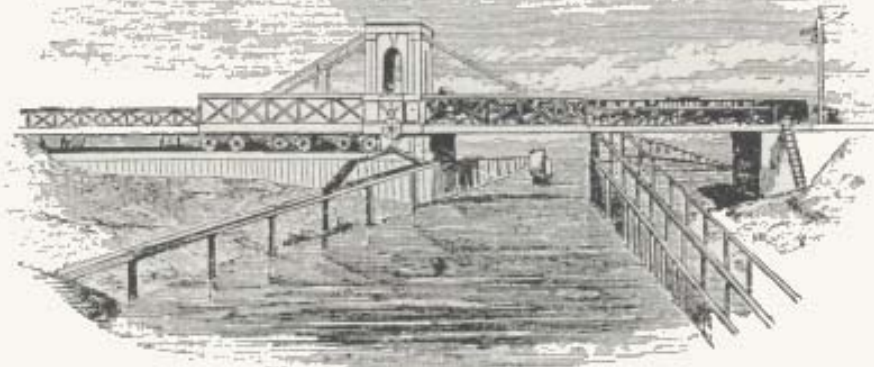


West Sussex Electrification, Southern Railway



The original timber bridge over the Arun near Ford. It had a clear span of 63 ft.

WITH the ceremonial opening to electric traction of the Mid-Sussex and Sussex Coast lines of the Southern Railway on June 30, and the inauguration of regular electric services on July 2, all the principal main lines of the ex-L.B.S.C.R. have been converted from steam haulage to 600-volt direct current with a third rail. The latest electrification comprises the Dorking North-Horsham-Arundel junction, Three-Bridges-Horsham, and West Worthing-Havant, lines, and the Bognor and Littlehampton branches, with a total route mileage of 75 and a track mileage of 165. It is known as the Portsmouth No. 2 scheme, as it provides between London and Portsmouth an electric route alternative to the Direct line electrified last year.

Current is supplied from the grid and is stepped down to 33,000 volts three-phase before entering the 20 substations where it is converted to low-voltage direct current by mercury arc rectifiers. A total of 77 miles of 33,000-volt cables has been laid alongside the line, and running alongside them are small pilot cables for selective protection purposes and for the remote control of the substations and track paralleling huts. This control is centred at Havant, and the control room there supervises the operation of all the Portsmouth No. 2 scheme substations and also seven of those on the Portsmouth Direct line.

Services are being worked by two-car non-vestibule corridor sets for local traffic, and four-, eight-, or twelve-car vestibuled sets on the main lines, the basic main-line unit being a four-car train. A total of 39 four-car sets has been built, and 13 of them include a buffet

car of new design. No fewer than 68 two-car units have been built or reconstructed from existing stock at Eastleigh and Lancing. The two-car sets have two 275 h.p. motors and the four-car sets four 225 h.p. motors.

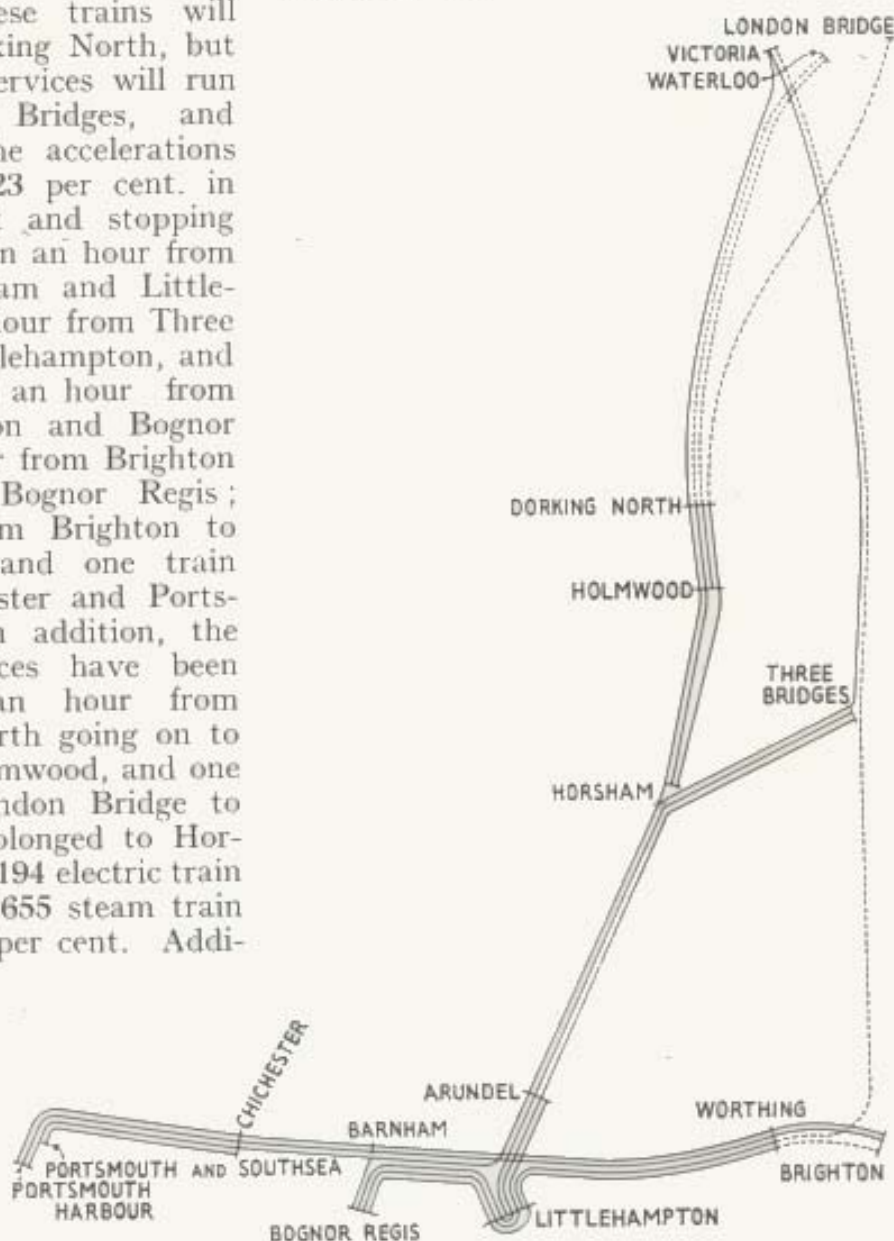
Among the principal engineering works connected with the conversion have been the lengthening of the platforms at Sutton, Dorking North, Horsham, Pulborough, Arundel, Littlehampton, Barnham, Bognor Regis, and Chichester, to 820 ft., so that they can take 12-car trains, and the lengthening of other station and halt platforms where necessary to at least 260 ft., in order to accommodate four-car trains. Complete station rebuilding is being undertaken at Horsham, Littlehampton, and Chichester, and a carriage shed has been built at Littlehampton. The old drawbridge over the River Arun at Ford, built in 1862 and strengthened in 1898, has been replaced by a fixed structure capable of taking the heaviest loads. A mechanical washing plant and a new carriage shed housing 80 vehicles have been erected at Streatham Hill, and two new bays added to the repair shops at Slades Green. Signalling work has consisted mainly of the installation of new signal boxes, with illuminated diagrams, controlling colour-light signals, at key-points, such as Dorking North, Horsham, and Havant, and the provision of intermediate sections with two-aspect colour-light signals.

Between London and Littlehampton an hourly service of fast trains is being provided by the extension of the present

London-Hove-Worthing trains leaving Victoria at 25 min. past the hour. The West Sussex and Portsmouth area is being served by expresses leaving Victoria every hour from 8.18 a.m. to 9.18 p.m., which divide at Barnham, one portion, including buffet car, going to Bognor Regis and the other to Portsmouth Harbour. Normally these trains will run via Sutton and Dorking North, but four down and six up services will run via Horsham, Three Bridges, and Croydon. In general, the accelerations mean a gain of 12 to 23 per cent. in journey time. Semi-fast and stopping services comprise one train an hour from Three Bridges to Horsham and Littlehampton; one train an hour from Three Bridges to Horsham, Littlehampton, and Bognor Regis; one train an hour from Arundel to Littlehampton and Bognor Regis; one train an hour from Brighton to Littlehampton and Bognor Regis; two trains an hour from Brighton to Portsmouth Harbour; and one train an hour between Chichester and Portsmouth & Southsea. In addition, the London suburban services have been extended, one train an hour from Waterloo to Dorking North going on to Horsham and one to Holmwood, and one train an hour from London Bridge to Dorking North being prolonged to Horsham. A total of 4,015,194 electric train miles has replaced 2,051,655 steam train miles, an increase of 95 per cent. Addi-

or operated from the beginning, by that railway. The oldest section, immediately to the west of Shoreham, was opened in 1846, but well before that time Vignoles had surveyed, on the instructions of Rennie, a line from Nine Elms through Dorking and Horsham to Shoreham and Brighton, and also a coastal line from

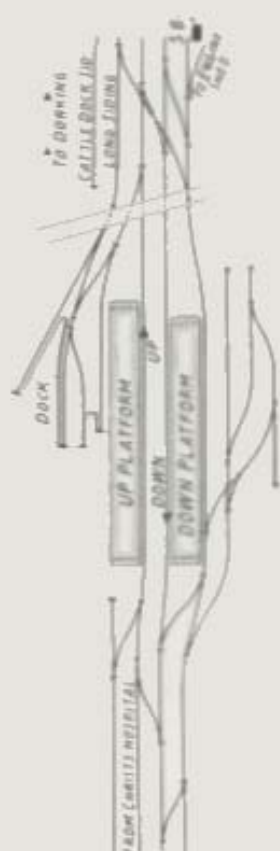
Diagrammatic representation of the train services provided over the newly-electrified Mid-Sussex and Sussex coast routes. The dotted lines represent existing services



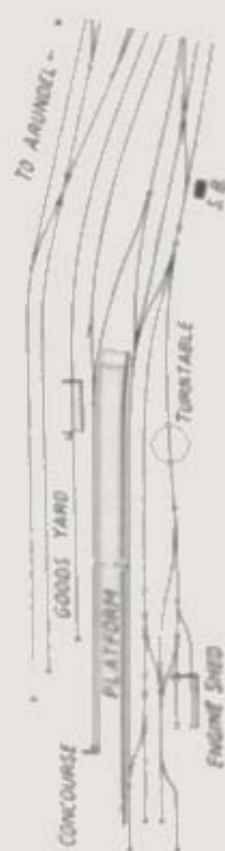
tional steam train miles aggregating 23,400 a year are being run on adjacent branch lines to balance engine workings and give more frequent services. Goods, parcels, and fruit trains are still being handled by steam locomotives on the electrified lines.

Until the 1923 grouping, Sussex was always the particular preserve of the London Brighton & South Coast Railway, and all the lines just electrified were built,

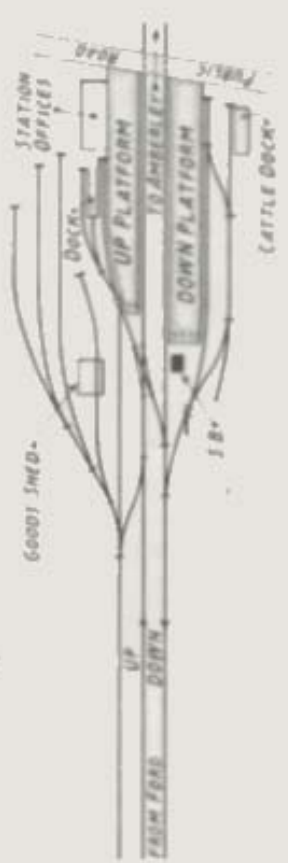
Shoreham to Portsmouth. Together with a proposed line from Kennington to Croydon and Brighton, these routes were intended to form the nucleus of the Surrey, Sussex, Hants, Wilts, & Somerset Railway, which, if it had got as far as its title suggested, might have meant a little less amalgamation in 1923. Robert Stephenson also surveyed in the 1830's a route from Wimbledon through Horsham to Shoreham.



Diagrams of tracks, Dorking North (left) and Horsham (right) stations



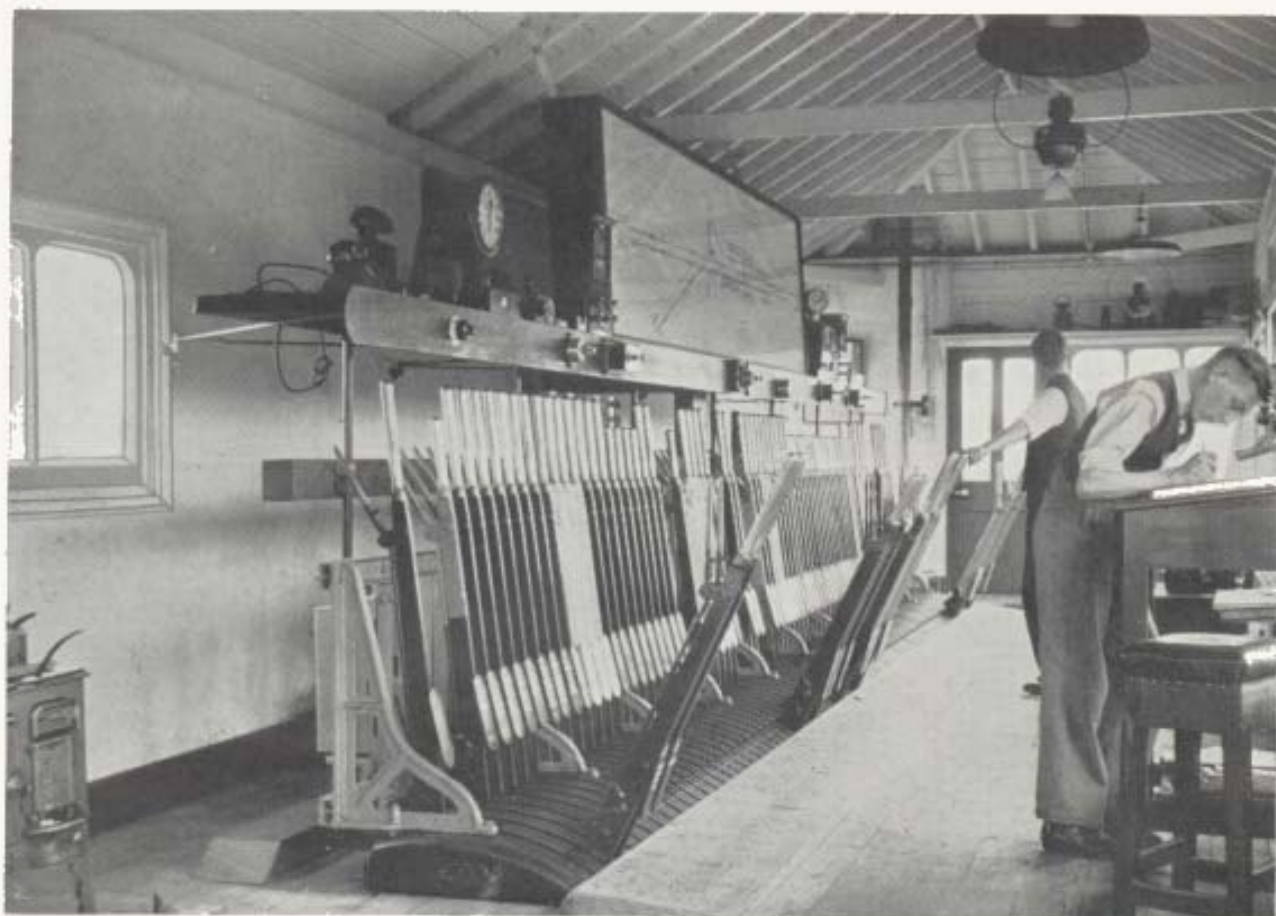
Diagrams of tracks, Arundel (left) and Littlehampton (right) stations



The upper diagram in every case shows the old layout and the lower diagram the present layout

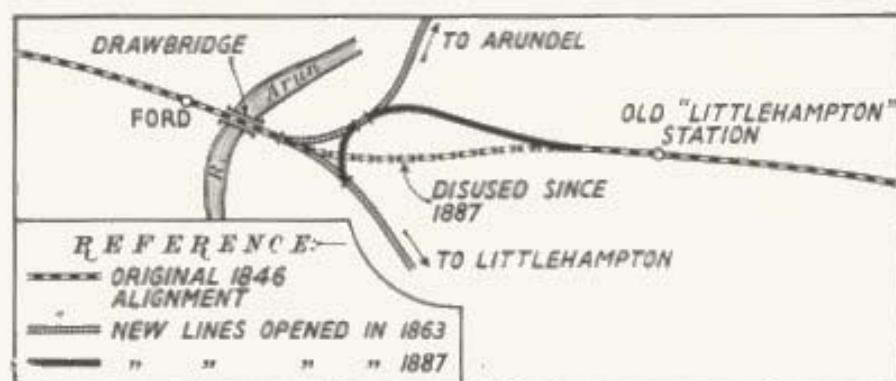


The new electro-mechanically equipped box at Arundel



Interior of Havant box, showing the new electro-mechanical locking frame. On the quadrant is a special bracket fitting carrying the electric lever locks situated immediately behind the levers

This equipment, in common with the remainder of the new electric signalling apparatus in the Portsmouth No. 2 scheme, is of Westinghouse manufacture



Layout of lines near Ford, showing opening dates

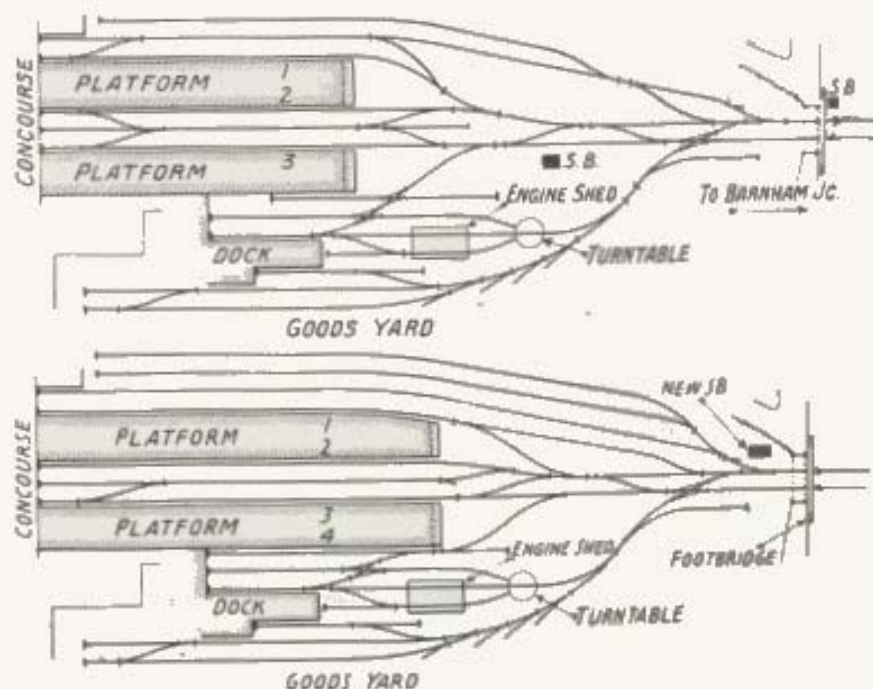
Westward along the coast from Shoreham, the railway actually built was projected by the Brighton & Chichester Railway, incorporated on July 4, 1844, and by the same Act empowered to sell its line to the London & Brighton Railway, which at that time comprised only the main line to Brighton and the branch to Shoreham. The sale was duly carried out in August, 1845, when the L. & B. gave a premium of £12 10s. a share on the 4,520 £50 shares, thus paying a premium of £56,500, or 25 per cent. Meanwhile, by its Act of August 3, 1845, the Brighton & Chichester Railway had received Parliamentary sanction to make an extension to Portsmouth which might be sold on completion to the L. & B. The B. & C. Company therefore retained its corporate existence as the proprietor of the extension works, as the sale could not legally be completed until the line was opened, but the existence was merely nominal, for the works were carried out, and the money for them paid, by the

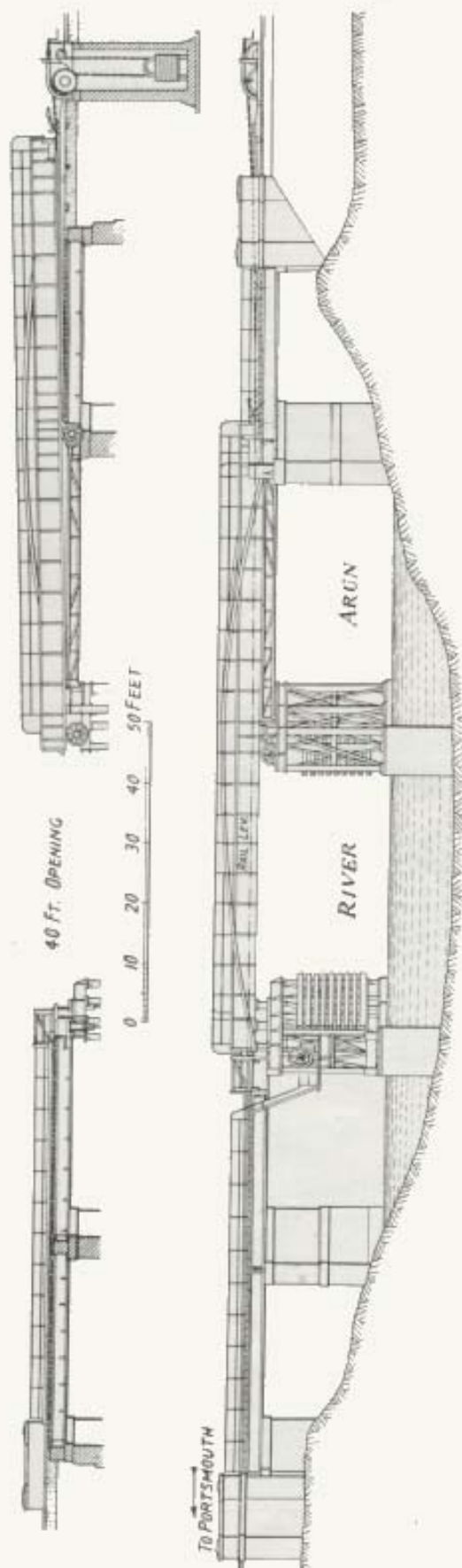
L. & B. The openings were: Shoreham—Worthing on November 24, 1845; Worthing—"Littlehampton" (station at Lyminster), March 18, 1846; and "Littlehampton"—Chichester (including Ford drawbridge), June 9, 1846. Although built as a double-track line, the Worthing—Lyminster section was worked as single track until 1847. The Lyminster—Chichester section was at first built as single track.

The extension from Chichester to Havant was opened on March 15, 1847, and from Havant to Portsmouth on June 14, 1847, but subsequently the section from Portcreek junction to Portsmouth became a joint line of the L.B.S.C.R. and the L.S.W.R. By Act of July 11, 1861, the Bognor Railway Company was incorporated; it opened the line from Barnham junction to Bognor on June 1, 1864, but was absorbed by the L.B.S.C.R. by an Act of July 29, 1864, and the actual taking over was effected in October of the same year. The Littlehampton

Diagram of tracks, Bognor Regis

Upper: Old layout
 Lower: Present layout





Drawing of the old roll and lift bridge at Ford as rebuilt in 1862 and now replaced by a fixed-span bridge

branch from Ford was opened on August 17, 1863, but it was not until January 1, 1887, that the loop from Arundel junction was opened, at the same time as a deviation of the coast line was carried out. As shown on the accompanying sketch map, the original route between "Littlehampton" (Lyminster) and Ford drawbridge was somewhat to the south of the present one. The station at Lyminster (some early accounts called it Leominster), which was subsequently named "Arundel & Littlehampton," was closed when the Littlehampton branch was opened in 1863.

Mention has already been made of the recent replacement of the old Ford drawbridge, but this was not the original structure. It was an Admiralty stipulation which led to the original bridge, built in 1846 to the designs of John Urpeth Rastrick, being made to open, so that ships could get up to Arundel. Little is known of this original structure other than what is conveyed by the woodcut reproduced, except that it was single track and consisted of two movable trusses, viz., the draw span 144 ft. long, weighing 70 tons, and the track-continuity platform; both were mounted on carrying wheels 6 ft. in diameter. It was built by John Eede Butt, of Littlehampton. In 1862 it was replaced by a drawbridge, under the direction of Mr. Jacomb Hood, then Chief Engineer of the "Brighton," and it is this structure, strengthened in 1898, which has lasted until the present reconstruction. It was built by Henry Grissell, of the Regent's Canal Ironworks, London. The method of opening and closing the span can be seen from one of the accompanying drawings. Of late years the bridge has seldom been opened to allow river traffic to pass, the last occasion being on April 5, 1936, and it has been considered unsafe for any of the heavier modern types of Southern steam locomotives, although the ex-L.B.S.C.R. Atlantics were allowed over it at slow speed. Parliamentary powers were therefore sought to rebuild it as a fixed bridge, and the conversion has just been completed under the provisions of Section 36 of the Southern Railway Act of June 10, 1937, the work being carried out coincident with electrification. During the past ten months the two piers in the river

Passenger Train Head Codes, Portsmouth No. 2 Electrification, Central Section

Service	Route	Route Indication	Service	Route	Route Indication
Victoria and Portsmouth Harbour	Mitcham Junction ..	20	London Bridge and Littlehampton (via Horsham)	Mitcham Junction ..	51
	Quarry & Horsham ..	26		Quarry & Horsham ..	53
	Redhill & Horsham ..	28		West Croydon ..	57
	Mitcham Junction & Littlehampton ..	70		Redhill & Horsham ..	59
Victoria and Portsmouth Harbour (via Littlehampton)	Quarry, Horsham & Littlehampton ..	76	Three Bridges and Horsham	—	2
	Redhill, Horsham & Littlehampton ..	78		—	5
	Mitcham Junction ..	40	Three Bridges or Horsham and Littlehampton	—	—
	Quarry & Horsham ..	46		—	—
Victoria and Bognor Regis	Redhill & Horsham ..	48	Three Bridges or Horsham and Bognor Regis	Direct	6
	Mitcham Junction & Littlehampton ..	90		Littlehampton ..	7
	Quarry, Horsham & Littlehampton ..	96	Arundel & Littlehampton	—	1
	Redhill, Horsham & Littlehampton ..	98		—	—
Victoria and Bognor Regis (via Littlehampton)	Quarry & Worthing ..	16	Arundel and Bognor Regis	Direct	4
	Redhill & Worthing ..	18		Littlehampton ..	3
Victoria and Littlehampton (via Worthing)	Mitcham Junction ..	50	Brighton and West Worthing	Direct	1
	Quarry & Horsham ..	56		Preston Park ..	32
	Redhill & Horsham ..	58	Brighton and Littlehampton	—	35
	Mitcham Junction ..	21		—	—
London Bridge and Portsmouth Harbour	Quarry & Horsham ..	23	Brighton and Bognor Regis	Direct	64
	Redhill & Horsham ..	25		Littlehampton ..	31
	Mitcham Junction & Littlehampton ..	71	Brighton and Portsmouth Harbour	Direct*	60
	Quarry, Horsham & Littlehampton ..	73		Direct†	62
London Bridge and Portsmouth Harbour (via Littlehampton)	Redhill, Horsham & Littlehampton ..	75	Bognor Regis and Barnham	—	1
	Mitcham Junction ..	41		—	12
	Quarry & Horsham ..	43	Bognor Regis and Portsmouth Hbr.	—	13
	Redhill & Horsham ..	45		—	—
London Bridge and Bognor Regis	West Croydon ..	47	Littlehampton, Barnham and Portsmouth (Low Level)	—	15
	Mitcham Junction & Littlehampton ..	91		—	—
	Quarry, Horsham & Littlehampton ..	93	Chichester and Portsmouth (Low Level)	—	1
	Redhill, Horsham & Littlehampton ..	95		—	—
London Bridge and Bognor Regis (via Littlehampton)	Quarry & Worthing ..	17	Waterloo and Horsham	—	—
	Redhill & Worthing ..	19		—	—
London Bridge and Littlehampton (via Worthing)	—	—	London Bridge and Horsham	Mitcham Junction ..	L
	—	—		Mitcham Junction ..	A

Empty trains between West Worthing, Lancing, Hove, and Lover's Walk, via Preston Park do not carry any route indicator.

All other empty electric trains carry the relevant route indicator with a bar over it

* Semi-fast passenger. † Slow passenger

have been strengthened with reinforced concrete piles, and new trestles have replaced the old. During the week-end of April 23-25 last, the superstructure of the old bridge was cut up into sections by burning, and removed; the new spans were placed in position by 36-ton breakdown cranes. Road services were run while the bridge was closed to traffic.

Of the remaining lines involved in the new electrification, it is enough to record briefly that the L.B.S.C.R. opened the Three Bridges-Horsham line on February 14, 1848, and the Dorking-Horsham section on May 1, 1867. The Mid-Sussex Railway was incorporated by Act of

August 10, 1857, to build a line from Horsham to Pulborough and Petworth, which was opened on October 15, 1859. It was purchased by the L.B.S.C.R. on May 31, 1860, and the Petworth line was extended to Midhurst. Finally, the Pulborough-Arundel junction line was opened on August 3, 1867.

It may be added that full technical details of the electrification are contained in a special fully-illustrated supplement to *The Railway Gazette* of June 24 last. This includes articles on traffic operation, signalling arrangements, civil engineering works, power supply and distribution, and new rolling stock.