

### CENTENARY OF THE BELGIAN RAILWAYS

*Probably no country owes more to its railways, which were the first in the world to be planned as a system. There are now about 27 route miles to each 100 sq. miles of territory, the greatest density in the world*

AS a newly-established kingdom which emerged from the revolution of 1830, Belgium had a strong incentive to develop her transport systems, not only to meet internal needs without crossing frontiers, but also in such a way that her lines of communication should be of international importance. Some of the early considerations are briefly set out in an editorial article on page 768, but once the principle of State ownership had been adopted by the law of May 1, 1834, construction proceeded apace, at the expense of the Treasury, of a railway system based on Malines. It was designed to extend northwards to the port of Antwerp; southwards to Brussels and the French frontier near Valenciennes; westwards to Ghent, Bruges, and Ostend; and eastwards to Louvain, Liège, Verviers, and the Prussian frontier.

Work was begun on the Brussels-Malines section—the

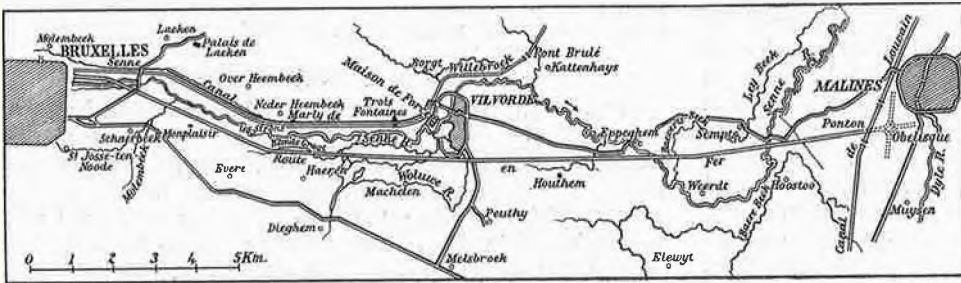
from the firm of Robert Stephenson & Co., which transferred the order for one to Tayleur & Co., and itself built the other two. All three engines were of the new standard six-wheeled type. *L'Elephant*, the largest built by Tayleur & Co., had four coupled wheels, and a small pair of leading wheels; while *La Fleche* and *Stephenson*, built at Newcastle, had single driving wheels.

These three locomotives were all in service on the opening day, and, in view of British participation in the work, it was fitting that the first train should have been in charge of an English driver, while George Stephenson travelled in one of the carriages. Both he and Robert Stephenson were honoured by King Leopold in recognition of their services in the development of railways and improvement of the locomotive. The following is a contemporary account of the opening ceremony:—

At a quarter past twelve o'clock the King being at the station, near the Boulevards, to witness the ceremony, the departure of the steam-carriage train was announced by a salute of artillery. Immediately three files of 10 carriages, each carrying nearly a thousand persons, began to move, drawn by *La Fleche*, *Stephenson*, and *L'Elephant*. The passage from Brussels to Malines occupied 53 minutes. On their return *L'Elephant* took in tow all the 30 carriages that had been drawn by the three locomotives, and would probably have reached Brussels in half an hour, had it not been obliged to stop at Vilvorde for a fresh supply of water. In the

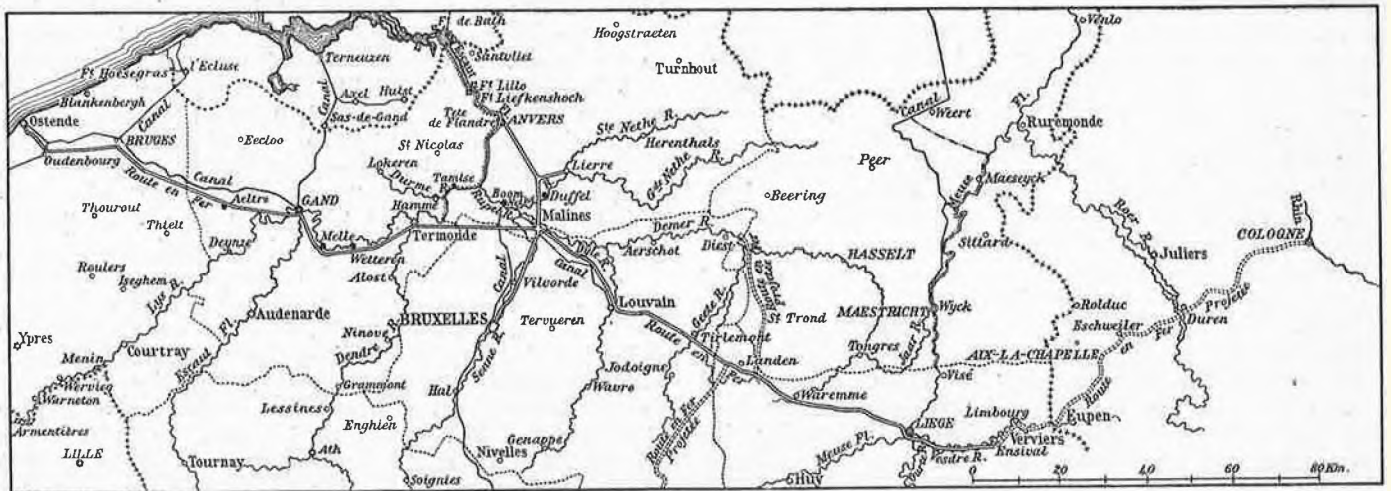
evening, the Minister of the Interior gave a public dinner to 200 of the principal persons, natives and foreigners, who were present at the ceremony.

At first, the carriages were first and second class only. In a week or two it was discovered that nobody used the first class carriages, and they were therefore taken off, the second class only remaining. For many weeks after the opening of the Brussels-Malines line, the points of departure were besieged by wondering crowds anxious to



Reproduction of an 1835 map (but with modern kilometre scale) of the Brussels-Malines Railway—the first Belgian line

first to be undertaken—on June 1, 1834, not quite a month after publication of the law, and on May 5, 1835, this section was formally opened for traffic. This line was not only the first railway in Belgium, but also the first on the European Continent to use steam traction. The first engineer was Albert Simons, but George Stephenson also played an important part in an advisory capacity. This early and important connection with the Belgian railways led to an order, in 1834, for three locomotives



An early Belgian map (but with modern kilometre scale) showing the railway system as originally planned to link Ostend and the Prussian frontier, with branches from Malines to Brussels and Antwerp

obtain seats in the trains. The supply of carriages, however, was meagre, and speculators made large profits by buying up tickets and re-selling them at a premium. As soon as the number of carriages was increased, this lucrative trade came to an end. Five trains a day were run between Brussels and Malines, and *vice versa*; but on Sundays the crowds were so great that the trains succeeded each other with only a few minutes' interval. The carriages on the early Belgian lines were even ruder than early ones in England, and they had to be mounted by means of ladders. This primitive method was, however, soon superseded. An opening, without door, was made in one side of the carriage, and the traveller in ascending rested his foot on a triangular iron step. As many accidents occurred by reason of the smallness of this step, it was speedily replaced by the wooden foot-board and doors were placed in the entrance apertures. These primitive open cars remained in use for something like ten years, and they were then replaced by covered carriages, but with the sides still open to wind and weather. At first, the cold was shut out by curtains, and later by movable sheet-iron shutters.

On May 4, 1836, the Brussels-Malines line was extended to Antwerp and then three classes of carriage were permanently adopted. The third class carriages were termed *wagons*, the second *chars-à-bancs*, and the first *diligences*. The original *chars-à-bancs* contained forty passengers, all of whom had to enter and leave by one door. Later on they were constructed to carry eighteen, and finally to carry ten as at present. The first-class *diligences* were a distinct improvement upon any carriages which, down to the date of their introduction, had been in use upon the Belgian lines. There was a corridor down the centre, and the seats were arranged in compartments, each containing eight places, four on a side. These carriages were necessarily somewhat stuffy, but they were, generally speaking, comfortable, and the traveller no longer had aught to fear from the weather. They long remained in general use. Up to 1868 they were commonly met with on the Belgian lines, but were subsequently withdrawn, although a few lasted until the early 'eighties.

#### Completion of Original System

The remaining parts of the original system were opened as follow: Malines to Ghent in 1837 and thence to Ostend in 1838; Malines to Louvain and Tirlemont in 1837, thence to Ans in 1838, to Liège in 1842, and through Verviers to the Prussian frontier in 1843; Brussels to Halle in 1840, to Mons in 1841, and to the French frontier at Quievrain in 1842.

M. Simons hardly saw the completion of the railway system which he planned, for he died on May 14, 1843, at the early age of 46. In conjunction with H. Maus he built the engines which, with the aid of cables, hauled the trains up the steep incline on the Malines side of Liège from 1842 to 1871, on a gradient of 0.028. He constructed the first railway bridge over the Meuse at Liège, the so-called Val-Benoit bridge, and directed the boring of the tunnels on the Liège-Aachen line.

Apart from the original railway system, two other lines were taken in hand by the Government about the same period. That from Ghent to Courtrai was completed in 1842, and the line from Braine-le-Compte to Manage and Namur in 1843. These brought the Belgian railway total up to 541 km. So far the State had reserved for itself the monopoly of building railways, but the popular idea arose that the new mode of transit was too costly to become general, or to allow of the transport of heavy goods, by reason of competition from the waterways. The low rates, rendered necessary as a matter of course, gave

such unsatisfactory financial results that, when the Government proposed fresh schemes of extension, the Chambers refused to sanction a further outlay. Thus an opportunity was given for private enterprise to carry on further construction.

In 1842 the State granted a private company the right to build a line, 50 km. in length, from Antwerp, Tête de Flandre (now Rive Gauche), to Ghent. Other concessions followed in 1845-1846, including chiefly the sections of Namur-Liège, Charleroi-French frontier, Antwerp-Dutch frontier, and Entre-Sambre and Meuse, and subsequently the West Flanders lines and those of the Province of Luxemburg.

In granting concessions to private companies the State followed one of two methods, either (a) the company constructed the lines which were then operated by the State, or (b) both construction and operation were carried out by the company. In the latter case the companies were naturally tempted to consider their own advantage, and by combining were able to compete actively with the earlier State lines.

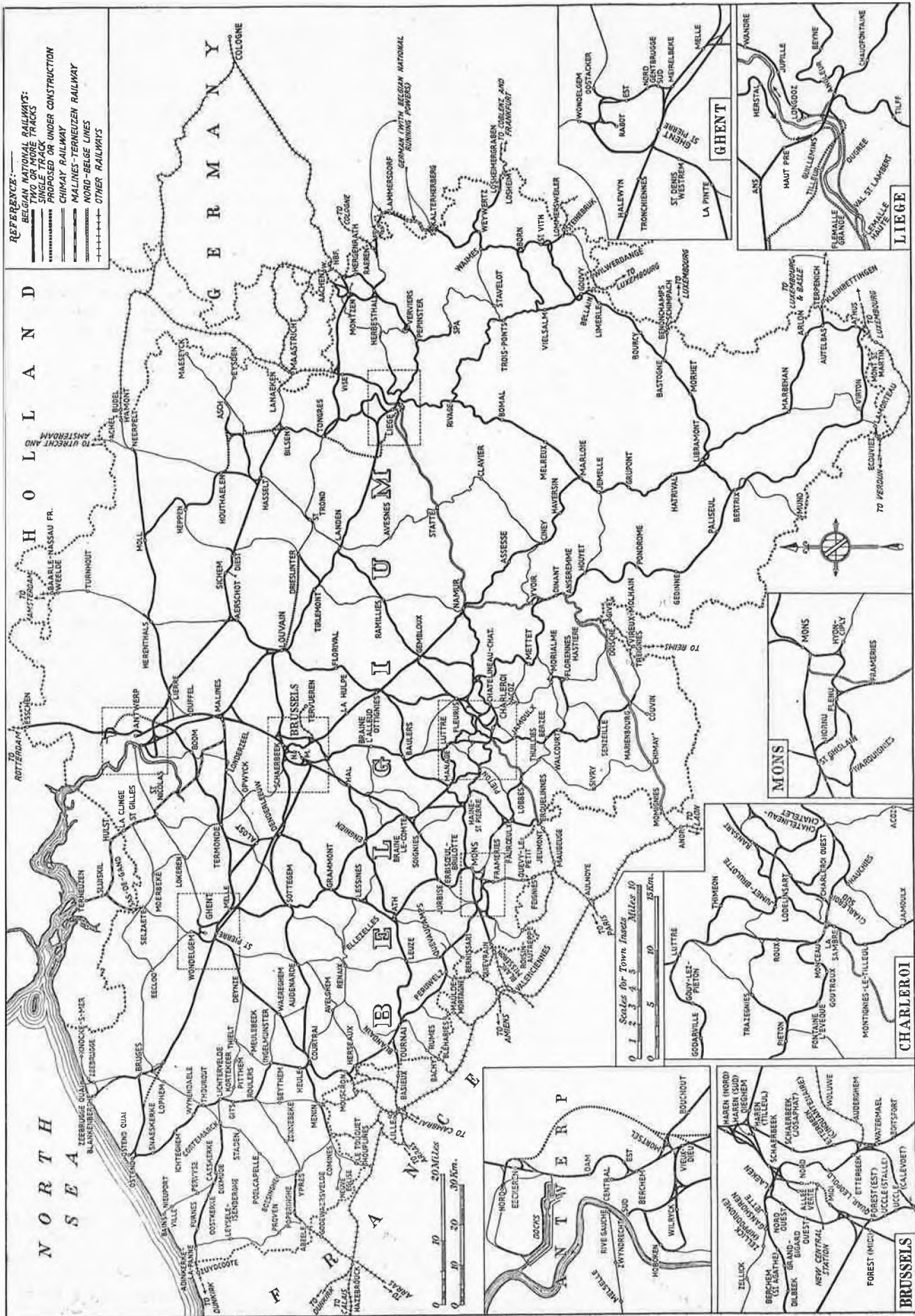
The Antwerp-Dutch frontier, Entre-Sambre and Meuse, Louvain-Charleroi, and Chatelineau-Morialme lines were amalgamated in 1864 as the Société du Grand Central Belge, the name of this company corresponding to the geographical position of its network; the Aix-Maestricht-Landen line was added to it in 1867.

#### Fears of Foreign Control

In addition to the foregoing considerations, the fear that the companies might come under the control of foreign financiers induced the Belgian Government to adopt the policy of acquiring the railways, which has been consistently followed since 1871. This policy permitted of a unification of tariffs and regulation of competition as now exists between the railways and waterways.

Perhaps the most important example of Belgian lines passing to foreign control was provided by the system now known as the Nord-Belge. On August 12, 1845, a concession was granted to the Société de Chemin de fer de Namur à Liège, an English-owned company incorporated in Belgium, to build a line through the Meuse Valley from Liège to Namur, a distance of 60 km., for a distance of 12 of which outside Liège there is a route on each bank of the river. This line was opened on September 5, 1851. The English company ceased to work the line in 1854 and made it over in the following year to the French C. de f. du Nord—which adopted the name Nord-Belge for this territory—against a fixed annual rental of one million francs, which is still being paid and justifies the continuance of the legal existence of the old company. In the original concession one of the articles stipulated that the period of its validity was to be "90 years from the time when the whole line shall have been brought into use," while another laid down that if within ten years of the granting of the concession France should build a railway to Givet, also on the Meuse, at the Belgian frontier, the company should be obliged to prolong its line another 50 km. from Namur to join up, and, in that case, "the date of the expiration of the concession for the whole line shall be that prescribed for the Liège-Namur section." A line was in fact built to Givet by the Est Company in 1858 and the Nord-Belge line, the financial position of which apparently was not very good at the time, built the extension, under some pressure from the Belgian Government, and completed it in 1863. A dispute as to the interpretation of this arrangement was settled in 1933 by the decision of the Belgian Courts that the concession should expire in 1941. (This was referred to in our issue of October 13, 1933.) In addition, the Nord-Belge has





Map of the Belgian railway system indicating lines worked by the Belgian National Railways Company and by private companies. The extensive secondary and local light railway network is not shown

lines from the French frontier to Mons and to Charleroi. It may be added that the original Namur-Liège company possesses a line between Mons and Manage which, on January 1, 1857, was to have been leased to the French Nord, but eventually passed to the Belgian Government, to which it is now leased until 1941 at an annual rental of 672,330 fr.

During the period between 1870 and 1900 no fewer than 18 of the concessioned railways were taken over by the State as follow:—

Bassins-Houillers .. .. .	January 1, 1871.
Pepinster to Spa .. .. .	September 16, 1872.
Luxembourg .. .. .	January 1, 1873.
Dendtre-et-Waes .. .. .	May 1, 1876.
Lignes des Flandres .. .. .	January 1, 1878.
St. Ghislain to Erbisœul .. .. .	September 16, 1879.
Antwerp to the frontier .. .. .	July 1, 1880.
Marbehan to Virton .. .. .	March 15, 1881.
Lierre to Turnhout .. .. .	March 1, 1882.
Antwerp to Ghent .. .. .	January 1, 1896.
Liégeois-Limbourgeois .. .. .	January 1, 1896.
Ghent to Eecloo .. .. .	January 1, 1897.
Grand Central Belge .. .. .	January 1, 1897.
Plateaux de Herve .. .. .	September 7, 1897.
Sichem to Montaigu .. .. .	July 1, 1898.
Liège-Limbourgeois to the Dutch frontier .. .. .	January 1, 1899.
Hesbaye-Condroz .. .. .	January 1, 1900.
Saint-Trond to Hasselt .. .. .	July 1, 1900.

TABLE SHOWING THE GRADUAL EXTENSION OF THE BELGIAN STATE RAILWAYS FROM 1835 TO 1900

Year	Mean length of line km.	Year	Mean length of line km.
1835 .. .. .	13.5	1868 .. .. .	862.7
1836 .. .. .	35.7	1869 .. .. .	862.7
1837 .. .. .	90.8	1870 .. .. .	868.7
1838 .. .. .	202.6	1871 .. .. .	1,422.2
1839 .. .. .	273.3	1872 .. .. .	1,469.6
1840 .. .. .	324.7	1873 .. .. .	1,871.1
1841 .. .. .	340.5	1874 .. .. .	1,925.1
1842 .. .. .	398.5	1875 .. .. .	1,966.5
1843 .. .. .	485.5	1876 .. .. .	2,053.2
1844 .. .. .	559.8	1877 .. .. .	2,144.7
1845 .. .. .	559.8	1878 .. .. .	2,435.3
1846 .. .. .	559.8	1879 .. .. .	2,552.0
1847 .. .. .	569.6	1880 .. .. .	2,724.0
1848 .. .. .	594.9	1881 .. .. .	2,869.5
1849 .. .. .	624.6	1882 .. .. .	3,004.0
1850 .. .. .	624.6	1883 .. .. .	3,074.1
1851 .. .. .	624.6	1884 .. .. .	3,129.0
1852 .. .. .	624.6	1885 .. .. .	3,173.1
1853 .. .. .	631.4	1886 .. .. .	3,199.9
1854 .. .. .	636.6	1887 .. .. .	3,216.6
1855 .. .. .	652.4	1888 .. .. .	3,226.8
1856 .. .. .	713.1	1889 .. .. .	3,235.4
1857 .. .. .	744.6	1890 .. .. .	3,248.6
1858 .. .. .	745.7	1891 .. .. .	3,269.4
1859 .. .. .	745.7	1892 .. .. .	3,275.8
1860 .. .. .	747.2	1893 .. .. .	3,278.7
1861 .. .. .	748.6	1894 .. .. .	3,288.6
1862 .. .. .	748.6	1895 .. .. .	3,298.8
1863 .. .. .	748.6	1896 .. .. .	3,502.1
1864 .. .. .	748.6	1897 .. .. .	3,991.6
1865 .. .. .	749.2	1898 .. .. .	4,003.9
1866 .. .. .	789.8	1899 .. .. .	4,039.9
1867 .. .. .	862.7	1900 .. .. .	4,050.1

The Belgian State Railways mileage remained practically unchanged from the beginning of the present century until the acquisition of the West Flanders Railway, one of the most important systems then remaining in private hands. This was formally purchased by the State on January 1, 1906, but it continued to be worked by the company for exactly two years longer. In January, 1908, therefore, the State-operated mileage was increased by the 178 km. of the West Flanders lines, which were as follow: Bruges-Courtrai (52 km.); Courtrai-Poperinghe (43 km.); Poperinghe-Hazebrouck (6 km. in Belgium and 15 km. in France); Ingelmunster-Deynze via Thielt (25 km.); Roulers-Ypres (22 km.); Roulers-Menin (15 km.).

When, on January 10, 1919, the Administration of the

Belgian State Railways resumed possession of its system after the war, it found itself faced with a great task of reconstruction. Nearly a third of the track had been destroyed in the course of military operations, or removed by the German forces. Some 350 important bridges and one tunnel had been demolished, 359 stations were inaccessible, and the principal sidings had been blown up. Most of the locomotives had been rendered useless, and the remainder had suffered the abnormal wear of four years of war. The Administration's task was all the more difficult because of the urgency of helping in the rapid re-establishment of the economic life of the country. The hasty work done by the Allied armies to rebuild the bridges in the devastated zone constituted, in spite of its temporary character, the starting-point of the task ahead. It was not until 1930 that the temporary tracks and bridges constructed by the British Railway operating Division and the Royal Engineers in the British Army's sector were replaced by permanent structures.

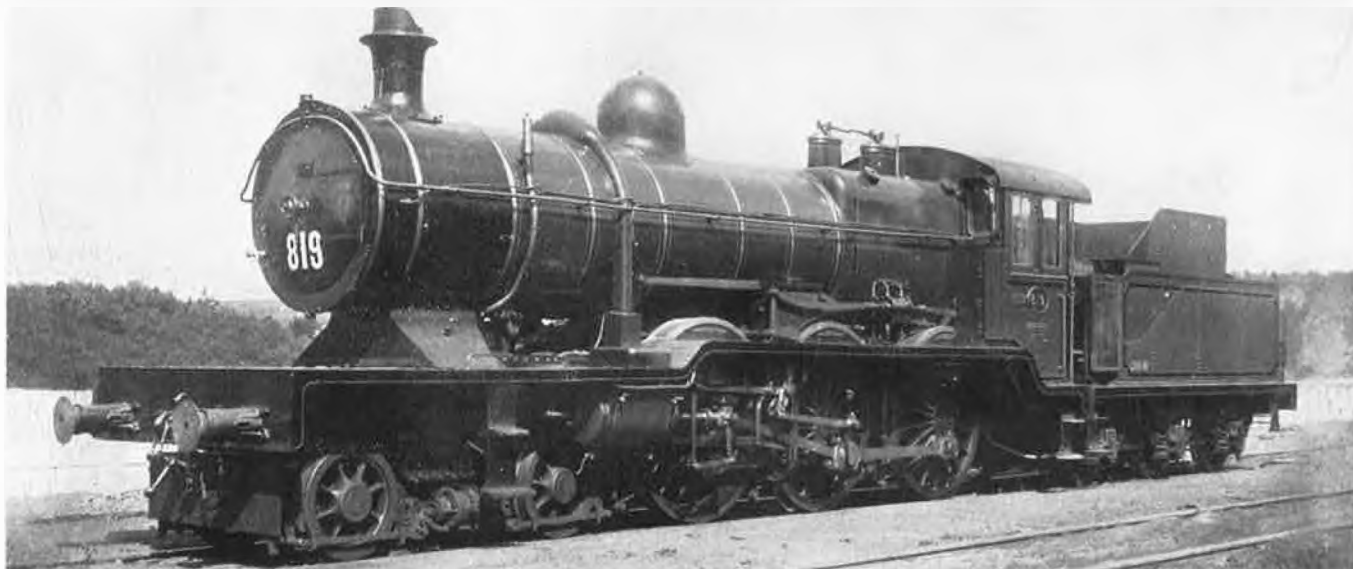
As from September 1, 1926, the Belgian State transferred the right to work its railway system to the Société Nationale des Chemins de Fer Belges (Belgian National Railways Company) for a period of seventy-five years. At the present time the whole railway system belongs to the Belgian State with the exception of the lines owned by the Nord Belge, the Malines-Terneuzen Railway Company, and the Chimay Railway Company. The length of standard gauge lines in Belgium totals 5,061 km., of which 4,841 km. belong to the State and 275 km. to private companies.

### Locomotives

Great Britain supplied the first locomotives in Belgium, those used to haul the inaugural trains from Brussels to Malines on May 5, 1835, to which reference has already been made. They were the product of Robert Stephenson & Company, and were immediately followed by two more built in England, *Le Rapide* and *L'Eclair*. In the same year the first engine of Belgian construction, *Le Belge*, left the Cockerill workshops. Since then in the field of locomotive engineering, Belgium has always been a pioneer.

The first bogie locomotives on the Continent of Europe were built at Liège about 1860 by the Saint-Léonard Company for service in Spain. The Belgian engineer Walschaert in 1844 invented the valve gear which bears his name and which is in wide use throughout the world. The name of Belpaire, a Manager of the Belgian State Railways, will always be associated with the development of the firebox. His studies of the use of fine coal, instead of coal or bricquettes, led to the general adoption of the former type of fuel. Belpaire also invented the well-known flat crown firebox, the use of which became universal on many of the great railway systems of the world. Another well known name in the locomotive world is that of Flamme of the Mechanical Engineer's Department of the Belgian State Railways, a pioneer in the use of the superheater and a protagonist of simple expansion in preference to compounding.

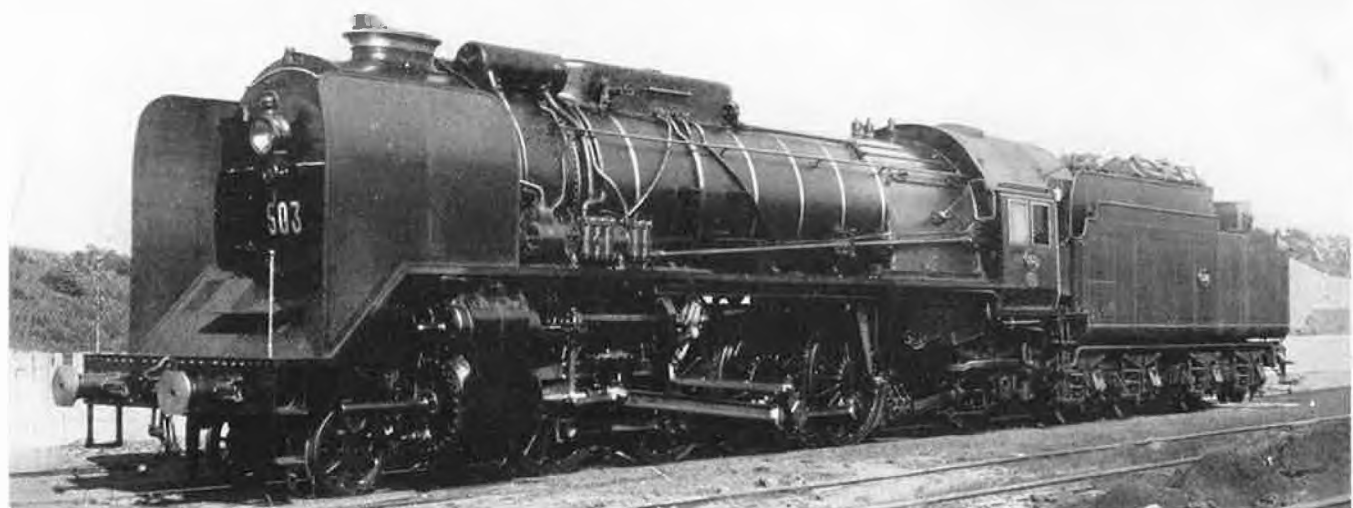
Belgian locomotives for long bore a strong characteristic external appearance towards which the large square chimneys on many of the older types contributed materially. Standard four-cylinder 4-6-0 locomotives have borne the brunt of the heaviest traffic since before the war, but more recently were supplemented by Flamme 'Pacifics', which, with their double chimneys and foreshortened taper boilers, present a striking appearance. The distinction of being the heaviest express locomotives in Europe belongs to the Belgian 2-8-2's specially built in 1930 for the Luxembourg line, which scale 128 tons exclusive of the tender. The latest Pacific type express locomotives of which we



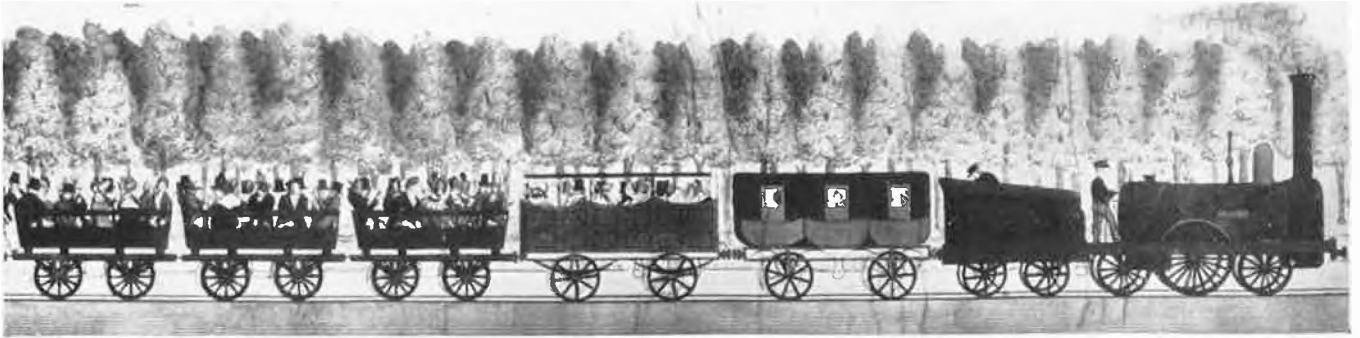
*4-6-0 four-cylinder compound passenger locomotive, Belgian National Railways*



*Consolidation (2-8-0) type goods engine for heavily graded lines*



*The heaviest passenger engine in Europe, 2-8-2 two-cylinder locomotive No. 503*



*One of the first trains on the Brussels-Malines line, which was inaugurated on May 5, 1835*

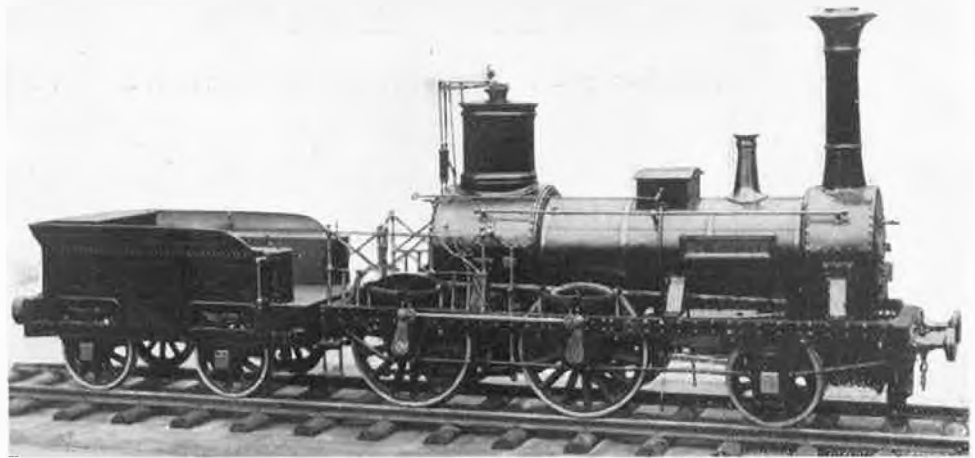
gave an illustration in our issue of April 5, and which bear a striking resemblance to Mr. Gresley's 2-8-2 express locomotive *Cock o' the North*, are again outstanding in appearance from the normal Continental locomotive. The Belgian National Railways possess a large variety of locomotive types, an inheritance of the war, when, to replace the locomotives destroyed, many modern engines of various types were handed over as reparations by Germany.

#### **Electric Traction**

Despite the country's dense network of railways, Belgian lines have relied on steam traction up to within a few days of their centenary, with but one exception. That is the suburban branch line from Brussels (Quartier Léopold) to Tervueren, a distance of about 9 route miles. In 1929 a private company saw possibilities in this line and obtained a concession for its electrification and working. Electric traction was inaugurated on December 1, 1931, and since that date an appreciable suburban traffic has been built up, in addition to holiday traffic.

The initial venture of the Belgian National Railways

Company itself in electric traction is that between Brussels and Antwerp which this week has been brought into public service. The work is one of the most important electrification projects on the Continent in recent times as, in addi-



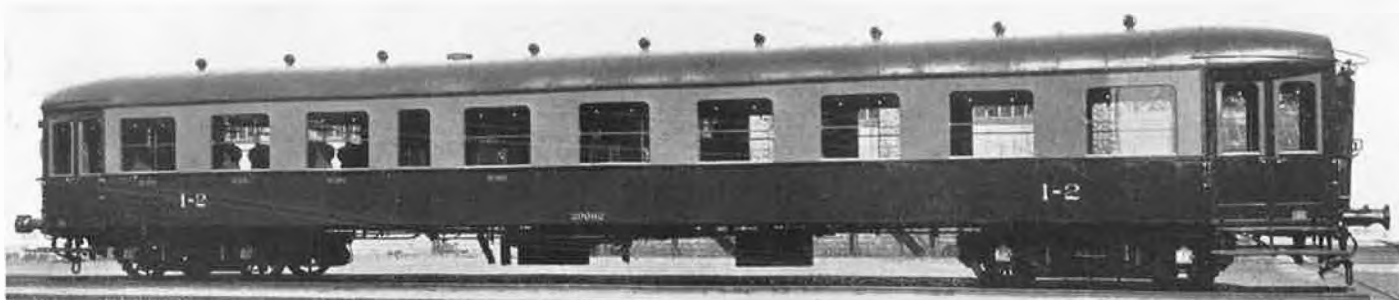
*Model of the locomotive "L'Elephant" of 1835*

tion to electrical equipment, the lines used are largely new construction closely paralleling the steam line between Brussels (Nord) and Antwerp (Central), a distance of 27½ miles. The electrification, which is at 3,000 volts



*Four-car 3,000-volt d.c. electric train as used on the newly electrified railway between Brussels and Antwerp on the Belgian National Railways system*





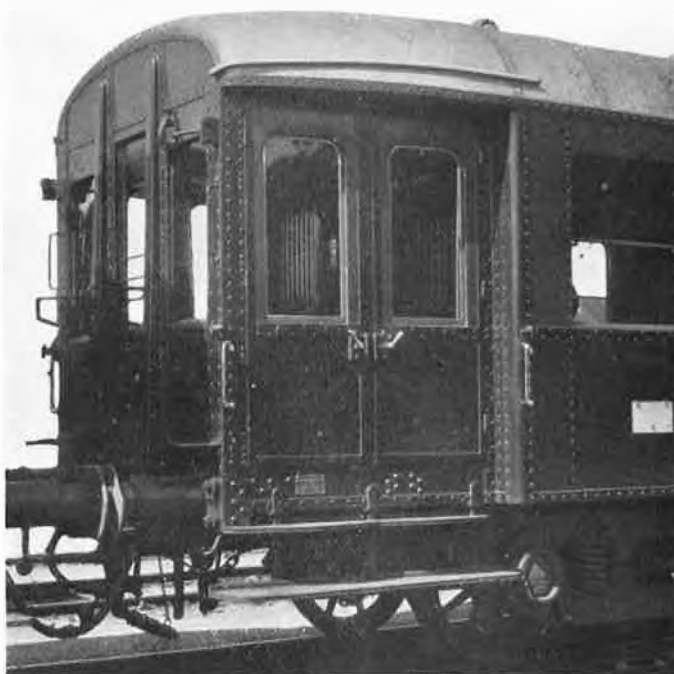
*New all-steel rolling stock is fast replacing the old wooden stock. One of the new first and second class composite coaches for internal express trains. Note the large double doors to the end vestibules*



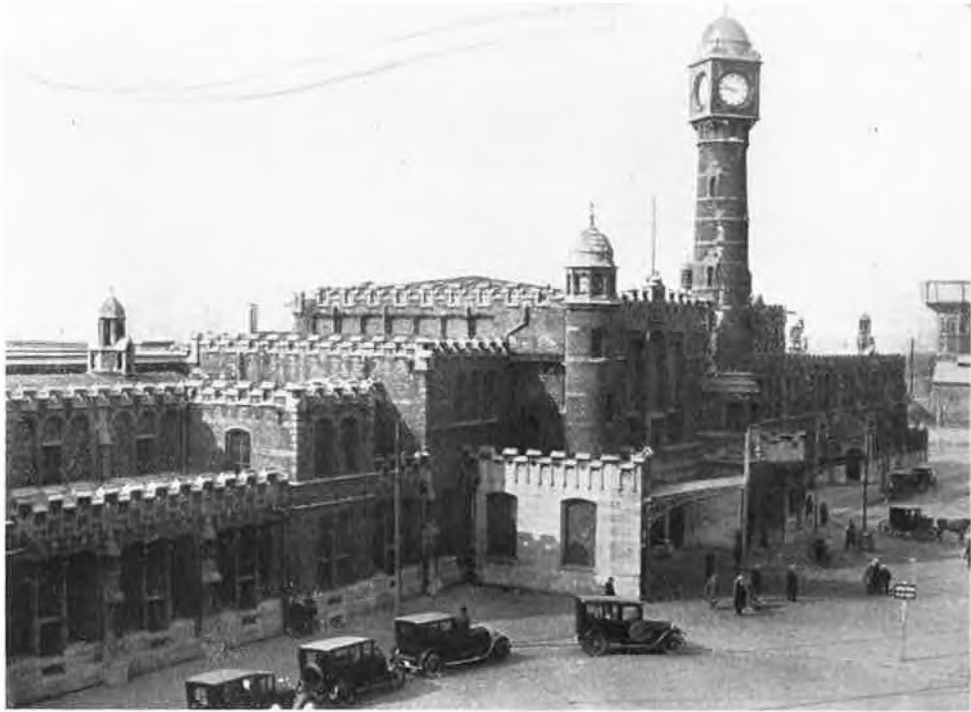
*First and second class all-steel composite coach of the side-corridor type as used for international services*



*The spacious luggage hall at Knocke-sur-Mer, a popular holiday resort*



*Reinforced end vestibule with double doors, on rolling stock for internal services*



*Belgian station architecture exhibits a surprising variety of style and inspiration. Above is Ghent St. Pierre, where a clever experiment in orientalism has produced a striking effect*



*The dignified mass of the harbour station at Ostend forms a fitting gateway to the country for visitors from abroad*





*The graceful exterior of Verviers Central is the product of a restrained design and the delicate handling of ornament*



*There is an ecclesiastical note in the dome and pinnacles of the Central station at Antwerp which echoes the magnificence of the cathedrals and churches of the city*



*Old Siemens and Halske power signals at Brussels Nord station. On the right of the picture is a train of all-steel coaches*

d.c., and new rolling stock were described and illustrated in our *Electric Railway Traction Supplement* of April 5 last.

### Signalling

The signalling on the Belgian lines has been of the most efficient type for many years, particularly on the main international routes. At first British practice was largely followed, the Saxby and Farmer apparatus being adopted, but in the course of time certain German methods found favour and were combined with English ideas to form a distinctive system possessing considerable merit. The double-wire system of working, with upper quadrant signals, but using the English bracket signal at junctions, was made standard for the main routes some years before the war and was supplemented by electric fog repeaters on the Brussels-Antwerp line in 1908, the first installation

of such a method of signalling, as far as we are aware. At the same time the power operation of distant signals was made general on that route. The yellow arm and light were adopted for those signals about the same time, and the use of lock-and-block on the Siemens and Halske system, worked on the normally blocked principle, was generally applied where the traffic was at all heavy. These arrangements made the Belgian lines rank among the best-signalled of any on the Continent and were carried out by the then Signal Superintendent, the late L. Weissenbruch, Secretary of the International Railway Congress Association, under whose direction also electric power signalling was installed at Antwerp Central in 1904 and subsequently at most of the principal stations, including Brussels Nord, where a large signal-box, very advanced for the time, was opened thirty years ago and has only just been superseded.

Probably the most interesting feature of Belgian



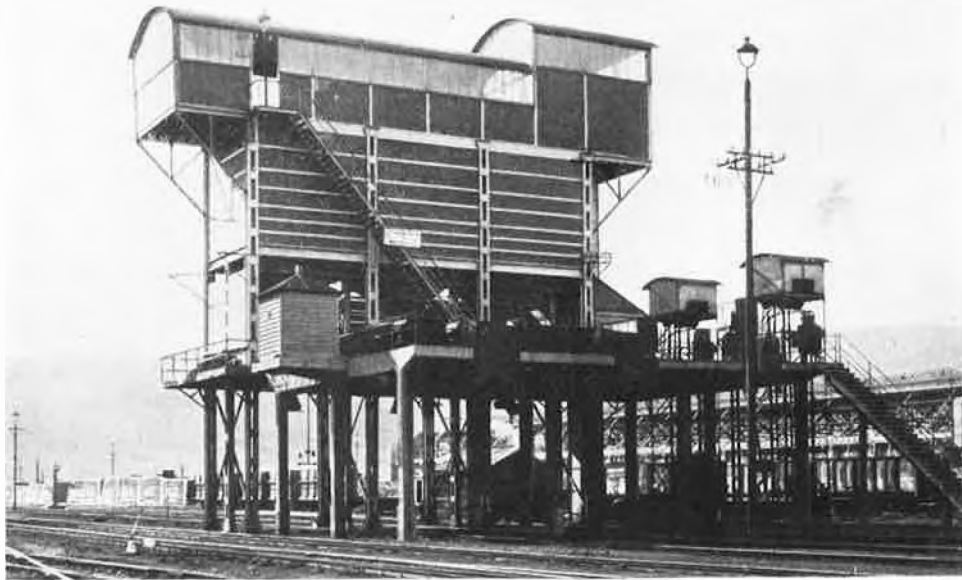
*New electric power signal box installed at the Nord station, Brussels, by the Ateliers de Constructions Electriques de Charleroi*



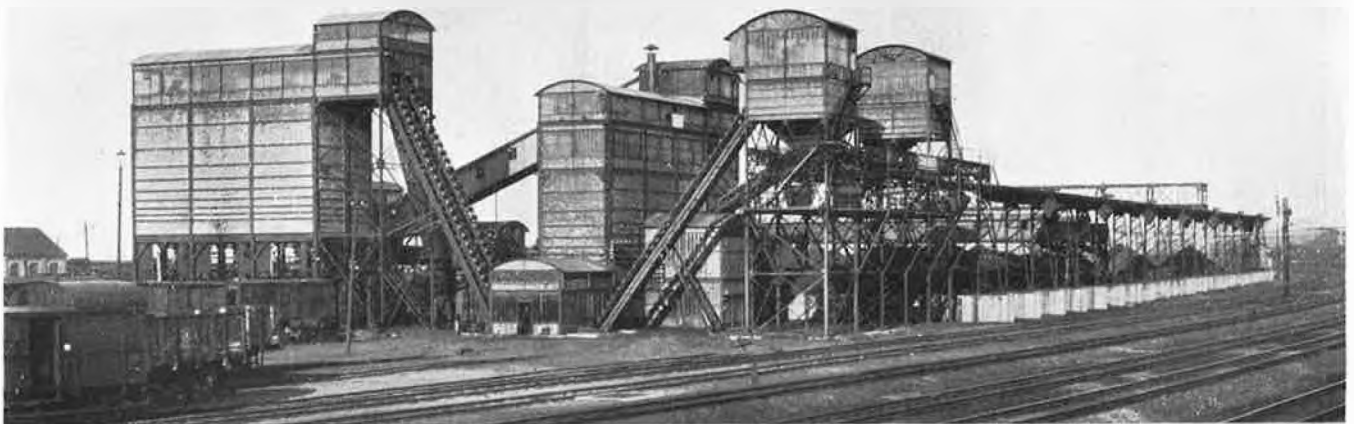
*Latest mechanically-operated three-position semaphores*



*Flower-beds and lawns form an unconventional but attractive foreground to the marshalling yard at Antwerp Nord. Note the loud speakers for transmitting orders to shunters*

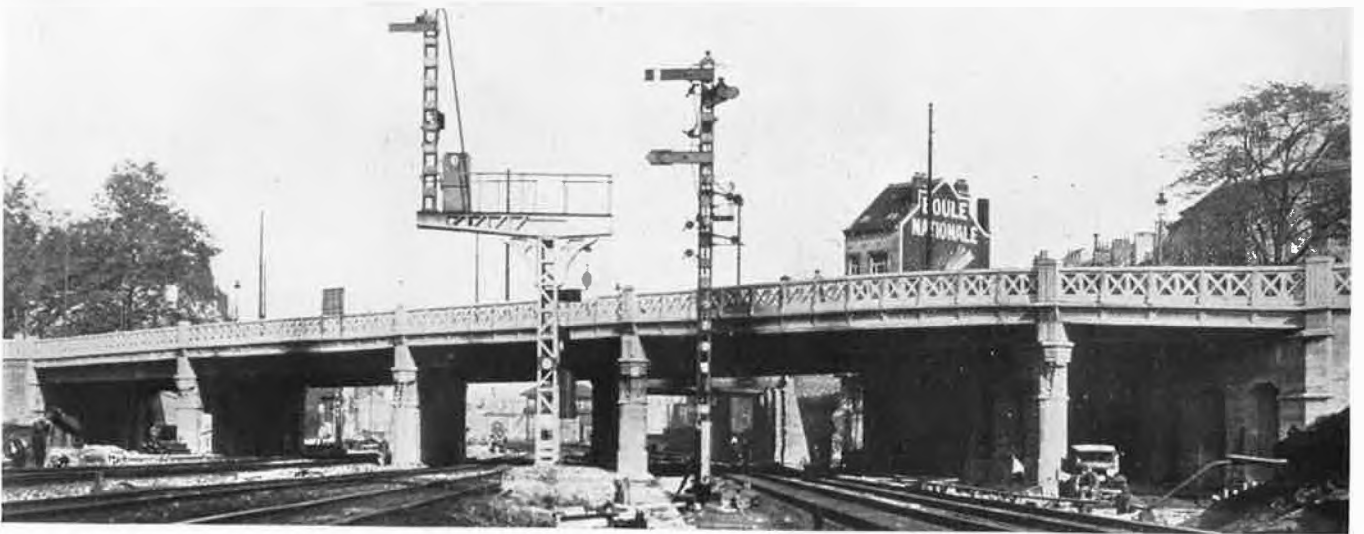


*View of a large locomotive cooling plant*



*Coal screening installation for locomotive fuel at Schaerbeek*





*A pleasant design of bridgework adds to the appearance of the Belgian railways. Above is the bridge carrying the Avenue de la Reine across the approach to Brussels Nord*



*Flying junction at Schaerbeek*



*A handsome single span across the Luxembourg line of the Belgian National Railways*



*Steel bridge carrying the electric over the steam lines to the north of Malines station, Belgian National Railways*

signalling is the adoption of the three-position signal since the war, not only on account of the code used, in which home and distant type arms are retained, each operating to three positions and enabling four indications to be given, but also because mechanical working has been used in conjunction with ingenious slotting apparatus. First used between Brussels and Antwerp in November, 1919, this system has been extended to cover the main express lines. It has resulted in a considerable simplification of the signal aspects, which has found great favour with the drivers, and it enabled the signalling to be re-established after the war with the minimum of expense. It also was due to the initiative of M. Weissenbruch.

Power signalling has been developed and extended, several of the old plants, including that at Brussels Nord,

rails weighed 17.5 kg. per m. (35 lb. per yd.), whereas the present standard rail is of 50 kg. per m., or 100 lb. per yd. in 18-metre lengths. Creosoted sleepers prevail, and, where they are of hardwood, soleplates are dispensed with, except in curves of less than 500 metres radius. The rails are laid with a cant of 1 in 20, and the joints, until quite recently, were staggered. An ample depth of broken stone ballast is laid on all the main lines, and the general standard of permanent way maintenance has of recent years been brought to a high level. On the principal main lines the maximum permissible speed is 120 km.p.h. (75 m.p.h.) In all recent construction the crossing of one line by another has been avoided by means of flying junctions. The use of reinforced concrete for overbridges has become prevalent.

having been replaced by new ones on the A.C.E.C. system. Train dispatching, with selective telephone apparatus, has been installed on the chief routes, and colour light signals between Namur and Charleroi, and between Brussels and Antwerp on the electric lines. It is therefore evident that the fullest attention to safety of working is being given by the management.

### Permanent Way

The fish-bellied type of rail first used in Belgium was followed by the double-headed rail, and, in 1860, the flat-bottomed, or Vignoles, type was adopted. The earliest



*In connection with alterations to the lines at Brussels Nord, Belgian National Railways, to accommodate the trains on the new electrified lines between there and Antwerp, electric signalling has been installed. Above is a view of the approach to Brussels Nord station, showing power-operated points*