, unhindered by the economist's synoptic spectacles. But these brief, fragmentary sketches are no more than two or three

odd pieces of a great jig-saw puzzle; the many remaining bits of the pattern have still to be rescued from the box-room of our industrial history.

A hundred years later, that is, by the end of the nineteenth century, a very different industrial structure formed the background of the economic stage. But in type and outlook, the majority of the actors did not appear to differ greatly from their predecessors. There were still the few who believed in management, among the many who did not even care to listen to them. Yet the few had built up an achievement which the many could not continue to ignore. There was a literature, a terminology, a body of engineering principles. Across the Atlantic a new voice was heard, joining in the main theme, from one who was soon to assume the role of spokesman.

In the British " management movement " about this time, the outstanding feature was a contrast. On the one side, in the technical spheres of engineering and accountancy, there was a full endorsement of the professional outlook. The existence of an expertise, of principles with the force of unfailing application, was fully recognised. On the other side, there was a steady refusal to regard management, the art of welding these skills and many others together, of making them effective in a series of unified operations, as requiring any other qualities than " common-sense " or " experience " or " flair." Those who felt the intellectual fallacy of this attitude and urged a more scientific approach to the problems of management were " voices crying in the wilderness."

Gradually, however, others followed them and little by little they swelled to a chorus speaking in the same strain. Before long, even before the end of the century, it became possible to write of " the struggle for the administrative training of the engineer." Soon those engrossed in the technologies of accountancy and commerce found themselves involved. On the one side were the many to whom their traditional technical proficiency was the be-all and end-all of industrial competence. On the other, were all those who believed that effectiveness could be attained only by the recognition of management itself as a technical subject and by the evolution of principles which would enable it to be

understood, taught and applied on a scientific basis. That struggle is not yet ended. Two wars have added their quota of emergency organisation and of experience, sometimes bitter experience, to the fight. With every decade it has become clearer that those who believe in management in the modern sense are "inherently in line with the march of events."[3]

There are many aspects of the story of scientific management, aspects within the memory of men still living, which are important and valuable. But three of these aspects have a particular claim to emphasis, if only because of their pertinence to contemporary problems and development. They are the training problem, the development of the earlier textbooks, and the story of the acceptance of Taylor by the executives of British industry. Whatever may be felt as to the significance of management contributions to the Industrial Revolution and to the manufacturing progress of the nineteenth century, no one can deny to Taylor his pre-eminence in the evolution of management as a scientific subject. That he largely failed during his lifetime to win in this country, the attention and respect which are his due may be attributed to a number of causes. To the severely empirical bent of British industrialists in the early years of this century he may have seemed too doctrinaire. His parallel pre-eminence in the field of pure engineering technique may have deflected the attention of a generation, still largely dominated by its interest in the technical aspects of engineering, from his more enduring achievement in the management field. He was, after all, the inventor of high-speed steel and the author of *Notes on Belting*. The very simplicity and modesty of his own exposition of his principles made it possible for amateurs to play with his methods without appreciating the philosophy underlying them. All these were factors contributing to an under-estimation of his management work.

Even those who were interested in his ideas, but somewhat alarmed by their strangeness, alike with those who were avowedly hostile, found their natural conservatism reinforced by a fourth element in the picture, in which Taylor was undoubtedly the victim of misrepresentation and misunderstanding, namely, the uncompromising opposition of organised labour.

As far as this country was concerned this opposition was almost entirely derivative and based on hearsay. It was a fraternal imitation of the policy of certain craft unions in the U.S.A., an imitation which failed to take into account either the exaggerated terms in which American trade union controversy is apt to express itself, the difference in conditions, or the special circumstances which focussed hostility against the so-called " Taylor system." In fact the whole controversy arose from the particular series of events which led to the strike at the Watertown Arsenal—a job which was not handled by Taylor himself, but in which an industrial organiser using his methods found himself faced by a mass of jobbery and corruption due to the fact that certain very narrow craft unions were running a political racket at the public's expense. Such a situation was bound to lead to misrepresentation and exaggeration : Trade Unions are no more prone to detachment than other groups in defence of " vested interests." And the original mud-slinging and heresy hunting of this conflict was translated by the Trade Union movement in this country into a serious protest against the whole idea underlying Taylor's work. This fact was undoubtedly restrictive. Scientific management can be abused in its application, just as other forms of knowledge can be abused. Labour is justified in fearing such abuses and in seeking safeguards against them. It is not justified in condemning knowledge itself. Still less were employers and others justified in ignoring Taylor's work because of this misunderstanding. Even the National Institute of Industrial Psychology went out of its way in the early years of its existence to explain that what it was doing " was not scientific management."

These facts have a considerable bearing on the British situation today. Management is still not uncommonly regarded as the " enemy " of labour. In truth, sound management is the only foundation on which any society can base a rising standard of living and the realisation of labour's legitimate aspirations. There is the possibility that again today progress in the development of management knowledge and its application may be hindered by unenlightened opposition from vociferous elements among organised labour, who have not troubled to study their facts

or to understand the case they are opposing. This is no plea for "Taylorism" as it existed in the early 1900's; there has been much growth since then. But it is indeed a defence of the thought that only by the achievement of a sound science of management and its unceasing application can industry in Great Britain prosper or the well-being of her workers be ensured. This lesson has been repeated throughout history.

If any worker doubts it, he should study what is happening in Russia today. Ever since the inauguration of the first five-year plan the drive for production has been speeded up—Stakhanovism, Shock Brigadiers, socialist competition, the strictest discipline, individual responsibility and leadership, all these are features of industrial life under the Soviets just as they are in capitalist countries. No ideology, no "ism," no political theory can win a greater output with less effort from a given complex of human and material resources, only sound management. And it is on such greater output that a higher standard of life, more leisure, more amenities for all must necessarily be founded.

Any account of the unfolding of industrial management in Great Britain could end only in one way, in the story of the personnel function, the human factor in management. Not only does this element in the executive process run right through it at every stage; not only does it form the thread which links the successive scenes into a continuous story. Even more important, it represents the phase of management that is to be the dominant note of the new industrial age. The 1740's were the era of merchants in control of production. In the 1840's the machines and their technicians held sway. The 1940's are the epoch of the triumph of man over the machine, the human factor over the mechanical. Moreover, the function of personnel management in its modern shape—though it remains surprisingly true to the tenets of its pioneer—is in fact a direct application of the most advanced thinking on the "theory" of management as a whole, which tends increasingly to emphasize as the most essential feature of executive control the exercise of "leadership" in a group of persons collaborating towards a given aim.

The story that was outlined in the previous chapter showed the evolution of this field of thought. To Robert Owen a "personnel" approach was an essential factor in management. He maintained that without it industry could not progress. To his fellow manufacturers whose business horizon was bounded by the conception of profit, he was able to claim—and to prove—that personnel management pays. His contemporaries and their successors chose to disregard his teaching. As industry wallowed more and more deeply into the mire of social disrepute, the enlightened minority among the manufacturers began to evolve a fresh attitude towards the personnel function. It became a "welfare" service, provided by the "good" employer to offset the "necessary evils" of industrial employment. It fell to war to demonstrate that such a division of life into water-tight compartments, such a double morality, could be only a half-truth. At first in 1916 and then with greater force a quarter of a century later, in 1941, industry had demonstrated to it in unmistakeable terms the old, old lesson of Owen—that personnel management pays. It fell to a Chief Inspector of Factories, a spiritual descendant of the great pioneer, to point out to employers the truth of his other main tenet that no system of management can be successful that has not as its bedrock the human element in the organisation.

Within our own times a new group of pioneers has appeared. They have laboured in industry though they were not of it. Bringing to bear the analytical force of the academic mind they have been able to conduct researches that have revealed new principles in the foundations of management. Where their findings will lead no one can yet say; but of their significance for the future of industry there can be little doubt. Elton Mayo, North Whitehead and their associates at the Western Electric Company have blazed a trail that is as yet too little known to the executives of our contemporary industry; their work is incomplete and not yet a part of history.

* * *

While speculation as to the future is always dangerous, it is perhaps in this connection not entirely inappropriate. One of the

most striking facts brought out in this volume is that, despite twenty-five years of organisation and propaganda by those interested in management, the mistakes made under the impact of war in 1914-1916 were repeated almost to the letter in 1939-1941. This does not imply that there had been no progress in the intervening quarter of a century. Far from it: there had been much progress. But it was intensive, rather than extensive. A comparatively limited circle of people interested in management as a scientific subject had pushed forward their researches and had done their utmost to win new adherents. The first International Management Congress to take place in Great Britain was held in 1935: it was the sixth in a series started in 1924.

On balance these elements among firms and individuals who were interested were but a small percentage of the total industrial picture. It is doubtful if at any time they represented ten per cent of all those engaged in management in British industry. No doubt their work affected a far wider circle by way of imitation. But imitation is not enough. Effective application of scientific management demands that those responsible should understand not only its methods but the principles on which they are founded. They must have a "concern" for the underlying philosophy which, as F. W. Taylor himself always insisted, was the most original and important aspect of his work. They must be interested intellectually in management as a subject, not only in the more profitable management of a particular undertaking.

As the event was to prove, despite much enthusiastic spade-work, this "concern" was still lacking in the great majority of British industrialists in 1939. They had no settled conviction that management as a subject was of importance or that failure to observe established principles was bound to reduce total production. Still less were politicians and publicists, civil servants and the general public conscious of management as a skill which could be learned, a subject of vital moment to the national wellbeing whether in war or peace.

In this there was a sharp contrast between Great Britain and the United States. Here there were perhaps half a dozen firms of management consultants, at least two of them of American origin: there, there were some hundreds. The American "man

in the street," whether it were Main Street or Broadway, understood that management mattered. So did his leaders. President Roosevelt wrote to Congress in 1937, " A government without good management is a house builded on sand." There were a score of universities with established schools of business administration. Almost every public library in towns of any size had a large section of management literature. The output of books and periodicals devoted to management was a flood as compared with the trickle in this country.

It is certainly pertinent to enquire how it occurred that, despite the efforts of quite a large number of persons who were genuinely " concerned " to further good management, the underlying principles obtained so little recognition in Great Britain. Why is the contrast with the experience of the U.S.A. so glaring ? Any complete explanation is impossible. But certain facts are worth noting.

From its earliest stages the study of management was adopted enthusiastically by the established engineering institutions in the United States as an integral part of their professional work. The original papers which initiated interest in the matter, by Towne and Halsey, not to mention Taylor's own *A Piece-Rate System*, were all read to meetings of the American Society of Mechanical Engineers. In 1938 the Management Division of this Society was the largest and most active of the four or five subject classifications into which their membership was divided.

In Great Britain, on the other hand, the established engineering institutions adopted a sceptical and cautious approach to the question. Those of their members who were interested in the matter found little support. There was a marked tendency to regard the intrusion of management subjects into meetings and curricula as an heretical lapse from an unalloyed devotion to technical issues. That this attitude did not correspond entirely with the real demands of the situation is perhaps illustrated by the fact that a separate Institution of Production Engineers was founded to meet the needs of those who were interested primarily in the management aspects of engineering. But this, of course, had to start from the gound floor and in the beginning consisted largely of younger men. The weight and experience of

the older societies, with their accumulated funds, fine buildings, spacious libraries and great traditions, were denied to those interested in management in Great Britain: whereas in the United States they had immediately taken a lead in giving this new application of the " engineering approach " the background which it needed.

Again, as earlier chapters have made clear, the movement in Great Britain was hag-ridden by the proliferation of small institutions, many of them with five out of half a dozen " objects" in common. Their differences over the sixth were, however, held to justify separate subscription lists, separate publications, separate councils and committees and branches in provincial towns, in short, all the institutional apparatus which costs so much to maintain and yields so little in return until the number of members is large enough to leave a comfortable margin which can be devoted to the real objects of the institution. Some of them indeed had no discoverable differences in purpose, except the personal differences between their permanent officials.

Given the national individualism this may have been an inevitable stage in evolution. Sir John Fortescue once discussed the organisation of the British forces which fought the War of the Spanish Succession (1702-1713). The whole force never at any time exceeded 70,000 men and for most of that period was less than half that figure:

> " The defect," he writes, " which will seem most flagrant, according to modern ideas, is the multiplicity of distinct units that go to make up so small a force . . . Why it may be asked instead of raising new regiments, did not the authorities raise additional battalions to existing regiments? The reply is that they doubtless knew their own business and adopted the best plan that lay open to them. Englishmen have a passion for independent command. To this day, as the history of the volunteers shows, there are many men, who, though unwilling to serve in any existing corps, would cheerfully expend ten times the care, trouble and expense on a regiment, or even on a troop or company, of their own."[1]

But, however inevitable, this dispersal of strength was

undoubtedly a grave handicap to the development of a knowledge and appreciation of management. None of these institutions was strong enough financially and in membership to exercise a real influence. None could pay the salary of a first-class director. None had more than the most exiguous resources to devote to research. Especially outside London, the multiplication of competing branches was apt to ensure that none of them could put up a really attractive programme in any season. If one of them succeeded in securing a speaker who really knew his subject the chances were that he would find a room in which the acoustics were as deficient as the draughts were obvious, peopled by a bored sprinkling of an audience. Their numerous journals were each slimmer than the last, and the unfortunate industrialist who was really concerned to study some subject in the management field usually decided sooner rather than later, that he really had not time to dig through the unclassified litter.

In the United States, the proliferation of voluntary institutions to satisfy personal pride or ambition is not, of course, unknown. But they were fortunate in that at a comparatively early stage one society, the American Management Association, began to establish a predominant position as the only management body, other than the Management Division of the American Society of Mechanical Engineers, of wide interest and utility to industry. There were certain specialist and smaller institutions such as the Taylor Society, which did much of the pioneering. But they tended to confine themselves to this distinctive role—to provide a forum for advanced thinking in the management field. Moreover, the American Management Association was organised almost from its inception into functional divisions, dealing with personnel, office management, purchasing, and so on. Each division had its own committee and made much of its own pace. The Association therefore possessed an elasticity which enabled it to meet varying demands and the difference of emphasis, now on one function, now on another, which has characterised the development of popular interest in management. It thus acted as a brake on the tendency to set up an independent institution for each functional interest which has handicapped the British movement.

A third factor which undoubtedly had a big influence is the far wider spread of education in the U.S.A. and the greater *per capita* resources available for educational purposes. Sir Ernest Simon has recently published some striking figures on this general subject. Thus while Harvard had its School of Business Administration and almost every major university in the United States had a well-staffed faculty teaching some of the aspects of management—Pennyslvania, Princeton, California, Chicago, Columbia, and the Massachusetts Institute of Technology to mention but a few examples—there was at the outbreak of war only a single chair at either of the older English universities, the Montague Burton Professorship of Industrial Relations at Cambridge, which as much as touched on the question. And, with the exception of London, Manchester and Dundee, which had small departments, the more modern universities were scarcely better equipped.

It was not till the nineteen thirties that the technical colleges, which have sometimes shown a livelier and more practical appreciation of national requirements than those who should give them a lead, whether the greater universities or the established professional institutions, began to take management seriously. Since then they have shown in many instances commendable initiative, originality and energy. But they have been gravely handicapped both by uncertainty as to what to teach and by an inadequate supply of individuals competent to teach management subjects.

The first difficulty is a natural consequence of the dispersed character of the management institutions in Great Britain already emphasised. With twenty or thirty separate societies in the actual management field, many of them trying to work out curricula and examination requirements independently, and with a number of professional bodies who wish to incorporate some management teaching into their qualifications, again working independently, it is inevitable that educational authorities should be presented with a most confused picture of what is wanted and no clear objective towards which to organise, in terms of either subject matter or standards.

The second difficulty is a consequence in part of the absence

of higher educational facilities for training in management which limits the source of supply of qualified teachers, and in part of the narrow financial policy imposed on local education authorities which prevents them from offering to men qualified in the field of experience rates for part-time teaching which are likely to attract them. A case occurred recently in which the same individual received almost simultaneously two invitations to deliver an occasional lecture on management: one suggested a fee of twenty-five guineas and the other of twenty-five shillings. The latter was from a local authority. It is much to the credit of the technical colleges, that, despite these difficulties, they have managed to find a supply of lecturers.

A fourth factor is the attitude of the government in the two countries. The Department of Commerce as it was built up in the Hoover administration, with its divisions of simplification, standardisation, packaging and so on, and its voluminous but practical studies of domestic and foreign markets for particular products was essentially management-minded. The Bureau of the Census provided a central source of statistical information which was again directed to the practical needs of business. It was thus enabled to organise a national census of distribution without exciting serious opposition from the trading community, a facility still denied to British traders. While President Roosevelt has changed much of the detail, the broad attack on the problem remains the same. His appointment of the President's Committee on Administrative Management was the first instance in history in which the governmental machinery of a great democracy has been examined from the standpoint of scientific management.[5]

The position in Whitehall justifies the writer who described the official temper in the English Civil Service as "stoical realism."[6] While much has been done since the outbreak of the present war to assist industry to better its management, chiefly at the instigation of Mr. Bevin, Sir Stafford Cripps and other Ministers, assisted by temporary officials brought in from the outside world, scarcely 10 per cent of the permanent officials of the administrative class have any conception what scientific management means, still less how to apply its principles to their

own areas of responsibility. This, and not ownership by the State, is the explanation of much of the frustration, the inter-departmental friction, the stolid conservatism which trouble those who have tried to serve their country in the present emergency, and who realise that, if it is to maintain a reasonable standard of living in the post-war world, a greater measure of central control and direction of economic life is probably inevitable. Unless that control exhibits a quality, a knowledge and a practical grasp of management problems, of which there are as yet little evidence in the government machine, its activities are likely to impose a brake on private initiative with very little compensating advantage in greater foresight and improved facilities.

It is questionable whether any government, whatever its complexion and majority, can deal effectively with the problems of a world whose *tempo* is that of modern scientific discovery as long as its administrative arm is paralysed by an absence of executive understanding. In other words, unless it is prepared to place good management within the machinery of government in the forefront of its agenda and to stimulate its servants to place greater emphasis on the executive as opposed to the political virtues, it will find that the best intentions are negatived by its inability to drive faster a machine designed for a far more leisurely age.

It would be particularly deplorable if the first Labour Government with a real working majority allowed its dislike of the private ownership of industry as a system of economics to blind it to the lessons to be derived from industrial experience. As was pointed out in the introduction to the first volume, industry has been the point of impact on the community of those developments in the applied physical sciences which, in the last hundred and fifty years, have revolutionised man's environment. There is therefore *a priori* ground for the assumption that the thinking of those engaged in industry will be better adapted than that of other groups in the community to the social changes rendered necessary by that environment.

No-one could accuse Mary Parker Follett of indifference to the human point of view or of lack of social responsibility. She

was convinced from direct observation and experience that the attempt to solve the problem of relationship between individuals, which is the core of our present difficulties, was " being made more consciously and deliberately in business than anywhere else . . . " " Among business men (not all, but a few) I find the greatest vitality of thinking today, and I like to do my thinking where it is most alive."[7] Since her death we have confirmation of this observation from two widely different sources. The most complete and scientific social-industrial experiment ever carried out, the Hawthorne Investigations[8] merely underlines inductively the truths about human administration which she had propounded as the result of deductive logic. The greatest practical experiment in democratic public ownership and regional planning of the twentieth century—the Tennessee Valley Authority—tells the same story.

Many supporters of Labour have quoted that experiment as a model of what can be expected from public ownership. It is therefore pertinent to quote the Authority's present Chairman, who was one of the three original Directors, as to the secret of its success. David Lilienthal has written :

> " The T.V.A. is a significant departure as an instrument of twentieth century democracy in this. In creating the T.V.A. Congress adopted and carefully wrote into law the basic principles and practices of modern management. A federal agency with the broadest of responsibilities was given a full set of tools that American business has found essential to good management."[9]

This is not surprising, if we bear in mind that it was F. D. Roosevelt who made the T.V.A. possible. What is surprising is the persistence in Great Britain of the failure to recognise the importance of management, to develop that awareness of the subject which is manifest in these quotations.

Ministers do not hesitate to insist on the vital urgency of raising the standard of management in industry. But it is even more urgent that knowledge of and respect for management principles should become common currency in Whitehall. The

tradition that " the British Civil Service is the best in the world " seems to impose an impenetrable obstacle to the realisation that it is not good enough for the tasks of economic reconstruction which await it.

Experiments in public ownership uninformed by the consciousness of management which is here postulated, will indeed make the worst of both worlds. They will destroy the initiative, the freedom to experiment, which are the main virtues of private industry without substituting any alternative dynamic. Unless those responsible are not only convinced that management matters, but are much more clearly informed than at present as to management methods and principles, they will create not an active and enthusiastic industrial democracy, but a wooden bureaucracy. Let them take to heart before it is too late Lilienthal's warning from the experience of the T.V.A.—

" the job can always be betrayed by the way the job is done."

1 *Philip Guedalla*—" *The Hundred Years.*"

2 *Dr. Alexander Ure*—" *Philosophy of Manufactures,*" 1835.

3 R. F. *Hoxie*—" *Scientific Management and Labour.*"

4 " *History of the British Army,*" *V. i, p.* 559.

5 *v. Vol. i, cp. xiv.*

6 *H. E Dale*—" *The Higher Civil Service.*"

7 *v. Vol. i. p.* 12.

8 *An account of the Hawthorne Investigations will be given in Vol. III.*

9 " *T.V.A.—Democracy on the March.*" *p.* 144.

INDEX

A

Adams, B. C., 141
Address to the Working Classes, 52
Allingham, G. C., 99, 102, 163
Amalgamated Society of Engineers, 178
AMERICAN Bureau of Personnel Administration, 206
Management Association, 229
Society of Mechanical Engineers, 90, 92, 93, 227, 229
Amulree Committee, 205
Arkwright, Richard, 60
Association of Industrial Welfare Workers, 185

B

Babbage, Charles, 8, 21
Balfour Committee, 120
Bevin, Rt. Hon. Ernest, 209, 212
Birmingham, Standing General Commercial Committee, 64
Bondfield, Miss Margaret, 100
Book-keeping, 16, 77-78
Boulton and Watt Foundry, 8, 21, 24-39, 41
Brandeis, Louis D., 96
BRITISH Association for the Advancement of Science, 116, 139
Management Council, 144
Burton, F. G., 148

C

CADBURY, Edward L., 101, 184, 192
Bros. Ltd., 183-4
Calculating Machine, 19-20
Carron Ironworks, 25, 61
Casson, Herbert N., 88, 125

Chambers of Commerce Conference, 135-136
City and Guilds of London Institute, 115, 135
Commercial Compendia, 18-19
Commercial Organisation of Factories, 7, 74, 86, 90, 148
Confederation of Management Associations, 188
Corporation of Accountants, 132
Cost Calculation, 22, 35, 69, 77, 164
Courtauld's, 179
Crawshay's Iron Works, 61
Crowley, Sir Ambrose, 61, 65

D

Dale, David, 48-50
Darby of Coalbrookdale, 61
Dempster-Smith and Pickworth, 90, 130, 158
Dicksee, M. R., 137
Discipline, 51, 82-86
Drinkwater Mills, 44-47

E

East India Company, 19
Eastern Rates Case, 96-97
Elbourne, E. T., 23, 86, 90, 142-159
Emmott Committee, 142
Employment Manager, 165
Engineering Management, Organisation and Economics, 128

F

Factory Administration and Accounts, 90
Factory Inspectors, 52, 174-175, 180, 209
Federation of British Industries, 143
Fleming, Sir Arthur, (Dr., A. P. M.), 126, 140, 143
Follett, Mary, 58, 167, 206-7, 235
Foremen, 92, 124, 130, 152
Fundamentals of Industrial Administration, 128

G

Garcke and Fells, 22, 23, 90
General Chamber of Manufacturers of Great Britain, 64
Gilbreth, Dr., 89, 95
Goodenough Committee on Salesmanship, 120

H

Hans Renold Ltd., 162-169, 101
Hawthorne Investigations, 206-7
Health of Munition Workers Committee (1916), 56, 91, 186, 193
H. M. Chief Inspector of Factories, 171, 211, 225

I

INDUSTRIAL Health, First National Conference, 212
Health Research Board, 193-201
Revolution, 7-14, 20, 55, 60-68
Welfare Society, 188, 193-201
INSTITUTE OF Chartered Accountants, 132
Export, 146
Industrial Administration, 13, 128-129, 141-3, 200
Labour Management, 192-201
INSTITUTION OF Civil Engineers, 74, 110, 153
Electrical Engineers, 72, 74, 109, 112
Junior Institution of Engineers, 99, 125
Mechanical Engineers, 72, 74, 90, 92, 110, 112, 128
Production Engineers, 129, 227
International Management Congress, 107, 144, 226
Iron and Steel Institute, 74

J

Joint Consultation, 182, 193

L

LEGISLATION
Combination Act (1824), 53
Companies Act (1900), 152
Conciliation Act (1896), 182
Education Acts, 111
Employers' Liability Act (1880), 182
Essential Work Order (1941-2), 171, 209
Factory Act (1819), 52
„ (1833), 109, 111, 174
„ (1867), 175
„ Consolidated (1878), 182
„ Consolidated (1901), 182
„ (1937), 205
Health and Morals Act (1802), 48
Health of Towns Act (1842), 181
Limited Liability Act, 116, 132
Technical Instruction Acts (1889-91), 111, 115, 135
Lewis, F. Slater, 7, 72-87, 90, 110, 148, 157
Liversedge, A. J., 91, 153
LONDON Chamber of Commerce, 135, 138
County Council Education Committee, 128, 130

M

Machinder, H. J., 140
MANAGEMENT Library, 107, 160
Research Groups, 13, 204
Manchester Association of Engineers, 100, 120, 163, 169
Mann, Sir John, 23
Mechanics' Institutes, 73, 110
Mellor Mill Accounts, 68
MERCHANTS, Training for, 158
Early Accounting Methods, 16-17
MINISTRY OF Labour and National Service, 170, 195, 209
Munitions, 23, 159, 186
Reconstruction, 101-101, 163
Supply, 188

Mond-Turner Conferences, 193
Morland, Sir Samuel, 19
Motion Study, 33, 89, 95, 102
Myers, Dr. C. S., 189

N

NATIONAL Certificates, 129
    Expenditure, Select Committee on, 208
    Institute of Industrial Psychology, 188, 194-223
New Lanark Mills, 48

O

Oldknow, Samuel, 10-47, 60
O'Meara, Lt.-Col. W. A. J., 127, 140
Organisation Charts, 80
Owen, Robert, 12, 40-59
Oxford Management Conference, 188

P

Payment by results, 32
PERIODICALS
    Cassier's Magazine, 92, 99
    Efficiency Magazine, 88, 125
    Engineering Magazine, 87, 92, 98, 112-116, 122, 148
    Industrial Magazine, 92
    New Statesman and Nation, 100
    Sociological Review, 101
    The Accountant, 22, 134-141, 202
    The Accountant's Journal, 202
    The American Magazine, 90, 98
    The Engineer, 22, 87-112
    The Incorporated Accountant's Journal, 134

PERIODICALS—*continued*
The Mechanical Engineer (Manchester), 99
The Mechanical World (Manchester), 91-99, 153-158
The Review of Reviews, 98
The Times, 142, 144
,, *Trade and Engineering Supplement*, 142
World's Work, 98, 146
Personnel Management, 33, 40-78, 170-201, 212
Piece Rates, 32
Pitman's Intensive Business Course, 142
Polytechnic, 135, 142
Premium Bonus, 105
President's Committee on Administrative Management, 231

R

Renold, C. G., 101, 165
Renold, Hans, 100, 162-169
Roosevelt, F. D., 227, 233
Rowntree, B. S., 187
ROYAL Commission on Scientific Education in U.K., 113
Ordnance Factories, 123
Society, 13, 17, 63
Society of Arts, 13, 63, 113, 115, 138

S

Scientific Business Management, H.M.S.O., 101, 191
Select Committee on National Expenditure, 208
SOCIETY OF Chemical Industry, 153
Incorporated Accountants and Auditors, 132, 135
Telegraph Engineers, 112
Soho Foundry, 11, 24-39
Smith, Adam, 62, 66, 177
Staff Management Association, 196
Staff Precedence, 79-80
" Stakhanovism," 104, 224

T

Taylor, F. W., 7-22, 72, 88-107, 162-169
Technical Education and Training, 30, 110-130
Trade Unions, 40, 53, 80-95, 104, 177, 223

U

UNIVERSITIES
American, 136, 230
Birmingham, 136
Bristol, 110, 129
Cambridge, Montague Burton Professorship, 230
Faculties of Commerce, 134-6, 139
Glasgow, 111, 153
Harvard Graduate School of Business Administration, 101, 206, 230
Hull, University College, 142
Japanese Imperial College of Engineering, 113
London—King's College, 110
„ School of Economics, 136, 140
„ University College, 115
Manchester, Department of Industrial Administration, 127-141
„ Owen's College, 110
New York, University College of Accounting, 136
Oxford, 139

W

Wealth of Nations, The, 62, 66
Wedgwood, Josiah, 64, 179
Welfare, 33, 56-67, 178-9, 192, 225
Officer, 180-183, 192, 210-225
Whitley Committees, 188
Whitworth Scholarship, 112
Wilkinson, 30, 61
Works Organisation and Management, 128
WORKS Manager, 85, 151
Management Association, 13, 200