Appendix No. 5.

Sketch describing the System of Working and General Arrangements of the French Railway Companies, compiled from the Minutes of the Commission d'Enquête sur les Moyens d'assurer la Regularité et la Sureté sur les Chemins de Fer. Paris, 1858.

The Commission was composed of the Minister of Commerce as president, of a vice-president, and of thirteen members, who were for the most part officers of the "Ponts et Chausées," and officers employed in the railway and telegraphic departments.

The following are the railway companies whose various systems of management formed the subject of the Report of the Commission:—

Nord.	Rouen.
Est.	Havre and Dieppe.
Paris-à-Lyon.	Grand-Central (Rhône et Loire.)
Orléans.	St. Germain.
Lyon à la Méditerranée.	Sceaux.
Ouest.	

1st Section.

STAFF.

What is the arrangement of the Staff to whose charge the maintenance and the superintendence of the Line is intrusted?

The general arrangement is, that each of the systems above quoted employs an engineer, superintendent, assistant engineers, and also district engineers. The subordinate working staff consists of chief guards, overseers, night and day watchmen, pointsmen, gate keepers (men and women), plate layers, &c., &c.

Nord.

This line is divided into four sections, at the head of each of which is a superintendent. The day and night services are distinct. The staff of the former consists of 1,215 servants under the above-mentioned officer; that of the latter of 255 officers and servants. There is a superintendent engineer and an assistant engineer.

Est.

This line is divided into four divisions (arrondissements), which are again subdivided into sections. A superintendent is placed at the head of each division.

The staff of the company is under the direction of a principal engineer, who is himself responsible to the engineer-in-chief of the company.

Lyon.

The staff of this company consists of 1 engineer-in-chief, 1 engineer, and 6 superintendents of sections; of 428 officers, servants, and workmen for the maintenance of way, and of 413 for conducting the traffic, to which may be added 19 pointsmen.

Orléans.

The director is at the head of the staff of the line. Under this superintendent are an engineer-in-chief, 3 assistant engineers, together with sectional and district superintendents. This railway is divided into three divisions (arrondissements).

Méditerranée.

General superintendents have the management of this railway. Under these general superintendents are superintendents who have charge of portions of the line varying from about 60 to 90 miles in length; 7 superintendents of sections, one for every 25 miles, and 5 superintendents of guards.

The superintendents of sections have to attend to the maintenance of the way, and the supervision of the police arrangements of the railway. The superintendents of guards have the management of the guards; and the signal arrangements are also under their charge. The pointsmen, gate keepers, and other servants of the company, in all about 540, are also under their direction.

Ouest.

In this railway the engineer has under him 6 superintendents of sections, to each of whom 3 to 5 overseers are responsible. Each of these overseers has the direction of a certain number of gangs of plate layers, each under the charge of a foreman.

There are 65 superintendent foremen. One of these gangs is allotted to every 1·863 miles of railway. The number of men in a division varies. In addition to this staff, 23 night watchmen and 24 gate keepers are employed.

Rouen, Havre, Dieppe.

The staff of this railway comprises 1 engineer-in-chief, 2 assistant engineers, 5 overseers (contrôleurs), and 216 servants, comprising gate keepers, night watchmen, and servants of the company employed at the bridges, viaducts, and tunnels.

Rhône et Loire.

3 engineers, 14 overseers, 334 plate layers, pointsmen, and gate keepers constitute the staff of this line.

St. Germain.

The staff of this company is composed of 1 inspector, 1 engineer superintending the maintenance of way and the working arrangements, 1 chief guard, 1 assistant guard, 2 overseers.

2.

Are the Works necessary for the Maintenance of Way executed by the Company or by Contract?

Nord, Est, Paris à Lyon, Orléans, Ouest, Grand-Central, et St. Germain.

On these railways the works are executed by the company.

On the railway from Lyons to the Mediterranean the maintenance of way in each district, and all the works pertaining thereto, are executed by the foreman of works, by contract.

The workmen, although employed by and attached to the foreman of works, are nevertheless considered the servants of the company, who reserve to themselves the power of determining the number of these workmen, and of fixing the amount of their wages.

The foremen of works are not obliged to make any deposit for the fulfilment of the contract. They are, however, at the expense of providing tools.

The materials necessary for the work are supplied by the company.

Rouen, Havre, Dieppe.

On these lines works required for the maintenance of way are executed by public contract, under the control of an agent-superintendent and 5 overseers.

This system has ever been found to work well, thanks to the permanent arbitrator elected by the company and the contractor, whose decision is final, and to the strict and vigilant control which has always been exercised.

There are difficulties attending this system in the case of the Government, which is obliged to make choice of that

contractor who offers the most favourable terms. This difficulty no longer exists in the case of a company, which is always at liberty to choose whatever contractor it pleases for the execution of its works.

3.

What are the Duties of the class of Servants termed "*Gardes?*" How are they distributed upon the Line?

The "*Gardes*" have charge of all signals; their duty is to examine and see to the efficient state of the permanent way; they constitute also the police of the railway and execute any smaller repairs that may be necessary in the maintenance of the way.

The number of the "*Gardes*" varies on the different lines. The districts allotted to each man are never of great extent, and those are the least extensive, where curves, important level crossings, and points, occur.

4.

How is the Night Service arranged?

The charge of the line at night is entrusted to special "*Gardes,*" who have been exempted from all day duty on the following lines:—Nord, Lyon, Orléans, Ouest, Rouen, Havre et Dieppe, and Rhône et Loire.

EST.

On this railway but few special "*Gardes*" are employed in night duty. This duty is taken by all the officials in their turn.

MÉDITERRANÉE.

There was no night traffic on the Lyons et Méditerranée railway, consequently no facts were elicited on this head.

ST. GERMAIN.

The 10 p.m. is the last train on this line.

The night "*Gardes*" in the same manner as the day "*Gardes,*" have the charge of the signal arrangements; they also act as police and overseers of the permanent way, but they have nothing to do with the works required for the maintenance of the permanent way. The overseers and superintendents of the sections are responsible for the performance of the night duty.

As a rule, railway companies appear to have adopted that system by which night duties are performed by a distinct staff. The "Est" being the only company which has not followed the plan; this company, however, find their system answer.

There are officers on some lines whose duty it is to see in person that the night "*Gardes*" rest themselves in the day time.

The night duty generally lasts 10 hours and the day duty generally 14 hours.

5.

How are the Gangs of Platelayers composed?

These gangs are composed of a foreman, and of plate layers whose number varies from two to six men.

6.

Is it the duty of the Divisional Inspectors to inspect the condition of the Line?

The foreman of the gangs of plate layers, together with the "Gardes," have the charge of the police arrangements as well as the management of the line. It is their duty also to see that signals, rendered necessary when repairs are being carried on, are made.

It is their duty too to inspect the condition of the whole length of the rails every morning, before they commence their daily occupations; they repeat this inspection of the rails the last thing every evening.

7.

When the permanent Way has to be repaired, by whose direction are the Works necessary for such Repairs commenced, and what measures are taken in order that those entrusted with the Maintenance of Way may act in concert with those charged with the conduct of the working arrangements?

The conduct of the repairs is undertaken either by the foreman of the gangs of plate layers, or by inspectors of sections, or by engineers, according to their importance.

When the repairs are of such a nature as at all to impede the traffic, the working arrangements rendered necessary during such repairs are mutually arranged between the superintendents of works and of traffic.

LYON ET MÉDITERRANÉE.

On this line, as the works necessary for the maintenance of way are under the same superintendents as the traffic arrangements, these superintendents necessarily conduct the traffic arrangements during any repair of the line.

ROUEN, HAVRE, DIEPPE.

There are no special directions upon this railway relative to repairs, which are, however, arranged so as not to interrupt the traffic.

During all repairs it is the duty of the foreman of plate layers to provide such signal arrangements as may secure the ordinary traffic from accident.

In the event of the repairs being of great importance, special arrangements are made.

RAILS AND CHAIRS.

8.

What is the Shape and what are the Dimensions of Rails? What is their weight?

The rails generally used are double T rails, their length varies from 14·76 feet to 19·68 feet, and their weight varies from 66 to 82 lbs. for every 3·28 feet.

9.

Is it not requisite that the Weight of the Rails should be increased in proportion to the Weight of the Engines?

Rails weighing from 79·40 to 82·50 lbs. are found to be of sufficient strength to bear the weight of engines in ordinary use. Most companies consider that in those cases in which rails of this weight are insufficient, sleepers might be added, which would supply the deficiency. It is considered that if rails of a greater weight be used, there would be some risk of such rails not being so well made.

NORD.

This company referring to rails weighing 88 lbs., suggest that probably, considering the improvements which are being made in forges, still heavier rails, well made, may be yet procured.

10.

What is the arrangement of the Supports for the Rails? Mention the Space between these Supports?

The rails are supported by chairs which rest upon wooden sleepers.

The distance between these supports depends upon the length of the rails, the ordinary distance is about 4·10 feet.

RHÔNE ET LOIRE.

In some parts of this line the chairs are supported by stone blocks.

On some lines new means of supporting rails are being tried.

The systems which appear to be the most deserving of attention are—1st. Pouillet's system. 2nd. The system of sleepers with chairs cast on them and bound together by iron fastenings.

On the "Nord" line, fishes to strengthen the joints are used. In this system the joint is suspended, and the sleeper is 11·81 inches from the joint.

LYON.

The great stability of the permanent way of this line is attributed to the length of the sleepers used. The sleepers are placed very close together.

11.

How is the Quality of the Rails ascertained? How are the Rails and Chairs tested?

Almost all the companies have special agents in the factories, who personally superintend the manufacture of the rails ordered by them, rails and chairs are usually tested by shock or by pressure. Rails and chairs taken indiscriminately from the new stock are submitted to these trials.

LYON.

This company have adopted the following system for testing rails and chairs manufactured for them.

The rails are divided into lots, each being the produce of one or of several days' manufacture, and the chairs into lots, each being the produce of one casting.

Their agent selects about one per cent. from each of the lots of rails and chairs, and, if more than one in ten of the thus selected rails and chairs fail to undergo the appointed test, the whole lot of those to which it belongs is rejected.

By this system of testing very good articles are obtained, and during the winter of 1853–4 only six fractures occurred in the rails, on this company's line.

The attention of this commission was specially called by one of the members to this fact. He attributed these favourable results to the system of testing quantities of rails separated into parcels of rails which had been manufactured at the same time, or on the same day, instead of testing the whole indiscriminately.

More importance is attached now than formerly to the quality of rails.

12.

Do Rails often break or get out of place? Do Accidents happen from these causes?

NORD.

On this railway the chairs break more frequently than the rails. Such fractures do not, however, occasion accidents. Up to the 31st December 1853, only two cases of fracture occurred, which caused the train to run off the rails.

These accidents were not attended with disastrous consequences.

EST.

The fractures in the rails were numerous in 1852 on the main line. The running off the rails of some goods waggons, however, was the only casualty which resulted. The company assign as the causes of such fractures, inequalities which occur in the tires of the wheels of the engines and tenders. In the Nanteuil tunnel, where these fractures were constantly in the habit of occurring, a fifth sleeper has been added, which has been found to answer the purpose of preventing fractures.

LYON.

From 1849 to the 31st December 1853, 27 fractures in the rails occurred chiefly in those spots where the permanent way had sunk. In the same period there were between 1,000 to 1,200 fractures in the chairs. These were attributed to a too tight keying up. No casualties, however, resulted.

ORLÉANS.

On this line, fractures, excepting when the rails weigh 66 lbs., are rare. Only one accident is reported to have been caused by such fracture.

ST. GERMAIN.

Fractures are rare upon this railway. They have been remarked to have always occurred 11·81 inches to 1·64 feet from the end of the rails. It has been observed that they have taken place at the change of the seasons, *i.e.*, at the end of a long course of dry weather, similarly at the end of a long course of wet weather. The permanent way yielding at such seasons in a certain degree.

There is a constant and rapid displacement upon wooden bridges.

OUEST, ROUEN, HAVRE, DIEPPE, MÉDITERRANÉE.

On these railways fractures have seldom happened, and no accidents are traceable to this cause. On the "Rive Droite" they are more frequent, and the fracture of a rail on the bridge of Quinze Perches, was the cause in the month of October 1853, of an accident which involved serious consequences. 37 fractures were reported in 1853.

Fractures are more numerous in chairs; but one company (Méditerranée) observe, that such fractures only occur in the joints, and that they are attributed to their being keyed up too tightly.

RHÔNE ET LOIRE.

In rails made according to the old shape, fracture is frequent. The accidents which have resulted are but of slight importance.

Displacement of rails is generally observable where the traffic is great, and in approaches to stations, and such displacement follows the track of the trains. This displacement has been chiefly observed in steep gradients, but rarely takes place at all in ordinary gradients. M. Julien has proved, that in gradients of 26·24 feet, the displacement varies from ·06 feet to ·13 feet per month. On the very steep gradients of the "Méditerranée," a rail with a notch cut in it, which rests upon a corresponding projection in the joint chair, is inserted in every other ten or twenty rails (according to the incline).

The displacements are more numerous in summer than in winter.

13.

How and by whom is the state of the permanent way and the Rails inspected?

All the servants of the company to whom the superintendence of the permanent way is entrusted, from the superintendent down to the plate layer, share this responsibility.

SAFETY RAILS.

14.

Are safety Rails ever used? are there any objections to using them?

Safety rails are only used at level crossings and at certain crossings of the rails. Without considering them positively dangerous, safety rails are generally looked upon as productive of more harm than good. They render the maintenance of way more difficult; and, in case of trains running off the line, increase the probability of accident.

Safety rails of wood have been used on the Val-de-Fleury Viaduct, they have, however, been done away with.

ROUEN.

This company consider, that if these rails be eventually found useful, it will be for viaducts.

LYON.

Wooden safety rails have been laid on some viaducts of this railway; they are, however, no longer used. Among the objections urged against them, it was alleged, that the sleepers became twisted in very wet or dry weather, and that thus the permanent way was constantly becoming twisted; and, also, that trains were in danger of being thrown off the rails by any obstruction inserted between the rails and the wooden safety rails.

15.

Have Parapets been erected in any places which may be looked upon as dangerous; as, for instance, on raised Embankments on the banks of Rivers?

EST.

On several portions of this line there are banks of earth erected as parapets.

PARIS À LYON.

On all the viaducts of this line parapets of solid masonry have been erected.

It is believed that in the event of a train running off the rails, this masonry would be sufficient to stand the shock.

ORLÉANS.

Similar precautions have been adopted on this railway between Tours and Nantes.

These are the only railways on which works of this description exist.

It is considered, on the whole, better not to have banks of earth on elevated embankments.

ROADS PARALLEL WITH THE RAILWAY.

16.

Are there any Places where the Railway runs alongside the High-road? What precautions have been adopted in order to secure Horses from being frightened by the passing Trains?

The proximity of railroads is the cause of but few casualties on the high-roads. Horses are soon familiarized with the noise of engines.

NORD, EST, ROUEN, RHÔNE ET LOIRE.

These companies have concealed the railway from the road by thick fences, or by dense plantations, or else by a wooden fence.

MONTPELLIER À NÎSMES.

On this line a wall 3,936 feet long by 9·84 high was erected.

M. Didion considers, that nothing is gained by thus concealing the railway from the horses, and the company, finding from experience that this was the case, have razed the wall alluded to above.

GRADIENTS AND CURVES.

17.

What is the maximum of inclines (déclivités) on railways?

1 in 100 is generally the steepest.

On the Rhone and Loire, Andrizieux et Roanne, is an incline of about 1 in 25.

On the Chemin de Fer de l'Est is an incline of 1 in 125 of 6 miles in length.

18.

Are there any Places where an ascending Gradient immediately succeeds a descending Gradient, without a level Space intervening? Can this be considered likely to occasion Accidents?

This occurs on all lines, Paris à Lyon being excepted.

Railway companies, with one exception (Est), consider that an ascending gradient may succeed a descending gradient without fear of accident.

NORD.

On this line this occurs in several places. A short level space has, however, always been contrived between. Mechanically speaking, it does not appear to matter whether this level space exists between or not; only without such a level the joints of the rails are more liable to derangement.

In the event of there being no intermediate level, the angle can be softened by means of a curve of a very great radius, of 32,800 feet, for instance.

The accident at Fampoux (Nord) has been attributed to an ascending gradient succeeding too quickly to a descending gradient.

Railway engineers are not, however, in general of this opinion.

19.

What Precautions are taken to avoid Accidents on steep Gradients?

The only preccautions usually adopted are slackening of speed and signalling from a greater distance. On the "Rhône et Loire" and "St. Germain" railways, extra breaks are used. The former company has besides special rules for regulating the traffic over gradients.

EST.

This company consider that when the permanent way is being laid down in steep gradients, the joints should be strengthened by iron splints to prevent the rails from slipping or from being raised by expansion.

MÉDITERRANÉE.

On this railway merely rails with notches are used.

It is generally considered advisable by railway companies to avoid gradients in tunnels, especially when the tunnels are damp, for damp on the one hand diminishes the efficiency of breaks, and on the other causes the wheels of ascending carriages to slip.

20.

What is the minimum of the Radius of Curves?

TABLE showing the MINIMUM of the Radius of CURVES.

Name of Railway.	Radius of Curve.	Remarks.
	Yards.	
Nord	464·65	Radius of the curve at St. Omer.
	235·05	Radius of the curve at Amiens, going towards Boulogne.
Est	765·31	Where the railway approaches stations.
Lyon	546·65	At the stations of Dijon and Chalons.
Orleans	431·85	Orleans station, going towards the central provinces.
	546·65	At Nantes.
Méditerranée	218·66	Alais à la Grand Combe.
	327·99	Montpellier à Cette.
Ouest	874·64	
	306·12 and 327·99	In stations.
Rouen, Havre, Dieppe	819·97	Paris and Havre.
	655·98	Dieppe.
Rhône et Loire	109·33	Roanne et St. Etienne.
	524·78	St. Etienne et Lyon.
St. Germain	273·32	

21.

How much is the exterior Rail raised in Curves of different Radii?

The formula which is used to calculate this is $x = \frac{a}{R} \cdot \frac{V^2}{8088}$

a representing the breadth of the line.
R „ the radius of the curve.
V „ the speed of the train.

TABLE showing the Amount of Elevation of the Outer Rail in Curves on the different Lines.

Name of Railway.	Elevation of the Outer Rails.	In Curves of.	Remarks.
	Inches.	Yards.	
Nord	2·75	1093·3	
	3·54	874·6	
Lyon	2·36	1093·3	
	2·36	546·6	Trains travelling at a slow pace.
Méditerranée	1·96	1093·3	
Ouest	1·18 to 1·57	874·6 to 1640	
Rouen, Havre, Dieppe.	1·96	1093·3	
Rhône et Loire	1·77	109·3	
	·86	218·6	
St. Germain	·78 to 1·18	874·6 & upwards	
	1·18 to 1·57	437·3 to 874·6	
	3·9	273·3	

22.

What Play is given to the permanent Way in straight Portions of the Line, and in Curves?

—	Nord.	Est.	Lyon.	Orléans.	Méditerranée.	Ouest.	Rouen, Havre, Dieppe.	Rhône et Loire.	St. Germain.
Breadth between the the rails.	Ft. 4·72	Ft. 4·75	Ft. 4·75	Ft. 4·75	Ft. 4·75 4·71	Ft. 4·75 4·72	—	—	Ft. 4·74
Play given to permanent way.	·049	·098	·098	·098 ·164 on the curves of the quays of Nantes.	—	—	·082	·098 ·147 in curves whose radius is less than 200 metres.	·016 ·032

POINTS AND CROSSINGS.

23.

What are the arrangements relative to the Points and Crossings; are the Points self-acting?

Crossings are generally so arranged that trains to change their line must back.

The "Rouen, Havre, and Dieppe" railways are an exception to this rule.

Iron of a superior quality is used for points and crossings.

The improved arrangements that have been made during the last four or five years in points and crossings are marked.

Several important improvements have been introduced, the first of which is the introduction of symmetrical points, the second the lengthening of points in general. The employment of self-acting points conduces considerably to general safety, for when once a train has passed, the self-acting points recover themselves, so that there is no danger of a train following in the wake of one which has already passed.

24.

To whom is the arrangement of the Points intrusted? Has the same Pointsman charge of several Points?

The pointsman has no other duty but the charge of the points; one pointsman has the charge of a number of points when the points and crossings are not too far apart, and when the traffic is not sufficient to require the services of two men for this duty.

In unimportant stations on the line, on the "Lyon" railway, the working of the points is entrusted to one of the company's servants employed at the station, or to a policeman of the line.

As a rule, the staff employed in conducting the traffic is responsible for the management of the points in stations; points at a distance from stations are under the charge of those to whom the maintenance of way is intrusted. The pointsmen, however, form part of the staff employed in the maintenance of way.

Pointsmen are chosen from those plate layers, who are distinguished for their coolness, punctuality, and good conduct.

BALLAST.

25.

What kind of Ballast is used upon the Line?

Good ballast should consist of gravelly sand, permeable by water. When, however, this description of ballast is not found in the district in which the works are being carried on, it is replaced by sand, or by broken stones, or chalk.

The best ballast is that which can be well packed, for instance, coarse sand or fine gravel, coarse gravel, broken stones or bricks.

NORD.

On this line there is ballast of all kinds.

In some places the ballast in dry weather becomes dusty, and in wet weather muddy, and which requires to be drained. In such places it is intended to replace it by good ballast brought from a distance.

EST.

The ballast is reputed good.

It is for the most part composed of a gravelly sand, containing a little clay; stones broken up small are used in some places.

LYON.

A similar description of ballast is used as on the "Est" railway.

ORLÉANS.

Sand or broken stones.

MÉDITERRANÉE.

Broken stones or gravel from the Rhône.

OUEST.

Quarry sand, in some places broken stone.

ROUEN, HAVRE, DIEPPE.

On the Rouen line, gravel; on the Havre and Dieppe lines, flint and chalk mixed, the chalk ballast by itself not being good.

RHÔNE ET LOIRE.

Generally gravel is used. In some parts of the line cinders from the forges are employed as ballast.

SAINT GERMAIN.

On this railway the ballast is composed of sand.

SLIPS.

26.

Are there ever Slips in the Slopes of Embankments, or in Cuttings? Have Accidents ever been attributed to Slips?

Except upon the Saint Germain Railway, no accidents have ever been attributed to slips.

These slips are attributed to clayey earth, which is often met with in great earth works.

A clay vein ·39 inches thick is sufficient to cause a considerable slip, and this has actually happened in the Steimberg and Homburgh cuttings, on the Metz branch ("Est").

LYON.

In three places on this line has the earth given way under the pressure of embankments.

M. de Sazilly's plan of drainage has been found to answer.

TUNNELS.

27.

Are there any Tunnels on the Line; what is their Breadth and Height; are the Dimensions of existing Tunnels considered sufficient?

TABLE showing existing TUNNELS and their respective DIMENSIONS.

Name of Railway.	No. of Tunnels.	United Length.	Breadth.	Height.	Remarks.
		Yards.	Yards.	Yards.	
Nord - -	4	846	7·87 to 8·30	5·46 to 6·72	The dimensions of the tunnels are found generally satisfactory.
		Miles.			
Est - -	—	7·04	8·09	5·68	Their dimensions are found insufficient. The company consider the breadth should be 8·72 and the height 6·15 yds.
Lyon - -	13	4·12	8·74	6·55	These dimensions are slightly varied in the tunnel of Blaisy.
					These dimensions are considered barely sufficient.

Table showing existing Tunnels, &c.—*continued.*

Name of Railway.	No. of Tunnels.	United Length.	Breadth.	Height.	Remarks.
		Miles.	Yards.	Yards.	
Orléans - -	20	5·55	8·09	5·94 to 6·48	In one of the tunnels in this network of lines these dimensions are slightly exceeded.
Méditerranée	7	3·92	8·74	5·26 to 8·20	The company consider that the minimum breadth should be 8·17 and the minimum height 6·26 yards.
		Yards.			
Ouest - -	1	153	7·65 to 8·09	6·01 to 7·10	The height is considered insufficient.
Versailles - rive gauche.	2	150			
Versailles - rive droite.	2	735			
		Miles.			
Rouen - -	11	8·52	8·30	6·34 6·56	On the Rouen line. On those of Havre and Dieppe.
Havre - -					
Dieppe - -					
Rhône et Loire -	16	2·82	2·73* 5·46†	5·46 5·79	These dimensions are considered insufficient.
		Yards.			
St. Germain -	2	430	7·65	6·47	Besides these tunnels, this company, jointly with the Ouest and Rouen companies possess the tunnels of the Place de l'Europe, and the united length of which is 849·92 yds.

* Single line of rails. † Double line of rails.

28.

What is the Breadth of the Formation level of Railways? What is the Breadth of the Interval between adjacent Lines of Rails, and between the Parapets of Viaducts?

Table showing the Breadth of the Formation, Level, &c.

Name of Railway.	Breadth of formation level at the level of the Ballast. On Embankments.	Breadth of formation level at the level of the Ballast. In Cuttings.	Interval between adjacent Lines of Rails.	Breadth of formation Level between the Parapets of Viaducts and Bridges.	Remarks.
	Yards.	Yards.	Yards.	Yards.	
Nord - -	9·07	8·09	2·07 to 2·40	—	Breadth between outer rail and parapet of bridge, 1·31 yards.
Est - -	9·07	8·09	2·03	- -	Breadth between outer rail and parapet of bridge, 1·56 yards.
Lyon - -	8·09	8·09	2·36 & between Dijon and Châlons 1·96	8·09 and 8·74	
Orléans—					
Paris à Orleans.	10·93	10·05	2·50	8·09	These dimensions are considered sufficient.
Ligne de Centre.	10·93	9·29	2·18	8·09	
Ligne de Bordeaux.	8·745 to 11·1		2·40	8·09	
Ligne de Nantes.			2·38		
Méditerranée:					
Marseille to Avignon.	9·07	8·20		8·74	
Tarascon to Montpellier	8·20			8·09	
Nimes to Calais	8·20		1·96 to 2·18	8·09	
Alais to La Grand Combe.	4·37 to 4·91			8·09	
Montpellier to Cette.	3·82			4·59	
Ouest - -	au niveau du terrassement 10·93		1·96	7·65 to 8·09	Dimensions thought sufficient.
Rhône - -	au niveau du terrassement 10·93		1·96	8·74	Ditto.
Havre - -	au niveaux superieur du ballast 8·09				
Dieppe - -					
Rhône et Loire	6·55		1·09	—	Breadth between outer rail and parapet of bridge, 0·54 yards considered insufficient.
St. Germain -	7·98		1·96	7·65	

LEVEL CROSSINGS.

29.

How many level Crossings are there?

Table showing the Length of the Railways and the Number of Level Crossings upon each.

	Nord.	Est.	
		Paris à Strasbourg.	Metz à Forbach.
	Miles.	Miles.	Miles.
Length of line - -	440·91	312·36	75·76
Number of level crossings	564	246	59

	Lyon.	Orléans.
	Paris à Chalons.	
	Miles.	Miles.
Length of line - -	237·84	686·82
Number of level crossings	235	741

	Ouest.	
	Paris au Mans.	Rive Droite. Rive Gauche.
	Miles.	Miles.
Length of line - -	131·65	10·55 10·55
Number of level crossings	110	20 20

	Rouen.	Le Havre.	Dieppe.	Rhône et Loire.
	Miles.	Miles.	Miles.	Miles.
Length of line -	79·48	55·26	31·67	93·15
Number of level crossings -	39	26	25	135

	Saint Germain.	Argenteuil.	Méditerranée.
	Miles.	Miles.	Miles.
Length of line -	12·42	2·79	182·57
Number of level crossings -	6	8	170

30.

Who have the charge of level Crossings and the Gates attached to them?

Level crossings, and the gates attached, are intrusted to special servants of the company, men and women, according to the importance of the crossing.

Paris à Lyon.

Only the frequented and important level crossings are under the charge of men.

Saint Germain.

On this Line the Gatekeepers are all Women.

Rhône et Loire.

Men alone are employed as gate keepers by this company.

There are five descriptions of level crossings.

1. When roads, on which there is a great traffic, cross the line. In this case they are watched night and day.

2. When the roads crossing the line are of less importance. In the daytime, the wife of the gate keeper may supply his place; in the night, however, he himself is bound to attend to the gate.

3. When the road is unimportant. In such cases the gates are closed at night.

4. Private level crossings, the gates of which are in the charge of the private individual to whom the level crossing belongs under the eye of the servants of the company.

5. Level crossings for foot passengers, which are closed at night. One of the members of the Commission considered that the employment of women as gatekeepers was open to objections, amongst which objections the impossibility of binding them by oath was alleged. The companies, however, who had adopted the system of employing women, unanimously gave it as their opinion that women made the best gate keepers, on account of their sedentary occupations. Besides which, it had been remarked that rarely had waggoners attempted to force their way across a level crossing, when a woman was acting as gate keeper.

31.

Has one Servant of the Company charge of several level Crossings?

When there are several unimportant level crossings very near to each other, one man has generally the charge of them.

32.

Have the Gatekeepers at level Crossings any portion of the line intrusted to their Charge?

On all railways, with the exception of "Rouen, Havre, and Dieppe," the gate keepers have a certain portion of the line intrusted to their charge. The extent of the district varies with the amount of traffic at the level crossing.

33.

Are not the Wives of Gatekeepers and Platelayers intrusted with the charge of the Gates at certain level Crossings? Is this system found to answer?

The women who act as gate keepers at level crossings are always the wives of plate layers or policemen.

The system of employing women in these duties has been found to answer in all respects.

One company ("Rhône et Loire") alone has not adopted this plan of employing the wives of the servants.

34.

Is there a Gatekeeper's Lodge at every level Crossing?

TABLE showing the Number of GATEKEEPERS' LODGES and the Number of LEVEL CROSSINGS.

Name of Company.	Number of Level Crossings.	Number of Lodges.	Remarks.
Nord - -	564	503	This company consider a lodge indispensable at every level crossing, with the exception of those level crossings so much frequented as to require watching day and night.
Est - - -	246	162	It is considered so important that the gatekeepers should have lodges, that the company are about to have lodges erected at all level crossings at present without them.
Metz Branch	54	54	
Lyon, between Paris and Châlons.	235	225	There are besides thirty-three houses on the line inhabited by plate layers and policemen,
Orleans - -	—	—	There are a good number of level crossings on the railway which have no lodges.
Méditerranée	170	111	
Ouest - -	—	—	On the main line of this railway there are no lodges at any of the level crossings.
Rouen, Havre, Dieppe.	—	—	All the level crossings have lodges attached to them, with the exception of a few level crossings which are only opened at certain seasons of the year.
Rhône et Loire	—	—	There are but thirty-eight lodges at level crossings on this railway, and these are situated where the line is crossed by a public or much frequented road.
Saint Germain	—	—	All the level crossings are provided with lodges.
Argenteuil -	—	—	There are not lodges at all the level crossings on this line.

35.

Are there any level crossings where the gates are always kept closed at night?

On all railways except on the lines of the "Rouen, Havre, Dieppe," and "Rhône et Loire," are there level crossings, the gates of which are kept closed at night. If, however, there is a lodge, the gate keeper is bound at all times, when required to do so, to open the gates.

The hours at which the gates of those level crossings, which are never opened at night, are closed, are fixed by the Government, and depend upon the season and the pursuits of the country people in the neighbourhood.

36.

Are level Crossings lighted at Night?

It is not customary to light any except important level crossings.

PARIS À LYON.

This company consider the lighting at night as hardly necessary, as each gate keeper has his lantern, and all waggons should have lighted lamps at night.

37.

Do the gates at level Crossings open across the Road, or across the Railway?

On all railways the gates are opened across the road.

On the branch from La Loupe to Mans "Ouest," the gates open across the railway. They do not, however, when open, reach as far as the rails.

When formerly gates were opened across the railway, instances frequently occurred of trains coming up and breaking through the gates. In the neighbourhood, however, of great stations, it is requisite to close the gates across the railway; but at such places gate keepers are stationed, whose sole duty it is to attend to the opening and shutting of the gates.

Besides which, it should be remarked that trains in this part of the line have either not yet got up, or else have slackened their speed, which considerably lessens the danger of closing gates across the line, above spoken of.

38.

Is it the custom to keep the Gates at level Crossings closed, and only to open them when required, or to keep them always open, and only to close them just before a Train is going to pass? In the latter case, how long previously to the passing of a Train are they kept closed?

On almost all railways it is the practice to keep the gates closed, and only to open them to allow carriages to pass. On the "Lyon à la Méditerranée" and the "Rhône et Loire" lines the gates are constantly kept open, and are only shut when a train is expected.

When a railway crosses a road on the level, on which there is great traffic, the gates must in general be kept constantly open, and must be closed only when trains are expected.

The gate keeper must always be present.

When the gates are kept closed, it is sufficient if he or his wife are at hand to open the gate, if required to do so.

39.

Are there Wickets for Foot Passengers at every level Crossing?

At almost all level crossings there is a separate passage for foot passengers. The way, however, in which these wickets are constructed varies on the different lines.

Some companies have adopted a side gate, which is fastened with a latch in the daytime, and with a padlock at night. Other companies are content with a simple turnstile, to which system, however, decided objections are made.

The Central Government has directed that this question should be considered.

The engineers superintending the working arrangements disapprove of the turnstiles, and recommend the adoption of gates.

40.

Are there any Gates which Foot Passengers can open themselves? In which case, what Precautions are taken to prevent Animals getting on the Line?

Animals cannot get upon the line through turnstiles, or through the gates for foot passengers; but this is not the case when such passages are closed by a rail only, under which small animals can pass. The instances, however, that have occurred are rare.

41.

Are there any private level Crossings for the use of Landowners, the key of which is possessed by the Landowner?

On all railways save two, "*Paris à Lyon*" and "*St. Germains*," there are private level crossings, the keys of which the landowners hold.

OUEST.

There is only one really private level crossing, and even this level crossing is superintended by the company.

NORD.

There are eleven private level crossings on this line, the keys of five of which are in the hands of private individuals. The company's servants superintend the six others.

EST.

There are three private level crossings. The company's servants lock them when the quick trains are expected.

ORLÉANS.

There are a certain number of private level crossings on this railway.

MÉDITERRANÉE.

There are but few private level crossings.

ROUEN, HAVRE, DIEPPE.

There are five private level crossings, superintended by the owners of the property where they occur.

RHÔNE ET LOIRE.

On this railway there are a few private level crossings. The proprietors have the keys.

42.

Are any of the level Crossings so dangerous to the Public using them, as well as to passing Trains, as to demand the erection of Works at any cost which will supply their place?

Very few accidents of any description at level crossings have occurred, and none at all to passing trains.

It is, however, the opinion of railway companies that level crossings should be avoided, whenever this can be done at a reasonable expenditure.

TABLE showing the ACCIDENTS that have occurred at LEVEL CROSSINGS, &c.

Name of Railway.	Number of Accidents to the Public.	Remarks.
Nord - - -	4	On this line there are no level crossings, except in places where the cost of carrying the road over or under the railway would have exceeded the expense of the gates, gatehouse, &c. of the level crossing by 160*l.* or 200*l.*
Est - - -	Several casualties.	This company consider that much frequented level crossings should be done away with as much as possible, on the especial ground of the great expense which such level crossings entail on the company.
Lyon - - -	None.	Level crossings do not appear to be so dangerous as to demand any great outlay for works to replace them.
Orléans - -	A few casualties.	It is considered better to avoid having level crossings, if this can be effected at a moderate outlay.
Méditerranée -	1	Level crossings are considered objectionable on grounds similar to those alluded to above.
Ouest - - -	Several unimportant accidents.	This company wish to diminish the number of level crossings upon their line.
Rouen, Havre, Dieppe.	None.	This company desire to do away with many of its level crossings.
Rhône et Loire -	Several casualties.	
Saint Germain -	None.	

FENCES.

43.

How are Railways fenced in?

All railways are fenced in by hedges or by palings.

Several kinds of fences are used. These are for the most part about 3·93 feet high.

Hedges which are to replace fences are planted about 1·64 feet from them.

44.

Are the Fences in use sufficient to keep out Trespassers on the Line, and can they be looked upon as an effectual safeguard against Accidents?

The difficulty in getting over fences is quite sufficient to deter any one from attempting to cross the line, for the purpose merely of making a short cut.

They are not sufficient to keep off persons determined to injure the railway.

45.

Are there any Plantations by the sides of Railways? Are there any objections to such Plantations?

The slopes of cuttings and embankments are usually covered with plantations, which serve to bind the soil together.

If tall trees such as poplars be avoided, there seems to be no objection to such plantations.

These plantations protect the excavations made by the side of the line, which would otherwise at times be flooded, at times dried up, and would emit a noisome smell. They also serve to consolidate the banks of earth.

They are grown too on land, which without such plantations would remain uncultivated.

They prevent also snow drifts.

These plantations should not be allowed to grow dense or lofty, for fear of the trees falling across the rails, &c. Poplars and trees, the wood of which is brittle, should be avoided.

Birches and maples are grown on slopes, and willows by the side of excavations.

46.

Does it often happen that mischievous persons injure the Permanent Way, or the Electric Telegraph Wires, or attempt to cause accidents by placing things on the Rails? Have such mischievous persons ever been detected and punished?

Such acts of mischief are rare, and their perpetrators generally remain undiscovered, but if caught they are severely punished.

47.

Do Animals often stray on the line? Do Accidents occur from this cause?

Animals rarely stray on the line.

TABLE showing the NUMBER of CASUALTIES from this cause on the different RAILWAYS.

Name of Railway.	Number of Casualties.
Nord - - -	Six animals killed without causing the train to leave the line.
Est - - -	Several horses and cows killed.
Lyon - - -	About twenty animals have strayed on the line; one cow only was killed.
Orléans - -	Several animals have strayed upon this line, and twice have thrown the train off the line. No injury to passengers resulted.
Méditerranée - -	Some oxen have been run over by a passing train.
Ouest - - -	None.
Rouen, Havre, Dieppe	A few animals have strayed on the line. No casualties.
Rhône et Loire -	A few animals have strayed on the line. No casualties.
Saint Germain -	None.

PART II.

ROLLING STOCK.

STAFF.

48.

What is the Staff who have the Management of the Rolling Stock?

NORD.

One superintendent engineer, three assistant engineers of the locomotive department.

One engineer superintendent of the central workshops at La Chapelle.

One engineer superintendent of the carriage department.

LYON.

One superintendent engineer, one assistant superintendent engineer, two engineers superintending the locomotive, &c. departments, and three inspectors.

ORLÉANS.

One engineer, to whom two other engineers and five superintendents at the head of the locomotive, carriage, &c. departments are responsible.

MÉDITERRANEE

There are two engineer superintendents, one at the head of each of the two sections of this line under whom are the superintendents of the several departments.

OUEST.

One engineer having under him seven superintendents of the various departments.

ROUEN, HAVRE, DIEPPE.

There is a distinct staff for the locomotive department, and for the department entrusted with the maintenance of way, &c.

RHÔNE ET LOIRE.

Similar to Rouen, Havre, and Dieppe.

SAINT GERMAIN.

One engineer and four superintendents.

49.

Is the Locomotive Power supplied by the Company or by Contract?

Nord.
Paris à Lyon.
Lyon à la Méditerranée.
Ouest.
Saint Germain.
} On these lines it is supplied by the company.

EST.

On this line, $3\frac{1}{2}d.$ is allowed for every ·621 of a mile run by a train of 14 passenger carriages or of 35 goods waggons. ·12$d.$ is allowed for the repair of passenger carriages, and the same also for that of goods waggons, for every ·62 mile travelled.

If their expenses do not amount to these fixed amounts, the managing engineer receives 10 per cent. of any sums so saved.

ORLÉANS.

A similar plan to that of the Est company. A rather larger sum per mile is however allowed.

ROUEN, HAVRE, DIEPPE.

The locomotive power on this line is supplied by contract.

RHÔNE ET LOIRE.

The locomotive power on some portions of this railway is supplied by contract; on other portions, by the company. A fixed system for the whole line has not yet been adopted.

50.

Does the Traffic Manager or the Locomotive Engineer superintend the running of Trains?

With the exception of the "Nord," the traffic and locomotive management are kept distinct.

51.

Where are the Companies Manufactories situated?

Name of Railway.	Manufactories situated at
Nord	La Chapelle (principal manufactory), Amiens, Lille.
Est	Epernay (principal manufactory), La Villette Montigne, near Metz.
Lyon	Paris, Dijon.
Orléans	Paris (principal manufactory), Orléans, Tours, Moulins, Bordeaux.
Méditerranée	Arles, Nimes.
Ouest	Vaugirard, Batignolles, Chartres.
Rouen, Havre, Dieppe	Sotteville.
Rhône et Loire	Oullières (principal manufactory), Perrache, Girors, La Terrasse, Feurs, Roanne.
Saint Germain	Batignolles.

52.

What Engine-houses do the Railway Companies possess?

TABLE showing in what PLACES the various RAILWAY COMPANIES have ENGINE-HOUSES.

Name of Company.	Engine-houses are situated at	Reserve Engines-houses are situated at
Nord	Paris, Creil, Saint Quentin, Amiens, Boulogne, Douai, Valenciennes, Lille, Dunquerque, and Calais.	Pontoise, Noyon, Breteuil, Abbeville, Albert, Arras, and Hazebrouck.
Est	La Villette, Epernay, Bar le Duc, Nancy, Strasbourg, Metz.	Meaux, Chateau, Thièrry, Vitry, Lerouville, Lunéville, Sarrebourg, and Saverne.
Lyon	Paris, Monsereau, Tonnerre, Dijon, and Chalons.	Melun, Sens, La Roche, Montbard, and Vesey.
Orléans	Paris, Etampes, Orléans, Kerjon, Chateauroux, Le Guetin, Moulins, Tours, Angers, Nantes, Poitiers, Angouleme, Bordeaux.	Toury, Lamotte, Bourges, Varennes, Blois, Saumur, Aucenis, Les Ormes, Chalais, and Libourne.
Méditerranée	Marseille, Arles, Avignon, Nimes, and Montpellier.	Saint Chamus, Tarascon, Alais, and Cette.
Ouest	Vaugirard, Rambouillet, Chartres, Nogeu, Actron le Mans, Batignolles.	
Rouen, Havre, Dieppe.	Batignolles, Sotteville, Le Havre, Dieppe.	
Rhône et Loire	Perrache, Givors, Rioi de Gui, La Terrasse, Flurs, Biesse, and Roanne.	
Saint Germain	Batignolles, Vésinet, Auteuil.	

53.

What are the Duties of the Superintendents of these Engine-houses? From whom do they receive their Orders?

These superintendents see that the engines are in proper repair; they give directions respecting any minor repairs upon their own responsibility.

They are responsible to the engineer or to the contractor for the traction. The engine drivers are under them.

54.

What is the Number of Engine Drivers?

TABLE showing the NUMBER of ENGINE DRIVERS employed.

Name of Company.	No.	Name of Company.	No.
Nord	163	Ouest	38
Est	164	Rouen, Havre, Dieppe	56
Lyon	100	Rhône et Loire	45
Orléans	174	Saint Germain	19
Méditerranée	53		

55.

By whom are these Engine Drivers nominated? What is required from Candidates for such Places?

They are generally appointed by the directors upon the nomination of the engineer of traction, who chooses them from the most deserving of the stokers (chauffeurs).

The stokers are selected from the most promising fitters (ouvriers monteurs) who have been working for at least one year in the company's workshops. This plan is adopted on the following railways:—Nord, Est, Paris à Lyon, Orléans, Ouest, Saint Germain.

Many of them are appointed from the Schools of Arts and Trades (Ecoles d'Arts et Métiers).

On some lines these engine drivers are specially examined.

Rhône et Loire, Rouen, Havre, Dieppe, these companies choose these engine drivers from their stokers, after a period of two or more years' service.

On one line (Lyon à la Méditerranée) engine drivers are not appointed younger than 25, nor older than 35. Their health must also be good, their sight unimpaired, and they must also have a reputation for good conduct.

56.

How are these Engine Drivers paid? Is there any Premium offered to those who consume the least amount of Coke and of Oil, and whose Engines require the fewest Repairs? What is the effect of such a System of Premiums?

On nearly all railways, engine drivers are divided into three or four classes, and are paid according to the class to which they belong.

A premium is allowed in proportion to the amount of coke and oil they consume and use. This system is found to answer.

EST.

This company offers no premium for economy in the use of grease.

NORD ET ST. GERMAIN.

These companies offer besides, a premium for accuracy and regularity in time.

The system of premiums is universally considered good.

If an engine driver is absent more than twenty-four hours from his station, he receives extra pay.

TABLE showing the various AMOUNTS of WAGES, &c. paid to ENGINE DRIVERS.

—	Nord, per Month.	Est, per Month.	Lyon, per Month.
	£ s. d.	£ s. d.	£ s. d.
1st class	8 0 0	10 0 0	11 0 0
2nd „	7 0 0	8 0 0	10 0 0
3rd „	6 0 0	6 0 0	9 0 0
4th „	5 0 0	—	—
	The total amount paid to engine-drivers (including premiums) in one month, November 1853, amounted to about 1,600*l.*	The premiums amount to about 1*l.* 9*s.* a month for each engine-driver.	The engine-drivers on this line are liable to a fine if they are behind their time.

—	Ouest, per Month.	Rhone et Loire, per Month.	Rouen, Havre, and Diéppe, per Diem.
	£ s. d.	£ s. d.	£ s. d.
1st class	10 0 0	4 16 0	about 0 8 0
2nd „	9 0 0		„ 0 6 10
3rd „	8 0 0		„ 0 5 7
4th „	—		—
		Exclusive of premiums which amount to a large sum especially in the case of those paid 2*l.* a month.	The 1st class are employed for passenger or goods' trains; the 2nd for goods' trains only; the 3rd for short journeys.

—	Orléans, per Month.	Saint Germain, per Month.	Lyon à la Méditerranée, per Month.
	£ s. d.	£ s. d.	£ s. d.
1st class	10 0 0	13 0 0	8 0 0
2nd „	9 0 0	11 8 0	6 0 0
3rd „	8 0 0	10 4 0	4 0 0
4th „	6 0 0	—	—
	Pupil or assistant engine-drivers, 5*l.* 12*s.* These wages are exclusive of any premiums they may receive.	This includes premiums. The premiums offered for regularity and for the quantity of fuel used are the same as are the premiums for the condition of the engines and the quantity of oil used. The premiums offered for the former are greater than those offered for the latter, as the former are looked upon as the more important consideration.	Exclusive of premiums.

57.

From whom do the Engine Drivers receive their Instructions?

The engine drivers receive their instructions when in the engine house, from the superintendent of the engine house; when in stations, from the station master; when travelling, from the guard of the train.

Sometimes in stations, when it is requisite, the station master delegates his authority over the engine driver to the guard of the train.

58.

What are the Duties of these Engine Drivers in the Engine-house, in Stations, and on the Line?

In the engine house they look after their engine, and see to all the small repairs.

In stations, they have to move all carriages requiring coupling, uncoupling, or shunting.

When travelling, they have to attend to any directions which the guard of the train may give, on all points, excepting such as may relate to their engines.

59.

Has each Engine Driver his own Engine

It is found desirable that every engine driver should have his own engine, as he thus has a greater pride in seeing that it is in good order.

60 and 61.

Are Engine Drivers alternately on Duty on the Line, and in the Engine-house? Are they on duty several days running? What is the greatest distance travelled by them in one day?

They generally take the duty in the engine house and on the line alternately.

It is found impossible to fix positively their exact work. This can be done as regards ordinary trains, but there are duties for which they may be required which are always uncertain.

As regards the number of days during which the engine driver may remain on duty consecutively, it depends entirely on the nature of the duty in which he is engaged. If he is merely employed for short journeys, there is nothing to prevent his continuing on such duty for some days together; but the case is different when he has long journeys to take, which compel him to remain on the line for more than a day at a time.

Thus the time allowed to engine drivers to remain off duty depends entirely on the kind of duties in which they may be engaged.

TABLE showing the average Distance travelled in Thirty Days by Engine Drivers, the Number of consecutive Days they are on the Line, the greatest Distance travelled in One Day; and also the Number of Hours they spend each Month on the Line, in the Engine House, and off duty.

Name of Railway.	For a Period of Thirty Days.										Number of Days on Line consecutively.	Greatest Distance travelled in One Day.	Remarks.
	Number of Hours passed.								Distance travelled.				
	On the Line.		In Reserve.		In the Engine House.		Off Duty.						
	Pass. Trns.	Goods Trns.	Pass. Trns.	Goods Trns.	Pass. Trns.	Goods Trns.	Pass. Trns.	Goods Trns.	Pass. Trains.	Goods Trains.			
Nord	123	207	105	58	74	117	418	338	2498·28	2295·83	3 to 8	285·66	
Est	130	210	—	—	147	160	443	350	3077·37	2057·37	4 to 7	217·35	
Lyon	—	—	—	—	—	—	—	—	1863·00	1366·20	9	198·72	
Orléans	—	—	—	—	—	—	—	—	—	—	*15 & 4 to 5	Summer 291·87 Winter 243·43	*The first number is when employed on short journeys, the last when on long journeys.
St. Germain, Auteuil	—	—	—	—	—	—	—	—	—	—	3 5	93·15 83·83	Auteuil. Argenteuil,
Méditerranée	—	—	—	—	—	—	—	—	—	—	4 to 6	111·78 155·25	St. Germain. After each period of service is completed the engine-driver is allowed 24 hours off duty.
Ouest	—	—	—	—	—	—	—	—	—	—	3 to 4 every week.	131·65	2 or 3 days at the engine house.
Rouen, Havre, Dieppe.	—	—	—	—	—	—	—	—	—	—	2	283·17	Every 3rd day they are off duty; on the Havre and Dieppe lines they work for 6 days and the 7th are off duty; they go off duty every evening.
Rhône et Loire	—	—	—	—	—	—	—	—	—	—	Several days	—	

62.

What is the Number of Stokers employed? Describe their Duties.

Stokers are under the orders of the Engine drivers; their duties consist in assisting the driver in attending to the engine on the line, and also in the engine house.

TABLE showing the Number of Stokers employed, their Wages, Premiums, &c.

——	Nord.	Est.	Lyon.	Orléans.	Méditerranée.	Ouest.	Rouen, Havre, Dieppe.	Saint Germain.	Rhône et Loire.
Number of Stokers employed -	216	170	108	140	42	42	56	19	46
Amount of Wages per Month -	3*l.* to 5*l.* 12*s.*	5*l.*	5*l.* 4*s.*	4*l.* to 6*l.*	3*l.* to 3*l.* 12*s.*	4*l.* to 5*l.*	4*l.* 16*s.* to 6*l.*	3*l.* 12*s.* to 4*l.* 16*s.*	3*l.* to 3*l.* 12*s.*
Amount of Premium - -	$\frac{1}{3}$ of the fixed salary.	$\frac{1}{3}$ of that allowed to drivers.	$\frac{1}{5}$ of what is allowed to to drivers.	Premium allowed.	No premium but a present every month.	Premium allowed.	$\frac{1}{3}$ of what is allowed to drivers.	$\frac{1}{5}$ of what is allowed to drivers.	$\frac{1}{5}$ of what is allowed to drivers.

These stokers are, by some of the companies, divided into several classes.

On the Lyon railway there is a distinct class of night stokers, fourteen in number, these are entitled to no premium, but they receive rather higher wages.

64.

What is the weight of the Engines now in use? Would it be advantageous to employ Engines of greater Weight than those now used?

TABLE showing the Weights of the Engines used on the different Lines.

——	Nord.	Est.	Lyon.	Orléans.	Méditerranée.	Ouest.	Rouen, Havre, Dieppe.	Rhône et Loire.	Saint Germain.
Passenger engines -	Tons. 17·67 to 33·88	Tons. 21·11 to 26·51	Tons. 22·09 to 25·53	Tons. Never exceed 25·14	Tons. 19 to 23	Tons. 22 to 23	Tons. 17·67 to 12·06	Tons. 9 to 18	Tons. 18 to 30
Good engines - -	—	21·60 to 24·55	—	Never exceed 30·35	22·09	27	19·42 to 14·33	—	—

NORD.

his company purposes, possibly, to increase the weight of he engines used upon its lines.

EST.

Possibly heavier engines will be required.

LYON.

It is probable that the weight of the engines of this company will be increased.

MÉDITERRANÉE.

Engines weighing more than twenty-three tons cannot be made use of upon this railway.

OUEST.

This company do not consider it desirable to increase the weight of their engines.

ROUEN, HAVRE, DIEPPE.

The weight of the goods engines used upon this line will be increased.

RHÔNE ET LOIRE.

Heavier engines are now constructed.

The report of Messrs. Woods and Marshall to the London and North-western Railway Company, upon the comparative merits of heavy and light engines, was laid before the Commission. The conclusions deduced from this report were not, however, such as induced English companies to increase the weight of their engines.

65.

What is the greatest Distance between the Axles of the Engines in use upon the different Railways?

——	Nord.	Est.	Lyon.	Orléans.	Méditerranée.	Ouest.	Rouen, Havre, Dieppe.	Rhône et Loire.	Saint Germain.
Greatest Distance between the Axles of Engines.	Yards. 5·30	Yards. 4·91	Yards. 4·91 4·67	Yards. 4·70	Yards. 4·64	Yards. 4·64 3·76	Yards. 4·23	Yards. 3·44	Yards. 4·37 3·93

66.

TENDERS.

TABLE showing the General Weight of Tenders.

——	Nord.	Est.	Lyon.	Orléans.	Méditerranée.	Ouest.	Rouen, Havre, Dieppe.	Rhône et Loire.	Saint Germain.
Weight of Tender - -	Tons. 7 to 10	Tons. 9·82	Tons. 6 wheels, 13 to 14 4 wheels, 9·13	Tons. 5·69 to 7·26	Tons. 7·5 to 10·5	Tons. Passenger, 7·85 Goods, 8·34	Tons. 4·07 to 5·39	Tons. 3·43 to 4·91	Tank engines are generally used.

68.

How are Engines tested?

Persons appointed by the railway companies personally superintend the construction of the engines, which are received provisionally after having been tested.

They are not finally received until after they have been tried over a distance between 2,484 and 12,420 miles.

They are not, however, used for ordinary traffic until the district Ingénieur des Mines has made a trial journey, when the necessary certificate is granted by the Prefect.

SAINT GERMAIN.

This company object to this interference of the Government authorities, as being calculated to cause delay.

Boilers, cylinders, and steam chambers are received, after having been subjected to a test of double the amount of pressure; and cylinders and steam chambers of cast-iron, to three times the amount of pressure, to which it is intended to subject them on ordinary occasions.

69.

How many Engines are there on each Line?

TABLE showing the Number of Passenger and Goods Engines on each Line.

——	Nord.	Est.	Lyon.	Orléans.	Méditerranée.	Ouest.	Rouen, Havre, Dieppe.	Rhône et Loire.	Saint Germain.
Passenger engines - -	152	78	72	172	45	35	58	10	—
Goods engines - - -	96	76	72	72	23	15	36	12	—
Engines - - - - -	—	22	56	—	—	—	—	40	—
Total number of engines -	248	176	200	244	68	50	94	62	26

70.

What is the annual maximum Distance travelled by a Locomotive?

TABLE showing the maximum and the mean Distance travelled by an Engine during the Year.

——	Nord.	Est.	Lyon.	Orléans.	Méditerranée.	Ouest.	Rouen, Havre, Dieppe.	Rhône et Loire.	Saint Germain.
Maximum distance travelled by a locomotive.	Miles. 37,260	Miles. 31,050	Miles. 22,356	Miles. *43,470	Miles. †37,260	Miles. 23,598	Miles. ‡37,976 §30,245	Miles. 24,335	Miles. ‡18,630 §21,735
Mean distance travelled by a locomotive.	15,525	21,114	14,904	—	—	12,420	—	—	9,315 11,178

* This has even been surpassed. † At times surpassed. ‡ Passenger. § Goods.

It is generally allowed by the railway companies, that they do not possess sufficient engines; the demand being greater than the supply. The French manufactories can supply the following number of engines every year:—

NAMES of Manufactories and Number of Locomotives that each can Supply in the Year.

Cail.	E. Gouin.	Cavé.	Le Creuzor.	Kacklin.	Buddicom.	Clement Desormes.	Orléans Railway Company.
100	72	50	80	100	40	40	34

This gives a total of 516 engines, which the manufactories in France can produce yearly. The produce of the Orléans workshops (thirty-four) has been already included. The other companies together produce thirty or forty more. The objections to procuring engines from foreign countries, would appear to be the higher price of engines in other countries, besides the duty on such articles.

71.

What Amount of Work can be performed by an Engine, without requiring to be thoroughly repaired?

TABLE showing the maximum and mean Number of Miles which an Engine can run after a thorough Repair.

——	Nord.	Est.	Lyon.	Orléans.	Méditerranée.	Ouest.	St. Germain.
Maximum number of miles run by an engine, after it has been thoroughly repaired.	49,680	74,520	62,100	93,150	—	186,300	49,680
Minimum number of miles run by an engine, after it has been thoroughly repaired.	27,945	31,050	—	37,260	31,050 to 37,260	—	—

OUEST.

This maximum distance, of course, is exclusive of all minor repairs undergone by the engine. This gives a period of fifteen years for an engine to work without requiring a thorough repair, supposing the engine to run 12,420 miles a year.

ROUEN, HAVRE, DIEPPE.

This company state, that the time during which engines can work without thorough repair, depends entirely on the care bestowed upon them, and the speed which is required from them.

SAINT GERMAIN.

Engines upon this railway require a partial repair after having run 24,800 miles, which takes six weeks.

72.

What is the Distance run by an Engine, without being examined and cleaned?

TABLE showing the Amount of Distance ran by an Engine without being looked to and cleaned.

——	Nord.	Est.	Lyon.	Orléans.	Méditerranée.	Ouest.	Rouen, Havre, Dieppe.	Saint Germain.
Number of miles run by an engine, without being cleaned.	155	186	—	497 to 931	373 to 497	497 to 621	283	373

LYON.

The engines return every day to the engine house; the boilers are examined after the locomotives have run from 800 to 900 miles.

RHÔNE ET LOIRE.

The quality of the water used upon this railway enables the engines to run upwards of 1,000 miles without emptying out the boiler.

SAINT GERMAIN.

The length of time for which an engine can run without being cleaned, depends very much upon the quality of the water used. Those companies whose termini are in Paris, unanimously complain of the bad water of that city.

The boilers get quickly encrusted over, and lime, which has been used to prevent this, has not been found successful.

73.

Have Boilers of Locomotives ever burst in Stations, or on the Line? What Casualties have resulted from such Explosions?

TABLE showing the Number of Boiler Explosions on the different Lines, and the Casualties which resulted therefrom.

Nord.	Orléans.	Ouest.	Rhône et Loire.	Saint Germain.
A rent in a copper fire-box at Enghien. A stoker and policeman hurt.	A boiler burst at the Corbeil station.	A crack in an engine.	Two explosions in the longitudinal steam chambers. These explosions took place just as the engine began to move.	A crack in the boiler caused by a flaw in the covering plate. This accident had no serious consequences.

SAINT GERMAIN.

This company consider, that with the present improved boilers, explosions are no longer to be feared; and that rents are the only accidents to be guarded against.

74.

What Precautions are taken when a Tube bursts, or when an Escape is discovered in the Boiler, when on the Line?

When a tube bursts, or when an escape of steam is discovered, it is customary to endeavour to stop up the burst tube, or the escape in the boiler. If this cannot be done, the fire is put out, and additional help is waited for.

EST.

This company consider, that the friction of the cinders against the lining of the pipes, and the incrustation which forms outside, are the causes of their wearing out.

Tan, which has been used as a remedy against this incrustation, is found not to answer.

75.

Have Fires ever been attributed to burning Ashes which have dropped from the Fire-box, or to Sparks from the Chimney?

Such accidents have rarely occurred, and have never been productive of serious consequences.

LYON À LA MÉDITERRANÉE.

This company in dry weather at harvest time, station some of their servants in the most exposed localities, to extinguish any fire so caused, and to give alarm should the exigency of the case demand it.

OUEST.

Between Maintenon and Chartres, near the line of railway, are many cottages with thatched roofs. Once a fire occurred at a small farm, which was attributed to a fragment of burning coke from an engine.

In cuttings, towards the end of summer, the dry grass on the embankments not unfrequently catches fire, these accidents have, however, proved of no importance.

Goods waggons sometimes have been burnt, such accidents have been traced to burning pieces of coke, or to sparks from the engines.

76.

Are the Locomotives provided with Ash-pans to keep burning Ashes from falling out, and with an Apparatus for preventing Sparks from flying about?

In general all locomotives are provided with ash-pans and with a grating to keep in the sparks.

MÉDITERRANÉE.

On this line the ash-pan is replaced by a plate placed underneath the fire box.

ROUEN.

There are ash-pans on this railway, but no apparatus for keeping in the sparks.

RHÔNE ET LOIRE.

An apparatus for keeping in the sparks, but no ash-pan is used by this company. One objection to the apparatus used for keeping in the sparks is, that it is found to diminish the draught.

77.

Have any objections been urged against the Ash-pans? Can they be used on all Engines?

All companies (Ouest, Rhône et Loire, and Rouen excepted) consider there are objections to ash-pans, especially when snow is on the ground.

Ash-boxes can be used on all engines except on the engines of the "Système Crampton," in which engines the boiler is too near the ground.

RHÔNE ET LOIRE.

This company consider ash-pans indispensable; all their new engines are furnished with them.

It is considered that if a plate be introduced behind the spokes of the wheel, the ashes which are projected by falling against the spokes of the wheels either of the engine or of the tender will be kept in.

78.

What is the shape of the Axles of Locomotives? How are they made? How tested?

NORD.

Thirty-two engines have cranked axles, the remainder have straight axles of a parabolical shape.

EST.

Straight and cranked axles, cylindrical if charcoal iron is used, inspected during manufacture and tested by blows.

LYON.

Straight and cranked axles are used; no special tests required.

ORLÉANS.

Of the 250 engines 115 have cranked, and 135 straight axles, either of a parabolical or cylindrical shape, made of hammered iron. No special tests, but in large orders some are broken.

MÉDITERRANÉE.

Straight and cranked axles. No special tests, but examined continually very carefully.

OUEST.

Straight and cranked axles. No special tests.

ROUEN, HAVRE, DIEPPE.

Straight axles of hammered iron. One end is broken off by a hammer as a test of quality.

RHÔNE ET LOIRE.

Straight and cranked axles of hammered iron.

SAINT GERMAIN.

Axles of very ductile and good welding iron.

As a rule railway companies object to test axles intended for use. On some lines, however, axles are subjected to a test.

It is considered that if English axles will run 80,000 miles, whilst French cranked axles are useless after the engine to which they belong, has run a distance of 24,000 miles, the fault rests with the quality of iron rather than with the way they are made.

79.

Do Fractures often occur in Axles of Locomotives? Have any severe Accidents happened from this cause?

Such fractures are of very rare occurrence; no accident of a serious nature has ever resulted from such a cause.

EST ET MÉDITERRANÉE.

On these railways no case of fracture in an axle has ever been reported.

LYON.

Fractures occurred in the cranks of 2-cranked axles, but this was after the engines had run a distance of 35,000 to 40,000 miles.

On the St. Germain and Versailles lines the cranked axles have not attained the 40,000 miles which they were warranted to run.

80.

Are not Cranked Axles more liable to break than Straight Axles?

This is the general opinion, but one company (Méditerranée) consider, that well-made cranked axles last as long as straight axles.

RHÔNE (RIVE DROITE).

On this railway some English cranked axles are still in perfect condition, although the engines to which they belong have run upwards of 124,200 miles.

NORD.

There is no record of any fracture having occurred in cranked axles.

81.

What is done when the Axle of a Locomotive breaks on the Line.

The spring is removed or supported, and the engine is taken to the first station; if this cannot be done, the fire is put out, and the engine has to wait until additional help arrives. Sometimes to get the engine back to the engine house it is necessary to rest the fore or after part upon a truck.

82.

Does not the Iron of the Axles after it has been exposed a certain time, deteriorate?

NORD, EST, ORLÉANS, LYON À LA MÉDITERRANÉE, ROUEN, SAINT GERMAIN.

These companies do not consider that the iron of the axle is liable to deteriorate.

PARIS À LYON.

This company is of the same opinion as regards axles of locomotives; with respect to axles of carriages, no deterioration has been perceived.

Many persons, however, think, that the iron used for the axles does deteriorate after it has been in use, and has been exposed for a considerable period.

M. Arnoux, who has made numerous experiments, has no doubt that a molecular change takes place in the iron axles of diligences.

83.

How are Wheels of Locomotives manufactured? What kind of Iron is used for the Tires?

Two sorts of wheels are used for locomotives; wheels made of wrought iron, and wheels with cast iron bosses and wrought iron spokes. These iron spokes sometimes are T-shaped, each T-shaped bar forming two half-spokes and a portion of the felloe, sometimes rectangular with an iron felloe of the same shape, welded on to each spoke.

On the Méditerranée and Rouen lines all the wheels have cast iron bosses and wrought iron spokes.

NORD.

The tires of the wheels are without welds.

LYON.

With this company no cast-iron boss has ever given way, but several bosses of wrought iron have given way at the welds, after having been used for several months; this the company attribute to imperfect manufacture.

84.

Do these Tires wear a long time? How many Miles is it considered that an Engine can run without the Tires of the Wheels becoming unfit for use?

TABLE showing the Number of Miles which an Engine can run before the Tires of its Wheels are unfit for use.

——	Nord.	Est.	Lyon.	Orléans.	Méditerranée.	Ouest.	Rouen, Havre, Dieppe.	Rhône et Loire.	Saint Germain.
Number of miles run by engine.	49,680		24,840 to 31,050	124,200	74,520 to 93,150	31,050 37,260 43,470 hardened iron.	46,575 for tires 1·96 inches thick.	27,945 to 31,050	41,607

LYON.

On this railway the tires of the engines are taken off when they are worn down to 1·18 inches, and tires of carriages when they are worn down to ·94 inches in thickness.

ORLÉANS.

Tires of wheels are turned up four times before they are considered as worn out.

MÉDITERRANÉE.

Tires are turned after the engine has run from 15,500 to 18,500 miles.

ST. GERMAIN.

Tires of locomotive wheels on this line are turned twice. After the engines have run 24,840 miles the tires are turned; they are turned a second time when the engine has run 9,315 miles more, and after the second turning they are run 7,452 miles. These distances would have to be considerably reduced, if there were many sharp curves on the line.

85.

Do Wheels of Locomotives often get detached or broken when on the Line? Do serious Accidents ever occur from this cause? What is done when such an Accident occurs?

Accidents of this nature are of rare occurrence.

Should such a casualty happen when the engine is on the line, if possible the wheel is refixed as well as can be managed; if it cannot be repaired on the spot, similar steps are taken as in the case of the axle breaking (see above).

86.

What is done if one of the suspending Springs is broken on the Line?

A wooden prop is inserted between the axle box and the framing, and the engine is taken very slowly and with great care to the nearest station.

87.

What is done when a Piston or any Part of the Machinery breaks?

The damaged portion is taken away, and if the engine cannot work without it, additional assistance is waited for.

88.

Does the Oscillation of Engines ever throw them off the Rails? What is done to diminish or prevent such Oscillation?

It is considered that such oscillation rarely throws an engine off the rails. Since balance weights have been used on the driving wheels, and a proper arrangement of springs, locomotives are very steady. This is noticeable on Cramptons' engines, where the wheel base is considerable, and the centre of gravity low.

To give greater steadiness to the engine, the tender is supplied with spring buffers, for by tightly coupling the tender to the engine, the effect is produced of an increased wheel base.

89.

Are Engines ever placed behind Trains, and if so under what Circumstances? Is there any Danger in their being so placed?

This is rarely done excepting for the purpose of moving trains in stations, or when a reserve engine comes to the assistance of a train, when, as the driver cannot see in front, a look-out is stationed at the head of the train, who communicates by signals with the driver. The pace is also reduced to 15½ miles an hour.

LYON À LA MÉDITERRANÉE.

On this railway engines are placed in the rear of trains in ascending gradients, this is sometimes also done in descending gradients. In the latter case the engine behind serves merely as a break.

This is found to be perfectly safe. Indeed, for ascending gradients, the practice of having an engine before and an engine behind, possesses one advantage over the plan of two engines in front, as in the latter case the waggons are liable to break away on the incline.

90.

What is the greatest Number of Engines attached to a Train? What are the Objections to attaching more than One Engine to the same Train?

Never more than two engines are attached to the same train, and then only on steep gradients, or when trains are unusually heavy or in distress.

In case, however, of snow or of frost, sometimes more than two engines have been attached; it has occasionally happened in case of goods trains being in distress, that two additional engines have been required to move the train.

There appears to be no serious objection to this practice in emergencies, but the Rouen company consider that it is not safe to attach more than one engine to quick trains.

Upon the Nord railway, when two engines are attached to the same train, the more powerful engine is placed first. This company do not consider that there is any danger in attaching two engines to the same train, no casuality ever having resulted from this practice.

The Orléans company consider that the practice of having more than one engine conduces to safety, as there is less danger of the train breaking down with two engines than with one.

It is the general opinion of railway companies that there is less danger in coupling an engine to a train than in sending it back by itself to the station.

ST. GERMAIN.

This company hopes that the Government will not interfere with any regulations, which railway companies may make in respect of the number of engines to be attached to one and the same train.

91.

Are Assisting or Bank Engines employed?

On all railways (Saint Germain excepted) there are assistant or bank engines for long steep gradients, and for very heavy trains.

On some lines there are regular stations for such engines. On others such engines are employed when needed.

92.

Are Registers kept showing the State and Work done by Engines and Axles?

Such registers are kept universally, with great exactness.

MÉDITERRANÉE.

On this railway there is in addition a separate account kept for each engine, showing all the repairs it has undergone.

93.

What is the Number of Carriages, Waggons, Trucks, &c., upon each Railway?

TABLE showing Number of Carriages, &c. upon the different Railways.

——	Nord.	Est.	Lyon.	Orléans.	Méditerranée.	Ouest.	Rouen, Havre, Dieppe.	Rhône et Loire.	Saint Germain.
Passenger carriages - -	660	619	253	761	200	522	293	117	181
Goods waggons, &c. - -	5,058	3,679	1,843	3,674	1,526	966	1,512	3,735	55
Total - -	5,718	4,298	2,096	4,435	1,726	1,488	1,805	3,852	236

Railway companies protest against the regulation, which compels as many empty carriages, as there are locomotives at the head of the train, to be placed between the engine and the passenger carriages, as being useless and extremely inconvenient. When an engine is added to a train at a station where there are no spare carriages it cannot be carried into effect, and in days of great traffic the passengers will fill all the carriages.

94.

How are the Axles of Carriages made? Do they often break? Do serious Accidents often result from this cause?

Carriage axles are generally made of charcoal iron.

Fractures in these axles are rare, and no serious accidents have ever been traced to this cause. Axles generally break at the journal, and never between the wheels. Such fractures are generally caused by the journal getting over heated.

95.

What is done when an Axle of one of the Carriages breaks on the Line?

The carriage in question is removed from the line, and, if possible, is conveyed to a station. If there are no means at hand to effect this, the carriage is temporarily placed on the side of the line.

96.

Are Wheels made entirely of Cast Iron, or part only?

NORD, EST, ORLÉANS, ROUEN, ST. GERMAIN.

These Companies do not use these kinds of wheels.

PARIS À LYON, OUEST.

On these railways all the wheels have cast-iron bosses, with spokes and tires of iron.

LYON À LA MÉDITERRANÉE.

The wheels of the waggons used on this railway to carry coals are made entirely of cast iron.

RHÔNE ET LOIRE.

The wheels of the coal and goods waggons of this company have bosses and felloes of cast iron.

97.

How are Carriages coupled? Are the Buffers in contact when the Train is in motion?

Carriages are coupled by a spring drawbar, and with two short coupling chains.

The buffers of passenger carriages are always in contact.

Between the buffers of goods waggons a play of ·16 feet is left.

Close coupling of waggons does not seriously affect the passage of trains in curves; and as there is no doubt of the almost complete suppression of lateral movement produced by the friction of the flanges of the wheels against the rails, on straight portions of the line, the closeness of the buffers is rather beneficial than otherwise.

98.

Do these Couplings often break; and in the event of their breaking is a severe Accident to be feared?

The couplings rarely break, especially in passenger trains. No accidents are reported as having resulted from this cause.

RHÔNE ET LOIRE.

On this railway such precautions are taken, that no accident has ever occurred, even on the steepest gradient.

It is to the number of the breaks and breaksmen employed, that this company attribute their immunity from casualties of this kind.

A remark from one of the members of the Commission, elicited the fact, that two methods, one for bringing trains in motion to a standstill, the other for moderating the speed of trains on steep gradients, were employed with success on the railway from St. Etienne to Lyon. The first consists in instantaneously uncoupling the engine from the train; the second is sprinkling sand upon the rails, to prevent the carriages slipping.

BREAKS.

100.

What Breaks are in use upon the different Railways? Do the Breaks in use ever get out of Order, or give way?

NORD.

Breaks are used for passenger carriages and luggage vans.
Breaks are used for goods waggons.

EST.

Slide breaks, with four blocks, worked with screws or with levers.

These breaks rarely get out of order or give way.

A steam break has been adapted to several locomotives of the Saint Germain and Auteuil railways. The engines upon these lines carry their own fuel and water, and have no tender. This steam break is intended to supply the place of the powerful break which ordinary locomotives possess in their tenders.

The application of steam power to the putting on of breaks is instantaneous in its action; but this great break power requires considerable care in its exercise, lest the machinery of the locomotive be put out of order by the suddenness of its action.

101.

Who is responsible that the Rolling Stock of the different Railways is in Working Order?

Special servants are entrusted with this duty in stations; the greasers look to the carriages when running. On the Nord railway ninety-one of the company's servants are employed in this department. Trifling repairs are executed on the spot, and any carriages which they may consider to require repair are removed to the company's workshops. A similar system is pursued on the Méditerranée railway. On this line such inspectors are selected from among the best workmen in the company's carriage department.

PART III.

WORKING. STAFF.

102.

What is the organization of the Staff for working the line?

NORD.

A general manager, an inspecting deputy manager, and three assistant managers, with inspectors under them.

EST.

A general manager is at the head of the staff.

A traffic manager acts as his deputy, especially in the superintendence of all matters relating to the traffic on the line.

Five superintendents conduct respectively its correspondence, accounts, &c.

Assistant traffic managers and inspectors superintend the traffic.

Station masters form an important body of officers on the railway. They have a large staff under their orders.

These station masters are divided into five classes, viz., three for principal stations, and two for other stations.

LYON.

The general management of this line is entrusted to a director and a sub-director.

One superintendent, two assistant superintendents, and twelve officers, conduct the working.

ORLÉANS.

The general management of this railway is under a director, who is assisted by a general manager, who has under his orders inspectors superintending respectively the traffic, accounts, and general business of the line.

Under these chief officers are three other inspectors, who have the general superintendence of the whole network of lines composing the Orléans railway, viz., one for each of the three divisions:—

1. { Paris à Corbeil et à Orléans.
   { Orléans à Tours et à Vierjon.
2. Tours à Bordeaux et Nantes.
3. Vierjon à Limoges à Nevers et à Clermont.

MÉDITERRANÉE.

A general manager is at the heads of the various departments, which have the conduct of the traffic, of the rolling stock, of the accounts, &c.

There are two traffic managers, one at Marseilles and one at Nimes, the former superintending the railway on the left, the latter that on the right bank of the Rhone.

OUEST.

A director is the chief officer of this company.

A chief and an assistant traffic manager assist him in his duties. There is a station master or an assistant station master at each station according to its importance.

ROUEN, HAVRE, DIEPPE.

This railway is superintended by a general manager; he is assisted by a general inspector, who supplies his place in his absence; there is also a traffic manager

The line is further divided into four sections, each under a controller.

RHÔNE ET LOIRE.

The different departments, secretarial, traffic, works and locomotive, are under the general orders of one director.

The various servants at the stations are under the direction of the station masters.

SAINT GERMAIN.

On this railway the inspector performs the duties of general manager, he has under him the usual staff of station masters, guards, &c.

103.

How is the Night Duty performed?

As there is in general but little night duty in any station, except in termini, the station master and his assistant and the other servants of the company take this duty by turns, so arranging that the same person never does duty two nights in succession.

ORLÉANS.

At principal stations on this line this duty is performed by officers of the company, termed night superintendents. The staff who act under their direction take this duty by turns.

In cases of emergency the night superintendent is bound to summon the station master, that he may take the responsibility of issuing directions.

SAINT GERMAIN.

There is no night duty upon this line.

RHÔNE ET LOIRE.

Only mail trains travel at night.

MÉDITERRANÉE.

Those servants of the company who have been on duty at night, are exempted from a proportionate amount of day duty. This duty is taken in turn.

104.

Who have charge of the Trains when on the Line? Does an Inspector accompany every Train? When there is no Inspector with the Train, is the Engine Driver under the Orders of the chief Guard? How many Officials accompany each Train?

On all railways excepting one (Saint Germain) the chief guard has charge of a train on the line. Outside stations the driver is under his orders. On the Rhône et Loire only, do inspectors accompany trains.

The following is the number of officials in charge of a train:—

ROUEN, HAVRE, DIEPPE, AND NORD.

1 for 7 vehicles, 2 for from 8 to 15, 3 for from 16 to 24.

EST.

1 for 8 carriages, 3 for goods trains, including the greaser.

LYON.

1 chief, 1 or 2 sub-conductors, and 1 greaser, when there are not more than 2 breaks.

ORLÉANS.

At least 2 men, besides the greaser on each train.

MÉDITERRANÉE.

Passenger trains, 1 conductor, 2 guards; goods trains, 1 conductor.

OUEST.

1 conductor, 1 breaksman; and with 24 carriages, 2 breaksmen; goods trains, 1 breaksman, 1 greaser.

ST. GERMAIN.

1 baggage guard and 1 breaksman for every 5 carriages.

105.

How many Trains are there daily upon the different railways?

TABLE showing the Number of, and the Distance run by, Trains.

——	Nord.	Est.	Lyons.	Orléans.	Méditerrannée.	Ouest.	Rouen, Havre, Dieppe.	Rhône et Loire.	Saint Germain.
Number of passenger trains daily	98	65	26	44	42	90	Summer 34 Winter 26	18	34
Number of goods and other trains	145*	143*	8*	75*	46	8	Summer 26 Winter 30	74†	None.
Distance run by all these trains daily	Miles. 12541·71	—	Miles. 4851·25	—	Miles. 2874·60	—	Miles. Summer, 3894·91 Winter, 3554·60	—	—

* These numbers are exclusive of ballast trains.

† A very large proportion of these trains are coal trains.

106.

What is the Maximum Number of Carriages in a Train. What is the Length of such a Train?

There cannot be more than 24 carriages in one and the same train. This is the maximum fixed by the law, which also limits the Lyon railway company to 20 carriages, this company employing six-wheel carriages.

However, on the Rhône et Loire railway, some trains consist of 34 carriages.

The maximum length of a train varies according to the length of the companies carriages, &c.

TABLE showing the Maximum Length of Trains upon the different Lines.

——	Nord.	Est.	Lyon.	Orléans.	Méditerranée.	Ouest.	Rouen, Havre, Dieppe.	Rhône et Loire.	Saint Germain.
Maximum length of a train	Yards. 201·16*	Yards. 174·92	Yards. 174·92	Yards. 203·35*	Yards. 218·66‡	Yards. 185·86	Yards. 170·55*	Yards. 258·01†	Yards. 185·86*

* This length includes one engine.

† This length includes two engines.

‡ This length includes the vans which usually accompany trains.

The Ouest company consider that the number of 24 carriages is sufficient, even for excursion trains, *i.e.* to Versailles (right and left bank).

SAINT GERMAIN.

This company consider that the authorized number might be increased with perfect safety. 30 to 35 carriages are mentioned as the maximum number which might travel safely in one train.

The Government have authorized a greater number of carriages in one train, for the purposes of conveying troops and matériel.

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107.

What is the greatest Number of Passengers that have been conveyed in one Train?

TABLE showing the greatest Number of Passengers conveyed in One Train.

——	Nord.	Est.	Lyon.	Orléans.	Méditerranée.	Ouest.	Rouen, Havre, Dieppe.	Rhône et Loire.	Saint Germain.
Number of passengers conveyed in one train	920	830	936	920	1000	800	870 (excursion train.)	816	1296*

* This is the maximum number that can be conveyed in a train of 24 carriages.

108.

What is the Maximum Number of Waggons in a Goods Train?

TABLE showing the Maximum Number of Waggons in a Goods Train.

——	Nord.	Est.	Lyon.	Orléans.	Méditerranée.	Ouest.	Rouen, Havre, Dieppe.	Rhône et Loire.	Saint Germain.
Maximum number of waggons in a goods train	60-70 rarely more than 50.	60	45-50	60	50-80 110 exceptional case.	40	45	50-80	No goods trains.

109.

What Weight does a Goods Waggon carry?

TABLE showing Weights carried by a Goods Waggon.

——	Nord.	Est.	Lyon.	Orléans.	Méditerranée.	Ouest.	Rouen, Havre, Dieppe.	Rhône et Loire.	Saint Germain.
Weight carried by a goods' waggon	Tons. 5·89 to 9·82	Tons. 4·91 to 9·82	Tons. 4·91 to 9·82	Tons. 4·91 to 9·82	Tons. 5·89 to 7·85	Tons. 5·89 to 7·85	Tons. 4·91 to 9·82	Tons. 3·14 to 3·43	No goods trains.

110.

What is the Ordinary and the Maximum Weight of a Goods Train? What is the Length of the longest Goods Train?

TABLE showing the Ordinary and Maximum Weight and Length of a Goods Train.

——	Nord.	Est.	Lyons.	Orléans.	Méditerranée.	Ouest.	Rouen, Havre, Dieppe.	Rhône et Loire.*
Weight of a goods train	Tons. 100-350 150-500	Tons. 360 175 225	Tons. 75-80 225 180 400†	Tons. 220 600	Tons. 350-400 600	Tons. 175 350 240 450	Tons. 134 233	Tons. 180 255
Maximum length of a goods train	Yards. 382·65 to 437·32	Yards. 393·58‡	Yards. 344·38§	Yards. 491·98§	Yards. 437·32§	Yards. 278·79	Yards. 244·99 to 273·32	Yards. 273·32

* Rhône et Loire.—In general the ordinary weight is regulated by the gradients to be travelled over.
† This weight includes its engine. ‡ This length is exclusive of the engine. § This length includes the engine.

111.

How many Break Vans are placed in a Passenger or Goods Train? What part of the Train are they placed in? Is there any Minimum fixed for the Weight of these Break Vans?

——	Nord.	Est.	Lyons.	Orléans.	Méditerranée.*	Ouest.	Rouen, Havre, Dieppe.	Rhône et Loire.†	Saint Germain.
Number of break vans in a passenger train.	1 for 7 carriages 2 „ 8 to 15 „ 3 „ 16 to 24 „	1 for every 8 carriages.	2 for and up to 12 carriages. 3 or 4 and up to 20 carriages.	Express: 1 for and up to 5 carriages; 2 „ 10 „ 3 „ 16 „ Ordinary: 1 „ 9 „ 2 „ 18 „ 3 „ 24 „	2	2 4 for trains of 24 carriages.	1 for and up to 7 carriages. 2 „ 16 „ 3 „ 24 „	1 for every 3 carriages, or 1 for each carriage.†	1 for every 5 carriages. 1 „ 3 „ atmospheric railway.
Number of break vans in a goods train.	2	2 One at each end of train.	3 One at each end and one in the middle.	1 „ 16 „ 2 „ 35 „ 3 „ 60 „	One in the after part of a train.	5	—	1 „ 6 „ 1 „ 2 „	—
Minimum weights of break vans.	No minimum.	—	—	—	—	—	—	—	—
What part of the train the break van is placed in.	If the train consists of seven carriages it is placed about two carriages from the end; if of 8 to 15, it s placed from 2 to 4 carriages from the end; if of 16 to 24 carriages two breaks are placed near the end of the train.	At the end of the train. —— If there is more than 1 break van, 1 is placed at each end; if 3 vans, then one is placed in the middle.	In front, in the middle, at or near the end.	When there is but one break van it is placed behind; the second is placed in the front; and the third in the middle.	1 is placed in front, and 1 behind.	—	If there is only 1 break van it is placed in front; if 2, one at each end; if 3, one in the front and the other two in the hinder part of the train.	—	—

Méditerranée.—On this railway there is a break van for every six carriages, on gradients of 1 in 160, and a break van for every three carriages on gradients of 1 in 80.
Rhône et Loire.—For easy gradients there are two break guards for every twelve carriages. On gradients of from 1 in 100 to 1 in 60 there is a break van for every three passenger carriages, and for every six goods carriages. On gradients of 1 in 25 there is a break for every passenger carriage, and for every two goods carriages.

112.

Are Empty Carriages always placed after the Tender? How many of such Carriages are thus placed?

The law directs that the same number of luggage vans or empty carriages be placed after the tender, as there are locomotives attached to the train. The general practice is in conformity with this law.

SAINT GERMAIN.

This company place after the tenders a carriage adapted in the fore part for luggage, in the after part for passengers.

NORD, PARIS À LYON, OUEST, ORLEANS.

These railway companies have remonstrated against this regulation, the practical utility of which they do not consider has been shown, while the inconvenience which it entails is manifest.

The Lyon company argue that it is really as needful, that vans or empty carriages should be placed in the rear as in front of the train.

There is an unanimous desire on the part of the railway companes, that this article in the regulations should be reconsidered.

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113.

Are Passengers and Goods ever carried in one and the same Train?

This is done on all lines. The goods waggons being placed in front and the passenger carriages in the rear.

TABLE showing the Maximum Number of Carriages and Goods Waggons in One Train.

—	Nord et Orléans.	Est.	Lyon.	Méditerranée.	Rouen, Havre, Dieppe.	Rhône et Loire.
Number of carriages and vans	24	30	25	—	33	The same number as passenger trains.

114.

Is there any Register kept of the Number of Carriages composing Trains, and of the Time of their Arrival and Departure?

Registers containing such details are kept in the principal stations of all lines. The chief guards of the various trains also keep a similar register.

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115.

Who examines the Carriages before they start?

The station master, his assistant, and special servants, perform this duty.

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116.

Who gives the Signal to start?

It is a general regulation upon most lines that the station master, or his assistant, give the signal.

Upon the Est railway the departure signal is a whistle of the chief guard of the train, which signal, however, is not given until the station master has struck a bell.

PARIS À LYON, RHÔNE ET LOIRE.

Upon these railways the chief guard repeats the signal for departure.

117.

What is the shortest Interval of Time allowed to elapse between the Departure of Two Trains?

The shortest interval of time allowed to elapse between the departure of two trains is generally ten minutes. On the "Lyon à la Méditerranée" and the Rhône et Loire railways the interval is fifteen minutes, on the "Saint Germain" railway the interval is but six minutes.

When a train which is intended to stop at every station follows a quick train, the interval between the departure of such trains is but five minutes.

A goods train is allowed to follow a passenger train after an interval of five minutes. On some portions of the "Nord" railway these intervals between trains are even less.

Railway companies consider that in general the intervals of time allowed to elapse between the departure of two trains, may be diminished if more signals on the line be erected, and entirely dispensed with if the signals were in sight of each other.

118.

Is it not a general Rule on all Railways which have a Double Line of Rails, that the Left-hand Line of Rails is reserved for Trains departing, and the Right-hand Line for Trains arriving.

This rule is now adopted on all railways, with two exeeptions, viz., between Strasburgh and Bâle, and between Givors and Lyon (Rhône et Loire).

119.

What is the Mean Speed at which Trains travel on the different Railways?

TABLE showing the Mean Speed at which Trains travel.

	Nord.	Est.	Lyon.	Orléans.	Méditerranée.	Ouest.	Rouen, Havre, Dieppe.	Rhône et Loire.	Saint Germain.
Mean speed travelled by trains per hour, in miles:—									
Mixed	23·59 to 27·32	28·56	27·94	27·94	24·84 to 27·94	24·84	23·59	12·42 to 24·84	—
Express	37·26 to 44·71	40·36 to 43·47	34·15	34·15 to 37·26	—	—	37·26 to 40·36	—	—
Direct trains	—	—	31·05	—	31·05 to 34·15	31·05	—	—	—
Passenger and Goods	17·38 to 19·87	18·63 to 21·73	19·87	24·84	—	21·73	18·63 to 21·73	—	—
Goods	12·42 to 17·38	15·52 to 18·63	12·42 to 18·63	15·52	15·52 to 18·63	18·63	15·52 to 18·63	7·45 to 14·90	—

SAINT GERMAIN.—On this railway the speed of trains amounts to 37·26 miles an hour. It is less, however, on the "Auteuil" and "Argenteuil" lines.

120.

What is the Maximum Speed at which Trains travel?

TABLE showing the Maximum Speed at which Trains travel.

	Nord.	Est.	Lyon.	Orléans.	Méditerranée.	Ouest.	Rouen. Havre, Dieppe.	Rhône et Loire.	Saint Germain.
Maximum speed at which trains travel;—				Miles.	Fast.				
Passenger trains	½ more than the mean speed.	½ more than the mean speed.	½ more than the mean speed.	49·68	43·47 Ordinary 37·26	33·55 sometimes 39·74	½ more than the mean speed.	24·84	37·26 to 39·74
Goods trains	Ditto.	Ditto.	Ditto.	24·84	24·84	—	Ditto.	14·90	—

A member of the Commission put the under-mentioned questions to the Nord company, and received the answers which are subjoined:—

Questions.

What is done when the train happens to be behind its time?

Is not the engine driver induced to try and make up for lost time, for fear of losing the premium given for regularity, and thus to exceed the maximum rate of speed allowed?

Answers.

When this is the case, it is the engine driver's duty to endeavour to make up for lost time by quickening the speed of the train.

There is a great check upon the engine driver, for although he might, by increasing the speed, arrive at the appointed hour, yet the consumption of fuel which such an increase of speed would occasion, would cause him to run the risk of losing his premium for economy in this particular.

It is found by experience that engine drivers rarely wish to increase the speed of their engine.

As it is of the greatest importance that trains should be punctual, engine drivers are urged to do all in their power to effect this, by increasing the speed (in a moderate degree) of trains behind their time.

Is the engine driver forbidden to arrive before the appointed time, and in the event of this happening is he fined?

There is a fine imposed upon an engine driver arriving before the appointed time. This, however, rarely happens in the case of goods trains, and never in the case of passenger trains.

Is there an instrument in use which shows the speed at which the train has been travelling?

The company has never been satisfied with the results, which the trial of an instrument of this nature has given.

121.

What Means are adopted in order to secure a Uniform Rate of Speed to Trains when travelling?

The only means adopted by companies to secure this end, is a fixed hour of arrival in each station. The speed of trains is regulated by the time fixed for their arrival at the different stations.

On the Orleans line an instrument has been tried, by means of which the regularity of the speed travelled might be ascertained. It has, however, failed.

On the line between Montereau and Troyes, an instrument invented by M. Deniel, called a tachometre, has been used. This machine showed the speed at which the train had been travelling, and the time of its arrival at the different stations, with great exactness.

No other companies have adopted this instrument.

122.

What Arrangements are made on the different Railways in order to enable Quick Trains to pass Slow Trains?

Arrangements are made at stations on the different lines, by which slow trains, both for goods and passengers, are shunted off the main line, 15 or 20 minutes before the quick train is due.

The telegraph is found very useful in cases where one train has to pass another.

123.

What Arrangements are made to allow other Trains to pass Ballast Trains? What Speed do they travel at?

Similar arrangements for shunting to those specified in the preceding section (122) to allow the ordinary trains to pass, are adopted in the case of ballast trains, which are accompanied by some officer of the company who is well acquainted with the signals and traffic arrangements of the line.

18 miles an hour is usually the maximum speed adopted by these trains.

On the Est railway the maximum speed is 22 miles an hour.

124.

What part of the Train are the Guards and other Servants of the Company placed in?

The chief guards are always placed in the luggage van in the front of the train. Other guards and greasers in the break compartments.

MÉDITERRANÉE.

On this railway the chief guard's place is in the break van at the end of the train.

OUEST.

There is an inspector on this railway, who rides on the engine.

On those lines where inspectors accompany trains no particular place in a train is assigned to these officers.

125.

What Communication exists between the Guards and Engine-driver?

On the generality of lines no communication exists, except by means of the signals which the guards carry.

The plate layers and other servants of the company employed on the line, if they see any signal made by a guard with a flag or lanthorn, repeat such signals in order to attract the driver's attention.

The engine driver's attention is also attracted by the guards whistling, and by the tightening of the breaks.

On the network of railways of the Orleans company a means of communication between the guard and engine driver exists by means of a cord fixed to the guard's van, which cord, if pulled, rings a bell in the tender. The guard is so placed as to command a view of the whole train.

The Government recommend the adoption of this system to the other companies.

A similar means of communication exists on the Rhône et Loire railway, but only appears to be used in cases of emergency.

NORD.

On this railway guards can get from one end of the train to the other by a hand-rail running along the carriages.

126.

How does the Engine Driver communicate with the Breaksman, when it is necessary to put on or take off the Breaks?

Several short whistles are the signal to put on, one long whistle the signal to take off the breaks.

127.

What precautionary Measures does the Engine Driver take when the Train approaches a Station, or a junction?

When a train approaches a station or a junction, the engine driver slackens speed, and whistles. They also slacken speed when passing stations at which they do not stop. They also reduce the speed of the train, when going to pass through points, in order to reduce as much as possible the chances of an accident in the event of the pointsman making a mistake.

Railway companies press for the revision of the 1st Par. of Art. 38 of the regulations, which directs the engine driver to whistle whenever the train approaches stations, level crossings, curves, cuttings, and tunnels, as this regulation would entail, in lines where curves and cuttings are of frequent occurrence, a constant succession of whistles.

Another article in the Regulations enjoins the driver to whistle whenever the line appears not to be perfectly clear.

128.

What Precautions are taken in passing through Tunnels, across Swing Bridges, along Steep inclines in Cuttings, or along any Portions of the Line which may be looked upon as dangerous; as for instance, raised Embankments on the Banks of Rivers, or Curves in Cuttings? What is the Minimum Distance, consistent with Safety, which should be seen along the Line in front?

At such portions of the line the speed of trains is usually slackened, and the whistle is used.

There are no particular regulations in force respecting trains passing through tunnels, excepting upon the Rhône et Loire railway, where a special regulation also exists for gradients.

It is considered safer to trust to signals than to the actual distance which can be seen in front, which distance often does not exceed 160 yards.

The signals are made from a distance of 600 to 1,200 yards.

129.

What are the Regulations for Night Traffic?

Night trains show a white light in front and a red light behind.

There are three red lights on the last carriage of the train, one fixed near the drawbar, and the other two near the top of the carriage, so arranged as to show red when seen from behind, and white when seen from the front.

130.

What are the Regulations in Foggy and Snowy Weather?

In foggy weather similar lights to those used at night are shown. The signals at stations are also lighted. In snowy weather, brooms are fitted to the life guards, and sometimes the ash-pans are taken off.

Nord.—Paris à Lyon.—These companies consider that walls from 1 yard to 1½ yards high, would prevent snow from drifting into the cuttings.

The question of what would be the best means to adopt to prevent the line from being blocked up with snow, is under consideration.

131.

What steps are taken by the Chief Guard of a Train, in the event of any Casualty bringing the Train of which he is in charge, to a Stand-still on the Line?

It is the duty of the chief guard, in the event of such an accident occurring, to station some servant of the company at least 550 yards behind the train, with a danger signal, to show to any train that may come up that the line is not clear.

The next thing to be done is to communicate, either by telegraph, or otherwise, with the nearest station, from which assistance can be procured.

When the train is able to proceed, explosive signals are placed on the rails, the explosion of which gives notice to the driver of any train that may follow, that another train is immediately in front; for these explosive signals are always removed from the rails by a plate layer, as soon as sufficient time has elapsed for the train to have got to a safe distance.

132.

What steps do Superintendents and Station Masters take when Trains are behind their Time?

When this occurs, they communicate with the other stations on the line, until they find out where the missing train is. They then despatch a reserve engine to its assistance

133.

Are Waggons, containing Materials, &c., for Repairs, always in readiness, in the event of Accidents, at the principal Stations?

This is the case on all lines; the Lyon à la Méditerranée company look upon this precaution as perfectly useless, and consider that the carriages and materials so set apart would be much better laid up with the reserve stores, when it would be kept in good condition.

Besides the articles for repairs of the permanent way and the carriages, thus in constant readiness, there is a chest of medicines and materials for dressing wounds, in the event of any personal injuries to passengers.

134.

In the event of Trains being in Distress should the Officials in charge of such a Train ask for Assistance?

There is no harm ever in summoning assistance, even though such assistance may not be requisite, as the reserve engine is always sent out after the train has been due a certain time.

It is especially desirable that assistance should be asked for on railways where there is but one line of rails.

135.

By what means, and to whom, are requests for Assistance made?

Such requests for assistance are made by the chief guard to the nearest station where reserves are kept.

They are made either by means of a portable telegraphic apparatus on the Nord and Orléans railway, or in the event of such not being in use, through the plate layers, who pass the request from one to another along the line, or else by means of a train passing in the contrary direction.

Such a request should specify exactly the nature of the accident, and the spot where it took place. It should also state whether the assistance should come up in front or behind.

The reserve engine does not come up behind unless there is a distinct *written order* to this effect, and then only if the accident has happened at a short distance from the station which it has lately left.

On the suburban railways (*i.e.* Versailles) assistance is procured by blowing a horn, which sound is repeated by the watchman.

On the Saint Germain line assistance is always summoned from Paris.

136.

How long a Time is allowed to elapse after a Train has become due, before Assistance is sent?

Five minutes after the appointed time for a passenger train, and 15 minutes in the case of a goods train, the next station is telegraphed to, for information of the missing train.

TABLE showing the Time allowed to elapse at the Reserve Engine Station after a Train has become due before sending to its Assistance.

——	Nord.	Lyon.	Est.	Orléans.*	Méditerranée.	Ouest.	Rouen, Havre, Dieppe.	Rhône et Loire.	Saint Germain.
Time allowed to elapse:— Passenger trains	Minutes. 10	Minutes. 20	Minutes. 10	Minutes. 45	Minutes. 20	Minutes. 20	Minutes. 20	Not until assistance is asked for.	Minutes. About 15
Goods trains	25	40	25	1h. 15m. *See* Observation.	1 hour.	35			

* ORLEANS.—When there is no telegraphic apparatus in the train this long interval is reduced to twenty minutes for passenger trains, and forty minutes for goods trains.

137.

Who issues the Orders for the Assistance to be sent?

This is generally done by the station master or his assistant.

138.

What Precautions are taken to prevent the Engine running into the Train which it is sent to assist?

There are signals placed 550 yards in front or behind the train in question, the engine also proceeds but slowly.

This engine on its return, carries a flag by day, and shows a coloured light by night.

SPECIAL TRAINS.

139.

What is the course pursued in respect to Special Trains? Is it generally notified on the Line that such a Train is to be run? Does an Inspector always accompany such Trains?

There is no regulation *prohibiting* special trains to run, without having given previous notice along the line. However, as a rule, previous notice of such trains is always given, if possible.

An inspector does not accompany special trains except on the Est, Paris à Lyon, and Ouest railways.

SIGNALS.

140.

What System of Signals is adopted on Railways?

Fixed and portable signals are employed on all railways.

There are fixed station and distant signals. The latter are discs, and show by their position (perpendicular or parallel to the line) whether or not the line is clear. These discs are coloured, and are lighted at night.

Signals of this description are placed at approaches to stations, at junctions, at swing bridges, &c. portable signals are made in the day with a flag, and with a lantern at night.

The signals "stop," "shut off steam," "proceed cautiously," are made by waving a flag in different ways in the day time, and by showing different coloured lanterns at night.

These signals are used by all the servants of the company, they are used if necessary on the line, at places where repairs are being carried on.

Plate layers and other persons employed on the line, give notice of the approach of a train, by blowing a horn.

The following statement which was given to the commission by the Nord company, of the portable signals in use upon that railway, will serve as a specimen of the usual signal system.

"NORD" System of Portable Signals.

	By Day.	By Night.
"Train in sight"	Two blasts on the horn.	
"Line clear"	Furled flag "presented" (au port d'armes).	A lantern (white) displayed.
"Slacken speed for a short distance."	Unfurled flag "held down."	A lantern (green) displayed.
"Slacken speed for a considerable distance.'	Unfurled flag "held up."	A lantern (green, alternating with red) displayed.
"Stop"	Unfurled flag "waved"	A lantern (red) displayed.

141.

Are Detonating Signals ever used? If so, when and how are such Signals made?

Detonating signals are used by day and night, and in fogs, to give notice to an advancing train, that another has been brought to a stand still, on the line in front.

Such signals are placed on the rails. On the Paris à Lyon, Méditerranée, Rouen, Havre, Dieppe, and Rhône et Loire railways, this description of signal is never used.

The Lyon company consider that these signals cannot be depended upon, as they are liable to be moved aside, by the broom of the life guards of the locomotive or to fail to explode.

THE ELECTRIC TELEGRAPH.

142.

Is the Electric Telegraph used as an Agent in the ordinary Working of the Line, or only in Emergencies?

With two exceptions railway companies use the electric telegraph constantly, in the ordinary working of the line.

The exceptions are Paris à Lyon and Saint Germain. These companies merely use it for the transmission of urgent messages.

NORD.

This company considers itself, in virtue of its agreement with the telegraphic department (administration de télégraphes) entitled to make as much use of the wires as it pleases, in the ordinary working of the line.

EST.

This company considers the electric telegraph as indispensable in working single lines.

Constant experiments are being made upon this railway, in the hope of rendering it a still more efficient agent in the signal arrangements, &c. than it is at present. Amongst these experiments may be enumerated the attempt—

1. To send a message of warning of the approach of every train.
2. To communicate from a train to the nearest station.
3. To place the two ends of a train in communication with each other.

Every improvement made in telegraphic communication will add to the safety of railway travelling.

M. Vuigner, the chief engineer of the Est company, is of opinion that the importance of the telegraph as an agent in the working of a railway, has up to this time been underrated, and considers that with the assistance of the electric telegraph, railways, having but one line of rails, will become as safe and efficient for all purposes of ordinary traffic, as railways having a double line of rails are at present, thus signals placed at from 1,200 to 1,500 yards apart along a line, should be worked by electricity, to show the approach of a train, and after the train had passed for a certain time these signals would assume their normal position.

143.

Between what Stations is there Electric Communication? What is the mean Distance between the Stations?

Upon every railway there is electric communication between all stations which are depôts for engines.

Some of the smaller stations can communicate with these depôts.

TABLE showing the Mean Distance between Telegraph Stations on the different Railways.

——	Nord.	Est.	Lyon.	Orléans.	Méditerranée.	Rouen, Havre, Dieppe.	Rhône et Loire.	Saint Germain.	Ouest.
Distance between the telegraph stations in miles - - -	6·83 to 24·84	2·48 to 20·49	23·59	12·42 maximum.	12·42	11·79	9·31 to 12·42	The stations have communication only with the terminus at Paris.	4·96 to 13·66

144.

To whom is the Working of the Electric Telegraph entrusted?

NORD.

At termini, and at large and important towns, to Government officials. At other stations, to officers of the company.

EST, LYON.

At most of the important stations to Government officials.

At a few of the great stations, and at all those of less consequence, to officers of the company.

ORLÉANS.

Government officials have charge of the electric telegraph at the chief towns of departments. The company work it at other places.

MÉDITERRANÉE.

As on the Orléans railway, with the exception of there being rather more places where the telegraph is superintended by Government officials.

OUEST.

By the Government at Paris, Chartres, and Le Mans, on the rest of the line by the company's servants.

ROUEN, HAVRE, DIEPPE.

By the Government at Paris, Rouen, Havre, and Dieppe, by the company at all other stations.

RHÔNE ET LOIRE.

By the Government employées at termini, at intermediate stations by the company.

SAINT GERMAIN.

By the station masters.

145.

Which of the Company's Officials have the right to send Messages by Telegraph?

Directors, engineers, inspectors, principal station masters, &c.

146.

What proof has the Official sending a Message that such Message has been received or understood?

It is the general practice to acknowledge the receipt of all messages; when they are important, the official receiving the message repeats it.

WORKING SINGLE LINES.

147.

Are there any Railways or Portions of Railways which have but One Line of Rails?

EST.

Metz to Forbach and Thionville, Epernay to Rheims, Blesmes to Saint Dizier, Lutterbach to Thunn, Montereau to Troyes.

ORLÉANS.

Moulins to Saint Germains des Fosses, Saint Maure to Poitiers, Angoulême to Libourne.

MÉDITERRANÉE.

Nîmes to Alais, Alais to La Grand Combe, Montpellier to Cette.

OUEST.

Thiel to Auvours.

ROUEN, HAVRE, DIEPPE.

Rouen to Dieppe.

RHÔNE ET LOIRE.

Saint Etienne to Roanne, &c.

SAINT GERMAIN.

The Argenteuil line.

The Nord and Paris à Lyon railways have no single lines of rails.

148.

What Regulations have been adopted by the various Companies for working Single Lines?

EST.

No trains, nor locomotives, besides the regular trains are allowed on the line, without notice being previously given to the officials at all the stations.

ORLÉANS.

The hours of arrival and departure from all stations, crossing places, and all other arrangements connected with the running of special or extra trains, are settled in the principal terminus.

MÉDITERRANÉE.

Nîmes à Alais.—Upon this section passenger trains never cross one another. Certain stations are appointed where goods trains always wait, whatever may be the delays, to allow passenger trains to pass.

Alais à la Grande Combe Section.—Two trains run one after the other, but trains at the same time never run in opposite directions.

Montpellier et Cette.—The precautions taken in working this section are similar to those adopted upon the Nîmes à Alais line, except that passenger trains cross at a certain appointed place.

OUEST.

Trains cross at appointed stations.

ROUEN, HAVRE, DIEPPE.

Similar regulations are in force to those adopted upon the Est railway.

ST. GERMAIN. ARGENTEUIL.

There is but one locomotive between Paris and Argenteuil.

149.

How is a Collision between Trains running in opposite Directions avoided?

1st. By previously fixing the points where trains are to pass one another, and the intervals between trains following each other.

2nd. By strictly prohibiting any train from leaving the station appointed for crossing until the other train has arrived.

3rd. By requiring at the stations appointed as crossing points for trains proceeding in different directions, a signal to be made five minutes before either of the two trains become due, ordering them to stop. The two trains stop outside the station, and ask for admittance to the station by prolonged whistles.

4th. By prohibiting any change to be made in the station previously fixed for crossing, although a train be behind time, unless such a change be authorized by a competent officer of the company; a proper notice of such change of crossing place being given along the line by telegraph to every station concerned, and receipt of the message acknowledged from each station.

150.

How is Collision avoided in the event of Assistance being sent to a Train?

EST.

Assistance must be requested either by writing or by telegraph, such a requisition must specify precisely where the train requiring assistance is. Such a train is protected for some distance before and behind by signals, and must not attempt to move after having made the requisition until the assisting engine is attached to it.

ORLÉANS.

The contingency of the telegraph being out of order, is provided for on this line, for if nothing has been heard of a train which is 35 minutes after its time, a reserve engine is sent after it.

Thus if a train be 30 minutes late, it must stop, on whatever part of the line it may be, and wait the arrival of the reserve engine.

If a train leave a station more than 10 minutes after its time, with the engine in good order, the depôt of the assistant engine is telegraphed to, in order that this delay in starting may not be reckoned in the 35 minutes. The telegraphic message is repeated in full, and the engine driver and conductor receive a paper stating the time at which they must stop.

MÉDITERRANÉE.

Assistance is only sent when a requisition is received in writing, showing exactly where the train requiring assistance is. The train must not move until the reserve engine arrives.

OUEST.

On this line the reserve engine always comes up behind the train.

RHÔNE ET LOIRE.

The train requiring assistance is protected by signals.

ST. GERMAIN.

The train which has asked for assistance should not move.

151.

Is not an Alteration in the System of Signals, and a more general and regular use of the Electric Telegraph requisite on Single Lines of Rails?

No alteration in the system of signals, but a more general and regular use of the telegraph is required. When the telegraph cannot work, no alteration in the crossing places can be made. On those portions of the Méditerranée railway, which have only one line of rails, there is no electric telegraph as yet; this is, however, of but slight consequence, as the portions of line in question are very short.

152.

On Single Lines is it the custom for a Pilot to Travel on the Train between the Points of Crossing, or for a Pilot Engine to draw the Train between these Points, and then immediately to return?

This plan has not been adopted, except on the Argenteuil line (St. Germain), where, when two engines are used, one man is appointed to accompany them over the same portion of the line.

This manner of working single lines has great inconveniences, and can only be adopted in cases of emergency as an expedient.

The Est company consider that such a system involves extra expense, and great loss of time, as well as increases the possibility of accident.

153.

Is the Approach of Trains telegraphed from Station to Station?

This is generally the practice, especially when the train is behind its time.

Special trains on the Orléans railway, and ordinary as well as special trains on the Est railway, never leave one telegraphic station before a message has been received from the next station that the line is clear.

154.

Does the Electric Telegraph ever get out of Order?

The electric telegraph gets out of order when the wires break or get entangled, or from defective insulation. These casualties are rare. The points of crossing must then be strictly adhered to. On the Rhône et Loire railway the constant damp of the tunnels is found to affect the wires, and also the electric current. It is proposed, therefore, to carry the wires outside tunnels on single lines.

Railway companies consider that there are grave objections against laying telegraph wires in tunnels, as they consider that the advantages to be derived would be more than counterbalanced by the expense and difficulty attendant upon the maintenance of the telegraph in such a situation.

155.

What Regulations exist in respect to Special and Extra Trains on Single Lines?

Most stringent regulations exist in this particular on all single lines. The hours of arrival and departure at all stations are previously arranged, and due notice is given to the various officials along the line, by means of a preceding train.

156.

What precautionary Measures are adopted on Railways with a Double Line of Rails, while Repairs are being carried on which confine the Traffic to a Single Line of Rails?

NORD.

The pointsmen at each end of the line have strict directions to allow no train to run on to the one available line of rails, unless the inspector in charge of the traffic over this line of rails is present.

When several trains succeed one another, this inspector travels with the last of such trains, in order to be present to watch the points at the other end of the line. The signals "to stop," are made 760 yards before the points are reached.

EST.

Before entering on the one *available* line of rails, the train stops to take up a servant of the company, who caries a "pass" flag. There is but one "pass" flag. The signals are made 760 yards before the points are reached.

LYON, OUEST, ORLEANS.

In such cases, all trains on these railways are accompanied by a special officer of the company, termed the "pilot."

MÉDITERRANÉE.

Instructions explanatory of the order in which the several trains are to run, are issued to the officials at each end of that portion of the railway where the traffic is being temporarily carried over a single line of rails.

RHÔNE ET LOIRE.

Servants of the company are placed at each end of the one available line of rails, in order to stop a second train from running on that line of rails, before the first train is clear of them.

OF INFLAMMABLE GOODS.

157.

What Precautions are taken in the Conveyance of Goods of this Nature?

A special decree prescribes the regulations to be observed in the conveyance of gunpowder. In addition to which regulation, waggons laden with goods of an inflammable nature, are placed at the end of goods trains, such goods never being conveyed in passenger trains.

The Lyon à la Méditerranée company state, that although no accident has occurred, a certain amount of danger is involved in allowing gunpowder to be left on the company's premises.

PART IV.

GENERAL MANAGEMENT.

158.

To whom are the Orders of the Director, or of the Board of Management given? By what Means are these Orders conveyed to the various Officers of the Line?

By way of replying to these queries, the following information was supplied to the "Commission of Inquiry," relative to the constitution of the boards of administration, &c., of the various railways.

The railway companies of France can be divided into two categories, viz.:—

1. Companies, where the council of directors has devolved a portion of its authority upon a board of management.
2. Where the council of directors acts alone.

Under the first may be classed,—

Nord, Est, Lyon, Rouen, Havre, and Dieppe; and Grand Central, companies.

Under the second,—

Lyon à la Méditerranée, Saint Germain, Ouest, and Orleans.

NORD.—There are three superintending officers, one for each principal department, each independent of the other, and responsible only to the council and board of management, in which no member is charged with the direction of any exclusive "branch," but every question is laid before all the members collectively.

EST.—Each of the members of the board of management of this railway takes a particular department, and transacts business daily with the head of that department.

In matters of general interest, however, the whole board confer together.

In the case of the following companies,—Lyon, Grand Central, and Orléans, Rouen, Havre, and Dieppe,—an officer, termed by the first three named "director," by the last two "chief manager," is alone in direct communication with the board of management.

A mixed board manage the affairs of the three last-named railways, elected by the Council of Directors of the Paris à Rouen, Rouen au Havre, Rouen à Dieppe railways. In the Lyon à la Méditerranée, Ouest, and St. Germain, a director takes part in the deliberations of the council, and sees to the execution of its orders.

Thus, in those railways where there is a "director," or a "chief manager," this officer becomes the medium through which the orders of the council of directors, or of the board of management, are conveyed in writing to the various officials.

In railways, where there is no such officer, the board of management give their orders directly in writing to the heads of the various departments.

From the minutes containing these orders, whether delivered to the director, or to the heads of departments, instructions are immediately drawn up and sent to the various subordinate officials charged with the execution of the particular duties referred to in the minutes.

These minutes are signed by all the heads of departments concerned in them.

159.

Who appoints the various Officers of the Company?

——	Nord.	Est.	Lyon.	Rouen, Havre, Dieppe.	Méditerranée.	Grand Central.	Orléans.	Observations.
Officers nominated:— By Council of Directors	Chief officers.	—	Chief officers.	—	The whole staff.	—	The whole staff.	"Est." The Council, however, have to ratify the appointment of any "employé" whose salary exceeds 120*l.* per annum.
By Board of Management	Rest of the staff.	The whole staff.	Officers of the 2nd class.	The whole staff.	—	The whole staff.	—	

As a rule, the director, or the traffic manager, or the chiefs of departments nominate the candidates for the consideration of the council, or board of management.

Candidates for appointments in the service of the Nord company, are examined previous to their appointment, as to their fitness for the duties they propose to perform.

The limit of age is forty years.

159*a*.

Are there many Retired Soldiers (Anciens Militaires) among the Officials?

In some companies a certain proportion of the appointments has been reserved for such persons in the "cahier de charges." In others no such reservation was made.

There is no doubt, however, that a large number of the employées on railways are selected from this class, especially in those departments where the official has to do personally with the public.

The Rouen company consider that it is not advisable to fix positively what posts are always to be held by this class.

160.

Are the Chiefs of the various Departments always consulted about the Promotion in their Departments?

This question was answered in the affirmative by all the companies, Ouest excepted; on which railway the director alone promotes, and is responsible only to the council of directors.

161.

What are the Regulations for maintaining Discipline amongst the Employées?

On all railways from the lowest servant to the highest official implicit obedience is required from every official to his immediate superior. Strict military discipline is thus preserved throughout the whole staff of all the companies.

162.

What are the Punishments for Negligence, Mistakes, and Neglect of the Regulations?

Reprimands, fines, temporary suspension, degradation, dismissal.

Dismissal follows negligence or incapacity involving the safety of the traffic, drunkenness, insubordination, untrustworthiness, fraud, or smuggling.

The board of management, or the council, have alone the power of dismissing any of the company's servants.

163.

Have there been any Officials who have lost their Situations on account of Political Offences, in conformity with the Decree of the 27th March, 1853?

Only one case has occurred where the Government has interfered; but in several instances the companies have fore-

stalled the Government authorities by dismissing employés themselves.

163*a*.

In the event of the Board of Management receiving a Complaint of an Official from the Government Department of Control what Steps are taken?

An inquiry is immediately instituted, according to the results of which the official is punished or explanation given to the Government department of control.

164.

Is the Remuneration of the Employés fixed or variable?

As a rule the pay is fixed, except for engine drivers and firemen, who receive a premium for saving coke, oil, &c.

Upon the Orleans line the servants of the company receive a certain proportion of the profits of the line.

164*a*.

Does any Superannuation Fund exist for Railway Employés? Is any Provision made for the Servants of the Company in the case of Sickness or Accident? Or in the event of an Official being killed while on Duty, is there any Provision for his Family?

From the answers of the several companies to these queries, the following facts have been deduced:—

1. That a regular system of pensions has been established on most of the railways, or is still under consideration.
2. That it is the usual practice to afford relief to any servants of the company who may be sick or injured.
3. That in the event of death ensuing to any official whilst in discharge of his duties, some compensation is in the habit of being made to his widow or to his family.

Upon the Orleans railway, when the profits reach eight per cent., 15 per cent. of the surplus is reserved for the employés. When the profits reach 14 per cent., 10 per cent. of the surplus is reserved, and above 16 per cent., 5 per cent. of the surplus is reserved. Of this surplus a sum of 250,000 francs is first set aside as a fund for sickness, &c. The remainder is divided in three parts, one is given at once to the employé, the second is deposited in his name in a savings bank, to be drawn out only with the consent of the council of management, the third is paid into the superannuation fund.

165.

Which of the Company's Servants take the necessary Oaths to enable them to take Depositions should the Occasion require?

The principal officials, and those officials whose duties are likely to bring them in contact with the public, such as station masters, guards, inspectors, breaksmen, and pointsmen.

165*a*.

Is there a sufficient Amount of Government Supervision and Interference?

A reply in the affirmative was generally received. The Orléans company considers that the amount of Government interference in commercial questions should be strictly defined. Upon an invitation from the Director-General of Railways, the President of the Council of Directors of the Lyon à la Méditerranée company made some remarks upon this subject, from which it may be gathered, that the Government of France, instead of instituting a rigorous system of surveillance over all the proceedings of the companies, had contented itself with associating with the staff of each company certain gentlemen selected from the corps of "ponts et "chaussées" and "mines," who, although working in concert with the company, still acted as a certain check upon any attempt to evade the law in any particular.

The president dwelt with considerable earnestness upon the far greater advantages which accrued to the public, as well as to the companies, by this system, when compared with the system of a more rigid police surveillance. In support of his argument, he adduced a striking example of the practical working of the latter.

He added, that the laws and regulations laid down for railways could be interpreted, if submitted to indifferent and unpractical persons, in a way very injurious to the interests of railway companies, and consequently to the safety of the public at large. The conclusions tended to deprecate any surveillance of the Government, other than that which, while guarding against any real infraction of the law, would steadily keep in view the real interests of railway companies.

PART V.

ACCIDENTS.

166-7.

In reply to these questions, calling for an account of all accidents that had taken place on the different lines, detailed tabular statements were produced.

168.

State the general Causes of Accidents.

The majority of accidents are attributable either to improvidence or to neglect of the regulations.

169.

What Precautions have been taken to prevent the Recurrence of Accidents?

NORD.

Ninety-five engines have been altered. The hinder axle has been moved behind the fire-box, and the distance between the axles increased from 3·32 yards to 4·91 yards. In carriages intended to be used in express trains, the distance between the axles has been increased from 2·89 yards to 3·55 yards.

Fresh distant signals have been erected. Fixed signals have been placed on lines running into stations.

Explosive signals are placed on the rails in fogs, and when the servants of the company cannot be present in person to make the signals. Tires of wheels have been made without welds. (Petin et Gaudet system.)

The axles of the carriages used in quick trains are made stronger, and the journals of a greater diameter and longer.

EST.

Some of the servants of the company, to whom blame has been attached, have been reprimanded, suspended, or degraded, and in other cases, dismissed.

The suggestions contained in the following remarks, which the engineers of the company made, after several cases of trains running off the line had occurred, have been since carried into effect:—

1. There appears to be some danger for quick trains, when the sleepers merely rest upon the ballast, without being packed in it.

2. Surface water derived from ground not occupied by the railway should, as far as possible, be prevented from flowing into the drains at the sides; and, in some cases, it would appear necessary to carry the water under the railway by a conduit, instead of by side drains.

3. The lateral pressure of the wheels has caused a sufficient alteration of the gauge to cause trains to run off the line. Balance weights on them have very much overcome this.

LYON.

The servants of this company have been urged to exercise the utmost vigilance in seeing that the regulations laid down are carried into effect.

ORLÉANS.

Improvements have been effected in some portions of the company's rolling stock, and a strict observance of the regulations has been enjoined.

MÉDITERRANÉE.

In consequence of arrangements that have been made, the traffic in and out of the goods station at Nîmes no longer interferes with the traffic on the main line.

Many more signals have been erected in exposed portions of the line.

Signal men have been placed at the extremity of each tunnel to communicate with each other by means of the electric telegraph.

The axles of passenger carriages have been placed further apart.

The axle journals of some of the trucks have been replaced by thicker ones.

Most positive instructions have been given to guards of trains never to omit placing danger signals in the rear of any train which may be brought to a stand still from any cause.

RHÔNE ET LOIRE.

The servants of this company have been frequently impressed with the importance which attaches to the strict observance of all rules.

SAINT GERMAIN.

Fresh signals for the prevention of collisions, and whistling when in curves have been introduced.

Special injunctions relative to the traffic arrangements have been given to the officials.

170.

Is a Train running off the Rails a matter of frequent occurrence? Are Casualties more frequent in Curves than in Straight Portions of the Line? What are such Accidents attributable to, and what Measures are taken to prevent their occurrence?

TABLE showing the Number of such Casualties that have occurred on the different Railways.

——	Nord.	Est.	Lyon.	Orleans.	Méditerranée.	Rouen, Havre, Dieppe.	Rhône et Loire.	Saint Germain.
Number of casualties - -	20	5 Two of which occurred in curves.	None on the line.	Number not mentioned. Very few appear to have occurred.	None.	1	Number not mentioned.	Very few.

ORLÉANS.—RHÔNE ET LOIRE.

Upon these lines trains do not appear to have run off the rails in curves more frequently than in straight portions of the line. The former company consider impediments that have got on the rails as the cause of nearly all the casualties of this nature that have occurred on their line.

On most railways, however, carriages not unfrequently appear to get off the rails when being moved or shunted in stations.

FRENCH GOVERNMENT REGULATIONS FOR THE POLICE, USE BY THE PUBLIC, AND THE MANAGEMENT OF RAILWAYS.

I.

Art. 1.

OF THE CONTROL AND SUPERINTENDENCE OF THE WORKING.

The control and the general superintendence of railways is vested in the Minister of Agriculture, Commerce, and Public Works.

The subordinate officers of the Government, to whom this control and general superintendence is entrusted, in accordance with the laws, decrees, and notices, are the Préfets—the "Ingénieurs des Ponts et Chaussees et des Mines," the inspectors of the commercial management, the commissioners charged with the administrative superintendence, and by any other functionaries designated by the several laws, decrees, or notices.

II.

DUTIES AND OBLIGATIONS OF RAILWAY COMPANIES.

Section 1.—*Stations and Permanent Way.*

Art. 2.

All regulations relative to public carriages and waggons plying for hire in the precincts of the company's premises are issued by the préfet, at the request of the railway company. These regulations are subject to the sanction of the Minister of Public Works.

Art. 3.

The railway companies must take the measures necessary to ensure that the railway and the works connected with it are kept in order, and that level crossings are properly watched; that the points and signals (day and night) are kept in order and properly worked; that stations, level crossings, and roads in their occupation are properly lighted; that servants are employed in such number as suffice for the performance of the several requirements, as well as to secure the safe working of the line.

The servants employed by railway companies should on no pretext whatever quit the post assigned to them without a direct order from their immediate superior, and then not until they are relieved.

Section 2.—*Rolling Stock.*

Art. 4.

No locomotives can be used until they have been submitted to the various prescribed tests and approved by the Government.

Locomotives must be provided with means for preventing the emission of sparks.

When a locomotive, in consequence of deterioration or from any other cause, has been pronounced in an unfit state to run, such locomotive is not to be used again until a fresh approval from the Government has been obtained.

Art. 5.

Registers, in which a daily account appears, are kept for all locomotives. In these registers is shown the date of the locomotive commencing to run and the amount of work it has performed, the various repairs or alterations it has undergone, and the renewal of its different parts.

There are also special registers kept for the axles of engines and tenders.

On these registers the following details appear under the number of each axle, the place of manufacture, the date of its having first been used, the test applied to it, the amount of work it has gone through, any accidents that may have occurred to it, and any repairs it may have undergone.

Every axle has its number stamped on it.

These registers are to be produced whenever any of the various engineers or other officers whose duty it is to see to the efficiency of the rolling stock and the working arrangements may desire to refer to them.

Art. 6.

No carriage is to be used for the conveyance of passengers until the Government has approved of it. This approval is only given when it has been satisfactorily proved that the carriage in question complies with the various requisitions relative to strength and convenience laid down by the Government, and that it is provided with every appliance which may conduce to the safety and comfort of the passengers travelling in it.

In every carriage should be distinctly specified the number of passengers it is intended to carry.

The minimum amount of space to be afforded to each passenger should be 18 inches in breadth, 25 inches in depth, 4 feet 10 inches in height.

Art. 7.

Locomotives, tenders, and all kinds of carriages should display—

1. The name or the initials of the company to which they belong.
2. A special number.
3. For passenger carriages the class to which they belong.

These marks should appear on the body of the passenger carriages, and on the framing of other vehicles.

The number of each locomotive is engraved on a plate fixed to the boiler.

Art. 8.

Locomotives, tenders, and rolling stock of every description, should always be kept in good order.

Section 3.—*The Composition of Trains.*

Art. 9.

It is not allowable for more than two locomotives in steam to be attached to one and the same passenger train.

The driver of the leading engine is always in charge.

Unless specially exempted by the Minister of Public Works, every passenger train must have at the head of the train following the tender as many vans or vehicles without passengers as there are locomotives in steam coupled together.

One vehicle not carrying passengers should also be placed at the tail of the train.

The construction and the use to which these vehicles are to be applied is determined by the Minister, who has previously advised with the company.

Art. 10.

The Minister of Public Works, having advised with the company, makes the regulations rendered necessary by the various seasons of the year for ensuring the safety of passenger and goods trains.

For instance, the maximum number of carriages for each train; this number is never to exceed twenty-four carriages for passenger trains without special permission from the Minister.

The maximum weight to be carried by goods trains, this weight to be regulated by the power of the locomotives.

The number and weight of break vans.

The number of guards in charge of these break vans, and the position they are to occupy in the train.

In every case, however, one of the two last carriages is to be provided with a break and a breaksman.

The chief conductor in charge of a train, or the driver of an engine running without a train, should always be provided with the signals required by the regulations.

Art. 11.

In all regular trains, unless specially exempted by the Government, a sufficient number of carriages of all classes, subject, of course, to the regulation set forth in art. 10, is to be provided for passengers; for this purpose reserve carriages are to be kept in readiness in different points of the line.

Art. 12.

Locomotives are always placed in front of trains, excepting in or near stations when they are employed in shunting carriages or when required to assist trains in distress.

In these special cases the speed must never exceed 15½ miles an hour.

Art. 13.

No goods of an inflammable nature are allowed to be carried in passenger trains.

Art. 14.

All carriages composing a passenger train are coupled in such a manner that the spring buffers are always in contact.

The vehicles belonging to companies of "*messageries*" are not permitted to form part of the company's trains, unless authorized by the Minister of Public Works, and in accordance with the provisions of the "Acte d'Autorisation."

No locomotive, tender, or any kind of carriage the wheels of which are made of cast-iron, is allowed to form part of a passenger train. At all times, however, the Minister of Public Works may specially authorize the use of cast-iron wheels with wrought-iron tyres in mixed passenger and goods trains, the speed of which trains is never to exceed 15½ miles an hour.

Art. 15.

Trains are provided with outside lamps at night.

Passenger carriages are provided with lamps inside at night, and also in the day when passing through certain tunnels which are particularized by the Government.

Art. 16.

A means of communication exists between the conductor in charge of the train the guards, and breaksmen, and the engine-driver; this means of communication is such as is prescribed by the Minister of Public Works, after having advised with the company.

Section 4.—*Of the Departure, Running, and Arrival of Trains.*

Art. 17.

On all railways the Minister of Public Works, having advised with the company, determines the direction in which trains and single engines run on railways having several lines of rails, and the points of crossing in railways which have only a single line of rails.

The regulations laid down by the Minister can never be departed from, unless the road be stopped, in which case the traffic upon the line is to be carried on, subject to the precautionary regulations made by the Government in conjunction with the company.

Art. 18.

No train must leave the station before the appointed hour.

No train must leave a station unless the regular time laid down by the Minister of Public Works, after having advised with the company, has elapsed since the train immediately preceding it has left or run through the station.

Signals which are placed at the approaches to every station at a distance previously determined by the Minister, with the concurrence of the company, indicate to the engine-driver whether or not he may run into the station.

Between stations, at certain intervals determined by the Minister with the consent of the company, signals are placed which indicate whether the regulated period has elapsed, and whether the line is clear. Directly he receives a signal the engine-driver should stop the train.

Art. 19.

Excepting in cases of emergency, or where the permanent way is being repaired, trains should never be stopped at any but the appointed stations. Locomotives, waggons, and carriages should never stand upon lines used for traffic.

Art. 20.

The Minister having advised with the company determines what precautionary measures should be taken for ensuring the safety of traffic over gradients and through tunnels.

The Minister will, with the consent of the company, also decide upon the maximum speed of trains in different parts of the line, and the length of time to be occupied in the journey.

Art. 21.

The Minister of Public Works, having advised with the company, determines what precautionary measures should be adopted in the running of special trains.

As soon as it has been determined that a special train should be run, information should be immediately given to the general manager stating why the train has been despatched and the hour of its departure.

Art. 22.

Those servants of the company enumerated in Article 3 should be provided with day and night signals.

Art. 23.

Whenever a train or a single engine is brought to a stand still on the line, signals "to stop" are made at least 870 yards behind, and in the event of both lines of rails being blocked up, or if the line is a single one, signals are placed at the same distance in front.

Art. 24.

The company is bound always to communicate the system of signals in use on its line to the Minister of Public Works.

These signals should consist of day and night hand signals, disc signals, detonating signals, and a telegraphic apparatus.

The Minister having advised with the company, determines the telegraphic stations.

In foggy and in very bad weather night signals are used instead of day signals.

Art. 25.

When a train approaches a spot where a branch line crosses the main line, the engine driver should slacken speed, so as to be enabled, should circumstances require it, to stop the train before arriving at the spot in question. In all cases the train should be stopped at those places settled by the Minister.

At all the points where lines branch off, and as a rule, wherever there are facing points on the main lines, there should be signals to indicate in which direction the points are set.

On entering terminal stations the engine driver should take care that the impetus acquired by the train should have completely ceased before reaching the platform, and that in order to bring the train up to the arrival platform, the engine must be set in motion again.

Art. 26.

When the train approaches those level crossings, curves, and cuttings particularized by the Minister, the engine driver should whistle to give notice of the approach of the train. The engine driver should also sound the whistle whenever the line does not appear to be perfectly clear.

Art. 27.

No one besides the engine driver and fireman is allowed to get on the engine or tender unless specially authorized in writing by competent officers.

From this prohibition the following officers are excepted:—

1. Ingénieurs des ponts et chaussées et des mines.
2. Superintendents of the rolling stock and permanent way.
3. "Commissaires de surveillance administrative;" in the case of the last-named officers only when a reserve engine is sent to meet a train, or in the event of their making a written requisition stating the grounds of their application, which is given to the station master or chief guard of the train.

Art. 28.

Depôts of engines (reserve engines) should be established in certain parts of the line determined by the Minister of Public Works, having advised with the company.

All regulations relative to the use, &c., of these engines are made by the Minister upon the proposal of the company.

Art. 29.

In each depôt of reserve engines there should be a van containing materials of every description useful for repairs in case of accident.

Every train should, moreover, be provided with the more indispensable tools required in cases of accident.

Art. 30.

If a train be more than 10 minutes behind its time in a journey less than 31 miles, and more than 15 minutes behind its time in a journey exceeding 31 miles, the following particulars are entered in registers kept for this purpose at certain stations on the line designated by the Minister of Public Works:—

The composition of the train in question.
The numbers of the locomotives drawing it.
The hours of its departure and arrival.
The reason for and length of its delay.

These registers are to be shown to the engineers, functionaries, and agents charged with the control of the working.

Art. 31.

Time tables, showing the various arrangements of the company for the regular trains of all descriptions, should be submitted at least a fortnight before such arrangements are intended to take effect, to the chief engineer, to the préfets of the departments through which the line runs, and to the Minister of Public Works. The last-named makes any alteration in the arrangements he may think fit.

If, during the fortnight, no alterations are made by the Minister, the arrangements submitted may be carried into effect provisionally.

Notices placarded in the stations and in such localities as the directors may appoint, at least a week previously to any fresh arrangements of the company being carried into effect, give notice to the public of the hours of departure of the regular passenger trains, and the hours of arrival and departure of the trains at each station.

All arrangements relative to excursion trains should be submitted to the Minister a certain time before they are intended to be carried into effect, which time is fixed for each railway by the Minister.

Art. 32.

In the event of the arrangements made by the company being found inadequate for the efficient carrying out of the regulations above specified, or if the staff employed by the company is found to be insufficient, the Minister of Public Works having advised with the company, makes such further arrangements as he may judge necessary.

III.

Tolls and Fares.

Art. 33.

No fare or toll of any description whatever can be charged by the company, without the approval of the Minister of Agriculture, Commerce, and Public Works.

Tables of approved fares, &c., should always be placarded in the most conspicuous parts of termini and stations, and in any other places which the Government may think fit to appoint.

Art. 34.

A table of the fares which the company desire to have sanctioned, should be submitted to the Minister of Agriculture, Commerce, and Public Works, a month before the company intend to charge the fares in question.

At the same time copies of the tables showing these fares should be forwarded to the préfets of the departments through which the line runs, to the "ingenieur en chef du controle," and to the inspecteur de l'exploitation commerciale.

A table showing these charges should be placarded as directed in Article 33, or in any other way which the Minister, having advised with the company, may consider desirable, as tending to give them general publicity.

No change in the company's approved rates of charges can be made except in the manner above specified.

Art. 35.

The company is bound to carry any goods which may be entrusted to it with care, punctuality, dispatch, and without partiality.

All packages, beasts, and whatever is entrusted to a railway company are registered at the terminal station from which they are sent, and also at their destination, according as they are received, with the total amount charged for them.

An invoice is given to the sender when requested, in such cases as are mentioned in the book of regulation charges.

When no invoice is given, the company is bound in all cases to give to the sender a receipt, in which is stated what is the nature and the weight of the package, the total amount charged, and the time requisite for the conveyance of the parcels in question.

Art. 36.

Whenever a company allows to parties sending goods ("expediteurs") a reduction, whether conditional or not, on the prices stated in the published ("tarif") charges, the company must communicate the particulars of such reduction in its charges to the Minister and to the engineer in chief.

In all terminal and in any other stations appointed by the Minister, after having advised with the company, the particulars of any reduction in the established charges which may have been approved of by the Minister, must be entered in a register; this register, upon which any remarks of the functionaries having the control of the line are entered, must be communicated to any person who may desire to see it.

IV.

Of the Regulations laid down respecting Passengers and Persons who have nothing to do with the Management of the Railway; also of the Regulations respecting the Officials of the Company.

Art. 37.

No one who is not a servant of the company is allowed to enter upon the company's premises. No stranger is suffered to throw or place anything in the company's premises, nor bring in any kind of animals into the company's enclosures; nor to cause any carriage or vehicle of any description which does not belong to the company, to enter upon or wait about the company's premises.

Art. 38.

The regulations set forth in the preceding paragraph do not apply to the under-mentioned public officials when they are in the performance of their several duties:—

Mayors and their assistants, police-officers, officers of the gendarmerie, police constables, or customs or octroi officials in the exercise of their duty, and persons who have special permission from the company. Customs officials, &c., have no right, excepting in very urgent cases, to demand admission into the company's premises, unless they can show an order from some competent authority, which explains the reason of their visit.

In all cases public officials must comply with such regulations which the Minister, who has previously advised with the company, has laid down.

Art. 39.

Every passenger must be provided with a ticket, on which is specified the class of carriage and the locality for which the ticket has been taken.

Any passenger who cannot produce his ticket, or who travels in a carriage of a higher class than that for which he has taken a ticket, is allowed to continue his journey by paying, in the first case, the whole fare, in the second, the difference between the fare from the place from whence he can show that he entered; or in default of being able to show that, the difference from the place whence the last examination of tickets took place.

If the passenger travels further than the station specified on his ticket, he will be required to pay the fare for the additional distance travelled.

Art. 40.

No passenger is allowed—

1. To enter or leave any carriage but by the door which opens to the near side of the line.
2. To go from one carriage to another, or to lean out of the carriage when the train is in motion.
3. To enter or leave any of the carriages at any place, except at stations, and not then until the train has stopped.
4. To enter, or attempt to enter, any carriage after the doors have once been shut, and the departure signal has been given by the station-master.
5. To smoke in the carriages or in the stations.

Deviations, however, may be sanctioned as regards the last regulation, should the company desire it, and if special precautions be adopted.

Art. 41.

Only the number of passengers specified upon the vehicle in accordance with article 8 can be admitted into one and the same carriage.

Art. 42.

No person in a state of drunkenness, no person who carries fire-arms or packages which, from their size, nature, or odour, could incommode other passengers, is allowed to enter any carriage.

Any person who has a fire-arm with him must prove, before coming on the departure platform, that his fire-arm is not loaded.

Art. 43.

No dog is allowed to be conveyed in any compartment of a passenger carriage.

The company may, however, allow passengers who may wish to be with their dogs, to travel in compartments specially set apart, it being understood that the dogs with them are muzzled.

Art. 44.

Any person depositing goods at a railway station to be forwarded, must state exactly the nature of the goods in question.

Special arrangements are made, should such be necessary, for the conveyance of inflammable goods of any description.

Art. 45.

Passengers are bound to obey the directions of the company's servants, in order that the regulations laid down may be attended to.

In the event of these regulations being broken, the "Commissaire de Surveillance Administrative," and in his absence the station-masters and chief guards of trains who have been sworn, are empowered to make a written declaration of any contravention of the regulations.

They possess, besides, the power, should such a course be requisite, of compelling the passenger to leave the train.

Art. 46.

It is the duty of the superintendents, "gardes," and other servants of the company, to see that any person trespassing on the company's premises is immediately turned out.

In the event of such trespassers offering resistance, any servant of the company may summon any constable or officer of the police to his assistance.

Animals found straying in the company's premises are put in the pound.

Art. 47.

There is a register kept in every station for entering any complaint against the company, or against any servant of the company, which a passenger may be desirous of making.

This register, placed in a conspicuous situation, is produced at the requisition of any person.

Every month it is examined by officers appointed by the Government.

V.

Further Regulations.

Art. 48.

No crier, vendor, or distributor of printed books or pamphlets is allowed in stations and in the waiting rooms without being specially authorized by the préfet of the department, having previously obtained permission from the company.

Art. 49.

Any servant employed on the railway whose duties bring him into contact with the public, should wear a uniform or some distinctive mark.

The "gardes" and superintendents may wear swords.

Whenever a servant of the company makes a declaration in writing, a duplicate of this declaration must be forwarded within 24 hours from its having been made to the ingenieur en chef du controle.

Art. 50.

A register, containing the following information relative to each individual of the staff employed by the company, must be kept:—

Extracts from any certificates he may possess.
The length of time he has been employed in various duties, and the proofs of such employment.
The date of his first entering the company's service.
The nature of his duties.
His salary.

In this register the functionaries in charge of the control of the line make any remarks they may think fit.

Art. 51.

In stations where reserve engines are kept, the companies must keep every description of materials which may be required in case of accidents.

All passenger trains must be provided with a box containing such materials for assisting in case of accidents as the Minister of Public Works may determine.

Art. 52.

The registers mentioned in paragraphs 5, 30, 47, and 50, are observed upon and signed by the "Commissaires de Survéillance Administrative."

Art. 53.

The particulars of any accident or of any circumstance whatever, which might have interrupted the regularity of the traffic or endangered the safety of the passengers, of the servants of the company, or of any other persons, although no serious consequences have resulted, must still be reported immediately to the "Commissaire de Surveillance Admistrative," by the nearest station-master and the chief conductor of the train.

The superintending engineers are also communicated with with the least possible delay.

If any person is hurt or killed, a report is made to the local authorities. Information of such a casualty is also forwarded to the préfet.

Art. 54.

In such stations where "Commissaires de Surveillance Administrative" are stationed, the company is bound to provide proper offices for their accommodation.

Art. 55.

The company submits to the Minister of Public Works its proposed traffic and working arrangements, copies of any printed and lithographed instructions, also circulars and directions addressed to the engineers superintending, previously to their being issued.

Any written direction which may be issued is copied into a special register, which copy is shown to the officer to whom the direction was addressed, whenever he may require it.

Art. 56.

The engineers superintending, the "Inspecteurs de l'Exploitation Commerciale," may inspect the register mentioned in Articles 36 and 47, and also the registers of receipts and expenses.

Art. 57.

Wherever this decree empowers the Minister of Public Works to make regulations upon a proposition of the company, the company is bound to submit a proposition to the Minister within a period appointed, otherwise the Minister has the power of coming to a decision on the matter in question, without advising with the company.

Should the Minister consider that the company's proposition requires modifications, he should, except in urgent cases, advise with the company previous to finally introducing his own modifications.

Art. 58.

Copies of this regulation are to be placarded by the company in the immediate neighbourhood of all the company's booking-offices, and in their waiting- rooms.

The tables of rates charged for and the terms and the regulations in force relative to the carriage of goods are exhibited in stations and in goods offices.

Extracts of such regulations which relate to their several duties, are given to engine drivers, stokers, guards, breaksmen, pointsmen, superintendents, "gardes," and other servants of the company.

Any regulations which apply to passengers, and any directions which afford information relative to the means to be adopted for the recovery of missing articles, &c., should be exhibited in every passenger compartment.

Appendix No. 6.

Summary of the Performance and Cost of Locomotive Engines employed on the Baltimore and Ohio Railway, United States, in May and June 1859. Communicated by Henry Tyson, Master of Machinery, Baltimore and Ohio Railway.

May 1859.

First Division.

Number of passenger engines	7
Average No. of miles run by each engine	2219
Miles run to 1 cord of wood (lighting fires)	901·3
„ 1 quart of oil	34·9
Pounds of coal consumed per mile run	22·8
Cost of repairs per mile run	8·00c.*
„ fuel „	3·07c.
„ stores „	1·32c.
Total cost „	12·39c.
Number of tonnage engines (including switching engines)	57
Average No. of miles run by each engine	1679
Miles run to 1 cord of wood (lighting fires	616·2
„ 1 quart of oil	24·1
Pounds of coal consumed per mile run	58·04
Cost of repairs per mile run	9·36c.
„ fuel „	7·91c.
„ stores „	0·89c.
Total cost „	18·16c.

Washington Branch.

Number of passenger engines	3
Average No. of miles run by each engine	2906·6
Miles run to 1 cord of wood (lighting fires)	562·5
„ 1 quart of oil	37·3
Pounds of coal consumed per mile run	25·8
Cost of repairs per mile run	2·85c.
„ fuel „	4·66c.
„ stores „	0·71c.
Total cost „	8·22c.
Number of tonnage engines	3
Average No. of miles run by each engine	1746
Miles run to 1 cord of wood (lighting fires)	997·7
„ 1 quart of oil	25·4
Pounds of coal consumed per mile run	41·0
Cost of repairs per mile run	1·77c.
„ fuel „	5·64c.
„ stores „	0·90c.
Total cost „	8·31c.

Second Division.

Number of passenger engines	4
Average No. of miles run by each engine	2365·5
Miles run to 1 cord of wood (lighting fires)	420·5
„ 1 quart of oil	48·2
Pounds of coal consumed per mile run	22·1
Cost of repairs per mile run	4·7c.
„ fuel „	2·2c.
„ stores „	0·6c.
Total cost „	7·5c.
There are also upon this division three wood-burning passenger engines:	
Average No. of miles run by each engine	2181·3
Cost of repairs per mile run	8·5c.
„ fuel „	7·7c.
Number of tonnage engines	35
Average No. of miles run by each engine	1903·3
Miles run to 1 cord of wood (lighting fires)	1032·8
„ 1 quart of oil	36·3
Pounds of coal consumed per mile run	67·7
Cost of repairs per mile run	8·0c.
„ fuel „	5·2c.
„ stores „	0·7c.
Total cost „	13·9c.

Third Division.

Number of passenger engines (10-wheel engines, weighing 60,000 lbs.)	3
Average No. of miles run by each engine	2857·3
Miles run to 1 cord of wood (lighting fires)	535·7
„ 1 quart of oil	26·0
Pounds of coal and coke (about equal quantities of each) consumed per mile run	65·0
Cost of repairs per mile run	5·5c.
„ fuel „	6·4c.
„ stores „	1·0c.
Total cost „	12·9c.
Number of tonnage engines	37
Average No. of miles run by each engine	1181·7
Miles run to 1 cord of wood (lighting fires)	1290·7
„ 1 quart of oil	19·8
Pounds of coal consumed per mile run	90·3
Cost of repairs per mile run	11·5c.
„ fuel „	2·3c.
„ stores „	1·2c.
Total cost „	15·0c.

Fourth Division.

No. of passenger engines	6
Average No. of miles run by each engine	2747
Miles run to 1 cord of wood (lighting fires)	753·1

* c. means a cent, which is about equivalent to a halfpenny.

Miles run to 1 quart of oil	34·8
Pounds of coal consumed per mile run	21·5
Cost of repairs per mile run	4·34c.
„ fuel „	2·84c.
„ stores „	0·89c.
Total cost „	8·07c.
There are also upon this division two wood-burning passenger engines:	
Average No. of miles run by each engine	2908·5
Cost of repairs per mile run	7·2c.
„ fuel „	5·7c.
Number of tonnage engines	21
Average No. of miles run by each engine	1125·4
Miles run to 1 cord of wood (lighting fires)	471·2
„ 1 quart of oil	21·2
Pounds of coal consumed per mile run	63·2
Cost of repairs per mile run	11·7c.
„ fuel „	3·8c.
„ stores „	1·4c.
Total cost „	16·9c.

PARKERSBURG BRANCH.

Number of passenger engines	2
Average No. of miles run by each engine	2940
Miles run to 1 cord of wood (lighting fires)	1680
„ 1 quart of oil	27·9
Pounds of coal consumed per mile run	26·3
Cost of repairs per mile run	4·0c.
„ fuel „	2·7c.
„ stores „	0·9c.
Total cost „	7·6c.
Number of tonnage engines	15
Average No. of miles run by each engine	1675
Miles run to 1 cord of wood (lighting fires)	584·3
„ 1 quart of oil	20·3
Pounds of coal consumed per mile run	65·8
Cost of repairs per mile run	10·6c.
„ fuel „	3·5c.
„ stores „	1·1c.
Total cost „	15·2c.

NOTE.—Cost of repairs includes the cleaning of engines.

JUNE 1859.

PERFORMANCE of COAL-BURNING ENGINES.

Builders.	Number of Miles run.	Cords of Wood for lighting fires.	Tons of Coal.	Miles run to One Cord Wood.	Lbs. Coal per Mile run.	———
25—William Mason	3,040	5½	33·92	552	24·90	Rebuilt at the Company's shops at Mount Clare since January 1857.
26— Do.	2,980	5¼	34·59	567	26·00	
27—Taunton Locomotive Works	3,020	5½	37·50	549	27·80	
89—Baltimore and Ohio R. R. Co.	1,018	1¾	12·35	580	27·17	
95— Do. do.	2,850	2	28·84	1,425	22·66	
200—R. Norris and Son	2,840	2	23·85	1,420	18·81	
201— Do.	2,172	2⅝	26·32	827	27·10	
207—Murray and Hazelhurst	2,840	2	23·24	1,420	18·32	
208— Do.	2,968	7	32·00	424	24·10	
220—Denmead and Son	3,045	1¾	35·35	1,740	22·73	Built for burning coal.
221— Do.	3,150	1⅘	41·10	1,684	29·33	
188—Baltimore and Ohio R. R. Co.	3,110	1⅞	26·25	1,658	18·90	
231—William Mason	2,968	5	24·75	593	18·70	
232— Do.	1,040	0¾	9·69	1,386	20·80	
233— Do.	2,998	2	30·67	1,499	22·90	
234— Do.	2,968	2⅖	26·25	1,372	19·80	
235— Do.	2,968	4¾	28·00	624	21·10	
236— Do.	2,452	1⅜	20·16	1,783	18·40	

Average number of cars in each train, 6.