1914

The Leeds and Liverpool Canal.

By W. A. Rucklidge.

AS a means of carrying goods and material from place to place, rivers have been used from the earliest times, but, through the increased size of the boats and the gradual silting up of the channel, the necessity for continual dredging, compelled men to turn their attention to artificial waterways, or canals. No doubt, at first, short stretches were made in order to avoid difficult pieces of river navigation, but even before the Christian era there were countries possessing canals of a considerable length. A notable case in point was the Imperial Canal, in China, having a length of about 1,000 miles.

These early canals, however, exhibited no great skill or ingenuity, being of one uniform level, and it was not until the invention of the lock by Leonardo da Vinci, in the Fourteenth Century, showing how canals might be generally and advantageously used for inland navigation in countries whose surface was irregular, that a great impulse was given to this branch of engineering.

Even then, the latter half of the Eighteenth Century had been reached before canal navigation, through the sagacity, energy, and liberality of the Duke of Bridgewater and his celebrated engineer, James Brindley, assumed importance in England, which speedily became intersected with these watery highways to an extent unequalled in any European country save Holland.

Of these watery highways, the Leeds and Liverpool Canal is one of the longest and most important, affording communication between the Irish Sea and German Ocean. The great object of the original promoters was stated to be the construction of "a navigable communication between the east and west seas," for the effecting of which

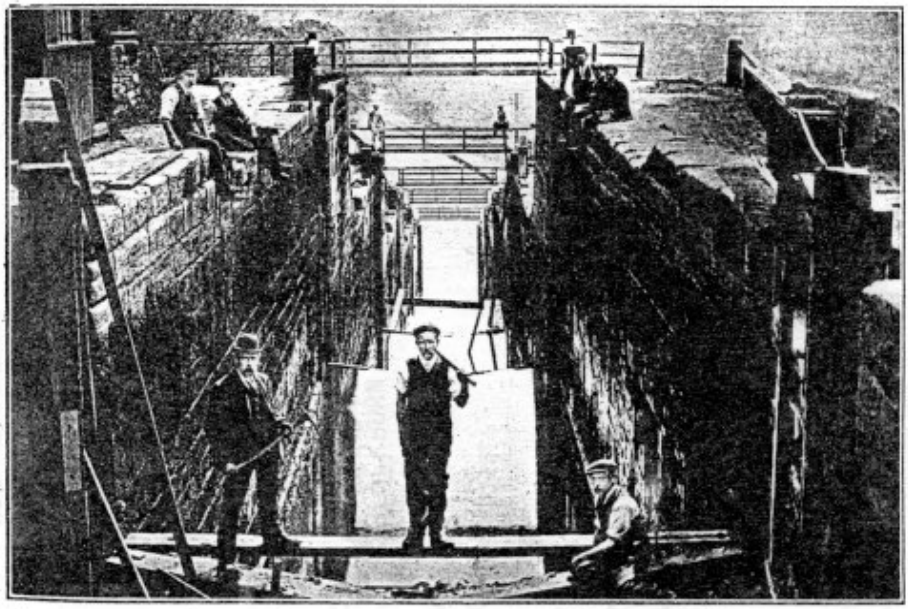
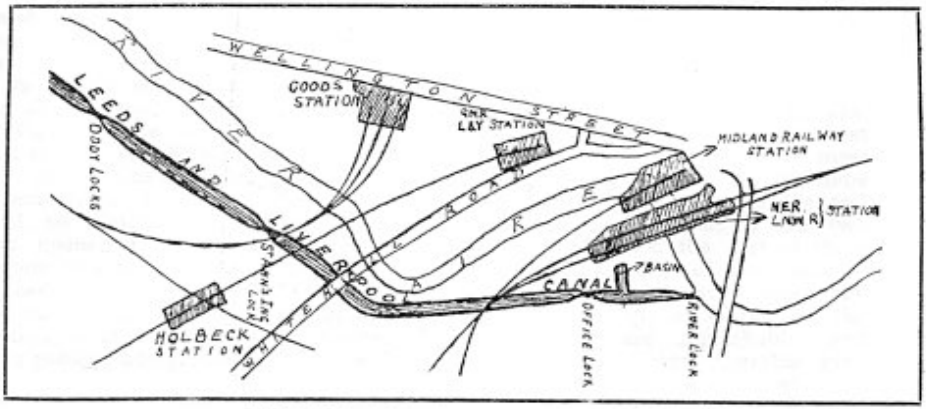


Photo. THE '5 RISE,' BINGLEY, FROM THE TOP LOCK, SHOWING ALL LOCKS OPEN. [*Moorhouse.*

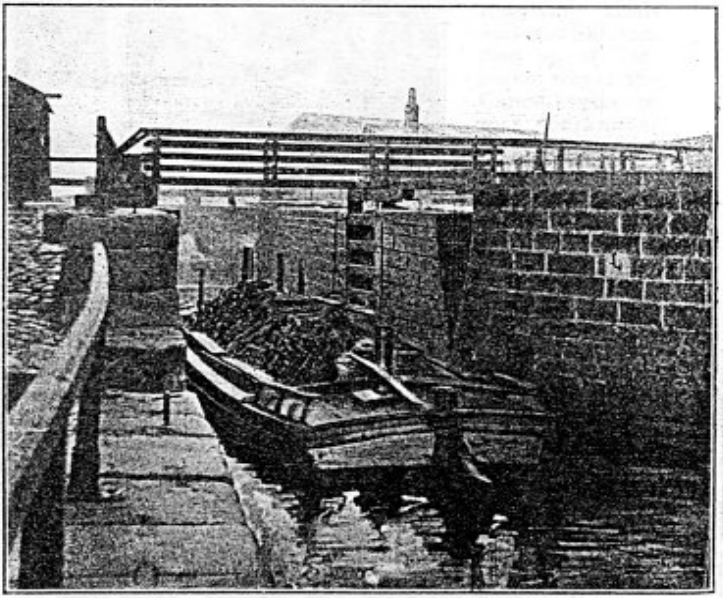


THE LEEDS AND LIVERPOOL CANAL AT LEEDS.

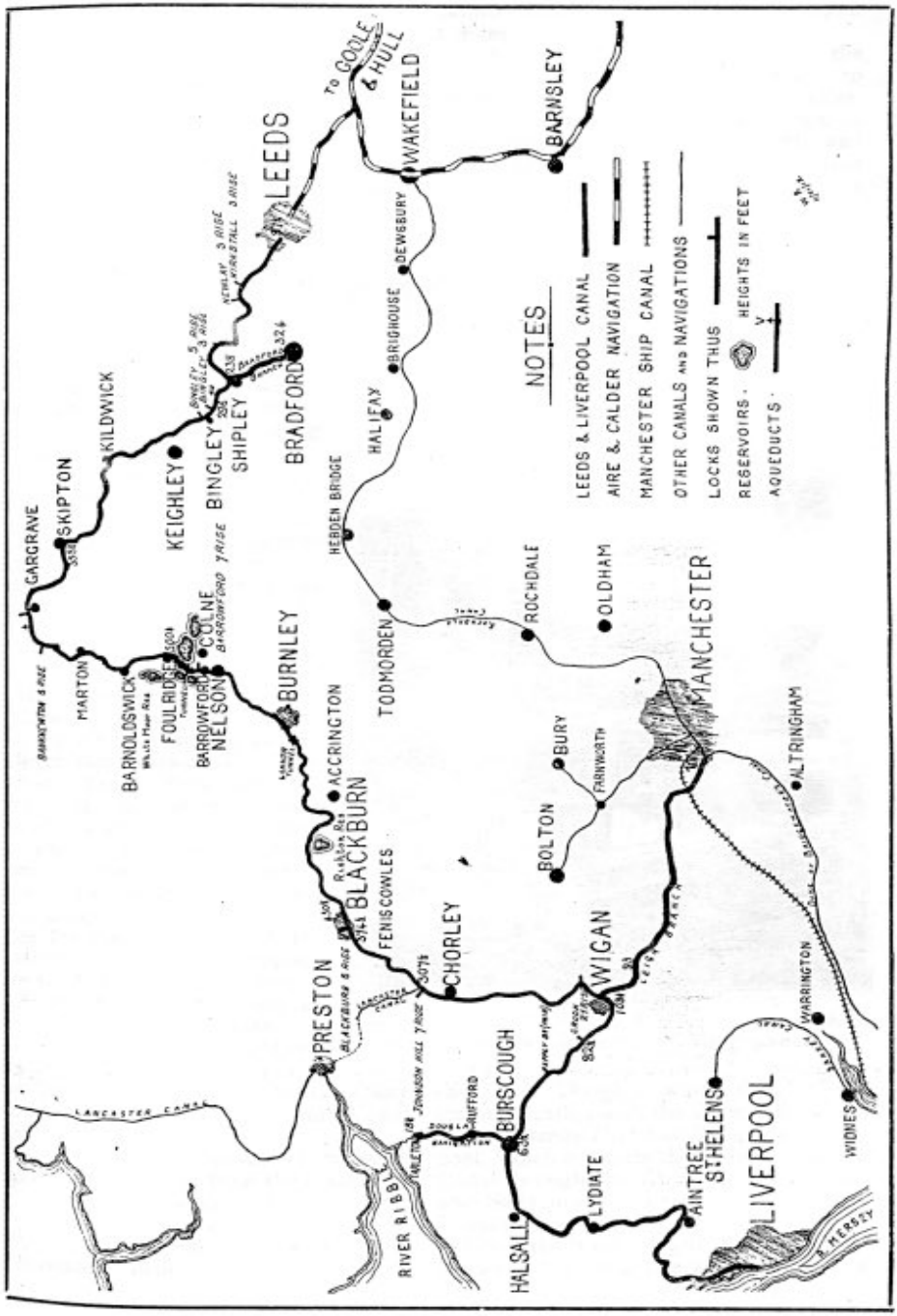
an Act of Parliament was obtained in 1770, by which they were constituted a body corporate, by the name of "The Company of Proprietors of Canal Navigation from Leeds to Liverpool," with power to raise the sum of £320,000 in shares deemed personal estate.

The line of the canal was first surveyed by Mr. Longbotham, whose plans, after being examined by that great surveyor, James Brindley, were adopted. Mr. John Hustler was one of the most active projectors, and Mr. James Fletcher was one of the principal engineers for the work, which was commenced at Halsall, in Lancashire, on November 7th, 1770, and continued with such great exertion and spirit that in a few years, in 1777, there were finished 33½ miles of the Yorkshire side, viz. from Leeds to Holmbridge, near Gargrave, and 28 miles on the Lancashire side, viz. from Liverpool to Newborough; but the money subscribed being all expended, the work was discontinued for several years.

In 1790 another Act was obtained to enable the Company to vary the line from the north to the south side of the river Calder, and to raise the further sum of



BARGE ENTERING LOCK THAT CONNECTS THE CANAL WITH THE RIVER AIRE AT LEEDS.

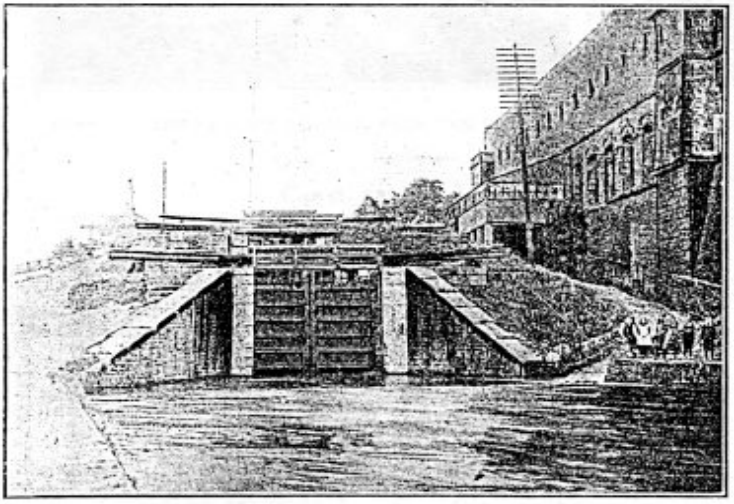


MAP OF THE LEEDS AND LIVERPOOL CANAL AND CONNECTING NAVIGATIONS.

money necessary. The work was now resumed, and in 1794 the Company obtained another Act to enable it to make a considerable alteration in the line, so as to pass near the growing towns of Burnley, Blackburn, Chorley, and Wigan, where the line joins the head of the Douglas Navigation.

The whole line, according to this arrangement, is 127¼ miles, and was finished on October 19th, 1816, when it was opened by a splendid aquatic procession, which passed along the Canal from Leeds to Liverpool.

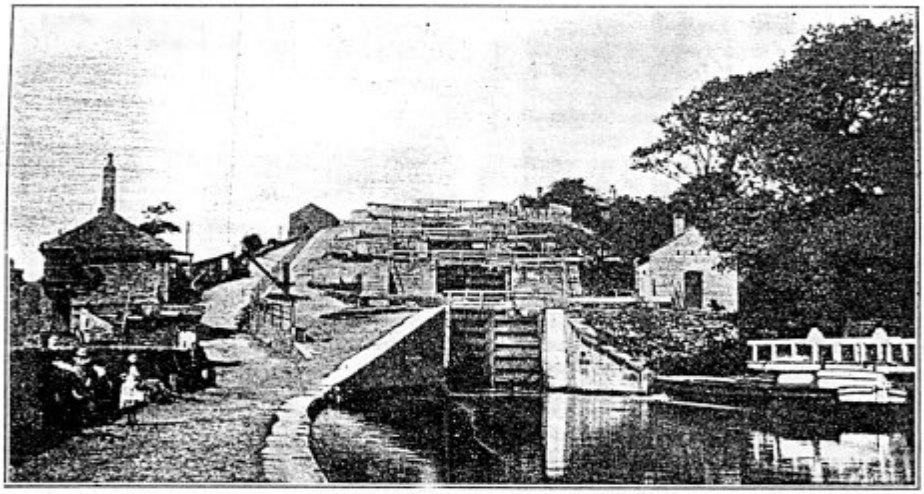
The summit of this extensive inland navigation is at Foulridge, near Colne, where it passes underground for a distance of 1,640 yards by a tunnel, which is 18 feet high and 17 feet wide. The fall eastward to the Aire at Leeds is 409½ feet, and westward to the basins at Liverpool 431 feet, which basin is about 52 feet above the river Mersey at low water.



THE '3 RISE' AT BINGLEY.

From Leeds, where the Canal is connected with River Aire by the River Lock, it follows the general course of the Aire back towards the river's source, passing through or close to the towns of Shipley, Saltaire, and Bingley. At Shipley the junction with the Bradford branch of the Canal is effected, and at Saltaire, where, owing to the great heaps of boulder gravel having prevented the straight eastward flow of the River Aire, and so causing it to wind round them, the Canal is carried over the river by an aqueduct, known as the Seven Arches. The "Arches" were constructed at the end of the Eighteenth Century by Mr. James Rhodes, but whilst one of the most interesting it was also one of the most costly engineering difficulties overcome in the construction of the Leeds and Liverpool Canal. At Bingley are two combinations of locks, the first of three "stairs," and the second of five "stairs." These, while they do not surpass the Brobdingnagian steps at Gatun on the Panama Canal, are remarkable, and the two sets being close together give one the effect of a gigantic staircase, enabling boats to be raised or lowered a distance of 90 feet.

From the top lock at Bingley there is a level run of sixteen miles to Holm Bridge, now on the northern side of the Aire, past Keighley, Kildwick and Skipton, then on to Gargrave, where the Canal begins to turn southwards to the Lancashire border, recrossing the River Aire about midway between Gargrave and Bank Newton. Here the Canal approaches its highest point, and after passing the six locks at Bank Newton and the three at Greenberfield, Summit Pool is reached—500 feet above sea-level. Near here is Foulridge Tunnel, 1,640 yards in length, through which the Canal passes. Formerly all boats were propelled through the tunnel by the method known as "legging"—that is, the boatmen lay on their backs on the deck of the boat and by pressing their feet against the roof or sides of the tunnel, caused the boat to proceed on its way. This mode of traction was necessary because there is no towing path through the tunnel, and



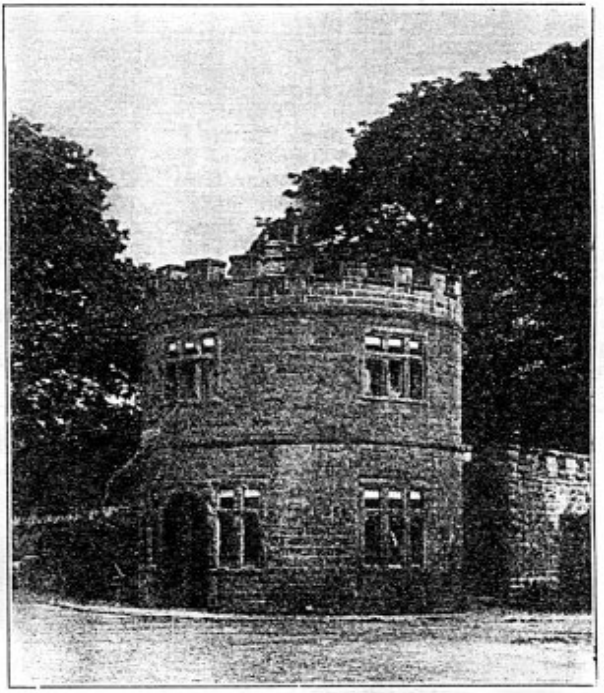
Photo] THE '5 RISE,' BINGLEY, FROM THE BOTTOM, SHOWING ALL LOCKS SHUT. [*Moorhouse.*

CANAL FROM LIVERPOOL TO LEEDS.

	Mls.	Fur.	Locks.	Rise. ft.	Rise. in.	Fall. ft.	Fall. in.	Height above the standard level at Liverpool. ft.	Height above the standard level at Liverpool. in.
From Liverpool to Douglas Navigation	24	7¾						63	7
Thence to Appley Lock	4	5¾							
,, ,, Crook Lock	3	2⅜	2	18	11				
,, ,, Leigh Branch at Wigan	3	0½	4	26	0				
,, ,, Junction of Lancaster Canal ..	1	0¾	21	198	10				
,, along Lancaster Canal to Chorley ..	8	6¾						307	4
,, to junction of Leeds and Liverpool Canal and Lancaster Canal, near Whittle-in-the-Wood	1	2							
,, ,, Johnson's Hillock Top Lock	0	5⅜	7	67	3				
,, ,, Blackburn Bottom Lock	7	1¼						374	7
,, ,, ,, Top ,, ...	0	6	6	55	10				
,, ,, Burnley	16	4¾						430	5
,, ,, Barrowford Summit Lock	7	5¼	7	69	11				
,, ,, end of Summit Pool	6	0						500	4
,, ,, Bank Newton Bottom Lock	5	4⅞	9			86	4		
,, ,, below Holme Bridge Lock	2	0	6			58	3		
,, ,, Skipton	4	1						315	9
,, ,, Bingley Bottom Lock	12	7¾	5			59	10		
,, ,, Bradford Canal	3	4¾	6			57	11	238	0
,, ,, Apperley Bridge	3	6¾	5			48	11		
,, ,, New Leeds Locks	4	0							
,, ,, Aire and Calder Navigation at Leeds Junction with the Aire is	5	0	13			101	5	87	8
	127	1¼	91	436	9	412	8		
DOUGLAS NAVIGATION.									
Junction with the Leeds and Liverpool Canal is								63	7
From Leeds and Liverpool Canal to River Ribble near Hesketh is	9	0	8			45	1		
Tail of Tarleton Lock is..								18	6
BRADFORD BRANCH	3	0	10	86	2			324	2
LEIGH BRANCH	7	0	3			15	2		

about 150 miles, which compares very favourably with the total navigation of the Birmingham Canal (158 miles 70 chains), and also with the Grand Junction Canal with a total navigation of 188 miles 51½ chains. Probably, the main line of the Canal, viz. from Leeds to Liverpool, is longer than the main line of any other canal in Great Britain, that approaching nearest to it being the main line of the Grand Junction Canal, from Brentford to Braunston, in Northamptonshire, 93½ miles in length, whereas the length from Leeds to Liverpool is 127¼ miles.

The table on page 30 shows the distance from place to place on the canal, with the number of locks, and rise or fall in that distance, and in certain instances the height above the Standard Level at Liverpool, which is 6 ft. 10 in. below the cill of the Old Dock Gates at Liverpool.



Photo] THE OLD CANAL TOLL HOUSE, COTTINGLEY. [*Moorhouse.*

On the main line of the Canal there are ninety-one locks, which are single ones, with the exception of the following, which are "staircase" locks, that is, there are two or more in immediate succession :—

The 5 Rise at Bingley Upper Locks is the greatest rise on any canal in the country.

At Ell Meadow, Dean and Appley, there are two locks side by side having dimensions as given in table below.

		Length.		Width.		Depth of Water on Cill.		Total Rise or Fall.	
		ft.	ins.	ft.	ins.	ft.	ins.	ft.	ins.
Oddy Locks	2 Rise	66	3	15	4	5	0	13	6
Forge ,, ...	3 ,,	66	10	15	0	5	0	26	6
Newlay ,, ...	3 ,,	65	2	15	4	4	9	26	4
Dobson ,, ...	2 ,,	65	6	15	2	4	7	23	8
Field ,, ...	3 ,,	66	3	15	3	4	9	25	5
Dowley Gap Locks	2 ,,	64	4	14	11	4	10	18	2
Bingley Lower ,, ...	3 ,,	64	10	15	0	5	9	28	11
,, Upper ,, ...	5 ,,	65	4	14	10½	5	0	59	2

		Length.		Width.		Depth of Water on Cill.		Total Rise or Fall.	
		ft.	ins.	ft.	ins.	ft.	ins.	ft.	ins.
Ell Meadow	pair	77	7	15	4	6	1	6	6
Dean	,,	77	8	15	6	5	5	6	7
Appley	,,	77	9	15	6	4	6	11	3

Table Showing Distances from Place to Place on the Canal.

	Distance from Leeds. Mls. Fur.
Leeds River Lock	—
Oddy Locks..	0 6
Kirkstall Forge Locks	4 0
Newlay Locks	4 4
Apperley Bridge Wharf and Dobson Locks	9 0
Field Locks	10 2
Junction with Bradford Canal	12 4
Shipley Wharf	12 6
Dowley Gap Locks	14 3
Bingley Dubb Wharf	15 2
,, Lower Locks	15 3
,, Upper ,, ...	16 2
Silsden Wharf	22 4
Kildwick Wharf	24 2
Snaygill Bridge	27 6
Shipton Wharf and Junction with Springs Branch	29 0
Bottom Lock, Gargrave, and Holme Bridge	33 2
Gargrave Wharf	33 6
Top Lock, Gargrave	35 0
,, ,, Bank Newton	35 6
Salterforth Wharf	43 4
Foulridge ,, ...	45 0
N.E. end of Foulridge Tunnel	45 1
Top Lock, Barrow Ford	46 6
Nelson Wharf	48 6
Brierfield ,, ...	50 2
Burnley ,, ...	54 4
Gannow Bridge Coal Tips	56 0
Rose Grove Wharf..	56 4
Hapton Bridge	58 2
Enfield	62 2
Church Wharf	64 0
Rishton Bridge	66 0
Blackburn, Eanam Wharf	70 2
Cherry Tree Wharf	73 0
Johnson's Hillock	79 2
Junction with Walton Summit Branch	79 6
Adlington Wharf	85 0
Wigan Top Lock	90 0
Junction with Leigh Branch Between Locks 85 and 86	92 0
Ell Meadow Lock	94 0
Crook Lock	94 4
Appley Bridge	97 4
Junction with Rufford Branch	102 4
Halsall Bridge	108 4
Lydiate [Holme's Bridge]	112 6
Litherland Bridge	122 6
Liverpool Terminus	127 2

From Leeds up to Summit Pool, which is practically at Foulridge, there are forty-four locks, and from Summit Pool to the Liverpool end there are forty-seven; but all these are single locks, and thirty-six of them occur between Wigan and Blackburn, including the 21 Rise, which occupies just a little over a mile of the Canal, having a total rise of nearly 200 ft.

On the Rufford Branch, or Douglas Navigation, there are eight single locks at Lathom (Top), Lathom (second lock), Runnel Brow, Moss, German, Baldwins, Rufford and Tarleton. The average minimum length, width and depth of water on cill are 68 ft. 10½ in., 15 ft. 6 in. and 5 ft. 2 in. respectively, although the last one is a high one, as the depth of water on cill at Tarleton is 8 feet, so that the real average for the other seven is 4 ft. 10 in. The average rise or fall from Lathom Top to Rufford is 5 ft. 7 in.

There are three locks on the Leigh Branch, viz. Dover Top, Dover Low and Plank Lane, with averages as above of 77 ft. 1 in., 15 ft. 11 in., and 5 ft. 6 in.; the average rise or fall of the three locks is 4 ft. 11 in.

There are only two tunnels on the Canal, one at Foulridge, 1,640 yards in length, and the other at Gannow, near Rose Grove, 559 yards long. In the former the minimum above the water-level is 8 feet, and the minimum width at water-level is 17 feet, and in the Gannow tunnel the measurements are 10 ft. 6 in. and 16 ft. 5 in. respectively.

The water supply of the Canal is maintained by reservoirs and streams. The following are the reservoirs, with their capacities:—

*Winterburn	45,250,000	cubic feet.
Great	57,500,000	,, ,,
Upper	18,000,000	,, ,,
Slipper Hill	6,000,000	,, ,,
Whitemoor	23,500,000	,, ,,
Barrowford	16,000,000	,, ,,
Rishton	22,000,000	,, ,,

*Calculated, when full, to hold 285,000,000 gallons, with an area of top water 40 acres. It cost nearly £90,000.

The chief streams used are Marton and Eshton Becks, in Yorkshire, and the River Douglas, in Lancashire.

As the measurements of the locks on the Canal are not uniform, there must be a maximum limit for vessels passing from one point to another. The maximum length of vessels that can use the navigation are:—

On Main Line.	Ft.	In.
From Leeds to 21 Lock at Wigan ..	62	0
,, 21 Lock at Wigan to Liverpool..	72	0
Width	14	3
Draught from Leeds to Skipton	3	11
,, ,, Skipton to Blackburn ..	3	9
,, ,, Blackburn to Liverpool ..	4	3
Headroom	7	6

For the branch canals, we have the following maxima for the boats:—

	Length ft.	Width. ft.	Width. in.	Draught. ft.	Draught. in.
Springs Branch ..	62	14	3	3	9
Walton Summit ..	62	14	3	3	3
Leigh Branch ..	72	14	3	4	3
Rufford Branch ..	62	14	3	3	6
Stanley Dock Cut..	72	*14	6	4	9

* Vessels over 14 ft. 3 in. can only navigate between Litherland and terminus of Canal at Liverpool.

The Leeds and Liverpool Canal 'short boats,' which are the maximum size which can pass between Leeds and the bottom of the twenty-first lock at Wigan, measure about 62 feet long by 14 ft. 3 in. beam, and draw when empty about 1 ft. 2 in., and when loaded with 45 tons, about 3 ft. 9 in. When these boats are constructed for use as steamers they are built so as to measure about 1 foot shorter and 3 inches less in width, the reduction in cargo carrying being nearly 15 tons.

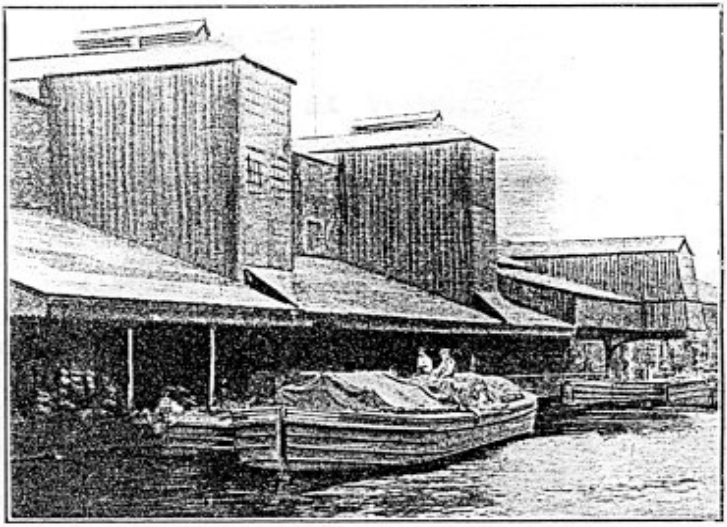
The Leeds and Liverpool Canal Company, as well as other carrying companies who use the Canal, are general carriers between Liverpool and Birkenhead and all places on the main line and branches of the Canal. There is a daily service of steam and other fly-boats between Liverpool and Wigan, Leigh, Blackburn, Church, Accrington, Burnley, Nelson, Skipton, Keighley, Bradford, Leeds and intermediate towns.

In connection with steam and sailing vessels, *via* Liverpool, and in conjunction with the Aire and Calder Navigation, which deals with boats to and from Goole and Hull, there is also communication to the above-named places, as well as with Manchester.

Of three water routes from Liverpool to Hull, that by the Leeds and Liverpool Canal, although the longest, has the advantage in the smaller number of locks used. (See page 34.)

It will be noticed that the shortest route is the one containing the greatest number of locks, whilst on the longest route the least number of locks is encountered.

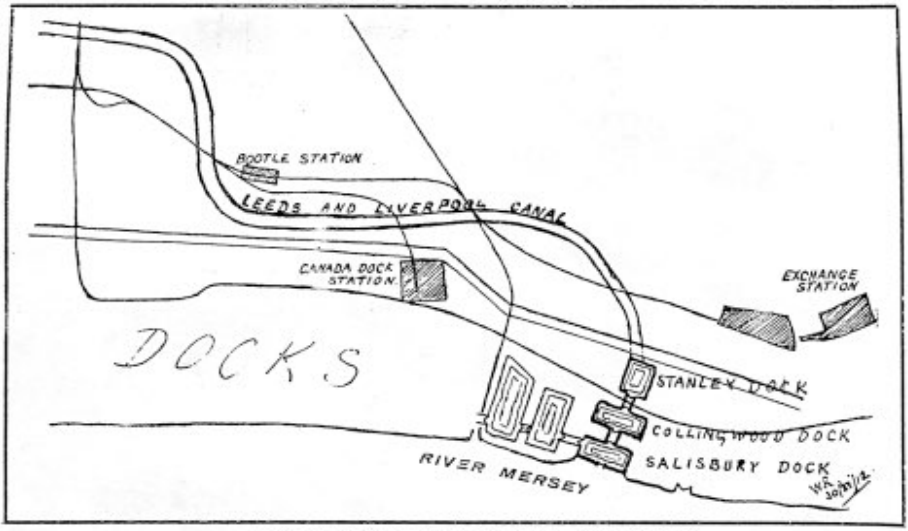
The time taken in the journey from Leeds to Liverpool by fly-boats is three days and three nights, whereas slow boats, working seven hours a day, take seven days. Except where the two tunnels occur there is a tow-path the whole length of the Canal. Traffic is worked through the tunnels by the Canal Company's



EANAM WHARF, BLACKBURN.

steam tug, which leaves Foulridge end at 6 a.m., 8 a.m., 10 a.m., 12 noon, 2 p.m., 4 p.m., and 6 p.m. on each day except Saturday and Sunday; the same times, except 4 p.m. and 6 p.m., apply to Saturday, and only 8 a.m. and 4 p.m. to Sunday. From the Barrowford end the times are an hour later in every case. In regard to the Gannow tunnel, the tug leaves the Burnley end every hour from 7 a.m. to 7 p.m. from Monday to Friday, and on Saturday each hour from 7 a.m. to 3 p.m. From the west end of the tunnel the times are at the half-hours in each instance. The tug does not run on Sundays.

In calculating distances for purposes of



THE LEEDS AND LIVERPOOL CANAL AT LIVERPOOL.

charges, the summit pools at Barrowford and Wigan are taken as equal to a distance of 9 miles, and the summit pool at Leeds as 4 miles, and each mile between the Liverpool termini at Pall Mall and Stanley Dock and Litherland Bridge is reckoned as 2 miles, and the same with each mile between the terminus of the Canal at Leeds and Newlay.

The Canal Company owns about 200

Route I.		
Leeds and Liverpool Canal ...	Liverpool to Leeds	Miles: 187¼
Aire and Calder Navigation ...	Leeds to Goole	Locks: 104
River Ouse and River Humber	Goole to Hull	
Route II.		
River Mersey	Liverpool to Eastham	
Manchester Ship Canal ...	Eastham to Runcorn	
Bridgewater Canal	Runcorn to Manchester	
Rochdale Canal	Manchester to Sowerby Bridge	Miles: 159
Calder and Hebble Navigation	Sowerby Bridge to Wakefield	Locks: 149
Aire and Calder Navigation ...	Wakefield to Goole	
River Ouse and River Humber	Goole to Hull	
Route III.		
River Mersey	Liverpool to Eastham	
Manchester Ship Canal ...	Eastham to Runcorn	
Bridgewater Canal	Runcorn to Manchester	
Rochdale Canal	Manchester to Manchester	
Ashton Canal	Manchester to Ashton	Miles: 149
Huddersfield Narrow Canal ...	Ashton to Huddersfield	Locks: 152
,, Broad ,, ...	Huddersfield to Cooper Bridge	
Calder and Hebble Navigation	Cooper Bridge to Wakefield	
Aire and Calder Navigation ...	Wakefield to Goole	
River Ouse and River Humber	Goole to Hull	

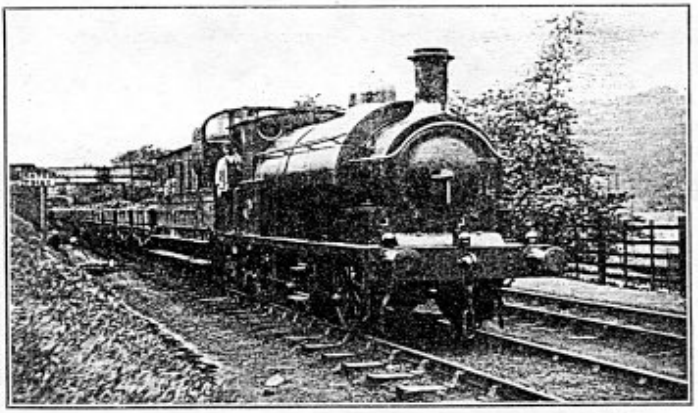
boats, of which between thirty and forty are steamers, and also about 120 horses for haulage purposes. The boats are built at various places along the Canal, such as Leeds, Burnley, Whitebirk (near Blackburn), Wigan and Liverpool, and the whereabouts of the wharves can be ascertained from the table showing the distance of the various places from Leeds.

The loads carried include stone, coal, grain, cotton, provisions and timber, but the length of boat and width of canal—42 feet—would allow for the porterage of articles which might not be convenient or suitable for other methods of communication between town and town.

For business purposes, the canal is divided into two sections—the Yorkshire section, superintended from Leeds, and the Lancashire section, superintended from Blackburn—with offices, wharves and warehouses at the principal towns through which the canal passes.

In conclusion, the writer would wish to thank the officials of the Leeds and Liverpool Canal Company for information and facts which were given to him, and also Mr. H. R. de Salis, author of *Canals and Navigable Rivers of England and Wales*, for permission to obtain certain data and to insert some of the tables in his book dealing with this canal.

A Ballast Train at Work.



Photo] [*Mr. G. W. Smith.*

Can any of our readers recognise to which railway the locomotive, etc., belong?

Mark answer "BALLAST."