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OF THE

MANCHESTER GEOGRAPHICAL SOCIETY.

THE MANCHESTER SHIP CANAL.

THE STORY IN BRIEF FROM 1708 TO 1896.

(See Maps.)

By Mr. W. BURNETT TRACY.

[Addressed to the Society, in the Library, and Revised to Dec., 1896.]

I sing a theme deserving praise, a theme of great renown, sir—
The Ship Canal in Manchester, that rich and thriving town, sir.
I mean to say it once was rich, e'er these bad times came on, sir;
But good times will come back, you know, when these bad times are gone, sir.

* * * * *

Success then unto Manchester, and joking all aside, sir,
Her trade will flourish as before, and be her country's pride, sir.
That is to say, if speculation can but be kept down, sir;
And sure we've had enough of that, at least within this town, sir.

Sung at the Theatre Royal, 1827.
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I.

I HAVE always attached considerable historic value to the fact that at the very beginning of Liverpool the importance of Manchester, direct and relative, was recognised.

It may of course be truly said that what is now known as the City of Manchester—the centre of the greatest skilled labour district in the world—owes its existence to the natural water facilities offered by the primitive rivers that drew their abundant and frequently erratic supplies from the fine ranges of hills forming the surrounding country. For it was the point of confluence of the Irk and the Irwell at Hunt's Bank that was marked by the original surveyors, A.D. 620, as the site for the first baronial residence indicating a settlement; and it may be taken as a striking instance of continuity of purpose that the same point now signifies the limit of the Port of Manchester. But what amounts to a particularly solid link in the chain of evidence that a ship route to Manchester was part of her commercial destiny, would sooner or later be absolutely required for the proper fulfilment of things, and was being even

then enforced by the early assertion of her manufacturing advantages of climate, coal, minerals and physique, is that the man who was called upon to build the first wet dock in Liverpool in 1708—when the population was 8,000, and there were only 84 ships belonging to the port, and none of them were above 70 tons capacity—became possessed of this idea, and was so far able to impress others with it that four years later he produced a plan headed "A Map of the Rivers Mersey and Irwell from Bank Quay to Manchester. Surveyed by the order of the Gentlemen at Manchester, by Thos. Steers, 1712." To this was appended a note, halting in expression here and there, but clear enough as to the main points of assurance, from which the following is taken *verbatim*:—

"The Inland parts of Lancashire and Yorkshire being favoured with great variety of valuable manufactures in Woollen, Linnen, Cotton, etc., and that in very great quantities, has made that Neighbourhood as populous, if not more so (London and Middlesex excepted), as the same extent of any part of Great Britain. The trades of these counties extend considerably through the whole Island as well as abroad, and the consumption of Groceries, Irish Wool, Dying Stuff, and other imported goods consequently very great; but as yet not favoured with the convenience of water carriage, tho' Providence from the Port of Liverpool up to the most considerable Inland town of Trade in Lancashire, Manchester, has afforded the Best, not yet employed Rivers Mersey and Irwell for that purpose. Those rivers are here described from Bank Key (whither from Liverpool the Navigation at present is used). The conveniences of the Navigation carried thence to Manchester might one time or other be of the greatest importance. . . . The Trade made more easy by an expensive Land Carriage being turned into an easy and cheap water carriage."

This was 185 years ago. The movement did not take shape at once, but in 1720 an Act was obtained to make and keep the "River Mersey and Irwell navigable, and passable for boats, barges, etc., from Liverpool to a place called Hunt's Bank in Manchester." This it was considered "will be beneficial to trade, advantageous to the poor, and convenient for the carriage of coals, stone, timber, wood, wares, and merchandises." The improvements under this Act greatly benefited the district for a considerable period. By 1829 it had become a favourite route for passengers; the journey was a pleasant one, and being accomplished within seven hours was considered sufficiently expeditious. In 1833 the Navigation paid 40 per cent.

The Bridgewater Canal was opened for traffic in 1776.

In 1824 a scheme for a ship canal from the Dee *viâ* Frodsham, Lymm, and Didsbury, was prepared, and submitted to Parliament in 1825, but vigorously opposed, thrown out on standing orders, and never revived. In 1838 Sir John Rennie recommended to a committee of Warrington gentlemen the construction of a ship canal, sixteen feet deep, between Liverpool and that place, which he declared could be carried forward to Manchester readily. In 1840 Mr. H. R. Palmer, at that time vice-president of the Institute of Civil Engineers, proposed a ship canal with five locks between Manchester and Liverpool for vessels up to 400 tons. This proposal was embodied in a report made to the Mersey and Irwell Company at their request. Interest in the railway movement ran high at this time, and hopes of cheap carriage with quick transit kept pace. This fortunately prevented any further steps being taken to make a canal which must soon have become inadequate, and probably also a serious hindrance to further development on account of the surroundings it would have attracted.

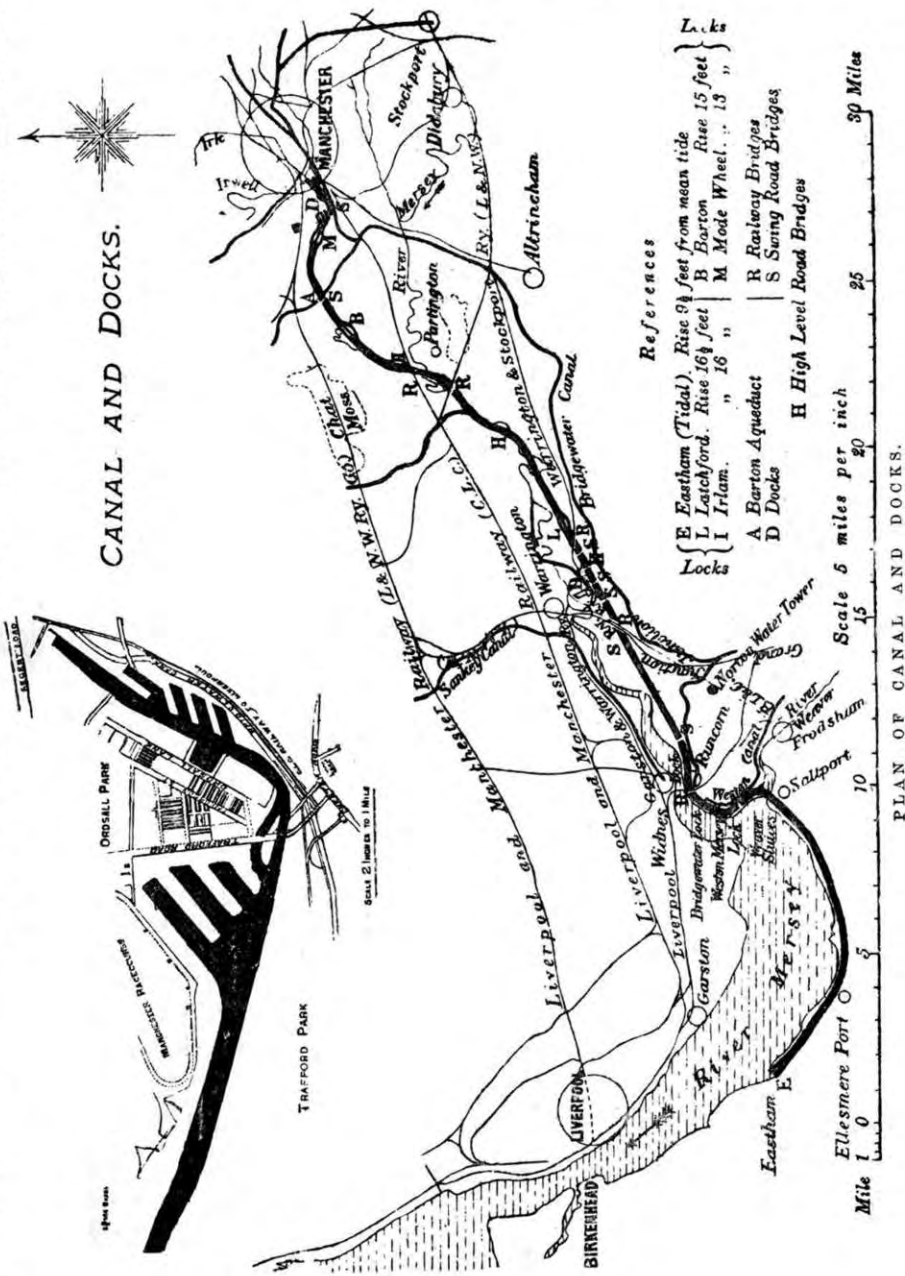
In the prospectus of the Liverpool and Manchester railway, January, 1825, it was declared that we "must not limit our consideration to the immediate accommodation of the mercantile classes . . . or even the still more important saving to the consumers of coals and of every description of goods conveyed. We must contemplate the important effects upon the commerce of the nation" created by such facilities. "It becomes a question of serious importance whether this country, indebted for so much of her wealth, power, and greatness, to the bold and judicious application of mechanical science, shall now pause in the career of improvement, while it is notorious that other nations will adopt the means of aggrandisement which we reject." This true note resounded, was caught up and carried forward, and that vigorous opening solo and chorus heard later at Didsbury at the house of Mr. Daniel Adamson, June 27th, 1882, was set in the same key. That was a representative gathering—merchants, manufacturers, municipal authorities, prominent citizens, and some penmen, quite sufficient to mould and energise a large purpose. It is said that there were seventy persons present, a number of good omen; that seventy went forth—forming a striking parallel instance in profane history—fired with a new propaganda, framed to some extent, as all are, upon antecedents; and to the full measure of their powers, temperaments, dispositions, and opportunities they announced it and kept it within daily sight and hearing of their fellows, constantly and contagiously testifying their own sincerity. A working committee was formed, and in three months (September 26th) they called a meeting of subscribers to consider two schemes, one tidal, projected by Mr. Hamilton Fulton, C.E., which had been unemotionally reviewed and placed on the minutes of the Chamber of Commerce five years before; the other being Mr. (now Sir) Leader Williams's proposal for a lock canal, which was accepted.

When the Duke of Bridgewater, firmly setting himself to a great work, determined to keep his expenses within £400 a year in order to be able to make the Bridgewater Canal, he gave an earnest of that deep sincerity of conviction and purpose which 130 years later inspired the people of Manchester and of Lancashire generally, when they, aroused by a kindred enthusiasm, became in 1885, after a long deliberative quickening, sufficiently if not fully alive to the meaning and value of the great work with which our city is now identified all over the world. The Manchester Ship Canal is now part of the geography of the district, and its silently growing assumption of definite reality and power is watched with every kind of interest—hope, fear, anxiety, confidence—from every point of vantage and disadvantage, with honest gaze and furtive regard. As it emerged from the shadows of plan and promise into a palpable existence in stone, metal, and concrete, in full possession of all the commanding elements of strength, in presence of the firm tenacity of purpose of all concerned and the successive fulfilments of disputed prophecies, the mists of evil imagination and gloomy prejudice soon began to lift, and have continued gradually to clear before the approach of what many of us believe to be the "rich dawn of an ampler day" for Lancashire, "Trustworthy Lancashire," as Mr. Pember truly described it in one of his most powerful speeches. When the dawn has broadened into day what will be revealed? is a question that has been well weighed by many who have devoted themselves to this work with the singularity of purpose and superiority to doubt or damp which mark and inspire the pioneer who has matured by well-considered stages. In view of the various treatment it has met with and will continue to receive, until absolute maturity is attained, in common with everything and everybody else of any importance, it may be useful to offer a summary that shall be something more than casual and must be much less than complete, embodying what the Canal is, the general conditions under which it arose and exists, what it has done, and what it can do.

II.

When we consider that the steam diggers and other ingenuities engaged in making this channel for ships represent the best labour of about 120,000 strong men, the tendency to cast any reproach for not commencing the work fifty years ago becomes subdued.

It is often stated, broadly and baldly, that the progress of waterways was seriously hindered and hampered by the exclusive attention given to railways from 1830 forward, and that many of those in existence at that time were crippled and



endangered by railway influence when they could not be subsidised or purchased outright. But this remarkable concentration of energy upon railways was by no means an unmixed evil; I would rather call it a social process, or a most complete instance of rapid evolution and useful expansion under a unanimous impulse. The almost boundlessly liberal support accorded to railway enterprise at this time provided the impetus and scope needed to arouse and impel mechanical skill and invention to their highest and in every sense largest efforts; and it incidentally nipped in the bud all those tendencies on the part of existing means of transport towards wilful independence and sluggish indifference—eldest born of monopoly—some irritating symptoms of which had already shown themselves in connection with both the Bridgewater Canal and the Mersey and Irwell Navigation. This magnificent expenditure brought the very best men into the line of effort. It secured also a rapid achievement of what was of primary importance, viz., a link connecting markets, a means of quick access for personal investigations and for the prompt interchange of samples of commodities, as well as of ideas. The transport of bulk is a consequence produced by the local genius for creating it and recognising the capacity of material and fitness of place. As the demand for the cheaper transport of heavy and non-perishable material and goods became more imperative, the very liberal terms upon which the railways endeavoured to suppress or minimise canal competition was certain to attract attention in due time. So we need not grumble about delays, nor wonder that a brief interval of doubt or even scepticism preceded faith in the abiding importance of transport by water, especially when we call to mind that the building of railways has led to the making of most of those powerful implements of engineering strategy that are now essential to the economic construction of all great works.

III.

It is natural to feel that the briefest summary of the main incidents of the construction of the Manchester Ship Canal demands something on a higher grade than mere general description *à la* catalogue, but it is a relief also to realise that the ornate would be utterly out of place, and that a simple and concise rendering of the plain facts of the case has a truly classic ring, that these indeed frequently approach the level of Homeric incident.

What may be referred to in general terms as the Canal's ground plan has required for its fulfilment the purchase of 4,600 acres of land, at a cost of £1,287,205, forming a property six times the area of the City of London, and within a trifle of the extent of the whole City of Liverpool. One thousand acres

have been raised both physically and in value by the addition of spoil taken from the cutting and not needed for other purposes. After allowing for the full requirements of the Canal and all accessories, a valuable surplus of at least 2,500 acres remains to be dealt with by the Company.

The total amount of excavation required for the Canal and docks was 51,603,747 cubic yards (half the quantity required for the Suez Canal), about one-fifth of which was through sandstone rock. A cubic yard of soil averages 1½ tons. The rate of excavation was from ¾ to 1¼ million yards per month, cleared with the aid of two floating dredgers, three German, four French, 60 English (Ruston and Proctor), and 31 other varieties of the steam navvy. Two thousand four hundred yards have been taken out in ten hours by the German excavator, but the average is about 500 less. Both French and German work best in soft material, and are not adapted for rough clearances. The English are good all-round machines, can do an average of 700 yards per day, taking what comes, but in favourable soil can reach 2,000. The average cost of excavation is, by land dredgers 1½d., by steam navvies 2d., and by grab 3d. per cubic yard; and the cost of the machines ranges from £800 to £2,400 each. These great initial forces have been rendered active by the energy of 192 portable and other engines, and supplemented by the service of 212 steam pumps, 194 steam cranes, 59 pile engines, 200 horses, and 173 locomotives working a rolling stock of 6,300 particularly sturdy wagons (each of seven tons capacity, or 4½ cubic yards), over a macaroni route of 230 miles of railway worming in and out, over and under and alongside everywhere. The cost of the railway was about £630 per mile (single line).

The power directing all this—the service of man—in favourable weather and when everything was in full swing, constituted an army of nearly 17,000 individuals, composed of eight companies officered by picked experts, each responsible for a section of about four miles. These men were grouped into communities at several points, and resided, many of them with their wives and families, in timber built settlements, almost suggestive at the first glance of early times in a new country. Two more strong detachments had charge of the railway deviations works, their responsibilities extending 1¼ miles inland on each side of the Canal cutting from the points where the lines cross, which they do at an elevation of 75ft. from water level, a height approached by a simple gradient of 1 in 135. The lines pass over the Canal upon steel viaducts, stretching in spans of 137ft. to 266ft., resting on each side upon piles of masonry that are monumental. There are five of these railway deviations, and they require one double viaduct four lines wide, and three single ones, with the usual up and down permanent way. The

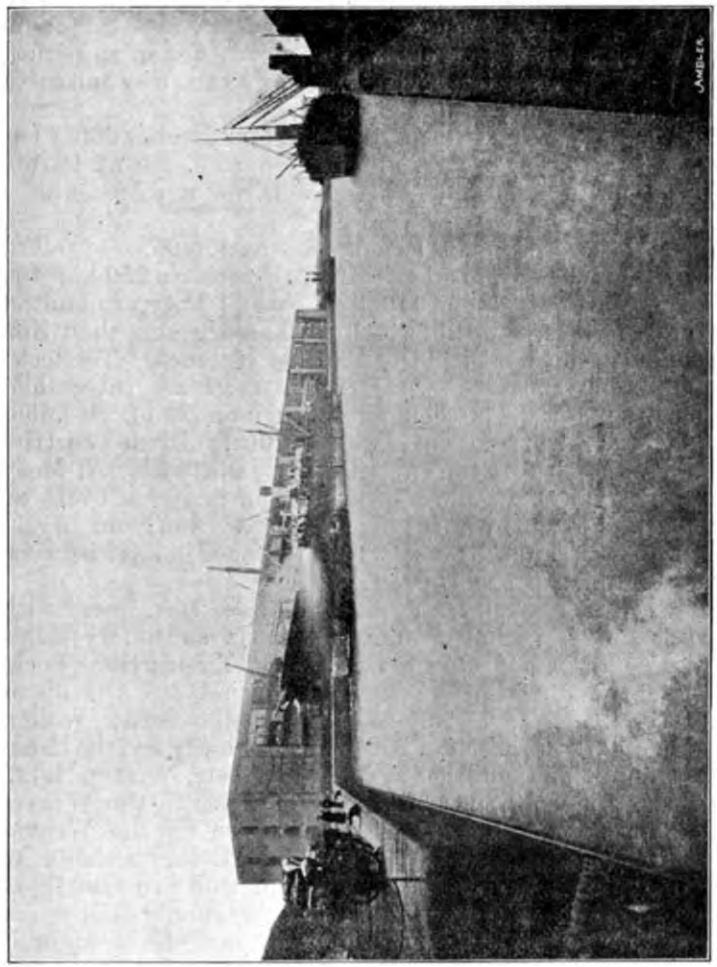
twelve miles of embankment leading to and descending from these bridges have long worn the appearance of having been recognised in a cordial spirit of adoption by, and thoroughly incorporated with, the scenery of the several districts; all marks of newness or disturbance are buried beneath a radiant verdure, as it might be in token of satisfaction at being thus raised from a sleepy and monotonous level to a position of usefulness and trust. In quite a remarkable manner has the formation of the country provided for the useful distribution of the great mass of material that had to be displaced for this big work—embankments to be built and faced, low-lying lands to be raised, and new property created by filling up stretches of river bed where the course was diverted. Equally remarkable were the coincidences in the distribution of rock, clay, and sand, most of the sections being able to provide for a large part of their requirements out of their own spoil.

Seventy millions of bricks have been used, which, piled together, would make 175,000 cubic yards of wall. This is in addition to 220,000 cubic yards of masonry and a million and a quarter cubic yards of concrete. Excellent clay in abundance awaited the diggers, and 460,000 bricks were produced weekly for a long period at what we may be permitted to call the company's model brick-farm or bakery at Thelwall, which was furnished with the latest machinery, and included a series of some acres of covered buildings surrounded by heated walls as a contingent provision against any lapse on the part of the sun. During the busy period 120,000 tons of coal were consumed and 100,000 tons of cement used per annum.

Following on the lines of making bricks without sun, how to make a year into 18 months was revealed by three powerful electric light installations; and 320 of Wells' portable oil lights, each 2,000 candle power, were used or held in readiness for the relief of shadow and the illumination of secret recesses.

The formation of eight miles of massive embankment and sea wall was necessary where the channel runs in the tideway or along the foreshore between Eastham and Runcorn. The foundations alternated between rock and clay, with occasional intervals of sand which had to be made substantial by close pile-driving — a weary process, constantly suggesting hope deferred, at the same time offering a rare chance for engineering skill and persistency. There are 13,000 piles at the base of a critical length of embankment extending about a mile in front of Ellesmere Port. The piles are 13in. to 14in. square and 35ft. long. They were driven on the water-jet principle by means of steam pumps, the water being conveyed at a pressure of 30lb. to the square inch through 2in. rubber pipes down to the pile; these were attached to a 1½in. wrought iron pipe which ran alongside the pile and, distributing the sand, made way for it.

This embankment is faced with stone, and is one of the 41 chief works on the line of the Canal which were so vast and impressive before the water hid three-fourths of their greatness. The sea wall, which in places where the rock is irregular rises from a depth of 40ft., averages 12ft. in thickness, and is faced



No. 6 DOCK, SOUTH VIEW.
Showing Four-storey Warehouses and expanse of water with large Vessels loading.

with heavy masonry hiding a concrete heart as hard as iron. There is a special length of sea wall at Runcorn extending 2,950ft., built in the tideway to separate the Canal from the river, 16ft. wide at the top, rising from a base of 22ft., and faced on both sides by 12in. piles. To compensate this appro-

priation of river course, an equivalent space has been cleared by the company on the Widnes side. The embankments where founded on rock or clay are formed of the latter with heavy stonework protection. They average 30ft. wide at the top, outside slope 1½ to 1, inside from 1 to 2 to 1, according to nature of soil. These banks have now stood the test of years, and have become thoroughly consolidated. Sir Leader Williams, in his presidential address to the Manchester Association of Engineers (January 12th, 1895), said—"They are in as perfect condition as when first made, but stronger, as the clay and earth are now thoroughly consolidated."

The deepest cutting is near Runcorn, and touches 66ft.; but the most imposing, being chiefly through rock, are at Barton and Latchford, the latter averaging 55ft. for a distance of a mile and a half.

The gates for the giant lock at Eastham (600ft. by 80ft.) weigh 300 tons each; the other principal gates are 250 and 200 tons. There are altogether 110 lock gates. They are built of Demerara greenheart wood, which is more durable than iron and renders them less liable to damage if struck. The locks are erected at five points. At Eastham there are three tidal (width of Canal 300ft.); then, after an interval of 21 miles, Latchford two (rise 16ft. 6in., width 290ft.); Irlam two (rise 16ft., width 370ft.); Barton two (rise 15ft., width 330ft.); Mode Wheel two (rise 13ft., width 330ft.). The largest is 600ft. by 80ft.; four are 600ft. by 65ft.; four 350ft. by 45ft.; one 350ft. by 50ft.; and one 150ft. by 30ft. The difference in level between Runcorn and Manchester is 60½ft.

There are 28 steel sluice gates 30ft. wide, 16ft. deep, with 10ft. rise, and two smaller ones. Also six subsidiary locks, forming side entrances into the Canal—viz., Twenty Steps Lock, connecting the Runcorn and Latchford Canal and the upper reaches of the River Mersey with the Ship Canal; Walton Lock, forming the connection between the Mersey and the Canal for Warrington, and entrance to proposed Dock; Weston Marsh Lock at the Weaver Mouth, being the entrance to the Weaver Navigation; Weston Mersey Lock, entrance for the Weaver Docks from the Estuary; Bridgewater Lock, entrance to Runcorn Docks (147 acres in extent); and Runcorn Old Quay Lock, entrance from the Mersey opposite Widnes.

A sluice gate weighs 50 tons, and the pressure of water is calculated at 100 tons more, yet are they so exactly balanced and controlled by Sir W. G. Armstrong's hydraulic apparatus that one gate can be raised four feet by one man in one minute. Ten of these steel-plated sentinels stand as it were on guard opposite the Weaver Mouth, nominally for the purpose of protecting that river and the estuary from any embarrassment either of ebb or flow. They could pass 50,000 cubic feet of water per second. Two of these gates would have been an abundant security, but they were a concession to one of the sixty-four almighty vested interests, so many of which have applied their enormous and Parliamentary powers of suction in one way or another to the Canal treasury. They will remain a permanent and splendid monument to Lancashire's determination, and a constant aid to reflection.

Probably the most popular work on the Canal is the Barton Aqueduct, by means of which the Bridgewater Canal is both carried over the Ship Canal and its course stopped and swung round at right angles during the passing of big ships. This takes the place of Brindley's fixed aqueduct over the old river, which held an unbroken record of 125 years. It is 235ft. long, 6ft. deep, 18ft. wide, is worked from a central pier and moves upon a radius of 64 rollers; it covers two spans of 90ft. and weighs when swinging 1,400 tons.

There are two high level cantilever bridges (683 tons) for passenger and general traffic at Latchford and Warburton, and seven swing road bridges from 507 to 1,800 tons. Also two railway viaducts over the Mersey, at Acton Grange (353 tons) and Glazebrook (561 tons), and one over the Irwell at Irlam (426 tons).

The Partington Coal Basin is admirably situated for the important purpose it has to fulfil, and it is sufficiently out of the way of the bustle of general business. This depot brings the great South Yorkshire Coalfield 30 miles nearer the sea, and for the first time gives it a fair chance. The Cheshire Lines are in touch with it, and the Midland Railways intersect this inexhaustible source of supply; Lancashire coal lies close round about, and the Wigan and Haydock fields are only eight miles away against 23 miles from Garston. The foundations are built for six tips; four of these have been working since the Canal opened; they are fitted with hydraulic machinery and every modern appliance for loading. About 160 tons of coal an hour can be delivered from each tip. There is five and a half acres of water space, 20 acres of quay area, half a mile length of quays, and five miles of sidings. The basin forms part of the Canal and the tips are alongside, so that vessels can proceed direct to their positions without any interference with the fairway, and afterwards continue their course without delay of any kind. There are also wharves for mining timber, chemicals, etc., and an excellent alternative is thus offered to St. Helens.

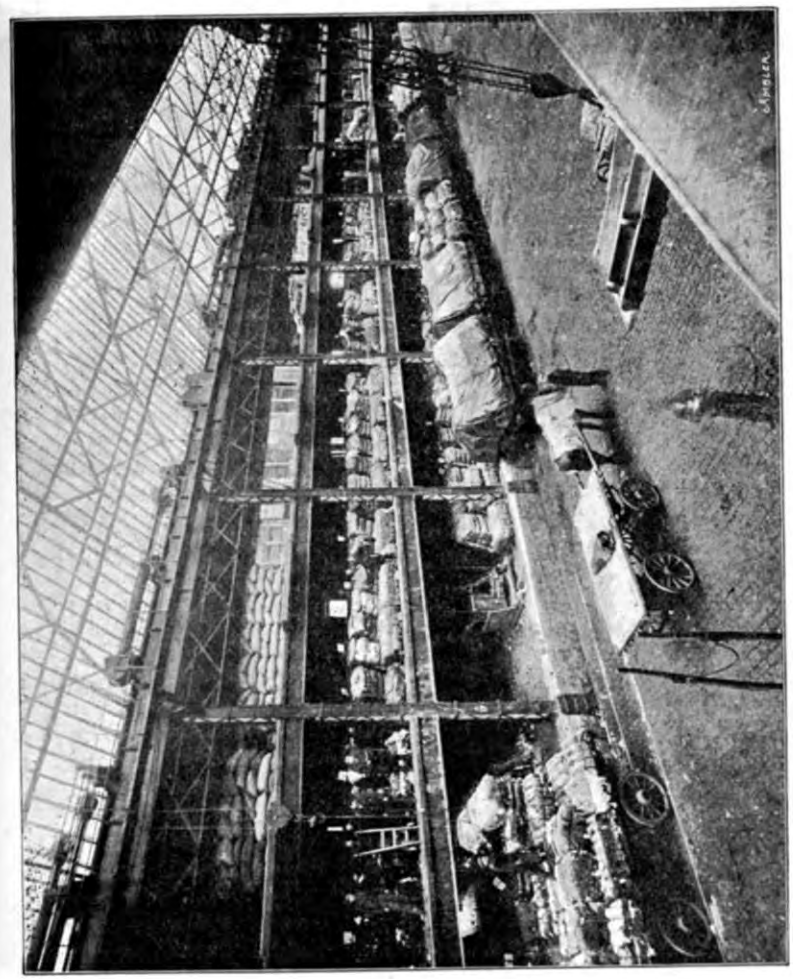
IV.

For the purposes of working the hydraulic machinery in connection with the docks and locks, there are seven and a half miles of pipes laid, which sustain a pressure of 700lbs. to the square inch.

The Manchester Docks and their equipment can only be referred to here in a summary manner. To all who are sincerely interested in the history and purpose of the Ship Canal, and who are constantly noting how that purpose is being fulfilled in many ways as sure and inevitable, if in some cases as slow, as the course of nature, the docks are an unfailing source of inspiration, promise, and hopefulness. Rid yourself for the moment of all personal considerations, and the metallic limit of dividends, and fix your attention upon a supreme effort made by a working district as big as a small nation to break a grinding and increasingly indifferent monopoly, and to let in a new stream of saving vitality. Every one should see the docks, and go about it quietly and thoughtfully. There is no better cure for the distractions of cavil, untruth, passionless criticism or passionate misrepresentation. There you are in the presence of "the beauty and mystery of the ships," you are conscious of the possibility of being in touch with the world without let or hindrance; there is something of "the magic of the sea" in the atmosphere of the place, and everything you look at and touch appears thorough and the best of its kind. All details of administration can at any time be altered and adjusted. The central fact is that the thing is accomplished, the alternative route is established, nature's offer has been accepted.

The Canal is three years old. Many of us can recall the opening day (1st January, 1894), "for traffic" as was said, when amidst the general glow of rejoicing, we could not help looking at the bare quays, the first sheds with unfinished roofs, the unpaved floors, and the primitive roads. But what have we now? While the hare has been prating, if not sleeping, the tortoise has been working diligently. There are 16 one-storey transit sheds, most of them 300ft. by 71ft., 35ft. high to point of roof, 20ft. at the sides; one two-storey fruit shed of the same area; one customs transit shed 150ft. by 40ft.; one London cargo shed 450ft. by 71ft.; six three-storey warehouses in three pairs, connected by girder and glass roofs over a 48ft. roadway. These are served by hydraulic cranes, the jibs of which can deliver goods from the ship direct to the third storey; they are fitted also with hydraulic lifts and jiggers, which can be moved along to any point for the loading of wagon or cart. The area of each floor is 300ft. by 72ft., and the ground floor is wagon height (3ft. 6in.) from quay level. All these buildings stand 36ft. 6in. from the edge of the quay walls, three lines of rails intervening for cranes and railway wagons, so laid, however, that cart traffic can pass over them. There is no interruption anywhere from chains or ropes, as the bollards which are placed at intervals of 75ft., and to which the vessels are moored, are built in with the quay walls, and emerge only at the extreme edge. The subways along which run the hydraulic service and fresh water supply

pipes are built round the docks just behind the coping. They are lined with concrete, measure 5½ft. by 3½ft., and extend altogether upwards of four miles. The docks and warehouses are lighted by electricity throughout, and the roadway down the centre of the quays between the sheds is 48ft. wide. All



INTERIOR OF THREE-STOREY SHED.
The work of an ordinary Goods Station is performed at each of these Sheds.

the roads are in good settled working order. The new range of 13 seven-storey warehouses are 65ft. deep, extend from the Salford quay along the entire length of Dock No. 8, and are specially designed for the storage of cotton; and the seven four-storey warehouses on quay No. 6, 72ft. deep, are fully occupied

with grain and general cargo. Altogether the dock premises now include 45 separate buildings, containing 157 depôts. There are 40 steam and 30 hydraulic travelling cranes, lifting from 1½ to 10 tons, with a varying radius of 15ft. to 30ft., and one 30-ton crane, with a 30ft. rake, for raising heavy machinery.

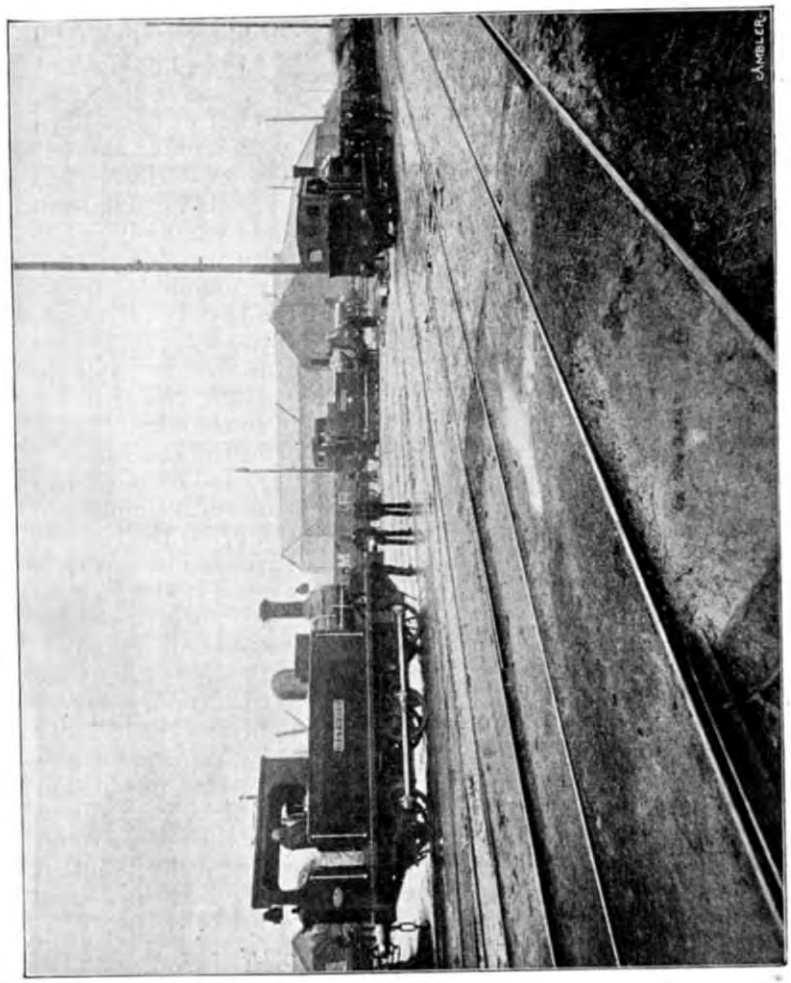
The railways of the company now measure 85 miles 50 chains. They convey traffic between the various loading and discharging berths, and along the Canal, and are connected with all the railway systems of the country. Trains are made up at the docks, and conveyed to the limits of the estate by the Ship Canal Company's locomotives, and then transferred to the railway companies. For some time after the opening there was a languid service of two trains a day, one in and one out; now there are about thirty trains daily, with prompt and willing service. There are now five stations, 300 points and crossings, 21 hydraulic capstans, a railway staff of 482 men, and 35 miles of permanent way about the docks. The gridiron on Salford Quay, where the several lines converge and divert, is a capital point for observation, and a striking and obvious testimony to growth. There are 22 locomotives and 337 wagons, the property of the company, constantly occupied about the docks only. During 1896, 672,000 tons of merchandise, requiring 113,195 wagons, was dealt with at the Manchester docks alone. The total traffic carried over the railways of the company for the year amounted to 844,789 tons, which means a movement of 2,300 loaded wagons per week. In 1894, 450 per week was never exceeded. The 14 canals in communication with the Ship Canal intersect upwards of 750 miles of country.

The timber wharf on the Trafford side of the docks with a frontage of 1,500ft. offers storage accommodation for 50,000 standards, which is equal to about 170 average cargoes. It was found necessary to increase the accommodation after the first season, on the Salford Quay side. During 1896 the total imports of timber reached 180,394 tons, being an increase of 86,584 tons over the previous year.

The dock frontage of Salford Quay from Mode Wheel Locks to the 30-ton crane is 2,200ft. The total area of the docks is 256 acres, giving a waterspace of 104½ acres and a quay area of 152 acres. The total length of the quays is 5⅛ miles. The best idea of the capacity of the Salford basin is obtained by striking an imaginary line across from the bridge-end of Trafford Wharf to the Salford quay, keeping 230ft. in front of the pier heads; this gives a width of 1,344ft. On the Trafford Wharf there are also a fixed landing stage half-a-mile long, an engine repairing shed, a shed for general use, overhead travelling crane and steam winding engines for timber movement, a permanent road 60ft. wide from the dock offices up to the dry docks yard and the Corporation cattle lairages, a distance of about

a mile, together with railway communication along the same course.

In the principal dock at Salford, three Atlantic liners have been berthed simultaneously at the same quay. The bottom width of the Canal, is, with one brief and temporary exception,



A GLIMPSE OF THE DOCK RAILWAYS.

120ft., and the average surface width is 172ft., for 30 miles. From Barton to Manchester it is increased to 170ft. and 260ft. respectively. The official notice, dated October, 1895, stated that "the Canal has been excavated throughout to a depth of 26ft. which will be maintained by dredging. The large docks have

been excavated to 26ft. and the smaller docks to 20ft.." The water space is considerably increased at all the approaches to the locks and docks and at Runcorn.

The cargo capacity of the Canal has been estimated upon 300 working days a year at nearly 145,000,000 tons. Seventy vessels a day could pass the locks under ordinary conditions, which is more than double the number entering Liverpool at the present time, and it is a little remarkable that the total number that entered the Manchester docks on the 1st January, 1894, was seventy-one.

The water supply, at a time when the rainfall was one-third below the average, was found to be 22,500,000 cubic feet per day. In time of drought the flow is equal to 14,500,000 cubic feet, which would be sufficient to pass 175 vessels varying from 50 tons up to 5,000 tons capacity through the locks daily. The Rivers Mersey and Irwell and their tributaries which comprise the watershed have a total length of nearly 300 miles, and an acreage of 568,703. The normal flow of the Irwell at Throstle Nest (Manchester Docks) is 150,000,000 gallons a day (there are $6\frac{1}{4}$ gallons to the cubic foot), while the storm flow is stated to be from 1,800,000,000 to 4,000,000,000 gallons. Up to the present time the supply of water has been so abundant that it has been necessary to keep the sluices at the locks constantly open. The sanitary condition of the water has been greatly improved since the opening of the Canal. A Joint Committee of the Lancashire and Cheshire County Councils has been at work for several years, armed with full Parliamentary powers to prevent the pollution of the rivers and streams; the sources of pollution have been exposed and grappled, but with considerable judgment and forbearance, and fully seven-eighths have now either in work or under construction sanitary processes which must be made efficient within a limited time under severe penalties. Public opinion is thoroughly roused, and the iniquity of river destruction is universally recognised. This view is also now backed by the unfailing force of self-interest, as, in addition to the fact that the Canal is daily proving itself a very direct benefit to Lancashire industries, it has also been shown and proved that many of the waste matters that caused the pollution can be utilised and made to pay much more than the cost of their transformation.

The reports of the Joint Committee show that they have been met generally in a loyal manner by the manufacturers whose works have caused the trouble, and that the offences are being rapidly reduced to questions of drainage, resting to a large extent with municipal and other local authorities. Great progress is being made in this direction also. The City of Manchester is working out a system of dealing with one-half of its sewage—amounting to 12,500,000 gallons daily—and before

long, it is declared, the whole 25,000,000 will be under proper treatment. The Borough of Salford has been experimenting for some time upon the best means of dealing with its sewage, which amounts to 10,000,000 gallons daily; and those districts that have continued to neglect their public duty in the matter are now placed under a pressure the result of which is certain, and without much further delay.

Although the water in the Canal and docks is dark in colour, except in close weather it is almost free from bad odour. It is admittedly much better at its worst than the Clyde at Glasgow or the Liffey at Dublin, and it is a very great advance upon what the rivers were before the Canal was made. There has been much affectation, as well as absolute falsehood, about what has been written and said upon this as upon many other points. The central absurdity is that any one should for a moment attempt to connect the question of the wilful pollution of watercourses (which takes place in many other places besides Lancashire) with the mission and success of the Ship Canal, which are respectively clear and ultimately certain; and a chief source of satisfaction is that the Canal is going to prove the salvation of our rivers as well as of the industries along their banks.

V.

Such is the Canal, as it came about and now exists; sketched in outline much too thin in places, but sufficient for a general indication. In dealing with a large subject, that personal interest as well as public duty has led one to observe and examine in all its bearings and circumstances of light and shade for many years, including the whole period of its actual growth, one approaches and proceeds with the task of summarising and being concise under a constant sense of restraint, which may occasionally cause a drifting towards a too bare enumeration. The task does not get easier as we proceed to the second division of our subject—the conditions under which its construction took hold of the people and was determined upon.

Doubt, query, and gloomy prediction are met with in almost every important connection in this world, but fortunately belief, confidence, and high purpose co-exist and counterbalance. When canals were first beginning to attract attention a cry was raised that they should be kept four miles clear of all towns of any size, lest the packmen should be handicapped.

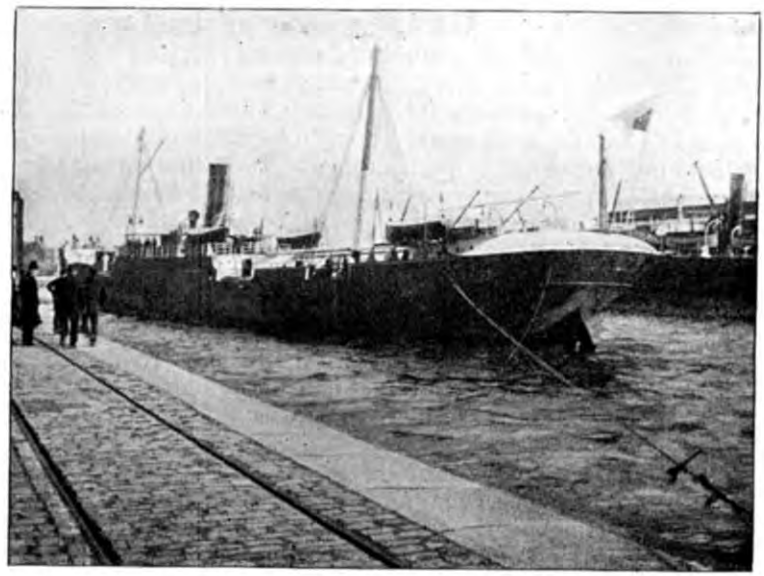
When the first railway was under discussion Lord Eldon expressed his regret that the intelligent people of the North had gone mad on such wild schemes; and another noble authority declared it was all very well to spend money—a process which, on the whole, he believed in, because it must do

somebody good—but he would eat all the coals that would be carried by railways. Fifty years later, in 1874, 127,000,000 tons were so carried, but the noble seer was fortunately dead.

There was also a solemn and pathetic protest entered against railways because they would give horses the go-by, quality would decline and breeders cease.

The Manchester Ship Canal in all the early forms of suggestion and projection indicated clear and broad commercial vision. The rapid accumulation of wealth had to some extent blunted the sensibilities and narrowed the range of observation, yet from the first comparatively small waves of depression up to the stronger and increasingly ominous ones, that ultimately caused the determination to make the Canal to become and remain so fixed, attention was always turned with growing seriousness and approval to the natural facilities and economies held out by water carriage. But quick recovery from these early variations of trade led to forgetfulness, and the expense became an increasing barrier as the necessity increased. Thus matters were allowed to drift until the work was ultimately undertaken in sheer defence of commercial life. I will take the liberty to quote from an early paper of my own instead of rewriting the passage, because it was written at an important time and under a brisk fire of enthusiasm: "There were two unrelenting tolls standing between the manufacturer and the raw material, one for touching the land and another for crossing it. With increasing prosperity a heavier share of the profits was demanded in this form, because the consumer had no option. The growth of foreign competition, chiefly in places where water transport has been regarded and proved as a chief factor, at length brought home to the skilled workers of Lancashire, Cheshire, and Yorkshire that their excellence could not prevail against more economical conditions. Out of this arose the determination to bring a waterway to Manchester, so that the landing tolls might be reaped in the district served, and thirty miles of expensive railway carriage avoided. One hundred and seventy-seven neighbouring towns are represented on the Manchester Exchange, and are benefited more or less by the Canal. Eleven of these have more than 100,000 inhabitants, and 151 of them justify their existence by skilled handicraft. Manchester is the nearest port for about 7,500,000 people, the working portion of which multitude produce manufactured goods that are approved and wanted—on level terms—almost everywhere. These people all require food and clothing, they send 2,000 buyers every week to the Manchester Produce Exchange, and 2,000,000 of them reside within carting distance of the docks. The canal scheme is the joint product of all these centres of energy and industrial life. They know its purpose, possibilities, and promise. They know it is neither a fad nor an experiment, but a long-delayed development of natural resources, and they know that the bitter and clinging hostility it provoked was its greatest testimony."

Lancashire's effort was the climax of a historical development. Her climate, physique, and natural supplies, already alluded to, had long ago determined what she was best and conspicuously adapted for. She was fully equipped with men and machinery up to date, and if she could bring her transport facilities up to the same level of equality, her native industries would be revived and strengthened, and new diversions encouraged. It was far above any small sentiments of spite or opposition, although there had been a long period of vital drainage.



BERTHING A VESSEL IN MANCHESTER DOCKS.

It was the ultimate accession of strength sufficient to provide a clear course for herself and her own, after hard training. She was at the same time conscious that as to the past under similar conditions she might have done as she had been done by. There must be no crying over spilt milk, but the supreme effort must be made to break down all artificial hindrances, all filtrations and subtraction of revenue, and remove every possible tax upon industry that merely represented a struggle to obtain an "unearned increment."

The enormous consumption of the district was easily ascertained by the published returns, and the rates of carriage were

known and read of all men, and also paid. The productions of the area to be served by the Canal included upwards of three-fourths of the cotton trade, the greater portion of the woollen, glass, chemicals, pottery, salt, coal, iron, and machinery trades, with a number of minor industries that total to a respectable sum. The district could thus establish an absolute moral right to demand that its supplies should come direct, and the provision of means to secure that end was elevated into a public duty by the emergencies of commerce. The maximum rates and charges by Ship Canal are fixed by schedule attached to the 1885 Act, authorising construction and incorporating the company. They represent an average saving of about 50 per cent on the rates prevailing at the time when it passed, which rates had then been recently defended successfully before a Royal Commission; they also represent an excellent profit. They can be reduced without risk of serious loss, and any competition means ultimate discomfiture to the opponent, whatever show of fight may be made for a time. These rates cannot be approached in the instances of raw and bulky material, food products not immediately perishable and requiring cheap transit, and heavy textile manufactures, the former being brought right up to the place where they are to be paid for and used—the latter sent back again by those who have transformed the raw material direct to those who want the goods; simply avoiding the people who have nothing to do with it, but who are merely waiting to tax it.

The case was submitted to everybody concerned with a fulness of detail, explicit statement, printed data and public challenge, that has never occurred before and is not likely soon to be matched.

Three hundred and twenty-six petitions in favour were presented by municipalities, chambers of commerce, various trading and manufacturing companies, including one from the Associated Chambers of Commerce and one from Manchester and district signed by 187,340 persons. The subscriptions for Parliamentary and other expenses amounted on July 23, 1883, to £65,750, the list being headed by 17 subscribers of £1,000 each, eight of £500, the workmen of Daniel Adamson and Co., Dukinfield, £430, two for £300, and 25 for £250 each. The subscription ultimately exceeded £100,000; and, in addition to this, on October 6, 1884, a Manchester town's meeting passed a resolution to contribute a 2d. rate. Assistance on the same basis was agreed to by the Salford ratepayers and also by those of Warrington during the same month.

The struggle for Parliamentary powers to make the Canal was continued over three sessions against the unrelenting opposition of the Mersey Docks and Harbour Board, the Liverpool Corporation, the railway companies, owners of estates, and

other public and private bodies. "Worse than fighting your way through an enemy's country," a friend of mine said. The following is a summary of the Parliamentary performances:—

SESSIONS 1883-4-5.

Session.	House.	Chairman.	Commenced.	Finished.	Result.	No. of Days.
1883	Commons	Sir Joseph Bailey	May 1st	July 6th	Agreed to	39
,,	Lords	Earl of Camperdown	July 30th	August 9th	Not passed	10
1884	Lords	Duke of Richmond	March 11th	May 24th	Agreed to	41
,,	Commons	Rt. Hon. G. Sclater-Booth	July 7th	August 1st	Not passed	20
1885	Lords	Earl Cowper	March 12th	May 7th	Agreed to	30
,,	Commons	Rt. Hon. W. E. Forster	June 15th	August 3rd	Agreed to	35
					Days	175

In the final event the Rt. Hon. W. E. Forster said: "The conclusion we have come to, I am very glad to say, is unanimous."

The Act of Parliament received the Royal Assent, August 6th, 1885. It covers 322 pages, and consists of 218 sections, 64 of which are for the so-called protection of "vested interests."

Every branch of trade, including shipowners, corn traders, cotton spinners, textile manufacturers, timber merchants, sugar refiners, fruit and vegetable dealers, and cattle traders, were consulted, and signed a powerful adhesion. These signatures and promises, obtained in a very brief space of time, represented in one direction an aggregate net tonnage of 1,000,000 tons, and in another more than half the owners of the goods the ships conveyed. This is part of what the 185 shipowners put their names to in 1886, which was subsequently twice confirmed: "With quay accommodation and facilities for loading and discharging with despatch, and if the charges on the ship are not higher than those at other ports, shipowners will make use of the Canal so soon as it is open for traffic. The additional thirty-five miles would not increase the rate of freight charged by a merchant steamer for a long voyage." Ship dues to Manchester have not yet been charged, and in all the early estimates they were given as a possible supplementary source of revenue, and not included in the figures that were kept before the public.

The secret of every well-organised mission is to keep in touch with everything kindred and representative, to keep the ball moving, to be constantly urging what you are sure of, inviting and compelling controversy, and making successful results well known. There are many people not open to argument for obvious reasons, but most of these are influenced or infected by example. The large and various constituency just

indicated, so carefully got together, was kept compact and well informed, directors and officials moving constantly in and out amongst those nearest the base of operations, the press generously recording and encouraging progress.

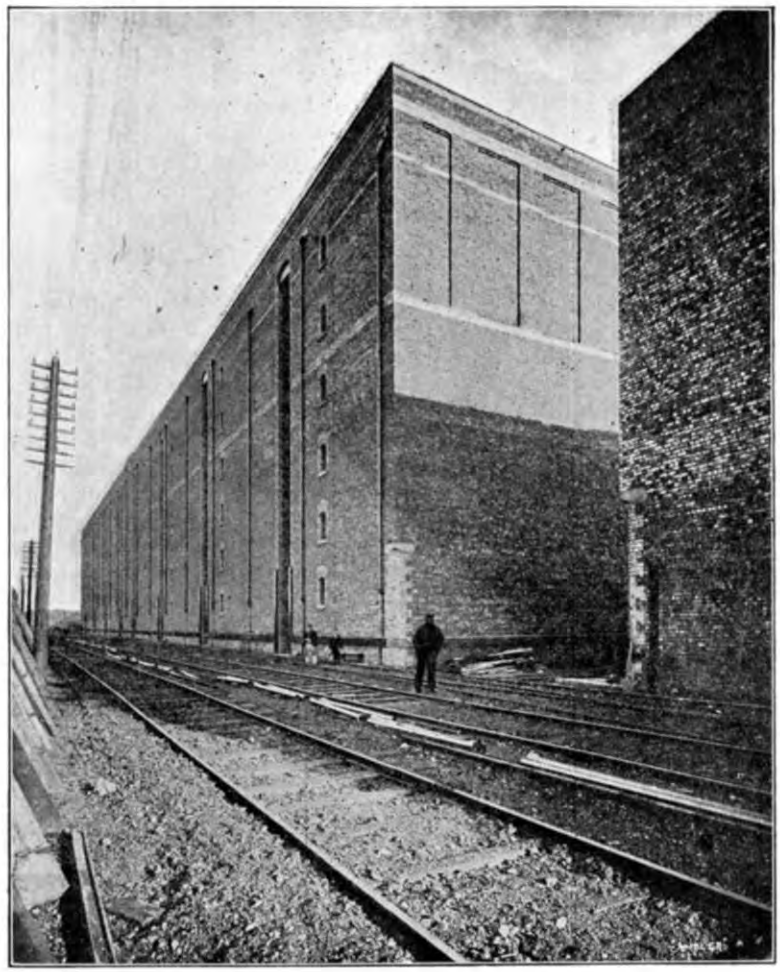
The episode of the frank and unselfish introduction of the project, backed by liberal subscriptions towards the cost of promotion both in and out of Parliament, gave the first great impulse; and the second great win for the cause was the favourable report of the Consultative Committee, backed by handsome subscriptions for shares, issued in 1886 after protracted deliberations extending over two months. This committee was called together by the Mayor of Manchester (Alderman Goldschmidt), and its decision was anxiously awaited as a virtual settlement of the question "to be or not to be"—the latter, certainly for a considerable time, if adverse.

The result was at once conveyed all round the circle; more meetings were held, courtesies exchanged and connecting links forged. Glasgow said, cheerily: "Go on and prosper, as you will do if you proceed as you are doing. Think of us and our little trickling Clyde, crossed by means of stepping stones only 120 years ago. We did not think our tonnage worth recording until 1831, when it stood at 732,327, revenue £18,392; but 50 years later this had grown to more than 3,000,000 tons, producing a trifle over £248,000 a year, and the population had grown also from 203,000 to 369,000. We owe all this to our navigation, without which our turnover would never have got beyond a few salmon."

Newcastle said, heartily, it reminded them of old times when they were paddling in 6ft. of water where they now have a depth of 22ft. at low tide, with a greatly increased width, gained by removing some 70,000,000 tons of obstructive material from the river bed, cutting off promontories and exploding a rocky cliff—Bill Point—that stood 72ft. above high water and extended 450ft. into the stream. And all this, together with the removal of a bar, which secured a low water depth of more than 20ft. instead of 6½ft., all the result of private enterprise and local determination.

Middlesbrough, too, was full of encouragement, and quoted from its proud register of difficulties conquered since 1808, when her sons went down the banks of the Tees towards Stockton to tow the ships by means of shoulder ropes. Since 1885 at least 20 miles of training walls have been built, and 2,000,000 tons of gravel and clay cleared from the channel; the waterway is 200ft. wide at Stockton and 500ft. at Middlesbrough; in 1863 the depth was 3ft. 6in., now it is 20ft. At one point 120,000 cubic yards of rock had to be broken up to a depth of 16½ft. and removed from the course; 2,600 acres of land had been reclaimed and about half of it sold.

The Provost of Dundee said to the writer: "I consider that the members of corporations ought to fraternise and do all they can to encourage and help each other in these large efforts for the public good."



A BLOCK OF THE SEVEN-STOREY WAREHOUSES.

This is sufficient to indicate the spirit that prevailed during the days of marching and camping out. Three years later, representatives from all these places and industries came at

different times to see the beginning of the fulfilment of what Jacob Bright called "this great design," and all those occasions have become historical.

VI.

The embarrassment of riches does not cease with the third and last aspect of the subject to be dealt with in this paper—what the Ship Canal has accomplished and what it can do.

Manchester is at once a natural terminus and starting point, a centre of great activity both ways. We have seen that 170 industrial towns helped to make the Canal, and an undisputed six millions of people have a direct and personal interest in supporting it, either in connection with what they make, what they use, or what they eat. In every instance relating to things that may be called essential the use of it means a saving, generally a large one; but when the saving looks small, regarded from the individual point of view, it still means a great deal to the individual, because to employers it frequently signifies a profit, and thus enables them to continue the operations upon which those individuals depend. This is the commercial view of what the Canal can do, that could not have been secured and would soon disappear without it, and should be kept constantly in sight. The continuance of these advantages depends entirely upon the presence and successful working of the Canal. The circumstances which rendered it necessary have not materially altered, and nothing has occurred to show that the same results could have been obtained in any other way, or that any permanent concessions of importance could be reasonably expected from any of the existing systems of transport.

The commercial case for the Ship Canal must always be considered in connection with the fixed and unalterable position of the railways. The frank manner in which the Liverpool deputation (1895) seeking a reduction of the railway rates was met by a polite but direct negative, should have revealed something to the most dense, and must have been a matter of certain knowledge to any one taking the trouble to find out what sort of a reduction must be made to be of any use whatever in competition. That deputation was a striking instance of the blind confidence some people cherish in the ability of the railway companies to reduce their rates to any level required to defeat anything else however legitimate, quite regardless of permanent charges or fixed cost. I do not believe that the railway companies really regard the Canal with the enmity with which they are often debited, because whatever tends to increase the stability of trade and manufacture must directly benefit them in their best paying departments, and most of the heavy traffic the Canal was built to take over and make a good profit out of, has been most distinctly referred to by them

on several important occasions as an unprofitable burden. The traffic the Canal was made to accommodate includes cotton, wool, flax, iron, iron ore, timber, oils, dyewoods, paper, paper-making materials, food stuffs, and also cattle. These the people within its area require for their own workmanship and consumption. They are not harassing any other centre of handicraft nor withdrawing anything from any place to which it can show a clear title. Their object has always been definite and their methods consistent; that object was to get relief from a tax to some extent justifiable, so long as it was inevitable, but which was made so only by the existence of a land barrier between Manchester—the commercial centre of this district—and the sea over which the material travels. For the return journey they offer the work of their hands and the productions of their mines—machinery, many articles of skilled manufacture, and abundant coal. "In what other part of the globe," said M. Fleury, the French expert, "are these two conditions so combined?" referring to the power of using raw productions and the power of producing what is wanted in all parts of the world.

Just before the Canal campaign commenced a Railway Rates Commission had been sitting, and much of the evidence there adduced had a direct bearing on the new case. One statement was that minerals were carried at a rate averaging 1s. 9¼d. per ton when their movement cost 2s. 2½d. (Five years later a further reluctant reduction of 2d. was obtained.) Mr. Findlay (London and North-Western Railway), combating the charge that Liverpool was unjustly hindered by the rates levied between that town and Manchester, explained that after paying terminal and collecting charges only 1s. 9d. was left for the thirty-one and a half miles of actual main line carriage out of the 9s. 2d. then paid for case and bale goods; and on November 1st, 1885, in consequence of the passing of the Ship Canal Act, this rate was reduced to 8s., leaving a margin of 7d. only. The Company's terminal buildings in Manchester and Liverpool cost £2,750,000, and £110,000 a year has to come out of earnings to pay 4 per cent on that. This is £6,000 more than the estimated cost of ordinary maintenance of the entire length of the completed Canal, which is set down at £2,000 per mile, and £400 per acre of docks. The goods stations at Liverpool alone cost more than the Canal Company paid for the Bridgewater Canal—a property 42 miles long, with 220 acres of docks and warehouses. After the Manchester and Liverpool terminal charges have been paid, there are, including shuntings, 57 miles of permanent way, wear and tear, steam power, and labour to be considered. It was said that during the first eleven months of the Canal's existence there was a difference of £400,000 in the railway turnover, caused by diverted traffic and reduction of rates, many of the latter probably private, and certainly temporary.

If there was previously a loss on part of this, and only a comparatively small advantage on the best of it, what does it matter, and why pretend to compete? Hence the merit of the flat refusal to the deputation.

The Canal is able to take over this heavy and in some cases almost barren traffic, and out of it can make a good position for itself, raise the industrial status of a great manufacturing district, including at any rate from two to three million adult skilled workers, and by thus improving the position of employers, which signifies for the men more regular employment, and as a result larger means for purchasing and travelling, the railways must be greatly helped in their two revenue-making departments—passenger and special traffic. Third-class passengers at fifteen to the ton yield 1s. 3d. per ton per mile for haulage only, as they load and discharge themselves, while it is stated that 3d. or 3½d. is the full average yield for heavy goods, including handling. Water carriage was intended to co-operate, not to compete, and each means of transport has a wide and definite sphere. The railway companies rightly decline combat with a foregone conclusion, merely to save some people the trouble of putting their business into the right grooves, knowing that if they carried many of these goods free of charge between Manchester and Liverpool the Canal could still offer inducements and pay its way, upon the basis of the Parliamentary schedule, beyond which it cannot and does not want to move.

On the 8th October, 1886, Mr. (now Sir) Bosdin T. Leech wrote in one of his vigorous letters: "I am prepared to prove that if the railways reduce their rates seventy-five per cent, the other benefits to Lancashire could still justify the introduction of independent through water communication. As the railways cost in primary working expenses about 55 per cent, and as 92½ per cent of the gross receipts even of the prosperous London and North-Western Railway disappear before the shareholders make a division, it is quite evident that the railways could not if they would enter into damaging competition with the Canal, which must be supreme for heavy goods not requiring speed."

The following are some of the savings per ton that were shown to be possible when Parliamentary permission to make the canal was obtained in 1885, after allowing for the reduction in railway rates made soon after the Bill passed. The comparison is between overland from Liverpool, and delivered in Manchester by the Ship Canal; cotton 6s. 8d. out of 13s. 8d., wool 8s. 8d. out of 16s. 5d., sugar loaves 11s. 3d. out of 17s. 11d., raw sugar 7s. 3d. out of 12s. 2d., bacon 8s. 5d. out of 15s., tinned meats 9s. 5d. out of 17s. 5d., tea 9s. 7d. out of 18s. 2d., wheat 5s. 1d. out of 9s. 11d., oranges 8s. 10d. out of 15s., petroleum 8s. 6d. out of 14s. 5d., tallow 7s. 8d. out of 13s. 6d., iron ore 4s. 1d. out of 6s. 11d., timber 4s. 8d. out of 9s. 5d.

Before going any further afield let us see how far this promise has been realised.

In November, 1893, two months before the Canal was opened for traffic, these figures, with many others upon which the Ship Canal case was based, were frankly reprinted by the Company as a direct reminder and means of test, and on November 21st, 1894, a comparative statement was issued, which has since been reprinted and confirmed, of which the following is a summary, and to which I have added the fourth column:—

	Cost viâ Liverpool to cart, Manchester.	Viâ Ship Canal to cart, Manchester.	Saving shown in 1885.	Present saving by Canal, 1896.
Cotton	13 8	6 3	6 8	7 5
Apples	15 3	5 0		10 3
Oranges	14 9	6 0	8 10	8 9
Tomatoes	18 7	6. 0		12 7
Iron Ore	6 11	1 0	4 1	5 11
Oil in Casks	13 10	4 9	8 6	9 1
Butter	15 6	6 3		9 3
Cheese	14 9	6 3		8 6
Bacon and Hams	15 0	6 3	8 5	8 9
Tinned Meats	17 5	6 3	9 5	11 2
Tea	18 8	7 3	9 7	11 5
Sugar in bags or casks	12 2	4 9	7 3	7 5
Paper	15 0	5 3		9 9
Tallow	13 6	4 9	7 8	8 9
Dyewoods	11 2	4 0		7 2
Timber, Logs	10 6	3 9		6 9
„ Deals, Battens, and Boards	8 11	3 0		5 11
„ Furniture Wood, Mahogany, &c.	12 4	4 0		8 4
Wool	16 4	6 3	8 8	10 1
Wood Pulp (Dry)	10 2	3 9		6 5
Wood Pulp (Wet)	10 2	2 9		7 5
Grain, Wheat (in sacks)	9 10	3 6	5 1	6 4
Flour	10 9	3 9		7 0
Onions	13 8	4 0		9 8

From this it will be seen that the promises of 1885 have been more than fulfilled, and that the benefits extend beyond the original list, which was intended merely as an indication of what might be generally expected. In order to show that these advantages belong to the entire Ship Canal area, a similar analysis has been applied to a number of the principal towns, with results proportionately satisfactory, the limitation of advantage, where such occurs, is in almost every case due to the absence of independent water access in the shape of barge canals. Three typical instances may be taken, all large users of raw materials and consumers of food. (1) Ashton, with an industrial population of 42,000, is 41 miles from Liverpool and 10 from Manchester. The total cost of carriage of cotton *via* Liverpool is 16s. 11d. per ton, *via* Manchester it is 11s., showing a saving of more than a third. The reduced railway rate

from Liverpool to Ashton is 10s. 5d., but to compete with the Canal it would require to be brought down to 4s. 6d., out of which 3s. 9d. must be deducted for terminal charges, leaving 9d. only to pay for 41 miles of carriage. (2) Todmorden, with 25,000 inhabitants, is 49 miles from Liverpool, and 24 from Manchester; total cost per ton *via* Liverpool 20s. 2d., *via* Manchester 14s., present railway rate 13s. 8d., rate to compete 7s. 6d. (3) Oldham, population 135,000, using about 160,000 tons of cotton a year, is crowded with cotton mills and machinery works. It is only seven-and-a-half miles from Manchester, forming part of Lancashire's inner circle, and the saving on cotton brought *viâ* Ship Canal and delivered there is 6s. 8d. out of 17s. 8d. The rail rate from Liverpool in order to reach the canal level would have to climb down from 10s. 8d. to 4s. 6d., or 9d. over the terminal charges as in the case of Ashton.

Wool from *ex* ship Liverpool to Manchester costs 16s. 4d. per ton, *viâ* canal it costs 6s. 3d. Halifax is 34 miles from Manchester, but there is independent water communication; much of the material required by the carpet and woollen manufacturers of this district has been brought round by Hull, at a saving of 2s. per ton over Liverpool. By the Ship Canal there is a further saving of 4s. 6d. secured, the total charge being 20s. against 26s. 6d. The manufactured articles will surely be returned by the same route, which is thirty miles nearer than Hull.

Iron and iron ore afford one of the most telling instances of the use and fitness of water carriage for weighty materials that are also awkward to handle. The various branches of the iron trade of Lancashire and the neighbourhood have probably suffered more from oppressive rates than any other branch of industry. In 1885 this was referred to in Parliament as amounting in some cases to as much as 117 per cent, a prohibitive tax. As two-thirds of the puddling furnaces and one-third of the rolling mills of Great Britain are to be found within the area directly served by the Ship Canal, and as one-third of the machinery exported from the United Kingdom proceeds from the same quarter, the vast importance of an all-round release in this direction is at once seen. The extent of that release is, that while pig iron costs *viâ* Liverpool to Manchester 6s. 10½d., and iron ore 6s. 11d. per ton, by Ship Canal they cost respectively 2s. 2d. and 1s. per ton; and while machinery in parts and in cases, collected from the makers' works to "free on board" at Liverpool, costs 13s. 11d., and at Hull 18s. 6d. per ton, it costs at Manchester 6s. only, with proportionate reductions for other kinds of machinery carried at owner's risk, in two and four ton lots.

The chairman, Mr. J. K. Bythell, after the Canal had been

opened eight months, said that he could multiply instances in which the trade of the district had been helped enormously by the savings which the Canal made absolute, and gave "chapter and verse" for two as being typical—(1) Cotton Yarns to the Continent cost 32s. 6d. per ton before the Canal was opened, the rate by Canal is 20s.; (2) Sugar from Hamburg formerly cost 22s. 6d., by Canal it is 12s. 6d. per ton.

The Manchester Wholesale Co-operative Society invested £20,000 in the Canal, and before it had been opened eight months it was publicly stated by one of their own officials that the society had very nearly recovered that amount.

FIRST SHED FULL OF COTTON AT MANCHESTER DOCKS.

Many economic writers have dealt with the subject of what the Canal has been the means of doing for Lancashire, and the following, from an article on "Manchester's Advance" in the *Manchester City News*, July 11th, 1896, is a fair expression of expert opinion:—

"In the course of an interview with another practical authority, not belonging to Manchester but well acquainted with our principal ports and all shipping ways and means, the question was put how far he considered the Manchester people were justified in associating the Ship Canal with the improved state of things? He said he thought the connection extended in every direction. The establishment of an industrial port

was always a safe and sound proceeding, and, in the particular case of Manchester, few ports had attained such a position in so short a time. There were no signs of amelioration until the Canal had become assured, and it had been shown by direct proof, and equally direct inference, that the presence of the Canal had saved the district fully £800,000 a year; consequently, quite £2,000,000 had been added to the industrial treasury, which meant a general benefit as certainly as the circulation of the blood affects every part of the human system. In the absence of the Ship Canal nothing of this would have happened, and there is no basis for the belief that any amount of effort could have drawn vitality out of the old conditions." *

Any substantial reductions on the part of the Mersey Docks and Harbour Board would be equally trying. When that Board was formed in 1857 it had to reckon with a sturdy group of vested interests, developed and nurtured by the Liverpool Corporation during a period of 150 years, and its bond-debt—not by any means directly representing value received in works or property by the Board or the estate—amounts to more than £16,000,000. So this burden of taxation may be said to serve the wholesome purpose of preventing the establishment of a monopoly, which always means the inflation of one part by the depression of another. Referring to the recent appeal (1895) to that Board by the Liverpool Cotton Association and the Fruit Brokers for a reduction of charges, the chairman of the Finance Committee, Mr. Robert Gladstone, said, in effect, that he would not vote against a reduction when it was proposed, but he could not say when that would be. He had always held that some of this traffic would pass forward to Manchester as it was unmistakeably the natural centre for it.

What was probably at the bottom of that speech was the knowledge, which anybody could gain with very little trouble, that if *the whole* of the Board charges were knocked off, amounting to 3s. per ton for cotton,† Manchester could still offer an advantage of 4s. and 5s. per ton to all who could cart their cotton from the docks, and an average of 3s. per ton to all the surrounding towns, while the saving on fruit represents a still larger percentage. Let us hope that this speech of Mr. Gladstone's, and the common sense grasp of the situation thus expressed in the *Liverpool Mercury* of October 2nd—"When

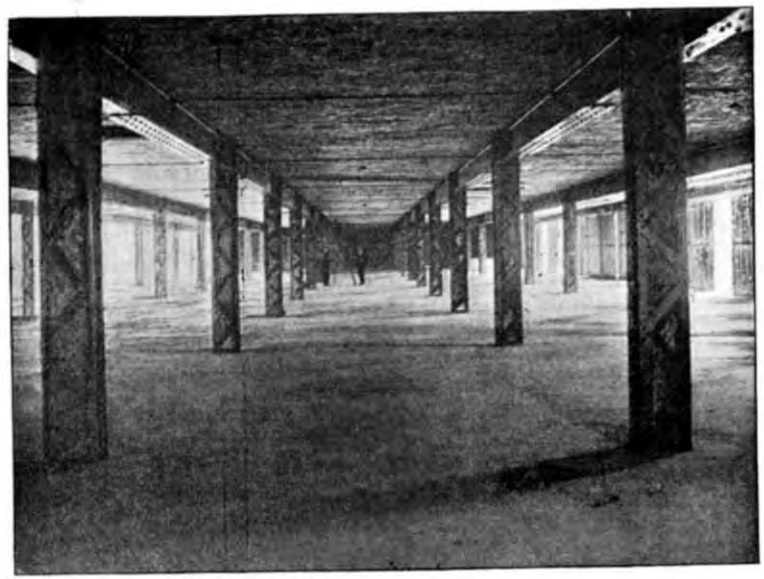
* Mr. Alderman Southern, in an important speech before the Manchester City Council, in April, 1896, said—"Complete success depends entirely on the development of traffic; there is abundant traffic to be secured to ensure success." He also quoted a report prepared for him by Mr. W. H. Collier, who has since been appointed Manager of the Ship Canal, and whose whole commercial training has been in the midst of the traffic of the district, in connection with the Bridgewater Canal. That report gives the bases of these estimates of savings, and it has since been adopted and supplemented in a most valuable manner with banking and other statistics, by Mr. A. Woodroofe Fletcher, in a paper read before the Manchester Statistical Society, February 10th, 1897, on "The Economic Results of the Ship Canal on Manchester and the Surrounding District."

† A futile shilling has since been taken off.

the Canal was made a competition to some extent with our own port was inevitable . . . . but the field of activity is still wide enough to enable compensation to be sought and found in other directions"—let us hope that these may be taken as signifying the advent of the time when "the envy of Ephraim shall depart and the adversaries of Judah shall be cut off; Ephraim shall not envy Judah, and Judah shall not vex Ephraim."

I pass over quite a score of points upon which it would be profitable to touch, all closely related to our subject and necessary to its complete demonstration.

Another chapter could be fully occupied on the lines of the last ten minutes, showing that the Canal is able and willing to



SECOND STOREY OF THREE-STOREY SHED.

complete its programme on the terms announced by its commercial heralds—showing, also, that every concession already gained by the community is part redemption of the original promises, whose complete fulfilment can be and can only be obtained by complete fidelity to the original engagements and clearly defined purpose, and that the delays, hindrances, and obstacles that have occurred, and may occur, are not part of it, but are cast in its way either by ignorance, prejudice, or cupidity. They have nothing whatever to do with its capabilities or capacity, both of which now belong to the settled order of things. No month has passed yet without solid advance

in some important direction, although one is reminded with painful frequency of those biting words of Tennyson—

> But these are the days of advance, the works of the men of mind,
> When who but a fool would have faith in a tradesman's ware, or his word?
> Is it peace or war? Civil war, as I think, and that of a kind,
> The viler, as underhand, not openly bearing the sword.

The work is proceeding without intermission, but the nature of it does not admit of a daily register, even friends must wait for results, and every individual one should work while he waits. Every advance means a death-blow to something that should not be allowed to live, that is against right principle, and consequently adverse to the general good; rings have to be broken and cliques dispersed that are not formed for the help or defence of the community, but for defiance rather and private emolument only.

It is no longer a question of the physical capacity of the Canal—that is proved; or of safety or economy—they are accepted. It has now become a matter of steady and persistent assertion against the usual hindrances that have harassed and will probably continue to impede every forward movement; all such movements must of necessity jostle something else, but there never was a period when more reasonable or willing concessions were made in recognition of every form of displacement or territorial right. And this fragment of contemporary history cannot be better concluded than by the simple statement of traffic and receipts so far.

	1894.	1895.	1896.
Traffic—Tons...	925,659	1,358,875	1,826,237
Receipts.....	£94,656	£136,759	£179,834

CAPITAL EXPENDITURE TO DECEMBER 31, 1893.

(Canal opened for Traffic January 1, 1894.)

For Construction and all expenses	£11,750,000
Land and Compensation	1,330,000
Bridgewater Canals Property	1,780,000
	£14,860,000

CAPITAL POWERS.

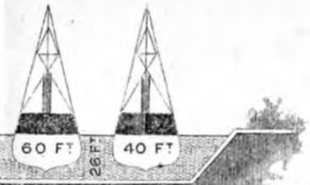
Ordinary Shares		£4,000,000
Preference Shares		4,000,000
		£8,000,000
Perpetual 3½ per cent 1st Mortgage Debentures	£1,359,000	
1st Mortgage Debentures—1914	453,000	
2nd Mortgage Debentures—1914	600,000	
New Mortgage Debentures — (Manchester Corporation Loan)	5,000,000	
		7,412,000
		£15,412,000

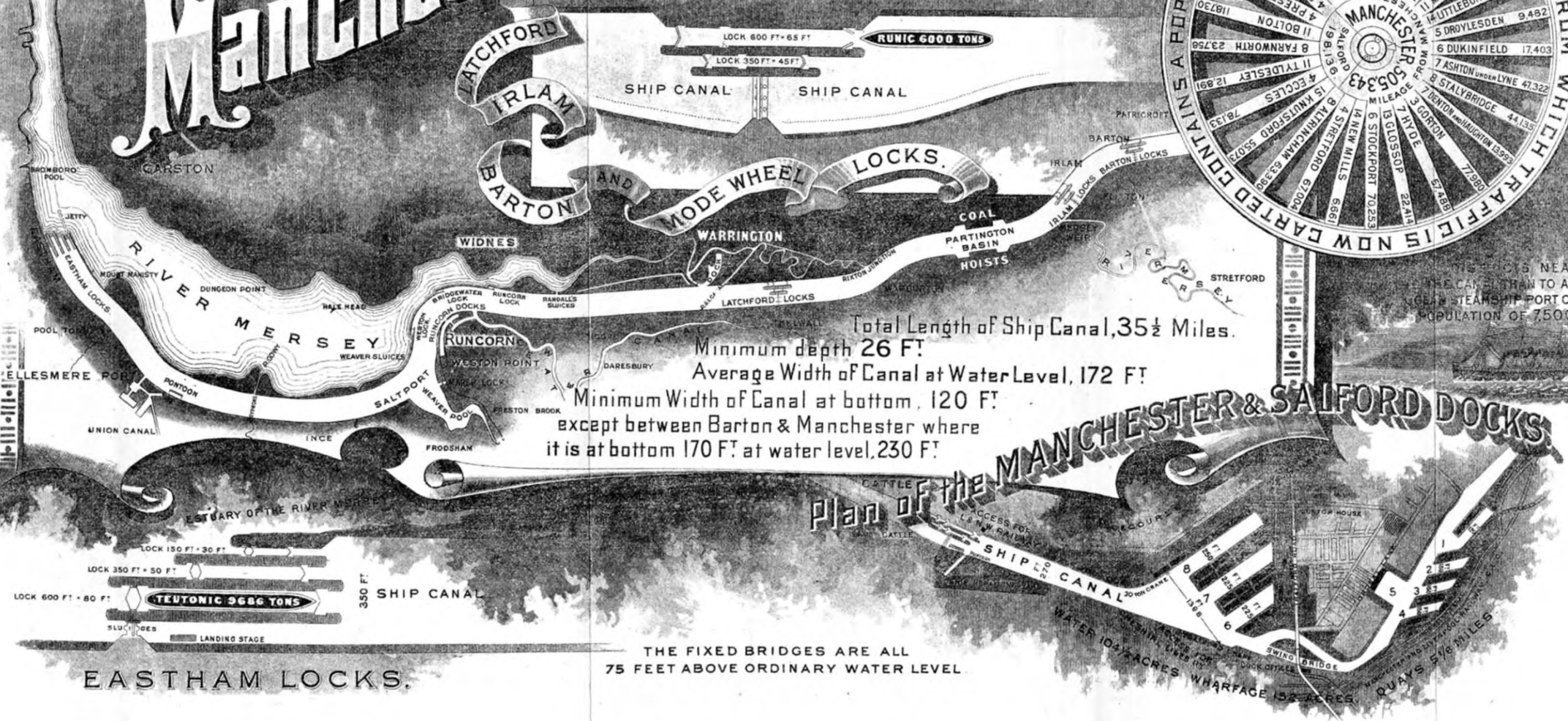
[The four larger pictures are from photographs by J. Ambler, Market Street; and the three smaller ones, kindly lent by the publishers of the *Paper Maker's Circular*, from photographs by Mr. E. Ward, Oxford Street.]

Manchester Ship Canal

CANALS IN COMMUNICATION WITH SHIP CANAL.

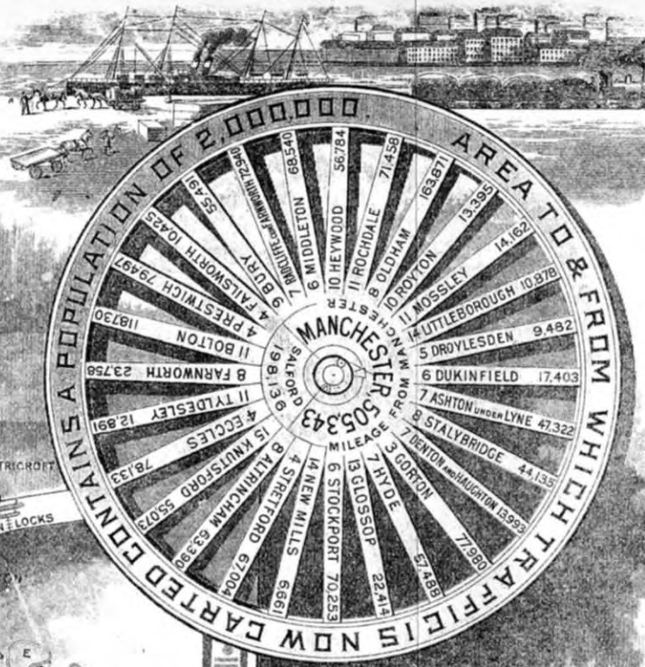
- BRIDGEWATER,
- SHROPSHIRE UNION,
- WEAVER NAVIGATION,
- TRENT & MERSEY,
- LEEDS & LIVERPOOL,
- ROCHDALE,
- BURY & BOLTON,
- ASHTON,
- HUDDERSFIELD,
- STOCKPORT,
- MACCLESFIELD,
- PEAK FOREST,
- CALDER & HEBBLE,
- AIRE & CALDER.





Total Length of Ship Canal, 35½ Miles.
Minimum depth 26 FT.
Average Width of Canal at Water Level, 172 FT.
Minimum Width of Canal at bottom, 120 FT.
except between Barton & Manchester where
it is at bottom 170 FT. at water level, 230 FT.

THE FIXED BRIDGES ARE ALL
75 FEET ABOVE ORDINARY WATER LEVEL



THE TOWNS NEARER THE CANAL THAN TO ANY OTHER OCEAN STEAMSHIP PORT CONTAIN A POPULATION OF 7,500,000.

Plan of the MANCHESTER & SALFORD DOCKS.

RAILWAYS IN DIRECT COMMUNICATION WITH THE SHIP CANAL.

- LONDON AND NORTH WESTERN,
- Gt WESTERN,
- MIDLAND,
- LANCASHIRE & YORKSHIRE,
- Gt NORTHERN,
- MANCHESTER SHEFFIELD & LINCOLNSHIRE,
- CHESHIRE LINES.