

Railway Facts in Fancy Frames.*

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EVEN nowadays, there are many people in this country who have never seen a railway station or a locomotive. A year or two ago I was in a remote Cornish hamlet, which contained at least a score of old or elderly persons who had never seen a railway track, but who had only, and at very rare intervals, travelled as far as the nearest market town, and, to these Cornish peasants, their Launceston was almost the rival of our London—London, to them a place inaccessible, and whose din had never even faintly touched the dull imagination of those far-away and static Cornish folk. The Cornish people talk about “going to England” when one crosses the boundary line of Cornwall.

And we ourselves, to whom railways are of the most familiar of those things that touch our daily life, even we have but a scant knowledge of the vast extent to which the railway enterprise of this country has spread during its relatively short life. I propose to deal with some railway facts and figures in a way that will, I hope, clearly illustrate the present condition of one of the most remarkable and energetic activities of Queen Victoria's reign.

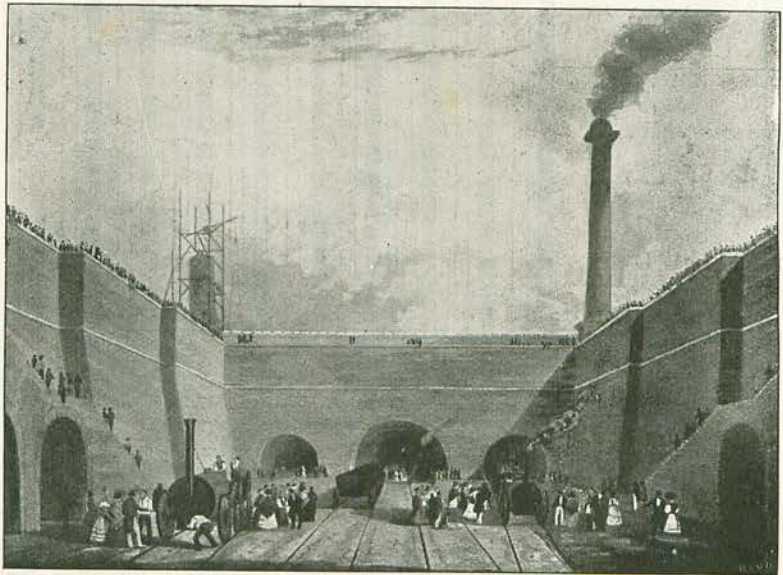
By way of contrast with railway surroundings as we now know them, just glance at this picture of the railway station at Edge Hill, Liverpool, in the year 1831 [No. 1]—a great pit for a station, with the tunnels opening into it; no hand-rails to the steep steps, no platforms or waiting-rooms, no Smith's book-stall smothered with newspapers and magazines; in

fact, “no nothink.” The passengers are casually strolling about the permanent way, preparatory to getting into the carriages, which, as we see, are merely open waggons, or they are having explained to them the wonderful proportions of the latest form of “Puffing Billy”—see the little group at the left of the picture: is not this almost grotesque to us?—and yet only sixty-five years have passed since the date of the scene depicted in this print. Even six years later than 1831, McCulloch wrote in his “Account of the British Empire,” published in 1837:—

... Exclusive of the means of communication by the common roads now described, and by canals, *railroads have lately engaged a large share of the public attention*, and will, most likely, be established, at no distant period, between all the great towns of the empire—where the ground is at all practicable. *They are made either of wood or iron*; but those only that are made of the latter could be advantageously constructed in this country. . . .

The words now italicized in the above quotation read strangely indeed to us of A.D. 1896: and so does McCulloch's statement:—

... The length of the Liverpool railway is 31 miles; and the fact that passengers were regularly



No. 1.—Entrance to the Railway Station at Edge Hill, Liverpool, in the year 1831. [Open trucks for carriages, “Puffing Billees” for engines, no shelters or platforms for passengers, and no hand-rails on the steep steps that lead down to the railway level.]

* Copyright by John Holt Schooling, 1896.

conveyed that distance, in carriages drawn by locomotive engines, in from 1½ to 2 hours, produced an extraordinary sensation. The advantages likely to be derived from the extension of the system to other parts of the country have, we believe, been a good deal exaggerated. . . .

Probably some of the good folk who made this journey at the wonderful speed of fifteen to twenty miles per hour, and who almost quaked at their own temerity, are now alive to test the sixty-miles-an-hour pace of a modern express.

Turn from this suggestion of the past to the diagram in No. 2, which serves to illustrate the vast and still increasing growth of railway enterprise, through the very practical medium of the amount of money invested in railways in this kingdom. When I ascertained the vast bulk of modern

railway capital, I was at a loss how to convey a clearer idea of its immensity than can be given by mere figures, until it occurred to me to contrast the official facts for the last ten years, 1885-1894, with the corresponding amounts of the National Debt of this country during the same period.

Inspection of No. 2 shows that, even in the year 1885, the paid-up railway capital of the United Kingdom had outstripped the amount of the National Debt, vast as that debt was; and, running the eye from left to right of No. 2, we see that the preponderance of railway capital over

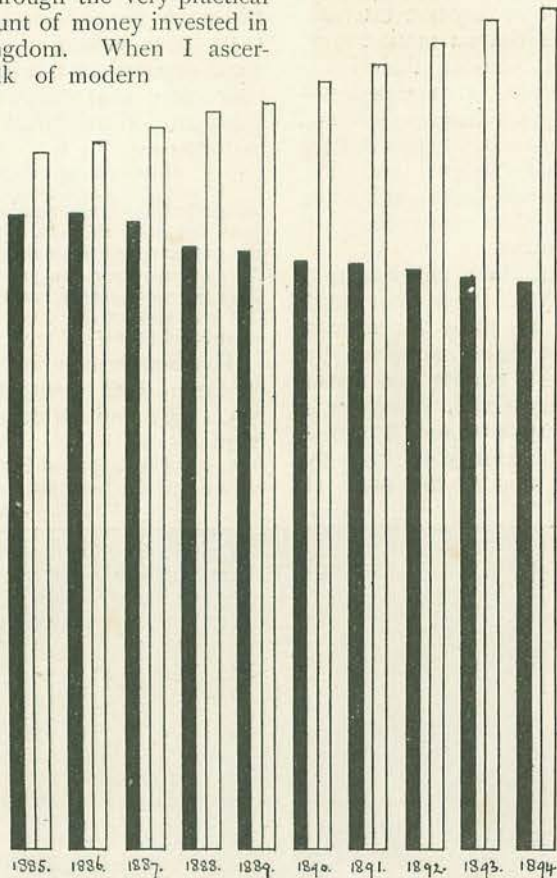
National Debt became greater year by year until, in 1894, the National Debt was nowhere. This surprising result has been caused both by the growth of railway capital and by the shrinkage of the National Debt; for one sees in No. 2 that, with the exception of the year 1886, the solid black columns

representing the debt of the country become shorter, while the outline columns representing railway capital steadily grow taller. For the sake of completeness, I give the figures upon which No. 2 has been drawn:—

Year.	National Debt (millions).	Railway Capital (millions).
1885	740'3	815'9
1886	742'3	828'4
1887	730'3	846'0
1888	705'6	864'7
1889	698'4	876'6
1890	689'9	897'5
1891	684'1	919'4
1892	677'7	944'3
1893	671'0	971'3
1894	666'2	985'4

The yearly income of the railway companies of the

United Kingdom is large enough to make even a Chancellor of the Exchequer's mouth water. Taking the most recent year for which official facts are available, 1894, the total receipts of these wonderful railway companies were the stupendous amount of over £84,000,000 sterling, of which, nearly eighty millions were receipts from traffic; the actual receipts into the Exchequer of the United Kingdom for the year 1894 being ninety-one millions—so that running the railways brings in a yearly revenue far short of that produced by running this kingdom. The total railway working expenditure for 1894 was over forty-seven



No. 2.—A comparison, for the ten years 1885-1894, of the amount of the National Debt with the amount of paid-up Railway Capital in the United Kingdom. [The solid black columns represent the National Debt; the outline columns represent the paid-up Railway Capital.]

than one-half the total cost of running the United Kingdom for the same year; or, to compare the total railway expenditure with the total receipts, the expenses swallowed say 56 per cent. of the receipts, thus leaving a margin of thirty-seven millions of profit for the year, or rather over 3¾ per cent.



No. 3.—Round the World in Forty Minutes. The trains of the United Kingdom completed an average mileage equal to the circumference of the Earth every 39½ minutes of the year 1894, day and night without cessation. In other words, the miles travelled by these trains during 1894 would suffice to "put a girdle round the Earth" no fewer than 13,374 times.

on the railway capital of 985 millions just mentioned.

The length of railways open for traffic throughout the United Kingdom had, in 1894, reached a total of nearly 21,000 miles (20,908 miles), and as the circumference of the earth may be put at about 25,000 miles, we see that the length of railroad open in this country is not far short of equal to the entire circuit of the earth! If the extension of our railway system during the past ten years be continued during the next twenty years, the length of open railroad will then equal the earth's circumference: an extension of 200 miles of road per annum will, in twenty years, make up the 4,000 miles of the earth's circumference by which our length of railroad now falls short. I may say that, on an average, every mile of railroad throughout the United Kingdom is traversed nearly forty-four times per day.

But when we come to the number of miles travelled by trains in the United Kingdom during one year, we shall find that earthly measurements and comparisons begin to fail us, and we shall have to press the sun into our service as an aid to clear perception of the facts. First, look at illustration No. 3, and bear in mind that the description of it and its meaning, which is printed below this illustration, is no freak of fancy, but a solid fact, based upon entirely reliable official information, the actual figures being:—

Miles travelled by trains in the United Kingdom during the year 1894.

(Passenger trains)	(Goods trains)	(Mixed trains)	(Total)
Miles.	Miles.	Miles.	Miles.
179'3 million.	149'5 million.	3'7 million.	333'0 million.

This extraordinary total of 333 millions of miles travelled by our trains during one year only is equal to these trains going all round the world every forty minutes of the year, day and night, without cessation! So that in less time than is occupied by an express from London to Brighton, this magnificent activity of the railway service of the kingdom has girdled the earth, as regards distance travelled, during this short time (say 39 1-3rd minutes), and as regards the amount of energy expended. This means that every time the second-hand of your watch completes a revolution, that during every minute of time which passes from the present into the past, our massive trains with their heavy load of human beings and goods cover more than six hundred and thirty-three miles! And this goes on day and night without a break, and the distance is increasing year by year. The yearly mileage of our trains is long enough to "put a girdle round the earth" more than thirteen thousand times every year.

The illustrative statements just made will, I hope, convey to my readers a clear impression of the really wonderful results now daily achieved by the railway enterprise of our country; but, should they fail to make my meaning vivid, an inspection of illustration No. 4 and a description of it will perhaps effect the desired purpose. We, as dwellers on the planet Earth, know that our domain in space is very small, and that all of us and everything we possess are entirely insignificant and petty when compared with the space outside the earth, and with what that space contains. But, thanks to our railway enterprise, we are supplied with facts which serve to slightly lessen this sense of our own nothingness, since we are able to use even the mighty Sun and his distance from us as a useful gauge of one year's railway activity.

If we take the mean distance of the sun



SUN 92,890,000 miles EARTH.
No. 4.—Return trips, twice a year, from the Earth to the Sun. The distance travelled in the year 1894 by the trains of the United Kingdom is nearly equal to going to the Sun and back twice during the year.

from the earth to be 92,890,000 miles, and apply to this immense distance the train-mileage of the United Kingdom during the year 1894, we find that this train-mileage is nearly equal to two return trips from the earth to the sun, for two of these inconceivably long return journeys would occupy only about six weeks in excess of the year's travelling! In order to assist the mind to understand what the distance illustrated in No. 4 really means, I may say that a cannon-ball fired at the sun from the mouth of an Armstrong gun, and which rushes through space at the speed of twelve miles per minute without any slackening of pace, would take from fourteen to fifteen years to reach the sun; or, again, if a baby were born with an arm (say) ninety-three million miles long, and who on the first day of its life accidentally touched the sun, then, according to the best estimates of the rate of speed at which feeling travels, the baby might grow to manhood, and the man attain to extreme old age, without even feeling the pain of the burn inflicted on the tip of his finger by the sun when he, as a baby, burnt his finger on the first day of his life! Now we realize, perhaps, what the vast distance in No. 4 means, a distance which is yet travelled (nearly) *four times a year, or once every three months*, by these wonderful trains of the United Kingdom!

Leaving these truly splendid "Solar records" of our train-mileage, let us glance at the more mundane question of receipts from passenger and goods traffic, respectively, and from first, second, and third class passengers, viewed separately.

Nos. 5 and 6 are a new sort of railway ticket, executed in black and white, and used for the present occasion only. No. 5 is divided into two "halves," one of which—to



No. 5.—The Traffic ticket for the year 1894, United Kingdom, divided into the receipts from Passenger and Goods traffic respectively. [Including season tickets.]

use an Irishism—is bigger than the other: the white "half" stands for receipts from passenger traffic, and the black "half" represents the receipts from goods traffic. Of course, as these latter receipts are larger than the passenger receipts, the "goods

traffic" occupies a proportionately larger part of the ticket in No. 5:—

	£	per cent.
Receipts from passenger traffic in 1894	36,495,488	or 45.7
Receipts from goods traffic in 1894	43,379,078	or 54.3
Total traffic receipts in 1894 ... £79,874,566 or 100.0		

Thus, out of every £100 of traffic receipts, £46 (say) were contributed by passengers and £54 by goods.

As regards the receipts from first, second, and third class passengers, respectively, the most casual glance at diagram No. 6 will show



No. 6.—The Passenger ticket for the year 1894, United Kingdom, divided into the receipts from each class. The fare was £4,042,000 FIRST CLASS, £2,702,000 SECOND CLASS, £4,028,000 THIRD CLASS; total fare £30,862,000. [Including season-tickets, but not including an item of £5,633,488 paid for excess luggage, etc., which cannot be split up into the three classes.]

that it is the third-class passenger who is the mainstay of the railway companies. This "ticket" is divided into three parts, each of which is in proportion to the receipts from first, second, and third class passengers respectively. The figures are:—

Receipts from passenger traffic during the year 1894.		
First-class	£4,042,000	or 13 per cent.
Second-class	2,792,000	or 9 per cent.
Third-class	24,028,000	or 78 per cent.
£30,862,000 or 100 per cent.		
Excess luggage, etc., not classed	5,633,488	
Total (see No. 5)	£36,495,488	

We may see from this little statement that the third-class passenger brings in to the railway company just six times as much as is contributed by the first-class passenger, and nearly nine times as much as the second-class passenger contributes to the yearly revenue of the railway companies of the United Kingdom.

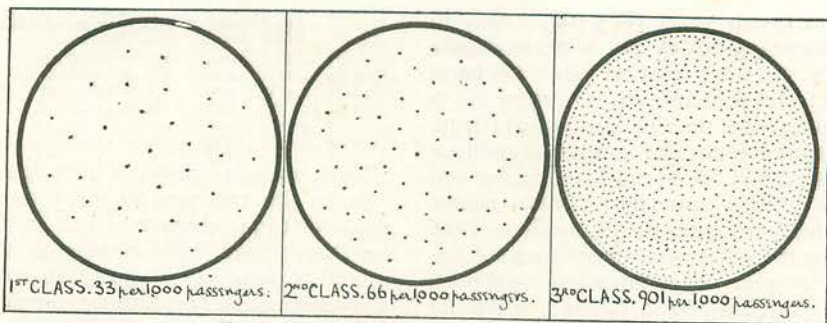
The third-class passenger is by far the most important customer of the railway company, and by looking at diagram No. 7 we may see how completely he outnumbered the first and the second class passengers.

Of every one thousand travellers who get into a railway carriage:—

- 901 are third-class passengers.
- 66 are second-class passengers.
- 33 are first-class passengers.

1,000

The actual number of ordinary passengers conveyed during the year 1894, excluding



No. 7.—The Might of the THIRD-CLASS Passenger.

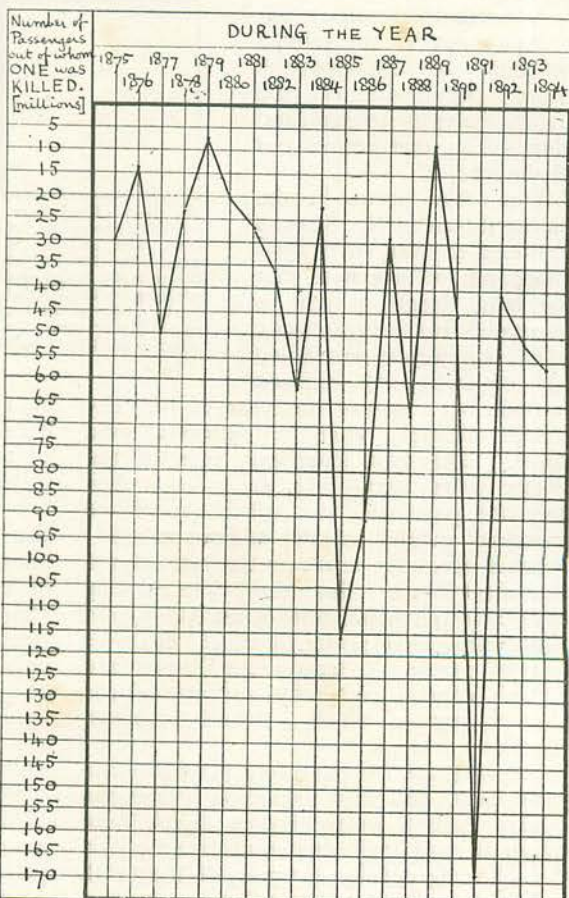
the journeys made by season-ticket holders, was :—

	No.
First-class.....	29,821,000
Second-class	60,162,000
Third-class	821,430,000
Total.....	911,413,000

ordinary quantity of railway travelling is the great degree of safety to passengers which has now been attained by our railway companies. This very important matter is illustrated by the chart in No. 8, the significant part of which is the zig-zag, lightning-like line which is seen in the chart. This line comes to a sharp point for each

This vast number of 911 million passengers conveyed during the year 1894 would, of course, be still greater if the journeys of the 1,184,861 season - ticket holders could be included; but, omitting these passengers, I may say that the number of first-class passengers in 1894 was about equal to the whole population of Italy, that the entire population of the United States approximately represents our second-class passengers during the year named, and that, according to the best estimates of the population of Asia, nearly all the mighty horde of nations in that vast continent would be required to equal in number the third-class passengers conveyed during 1894 by the railways of the United Kingdom, a result that makes one hold one's breath when the vastness of this carrying job is even partly realized. Let us hope that the shade of George Stephenson is able to know of these mighty things that have now been achieved from his magnificent and courageous initiative of two generations ago. During the two years 1893-1894, the number of *third-class passengers* conveyed by the trains of the United Kingdom exceeded by more than one million the population of the whole world, which, by the authority of Wagner and Supan, may be stated at 1,500 million persons.

Not the least satisfactory quality possessed by this altogether extra-



No. 8.—The increased Safety of Railway Travelling in the United Kingdom during the twenty years 1875-1894. [For description see text.]

one of the twenty years 1875-1894, and, to read the meaning of this No. 8, we have only to notice at what part of the left-hand column of No. 8 each of these twenty sharp points comes, and then to read at sight from this left-hand column the number of millions of passengers out of whom one person was killed by railway travelling (from causes beyond their own control) during each of the twenty years mentioned. For example, the point for the year 1875 comes just level with the "30" in the left-hand column of No. 8; this means that in the year 1875 only one passenger was killed out of 30 million persons who were conveyed by train—a number equal to the present population of England and Wales! Again, the point for the year 1894 falls nearly half-way between "55" and "60" millions in the left-hand column; this tells us that, in 1894, only one passenger was killed out of every (say) 57 millions of passengers conveyed.

A wonderful result, which is equivalent to the railway companies carrying nearly the entire population of the United States of America, and only killing one person out of the lot!

The other points in the zig-zag shown in No. 8 relate to the other years, viz.: 1876-1893, and we may note that the most dangerous year to passengers was the year 1879, when one person was killed out of every $7\frac{1}{2}$ millions carried; but this was the year of the Tay Bridge disaster, when 73 persons were killed. The least dangerous year of the twenty years 1875-1894 was 1891, when only one passenger was killed out of the enormous number of 169 millions carried; in other words, the result for the year 1891 is equivalent to the railway companies carrying more than the population of all Africa, and only killing one person out of this vast mass of people. (I here adopt Wagner and Supan's African population estimate of 164 millions, part of which is based on actual censuses.)

Grouping the facts into four periods of five years each, and now including passengers *injured* as well as passengers *killed* (from causes beyond their own control), we obtain the following concise summary of the death and injury encountered by railway passengers in the United Kingdom:—

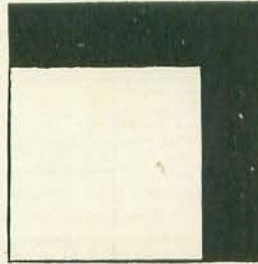
Period	No. Killed	No. Injured	Proportion of Passengers Killed and Injured to No. of Passengers Carried.	
			(Killed)	(Injured)
1875-1879 ...	165 ...	4,930 ...	1 in 16'5 millions	1 in 553,000
1880-1884 ...	112 ...	4,220 ...	1 in 29'1 millions	1 in 772,000
1885-1889 ...	138 ...	3,199 ...	1 in 26'6 millions	1 in 1,148,000
1890-1894 ...	77 ...	2,803 ...	1 in 56'0 millions	1 in 1,538,000
1875-1894 ...	492 ...	15,152 ...	1 in 28'4 millions	1 in 922,000

This summary shows a striking difference between the two periods 1875 to 1879 and 1890 to 1894, which is much in favour of the later period, both as regards killed and injured passengers. Taking the wide period of twenty years, the railway companies may claim to have killed only one passenger out of a number carried which is approximately equal to the entire population of England and Wales, and to have injured one passenger out of every 922,000 of passengers carried: results of which the companies may well be proud, and which are still being improved as time goes on.

It is interesting to examine the official records as to the employes of railway companies. In 1894 there were about 380,000 persons employed in the railway service of the United Kingdom. As the population of the United Kingdom in the middle of the year 1894 may be taken at approximately 38,000,000, it follows that one out of every hundred of our population is employed by the railway companies. If we consider the fact that the railway employes are nearly, if not quite, all males aged 15 to

69, and then compare their number with the males of the United Kingdom who are aged 15 to 69, we find that one out of every 30 males of these ages is a railway employe—a significant fact to arrive at, and one that illustrates rather strikingly the immense power and influence of the railway interest of this kingdom. In the same year, *i.e.*, 1894, the effective strength of the regular Army of the country, all arms, numbered only 219,000, so that the railway army of 380,000 was a very much larger and more important body than the British Army; see No. 9 for a comparison of the numerical strengths of these two armies.

We have seen from No. 5, and the account of it, that the goods traffic brings more money to the railway companies than the passenger traffic, despite the fact that the passenger share of the ticket in No. 5 is worth more than 36 millions sterling. In



No. 9.—A comparison of the numerical strength of the Railway Army with that of the British Army, for the year 1894. The British Army is the superimposed white square which is tucked away in the corner of the larger black square that represents the Railway Army of the United Kingdom.

order to earn 43 millions in one year by carrying goods, the railway companies have to perform a stupendous task—a task that is represented by the conveyance of nearly 325 million tons of general merchandise and minerals, for various distances, amounting in the aggregate to nearly 150 million miles, and all this during one year only.

To get some idea of the weight represented by 325 million tons—the goods traffic for the year 1894—let us look at illustration No. 10, which shows a thin “shaving” supposed to be sliced off the entire surface of the United Kingdom. We may take the mean density, or specific gravity, of the earth at 5,670—that is to say, that, bulk for bulk, the earth is between five and six times as heavy as water: assuming, for convenience, that the surface of the land in the United Kingdom is of the same density as the rest of the earth, one arrives at the fact that one year’s tonnage of goods conveyed by the trains of Great Britain and Ireland is equal in weight to a thin slice cut from the face of the whole kingdom, the thickness of which is a little more than the thickness of two leaves of this Magazine. Under the conditions stated, a slice of the United Kingdom, of this thickness, would equal in weight the stupendous quantity of nearly 325 million tons, and therefore the “shaving” in No. 10 illustrates the weight of goods conveyed during the year 1894.

It is rather interesting to compare the receipts per train-mile of various companies, and, in No. 11, the white columns stand for the average amount received by twenty different companies for every mile run by one of their trains during the year 1894. The black lines seen in No. 11,

which run part way up each of the white columns, stand for the amount expended by each of the twenty companies for every mile run by one of their trains. Here are the actual figures:—

Name of Company.	Receipts per Train-Mile.		Expenditure per Train-Mile.	
	s.	d.	s.	d.
1. Taff Vale	6	7	3	11
2. Furness	6	5	3	4
3. London and North-Western	5	6	3	0
4. Lancashire and Yorkshire	5	6	3	2
5. South-Eastern	5	5	3	0
6. London, Brighton, and South Coast	5	3	2	10
7. North-Eastern	5	1	2	11
8. London and South-Western	4	11	2	8
9. Great Northern of Ireland	4	10	2	6
10. Midland Great Western of Ireland	4	9	2	4
11. Great Western	4	8	2	7
12. Great Southern and Western of Ireland	4	8	2	6
13. Manchester, Sheffield, and Lincolnshire	4	7	2	6
14. Caledonian	4	7	2	5
15. Midland	4	5	2	6
16. Great Eastern	4	4	2	6
17. Glasgow and South-Western	4	3	2	5
18. Great Northern	4	3	2	7
19. North British	4	3	2	2
20. Great Northern of Scotland	4	0	2	0

These twenty companies are here arranged in the same order as in diagram No. 11, viz.: in the order of the receipts per train-mile. The Taff Vale heads the list with 6s. 7d. received for every mile run by its trains, and the Great Northern of Scotland comes last with only 4s. for running a train one mile. Of our big English lines, the London and North-Western comes out best with a receipt of 5s. 6d. for each train-mile run in 1894, and the Great Northern shows the smallest receipt of the English lines, viz.: 4s. 3d. per train mile.

As regards expenditure, and taking the big English lines that have a London terminus, the London and North-Western and the South-Eastern both spent 3s. per mile run by their trains, and the items for the other companies can be seen by inspecting the tabular statement just given.

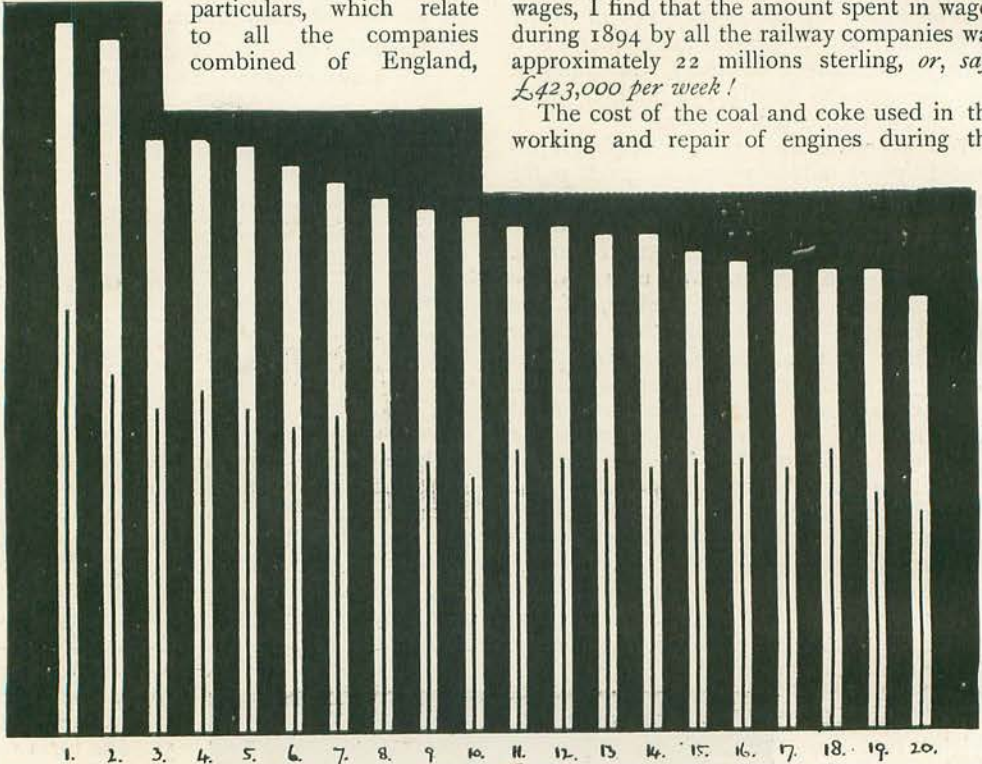


No. 10.—A fine “shaving” sliced from the entire surface of the United Kingdom, which is only a little thicker than two leaves of THE STRAND MAGAZINE, but which equals in weight one year’s tonnage of mineral and general merchandise conveyed by the Railways of the United Kingdom. [For detailed explanation see text.]

Concerning the working expenditure of the railway companies, it may be interesting to give the following particulars, which relate to all the companies combined of England,

other items, "maintenance of way," for example. Collecting all the wages from each item of expenditure which includes any wages, I find that the amount spent in wages during 1894 by all the railway companies was approximately 22 millions sterling, *or, say, £423,000 per week!*

The cost of the coal and coke used in the working and repair of engines during the



No. 11.—A comparison for twenty Railway Companies of the United Kingdom, of their Receipts and Expenditure per train-mile travelled during the year 1894. [For explanation see text.]

Wales, Scotland, and Ireland during the year 1894:—

Expenditure of the Railway Companies of the United Kingdom, on account of:—

	Cost per Ten Miles of Train-run.	
	s.	d.
Traffic expenses	8	9½
Locomotive power	7	6¾
Maintenance of way	4	6½
Rolling stock	2	4¾
Rates and taxes	1	8½
General charges	1	2½
Government duty	0	2
Legal and Parliamentary expenses	0	1¾
Compensations: Damage to goods.....	0	1¾
" Personal injuries	0	1
Miscellaneous	0	3¼
Total cost per train-mile	27	0¼

[Note.—In addition to this expenditure of £1 7s. 0d. for every ten miles run by trains, there was also an expenditure equal to 1s. 4d. per ten miles run by trains on account of steam-boat, canal, harbour, dock, etc., expenses.]

These figures show how the railway companies spent their money, and the amount spent for each item mentioned, for every ten miles run by their trains. Wages form the largest item of "Traffic expenses," and wages, of course, form part of some of these

year was over 3½ millions sterling; *i.e.*, about £70,000 per week was paid by the railway companies of the United Kingdom for coal and coke.

But the whole railway enterprise is a wonderful thing, and, choose what items you may of its operations, nothing but astonishing results are brought out when we are able to get a condensed view of the facts, some of which I have now held up for inspection, while many more remain behind.

To conclude, I think that all who may have read this account of our railways, and who have even partly realized what an enormous amount of quiet intelligence and steady energy is yearly spent for us by our railway army, will agree with me that one and all, officers and men alike, these railway men deserve our hearty congratulations upon the present development of the railway system of the kingdom, and upon its real efficiency as a public instrument of vast utility.