

The total tonnage here enumerated comprised both sailing vessels and steamers. The number and tonnage of the former is decreasing, and that of the latter increasing, to such an extent that steam vessels appear likely to absorb the whole international commerce of the country.

The following table of the principal ports of the country summarizes the tonnage of vessels with cargoes which entered and cleared coastwise, and from and to foreign countries and British possessions, in 1876:—

Port.	Entered.		Cleared.		Total.
	Tons.	Tons.	Tons.	Tons.	
London	9,074,519	4,503,673	13,578,192		
Liverpool	6,380,217	5,587,416	11,967,633		
Newcastle and North and South Shields	1,481,874	5,168,330	6,650,204		
Cardiff	671,209	2,883,535	3,554,744		
Hull	1,691,328	1,334,285	3,025,613		
Sunderland	303,820	2,289,710	2,593,530		
Southampton	992,447	705,517	1,697,964		
Bristol	1,087,602	496,679	1,584,281		
Swansea	587,741	992,092	1,559,833		
Newport	508,474	959,792	1,468,266		
Hartlepool	452,159	956,248	1,408,407		

These are almost exclusively mineral ports.

The subjoined table shows the total tonnage of the sailing vessels and steamers registered as belonging to the United Kingdom, at the end of each third year from 1864 to 1876:—

Years.	Sailing Vessels		Steamers.		Total.
	Tons.	Tons.	Tons.	Tons.	
1864	4,930,219	697,281	5,627,500		
1867	4,852,911	901,062	5,753,973		
1870	4,577,855	1,112,934	5,690,789		
1873	4,091,379	1,713,783	5,805,162		
1876	4,257,986	2,005,347	6,263,333		

During the period 1864-76 the number and tonnage of sailing vessels registered as belonging to the United Kingdom decreased, but the steamers increased from 2490 to 4335, and the table shows that their tonnage nearly quadrupled. The latter fact indicates a doubling of the average tonnage of steamships, the wants of commerce requiring them to be more and more large. Nearly three-fourths of the total shipping of the United Kingdom belongs to England and Wales.

The total tonnage of the United Kingdom, far larger than that of any other country, represents by itself more than one-third of the shipping of all the maritime states of the world.

Ship-building has long been an industry of great importance in England, although of late years it has suffered considerable fluctuations. The principal centres of the industry are the Thames, the Tees, the Tyne, and Sunderland on the east coast, and Liverpool, Barrow, and Whitehaven on the west. A very large proportion of vessels built in recent years are constructed of iron, with the consequence that the ship-building trade has mostly settled in those parts of the coast that are nearest to the iron and coal fields.

In 1874 the total amount of shipping built in England reached 277,984 tons; in 1875, 220,036 tons; and in 1876, 189,840 tons. In Scotland there were built 166,214 tons, and in Ireland 4311 tons in 1876. The numbers do not include ships built on foreign account.

VII. Railways.—Canals and Roads.

Far greater even than the impulse given to the country's foreign commerce by steam navigation has been the vast progress of internal communication effected by railways. The first ordinary roads deserving the name of highways

were made in 1660, and canal-building began in the middle of the following century; but though roads and canals aided materially in raising the commercial and industrial activity of the nation, their fostering agency was very slight compared with that of railways. In the half century during which England has built railways, its material progress has been vastly greater than that of the whole five previous centuries.

The first line of railway on which carriages were propelled by steam engines, that from Stockton to Darlington, fourteen miles in length, was opened September 27, 1825. Although this little line, pioneer not only of England's, but the world's railways, proved a great success, it had no immediate successors of any note till five years after, when the first really important railway, connecting two great centres of commerce, was finished. This was the line from Manchester to Liverpool, opened September 15, 1830, when Mr Huskisson was accidentally killed. As yet no railway had come near the metropolis, but great efforts were made by George Stephenson and his friends to get permission for constructing a line from London to Birmingham. The bill brought into parliament for this purpose met with the most violent opposition, chiefly on the part of the great landowners, who, so far from seeing that the new mode of communication would immensely enhance the value of their properties, loudly proclaimed that the substitution of steam for horse-power would be "the curse and the ruin of England." It took three years to get the bill for the London-Birmingham railway, which was passed at last in the session of 1833, obtaining the royal assent on the 8th of May. The first sod of the great line was cut at Chalk Farm, London, on the 1st of June 1834. Enormous engineering difficulties had to be overcome, originating not so much from the nature of the ground as from intense public prejudice against the new mode of locomotion. Instead of following the course of the old highroad, running along valleys, the line had to be pushed, by numerous viaducts and tunnels, over hollows and under hills, so as to avoid touching any considerable towns. It took five years to construct the railway from London to Birmingham, at a cost of over four millions. Even friends of the railway presaged that such outlay could not by any possibility be remunerative; but the contrary became evident from the moment the line was opened, in 1838. The first great "trunk" line proved a striking success, and its opening settled, without further controversy, the establishment of the new system of intercommunication in England.

All the great railway systems of England sprang into existence within less than ten years after the opening of the London-Birmingham line. Out of the latter grew, in the first instance, one of the largest of companies, the London and North-Western, while the most extensive system, as regards mileage, the Great Western, originated in a line from Paddington, London, to Bristol, for which an Act of Parliament was obtained in 1835, and which was opened in 1841. In 1836, a bill passed the legislature erecting the "Great North of England" Railway Company, from which was developed the now third largest of English railway systems, the North Eastern. A few years subsequently various other Acts were passed, sanctioning the "Midland Counties" and the "North Midland" lines, from which sprang the present Midland system, fourth largest of English railway companies. The construction of railways, up to this time, was confined almost exclusively to England; the work was begun much later in Scotland, and still later in Ireland.

The total length of railways in the United Kingdom at the end of the year 1825, which saw the opening of the first line, was 40 miles, constructed at a cost of £120,000. Five years later, at the end of 1830, there were not more

Early English railways

The first great trunk line.

than 95 miles, built at a cost of £840,925, but at the end of 1835 there were 293 miles, costing £5,648,531. Thus, in the first five years of railway construction, from 1835 to 1830, the mileage doubled; while in the second five years, from 1830 to 1835, it trebled. It quintupled in the next five-yearly period, till the end of 1840, when the total length of miles of railway in the kingdom had come to be 1435, built at a cost of £41,391,634, as represented by the paid-up capital of the various companies. The next five years saw again nearly another doubling of length of lines, for at the end of 1845 there were 2441 miles of railway, created by a paid-up capital of £88,481,376. Not far from a fresh doubling took place in the course of the next quinquennial period, and at the end of 1850 there were 6621 miles of railways, constructed at the cost of £240,270,745. Nearly all the railways opened up to this date were main or "trunk" lines, connecting more or less busy centres of population, the traffic between which was so large as to require double lines. Unlike most European countries up to the present time, England began railway building on a scale commensurate with the importance of the new mode of intercommunication, the leaders of the great enterprise foreseeing clearly the ultimate requirements of their work. It thus came to pass that double lines were made the rule, and single lines the exception. More recently, however, an increase has taken place in the construction of the latter, owing to the extension of short branches from the main lines.

The length of railways open for traffic in the United Kingdom, either with double or single lines, and the amount of authorized capital, were as follows at the end of each fifth year from 1856 to 1876:—

Years	Double or more lines.		Single lines.		Total.
	Miles.	Miles.	Miles.	Miles.	
1856	6,266	2,444	8,710		
1861	6,893	3,972	10,865		
1866	7,711	6,143	13,854		
1871	8,338	7,038	15,376		
1876	9,169	7,703	16,872		

Growth of railways from 1856 to 1876

Years.	Authorized Capital.		
	Shares and Stock.	Loans and Debentures.	Total.
1856	£282,890,751	£94,877,156	£377,767,907
1861	£322,369,654	£107,503,292	£429,872,946
1866	£466,151,633	£154,412,773	£620,564,406
1871	£451,898,908	£163,827,982	£615,726,890
1876	£549,095,705	£192,706,822	£741,802,527

Nearly three-fourths of the railways of the United Kingdom, and far more than three-fourths of the capital invested in them, fall to the share of England and Wales. The length of lines open for traffic in each of the three divisions of the kingdom, and the amount of authorized capital, was as follows on the 31st December 1876:—

Division.	Double or more lines.		Total.	By Loans and Debentures.		Total Authorized Capital.
	Miles.	Miles.		£	£	
England and Wales	7,591	4,398	11,989	£449,973,593	£161,438,942	£611,412,535
Scotland	1,063	1,663	2,726	£71,595,107	£21,130,250	£92,725,357
Ireland	515	1,642	2,157	£27,527,005	£10,137,630	£37,664,635
United Kingdom	9,169	7,703	16,872	£549,095,705	£192,706,822	£741,802,527

Distribution of railways over the United Kingdom.

Among the most marvellous effects produced by railways was the incentive given by them to the population to move from one place to another. Before the making of ordinary

roads, that is, previous to the middle of the 17th century, and the old era of packhorses and bridge paths, there was scarcely any movement worth the name; and the immense majority of people had to live and die in the places where they were born, simply through not being able to transport themselves elsewhere, even for a short distance. A change took place when highways came to be made, with stage-coaches rolling along them, at a rate of from six to ten miles an hour. But the accommodation afforded by these new means of travelling was necessarily limited, besides being costly, in time as well as money, and the mass of the people could not avail themselves of it. But what was impossible for "the coach" was the easiest achievement for "the train" of coaches. In "the train," placed upon two longitudinal lines of iron rails, and propelled by steam, the whole nation for the first time obtained freedom of movement. The ancient packhorses carried their hundreds, and the stage-coaches their thousands; but the railways carried their millions—and more millions than ever stage-coaches carried thousands.

The railways carried their first million of passengers in 1833, the year in which Stephenson won his great parliamentary battle in getting the bill for the London-Birmingham line passed. The number of passengers carried per mile in 1832 was 4860, but before other ten years were gone, the number of passengers had not only increased in proportion with the opening of new lines, but more than doubled per mile, and, instead of being under 5000, had in 1842 come to be near 12,000. The following table exhibits the growth of the passenger traffic on the railways of the United Kingdom, giving the length of lines open, the total number of passengers carried, and the number per mile, in every fifth year from 1846 to 1876:—

Years, Dec. 31.	Length of Lines open for Traffic.	Total Number of Passengers.	Number of Passengers Per Mile.
1846	3,036 Miles.	43,790,983	14,423
1851	6,890	85,391,095	12,309
1856	8,707	129,347,592	14,855
1861	10,869	173,773,218	15,988
1866	13,854	274,403,895	19,734
1871	15,376	375,409,146	24,415
1876	16,872	538,681,722	31,928

The table shows, more clearly than could be expressed by any description in words only, the striking changes effected by railways in the migratory habits of the people in the course of a generation. While the number of passengers was little above 14,000 per mile in 1846, it was nearly 32,000 in 1876. The number of passengers carried on the railways of the United Kingdom in the year 1876 was equal to four times the population of Europe, and more than half the estimated population of the globe.

Considerably more than four-fifths of the passenger traffic on the railways of the United Kingdom is in England and Wales. The number of railway passengers in England and Wales, in Scotland, and in Ireland, and the numbers travelling by each class of railway, were as follows in the year 1876:—

Divisions.	1st Class Passengers.	2nd Class Passengers.	3rd Class Passengers.	Total.
England and Wales	38,302,841	58,949,892	383,686,658	480,939,391
Scotland	4,693,843	3,319,741	31,978,057	39,991,641
Ireland	1,862,382	4,208,562	11,285,319	17,356,263
United Kingdom	44,859,066	66,478,195	426,950,034	538,287,295

Passenger traffic in 1876.

