NORTH-EASTERN COLLIERS ANCHORED DURING THE DURHAM COAL STRIKE, TYNE DOCK.

THE NORTH-EASTERN RAILWAY AND ITS ENGINES.

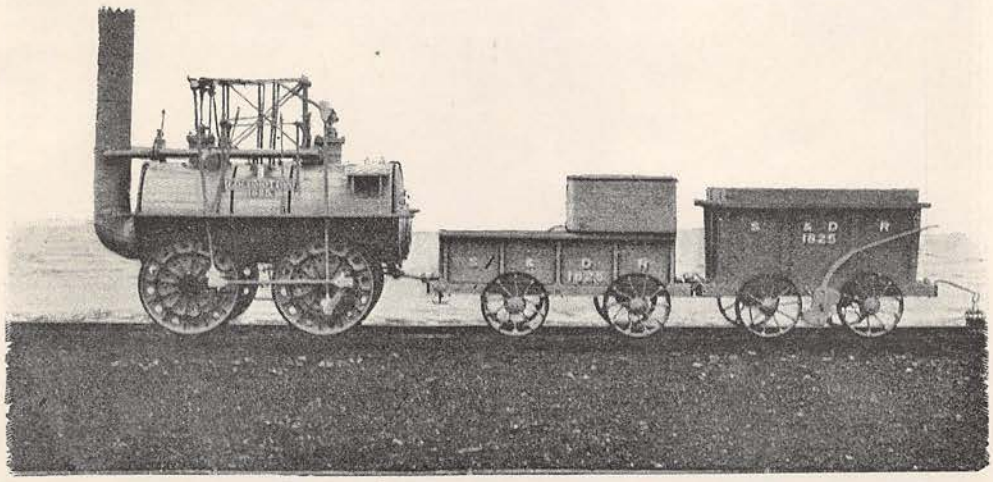
By WILSON WORSDELL, Chief Locomotive Superintendent.

Illustrations from Official Photographs.

THE North-Eastern Railway was formed in 1854 by the union of the York, Newcastle and Berwick, the York and North Midland, the Leeds Northern and the Malton and Driffield lines; it practically monopolises the traffic of the north-eastern counties of England. Stretching from Doncaster and Sheffield in the South, to Normanton, Leeds and Bradford in the West Riding of Yorkshire, to Hull, Scarborough and Whitby in the East Riding, the line runs through the city of York, at which point the Great Northern, Midland and Lancashire and Yorkshire Companies all work into the North-Eastern Company's Station. The main trunk line proceeds from York in a north-westerly direction, and branches run from it to the west, touching the Midland at Hawes, and the London and North-Western at Tebay and Penrith; to the east the main line serves the manufacturing centres of Stockton, Middlesborough, Hartlepool, Darlington, and the great mining districts in the county of Durham, while from Durham a branch line leads to Sunderland. The main line, continuing through the picturesque Team Valley, brings the traveller in about twenty minutes to the city of Newcastle, where the Tyne is spanned by Stephenson's famous high level bridge. From thence the railway passes through the county of Northumberland, skirting the sea-coast nearly all the way, and after passing near Alnwick reaches the border town of Berwick, by the celebrated bridge which crosses the Tweed (designed by the late Mr. T. E. Harrison, C.E., who was for many years chief engineer to the Company). From Alnwick, a recently constructed branch line runs in a northerly direction across Flodden Field to the border town of Coldstream. Branching off westwards from Newcastle, another section of the line passes through the village of Wylam, the birthplace of the Stephensons, and other places of interest, until it reaches Carlisle, the junction for seven different English and Scotch railways.

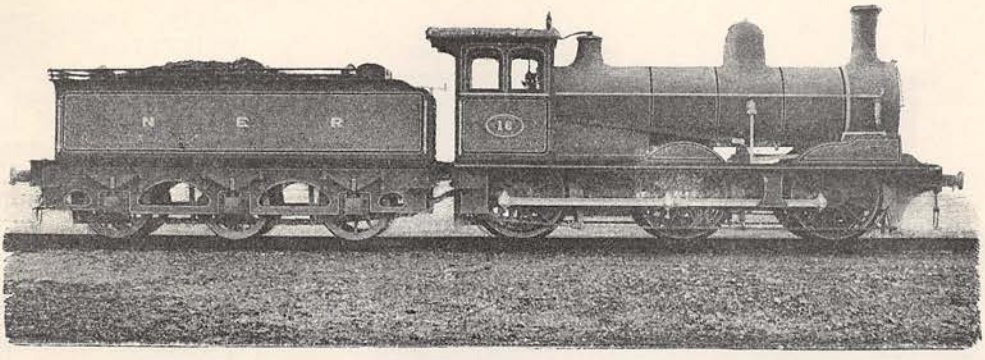
From Berwick to Edinburgh the railway is the property of the North British Company, but the whole of the "East Coast" express trains are worked to Edinburgh by the North-Eastern Company's engines. This is the route of the well-known "Flying Scotchman." Leaving King's Cross or Waverley at ten o'clock in the morning, travellers may reach either metropolis at half-past six in the evening, a fine performance

even in these days, seeing that the distance of 395½ miles is covered in eight and a half hours, inclusive of the stop for dining at York. When the races between the east and west routes were on in the summer of 1888, the Scotch express cleared the eighty and a



STEPHENSON'S "LOCOMOTION," BUILT 1825. NOW STANDING ON A PEDESTAL IN DARLINGTON STATION.

half miles from York to Newcastle in eighty-two minutes, and ran from Newcastle to Edinburgh, a distance of 124½ miles, in 128 minutes, reaching Edinburgh at 5.26 P.M., or one hour and four minutes earlier than the present advertised time. It is on this

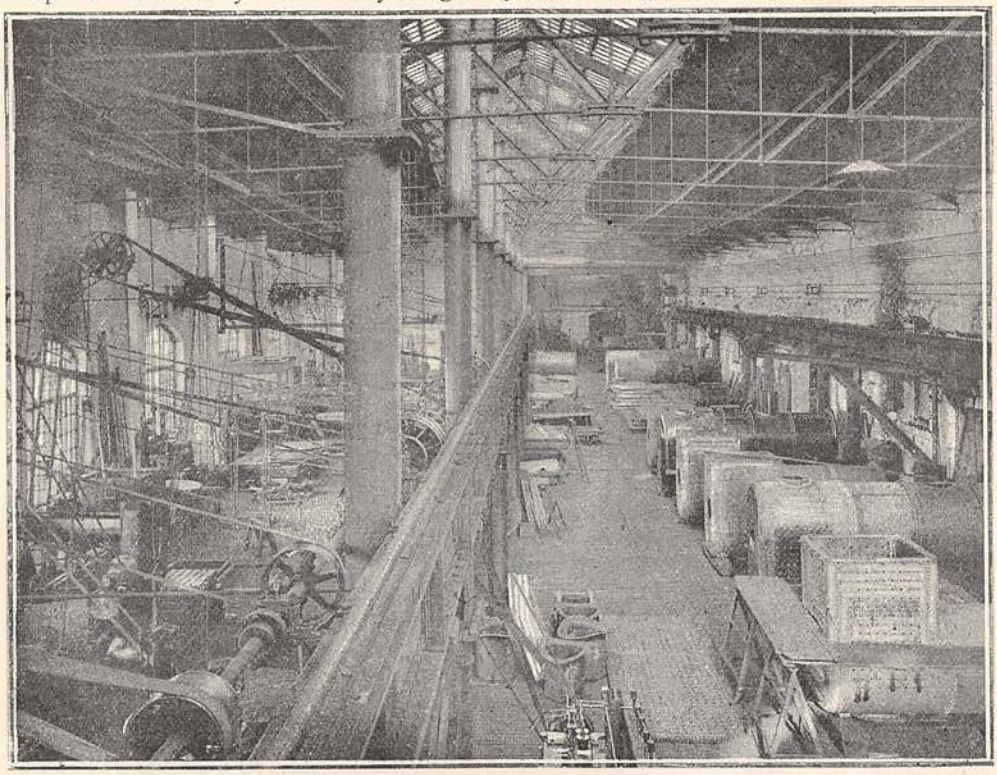


Compound goods engine, with 6-coupled 5-feet wheels, 18 and 26-inch cylinders, and 24-inch stroke ; was built in 1886 by Mr. T.W. Worsdell for the fast goods traffic from Newcastle to Berwick, Leeds, York, Carlisle, &c., and has given great satisfaction, showing a saving in the consumption of fuel of from 15 to 18 per cent.

section, that the express which leaves King's Cross at 8.30 P.M. runs from Newcastle to Edinburgh in two hours and forty-six minutes without a stop, one of the longest runs made by an engine without stopping to take in water.

The oldest section of the North-Eastern Railway is the Stockton and Darlington

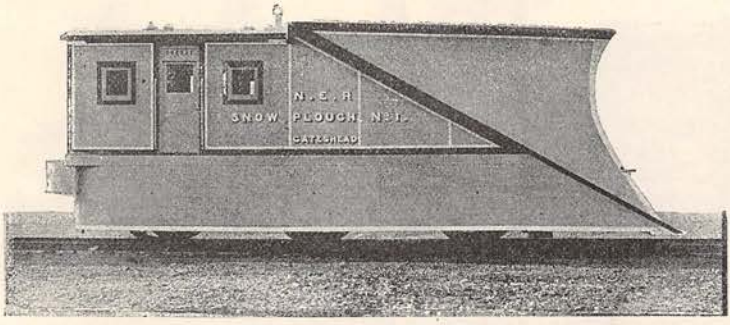
line, which, in fact, is the oldest bit of railway in the world, having been opened in 1825, though not amalgamated with the North-Eastern until 1863. The entire system comprises about forty-two railways originally independent, but amalgamated at various



BOILER SHOP.

times, in some cases before incorporation with the main system: the last amalgamation was with the Blyth and Tyne Railway, which was acquired in 1874.

The length of line worked by the Company is 1578 miles, and the train mileage run in the year 1891 reached a total of nearly twenty-seven millions; the engine mileage exceeded forty-one millions, which is not far short of half the earth's distance from the sun. The amount of capital sanctioned up to December 31st, 1891, was £61,149,365; the revenue last year amounted to over £7,000,000, and the expenditure to over £4,000,000, leaving a balance of fully £3,000,000 for the payment of interest and dividends.

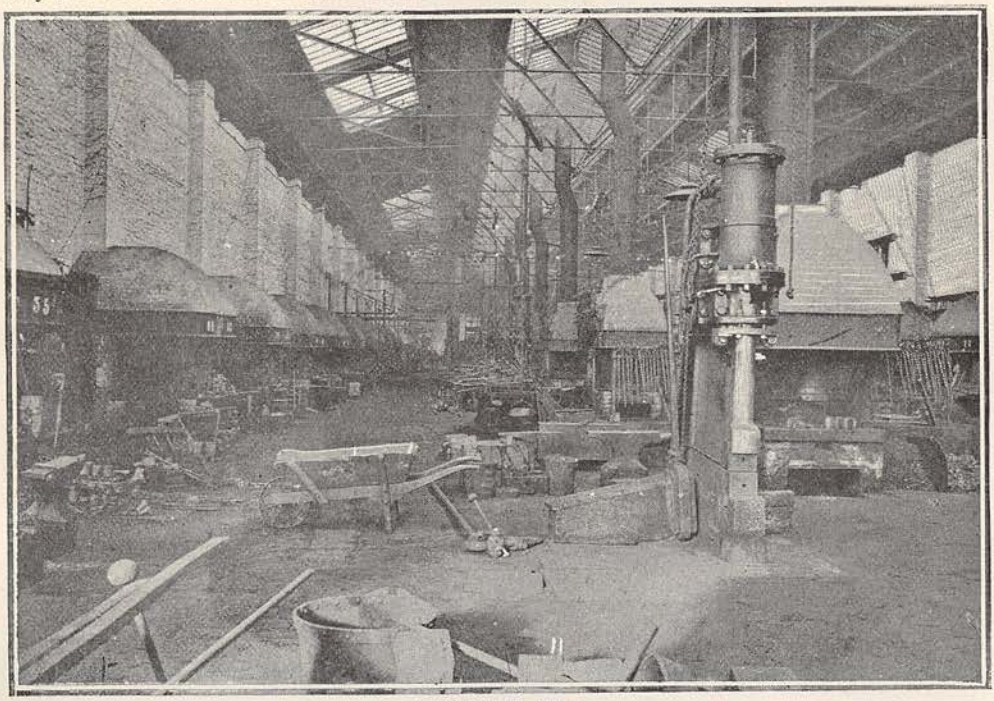


STANDARD SNOW PLOUGH.

The rolling stock comprises 1742 locomotives, 3281 carriages, and 83,500 wagons; the wagons alone, if made up into one train, would reach 271 miles, the distance from London to Newcastle. For road traffic there are 1763 carts and rulleys, and 1376 horses. The number of servants in the locomotive department is 12,840, including those employed in repairing carriages and wagons; 4931 are engaged in working the

locomotives, and the total staff of the Company numbers 38,000. The coal consumed by engines in 1891 amounted to 650,000 tons, and the weight of water used for all purposes was about 8,000,000 tons. There were 22,183 special trains run in 1891, of which 9377 were passenger and 12,806 goods. The weight of tickets issued to the public was thirty-nine tons, and the number of passengers carried reached a total of forty-seven millions. The goods traffic amounted to 9,283,600 tons, and the minerals to 32,493,238 tons. There are 533 stations on the line and 1001 signal cabins. The signal levers in use number 13,000, and 9270 lamps are lighted nightly

The head-quarters of the locomotive department are at Gateshead, but the locomotive works at Darlington are almost as important, and there are also large engine works at York. The Gateshead works were largely rebuilt, extended, and thoroughly reorganised in 1883 and 1884. Though not so large as the Crewe or Swindon works, they are second to none in the excellence of the tools and machinery used, and in the



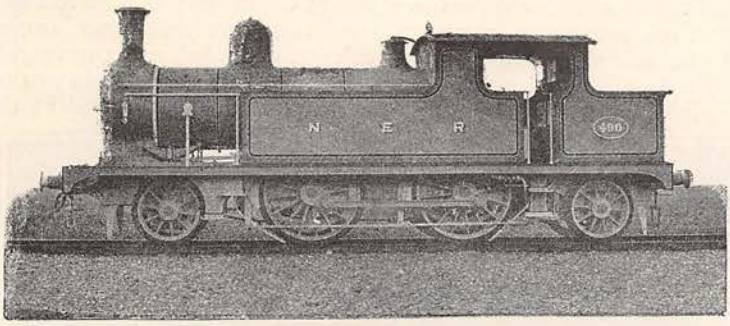
THE FORGE SHOP.

quality of the work produced. Since Mr. T. W. Worsdell's accession in 1885, the machine power has been further increased, particularly in the use of milling machines for finishing connecting and coupling rods, the rods and levers of valve-gear and other heavy work. He introduced the use of steel plates for boilers in place of Yorkshire iron, and laid down special gas furnaces for annealing the plates, the result of the change being a great saving in the cost of material for boiler construction.

In the boiler shop a special feature is the introduction of hydraulic presses for flanging purposes, the old system of flanging plates by hand being thereby superseded and a considerable saving effected in cost. Steel castings have also been brought into use for wheel centres of all sizes, fire-box roof bars, reversing-shafts and other purposes, for which forged iron was previously employed. Among the improvements made by Mr. Worsdell during the five years he held the office of locomotive superintendent for this Company, may be mentioned the testing house at Gateshead, where the strength of various specimens of iron, steel and copper is ascertained by means of a powerful hydraulic machine. For example, a piece cut off each plate intended to be used for boilers is tested, labelled and stored up for future reference. During his period of office, large and commodious dining rooms, as well as rooms for lectures, concerts, reading, and evening classes were built at Gateshead and York for the use of the workmen. The Gateshead Institution is capable of seating about 1100 men. Meals are cooked in gas ovens without charge, and every man's breakfast or

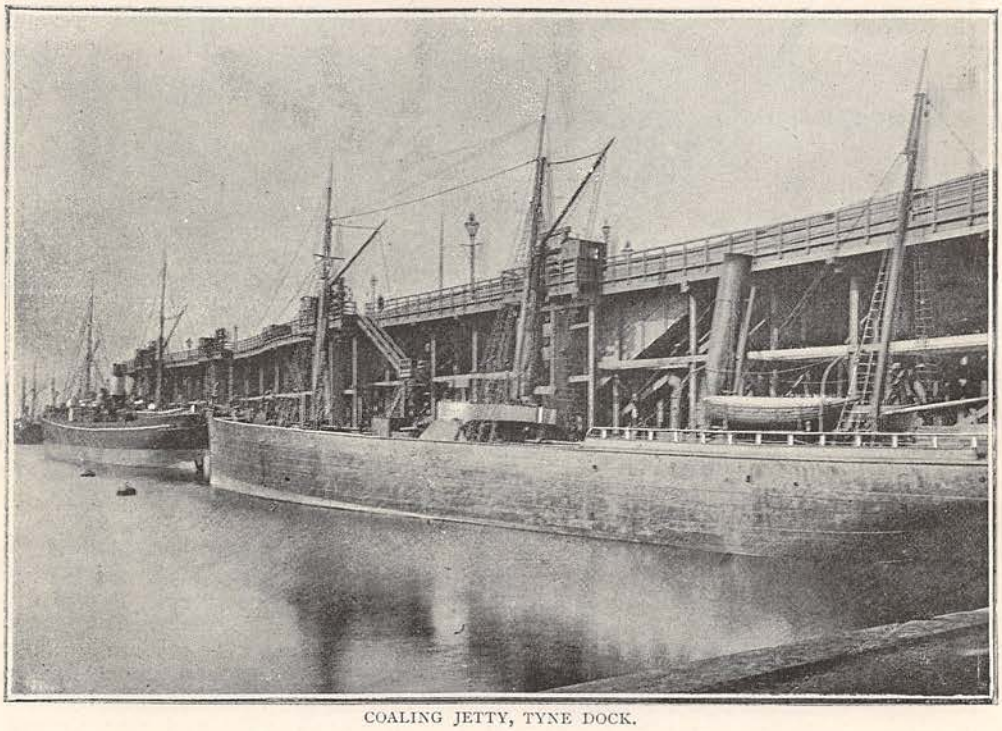
dinner is numbered and put in his place just before the electric bells ring, announcing in the various shops the approach of the meal hours.

The Company has extensive workshops at York, for building and repairing carriages and wagons, also wagon works at Shildon, and repairing shops at Gateshead, West Hartlepool, Tyne Dock and Percy Main. Nearly 3,000 men are employed upon this class of work, and in order to give an idea of the magnitude of the task to be performed in maintaining the rolling stock of a large railway company, it may be mentioned that, in the past year, 200 new carriages were constructed, 100 rebuilt, and 8,700 passed through the workshops for repairs, while 2,180 wagons were built as additional stock, 3,750 were renewed and 159,000 repaired. For the examination and greasing of carriages and wagons when working in trains, a staff of about 470 inspectors and greasers is constantly employed.



Passenger side tank engine, designed by Mr. T. W. Worsdell, 4-coupled 5-feet 6-inch wheels, 18-inch cylinders, and 24-inch stroke; built in 1886 for local passenger trains; it has 4 intermediate wheels coupled, and a pair of wheels with radial axle-box at each end.

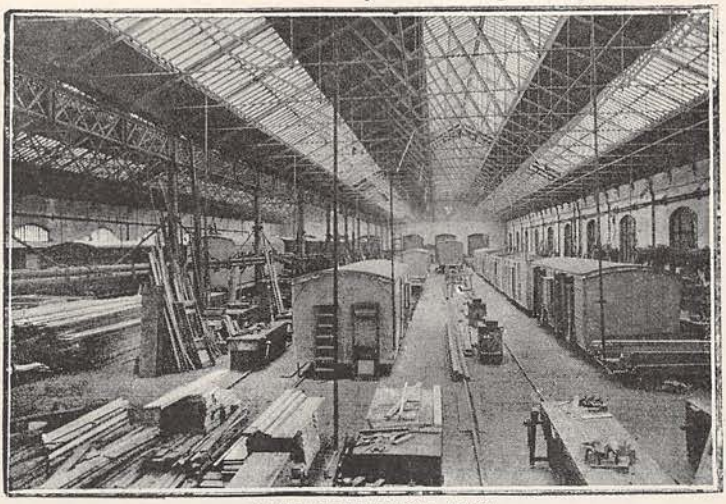
The North-Eastern Railway Directors have adopted Pintsch's patent oil gas



COALING JETTY, TYNE DOCK.

system for lighting carriages. Gas works have been erected at Newcastle, York and Hull, the three places being capable of producing 24,000,000 cubic feet of gas per annum, the illuminating power of which is about four times that of ordinary coal gas. 1,500 vehicles have already been fitted with the gas apparatus.

The North-Eastern for the last ten years have used the Westinghouse air-brake, which has given perfect satisfaction, fulfilling, as it does, every requirement of the Board of Trade. The continuous brake and the absolute block system of signalling are two of the greatest improvements ever made in railway appliances, and to these is no doubt largely due the comparative rarity of serious railway accidents during the last fifteen or twenty years. Previous to their introduction, the amount paid by the North-Eastern Railway Company in compensation for personal injury averaged about a halfpenny per passenger per annum. During the five years ending December 1891, the average was one-twelfth of a penny, and in the year 1891 only one-thirtieth of a penny per passenger.



CARRIAGE-BUILDING SHOP.

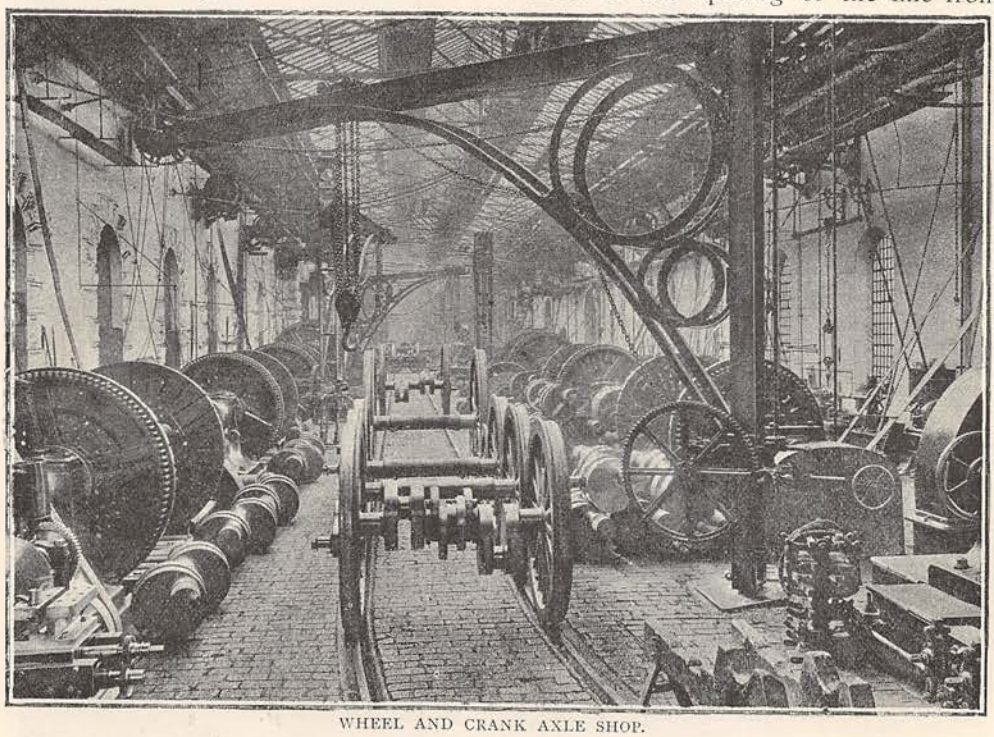
In addition to the working of the locomotives and the maintenance of rolling stock generally, the locomotive department is charged with looking after some 400 stationary

ENGINE STABLE.

boilers, fourteen steam tugs, 320 steam and hydraulic cranes, 104 pumping engines, 115 turntables, sixteen steam fire-engines (nine of these being kept on tug boats in the docks and ready at any moment in case of an outbreak of fire amongst the shipping) and fourteen manual fire-engines.

It may easily be imagined that to maintain all these appliances and to keep them in good working order, a great deal of supervision and labour is entailed. For the stabling of the locomotives, there are sixty-seven running sheds situated at convenient points on the line. An illustration is given of the shed connected with the Gateshead Works, which, together with the other shed at Gateshead, has accommodation for 250 engines.

Visitors to the Newcastle Exhibition in 1887, or to the Edinburgh Exhibition in 1890, will remember the contrast between the earliest and latest type of locomotive possessed by the North-Eastern Railway Company. The former, George Stephenson's No. 1 engine, "Locomotion," was built for the Stockton and Darlington Railway in 1825, and ran its first public trip on the day of the opening of that line, September 27th, 1825, and its last on the occasion of the opening of the line from

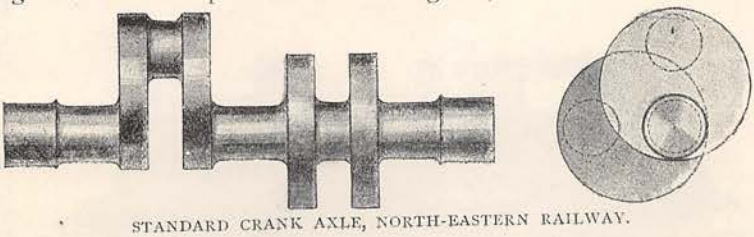


WHEEL AND CRANK AXLE SHOP.

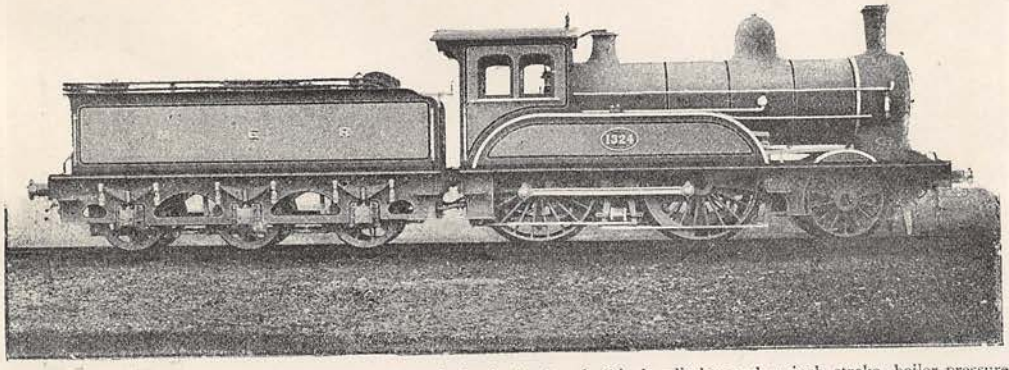
Middlesborough to Redcar on June 4th, 1846, a distance of 7¾ miles, which was performed in twenty-five minutes. This engine has travelled many thousands of miles to and from exhibitions, having been exhibited at Chicago in 1883, at Newcastle in 1887, at Paris in 1889 and at Edinburgh in 1890. On account of the great historical value of this engine, it has now been permanently stationed on a pedestal at Darlington, and therefore will not be exhibited elsewhere again. Another of these early locomotives bearing the name "Billy," and being also numbered "1" is mounted at the Newcastle end of the High Level Bridge and is an interesting object to persons visiting Newcastle. This engine was working at the Killingworth Colliery and only ceased from its labours in 1884. It was presented by the colliery owners to the Corporation of Newcastle, and the North-Eastern Railway Company at their request found for it a suitable resting-place. The celebrated "Rocket" engine was built a few years later than "Locomotion," and was the type used on the Canterbury and Whitstable line, opened May 3rd, 1830, when the locomotive "Invicta" ran the first train, and was driven by the late Mr. Edward Fletcher, who, for about fifty years, held important positions on the North-Eastern system of railways, having retired from the office of locomotive superintendent in 1882.

The other engine exhibited at Newcastle was one of Mr. Worsdell's compounds, the first built for the North-Eastern Railway, No. 1324. It has cylinders eighteen and twenty-six inches diameter, and twenty-four inches stroke, the driving wheels being

six feet six inches diameter coupled to trailing. The engine exhibited at Edinburgh was specially designed for working heavy express passenger trains between Newcastle and the Scottish capital, and is the most recent type of passenger engine on the North-Eastern Railway ; its cylinders are twenty and twenty-eight inches diameter, and twenty-four inches stroke, the driving wheels being single, seven feet six inches diameter. The horse-power indicated when running at eighty-six miles an hour on a level road with eighteen carriages on, was 1,068, the total weight of train being 310 tons. The average coal consumption of these engines, of which ten have now been built at the Gateshead Works, is about 28½ lbs. per mile, which is very low for heavy traffic at a high rate of speed, in fact about two pounds lower than the average of any other class of engine on the line. Altogether 47 compound express passenger engines have been built at Gateshead, and, including 212 goods engines, the Company have built 259 compounds since this system was adopted scarcely six years ago. The "Worsdell and Von Borries" compound locomotive, as is well-known, differs from the "Webb" compound in its greater simplicity of construction; indeed there is nothing to distinguish it from an ordinary engine, except that one cylinder has a larger diameter than the other, and a special valve is fixed inside the smoke-box to assist in starting the engine, when, owing to the position of the cranks, it is necessary



STANDARD CRANK AXLE, NORTH-EASTERN RAILWAY.

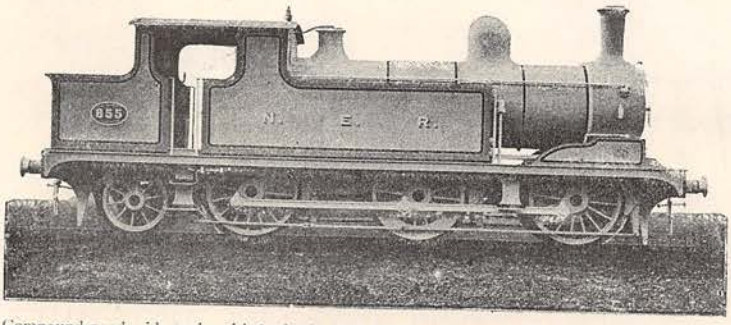


Compound express passenger engine, 4-coupled 6-feet 6-inch wheels 18 and 26-inch cylinders and 24-inch stroke, boiler pressure 175 lbs., was designed in 1886 by Mr. T. W. Worsdell for main line express passenger traffic. This engine, with a saloon carriage built by the Company, was placed in the Newcastle Exhibition of 1887, and was much admired.

to admit steam direct to the low-pressure cylinder. The valve closes automatically before the wheels have completed their first revolution, and, after that, it is only through the high-pressure cylinder that steam can reach the other.

The North-Eastern Railway Company own extensive docks at Tyne Dock, West Hartlepool, Middlesborough and Hull, besides a small dock of six acres at Sunderland. At Tyne Dock the water space extends over fifty-five acres including Timber Ponds, and during the past year 4,880 steamers and 1,572 sailing vessels were received into the Docks. This dock is famous as being the place where the largest quantity of coal is shipped in any single dock in the world. The illustrations of this place show in one instance the appearance of the dock during the Durham miners' strike, no less than forty-two vessels being accommodated whilst waiting for orders, and in another a view of one of the jetties with two steamers lying alongside.

waiting to be coaled. There are four of these jetties at which eighteen vessels may be coaled simultaneously. The coal wagons run by gravitation on to the jetty; here a man releases the bottom, which is made with two doors to fall when a pin is withdrawn. The coal passes through an opening in the jetty and down a large shoot into the hold of the vessel, the empty wagons returning by gravitation down another set of rails, whence they are taken back to the colliery to be refilled. By this means the Company have shipped 27,000 tons of coal in twenty-four hours, 130,000 tons in a week and during the past year 5,924,000 tons.



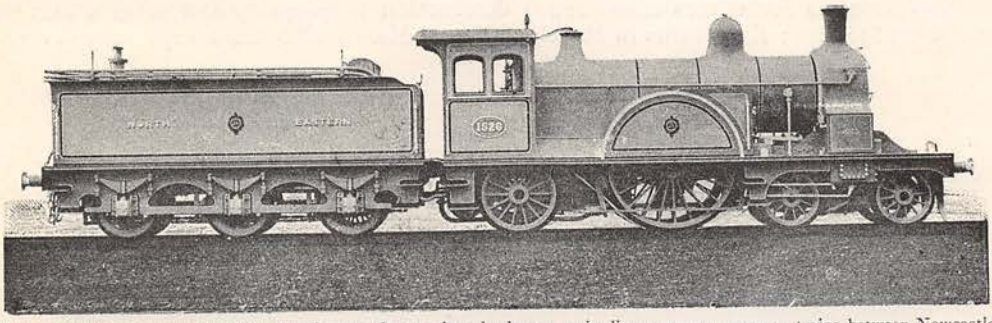
Compound goods side tank, with 8 wheels, 6 of which are coupled, the other pair being fitted with radial axle-box of the same design as those on the side tank passenger engines. It has 5-feet wheels, 18 and 26-inch cylinders, and 24-inch stroke. A powerful engine, designed for local goods and mineral traffic.

At West Hartlepool the docks cover seventy-three acres and are constantly crowded with vessels from all parts of the world. There is a very large trade in eggs

YORK STATION (NORTH-EASTERN RAILWAY).

at this port, some 9,000 tons being imported in the course of a year, also a very large timber trade for which ponds covering an area of fifty-seven acres have been specially provided. At Middlesborough the docks occupy a water space of sixteen acres, and here vessels are loaded with coal, steel rails, steel sleepers, and cast iron "pot" sleepers for the Indian and other railways abroad. Large hydraulic cranes

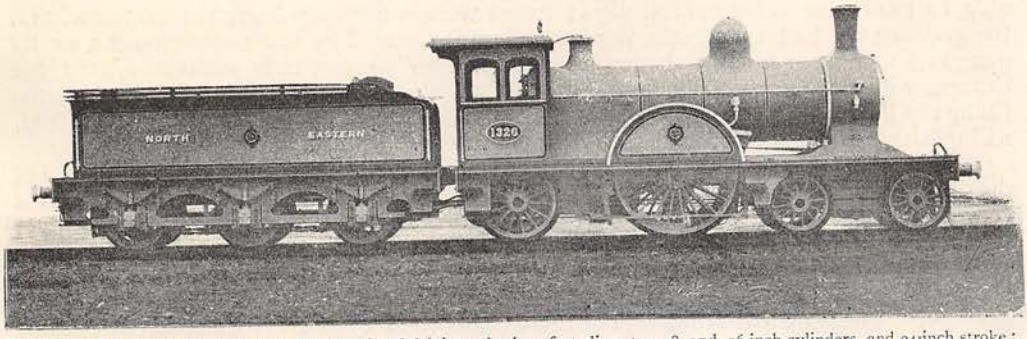
have been specially provided at Middlesborough for loading the iron and steel products. At Hull the docks cover an area of thirty acres and are capable of accommodating very large vessels. There is a large import of grain and timber at Hull besides an important fish trade. At all the North-Eastern Docks the most



This class of compound engine was built in 1890 for running the heavy main line express passenger trains between Newcastle and Edinburgh. It has a single pair of driving wheels, 7 feet 6 inches in diameter, 20 and 28-inch cylinders, and 24-inch stroke, a boiler pressure of 175 lbs., and carries 3,900 gallons of water; it is fitted with Gresham and Craven's patent steam sanding apparatus. One of this class was placed in the Edinburgh Exhibition of 1890. The weight of engine and tender when loaded is 87 tons.

modern hydraulic machinery is fitted for the quick loading of vessels and storing of goods in the warehouses.

It may be appropriate here to make a reference to the marvellous change that railways and steam power have brought about in the means of travel-

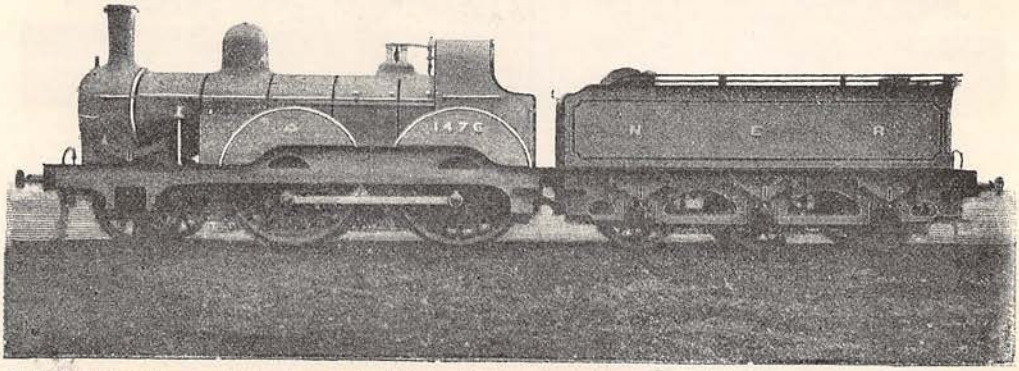


Main line express passenger engine, single pair of driving wheels 7-feet diameter, 18 and 26-inch cylinders, and 24-inch stroke; was built in 1889.

ling. Only 200 years ago, the roads of England were so bad that oftentimes a coach stuck fast in the mire and a farmer's team was needed to drag it out. The rich travelled in their own coaches, but six horses at least were required to overcome the badness of the roads. Towards the close of the reign of Charles II., coaches began to run thrice a week from London to the chief provincial towns, but no conveyance went further north than York, a journey that occupied six days in winter, and which is now performed several times a day all the year round in four hours! When it was proposed to run a "flying coach" between London and Oxford, leaving Oxford at 6 A.M. and arriving in London at 7 o'clock in the evening of the

same day, the undertaking was considered to be both difficult and dangerous. Fifty miles *a day* was the usual speed in summer and thirty in winter, distances which correspond to our present speeds *per hour* for express and stopping trains respectively. The fares for such travelling were twopence halfpenny per mile, or about the same as first-class railway fares now. On April 12th, 1706, a "York Four Days Stage Coach" was started. It left the "Black Swan," Holborn, every Monday, Wednesday and Friday and "(if God permits) performs the whole journey in Four Days. And sets forth at Five in the Morning." The York terminus was also the "Black Swan," in Coney Street, from which the up coaches started on the same days and at the same hour. Another service, two days a week only, was run between York and Newcastle.

Snow-storms sometimes cause much destruction to property and serious loss of traffic on the line; the storms in March 1886 and March 1888 were especially severe,



This class of engine, 4-coupled 7-feet wheels, 18-inch cylinders and 24-inch stroke, was built in 1885, at the time the Company was without the services of a locomotive superintendent. The general manager, Mr. Henry Tennant, undertook the direct supervision over the department at that period, and hence these engines are named the "Tennant Express." They work main line trains between York and Edinburgh.

the main line from Newcastle to Edinburgh being blocked so that no trains were able to pass over it for several days; trains were completely buried in the snow, and the passengers had to remain imprisoned until relieved by the snow-ploughs or by gangs of men sent to dig them out. These two storms, it is estimated, cost the Company about £100,000 including loss of traffic. Since the last great storm, the Company have built some very strong and effective ploughs which, it is expected, will greatly facilitate the removal of snow in future.

It will be readily understood from the above description, that the superintendence of the locomotive and carriage department of such a railway as the North-Eastern is a very considerable undertaking. Mr. Wilson Worsdell, the chief of the locomotive, carriage and wagon departments resides at Gateshead. His principal assistant in the locomotive department is Mr. George Graham of Darlington, who is assisted by Mr. Vincent Raven in the Northern Division and by Mr. John Murray in the Southern Division. The principal Managers of the works are Mr. Robert Stirling at Gateshead, Mr. W. Younghusband at Darlington, and Mr. W. Carr at York. Mr. Worsdell's chief assistant in the carriage and wagon department is Mr. David Bain, who is manager of the York carriage and wagon works.