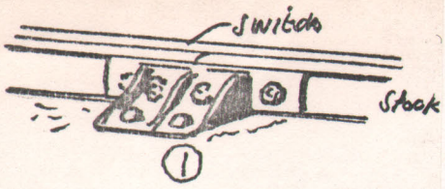
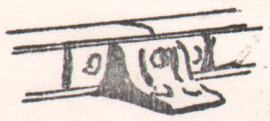
JOINT CHAIRS

Pre-fishplate and joint/plate assemblies.



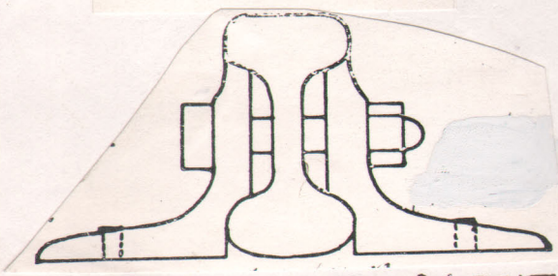
①



②

①&② G.W.R. Joint Chairs at Weymouth. 1905.

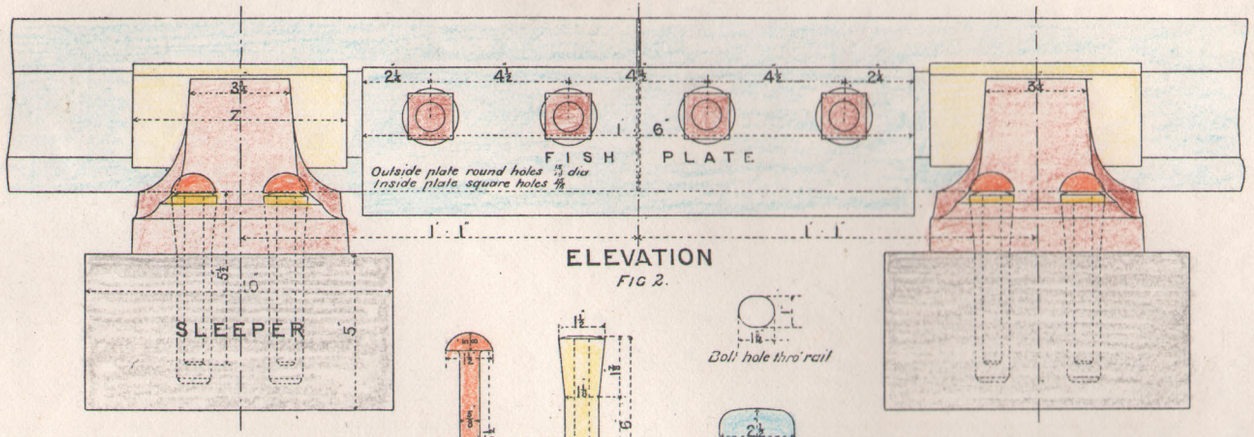
LSWR Joint Chair with fishplate (from photograph)
15" long: plate 22" (?)
'Brackets are bolted to rails by four wrought iron bolts' (1)



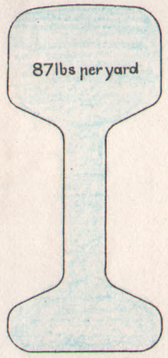
BRIDGES-ADAMS PATENT

LSWR VERSION

LONDON & SOUTH WESTERN RAILWAY



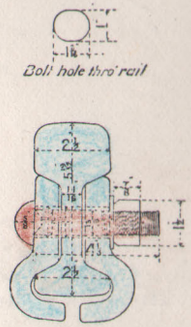
ELEVATION
FIG 2.



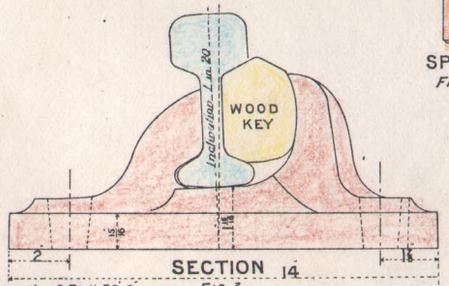
SECTION OF RAIL
FIG 1.

SPIKE
FIG 4.

TREENAIL
FIG 5.



SECTION OF RAIL & FISH PLATES
FIG 6.



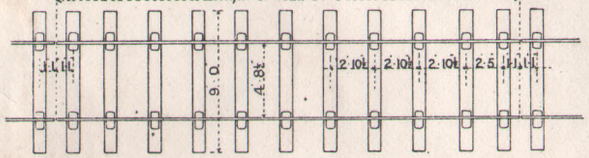
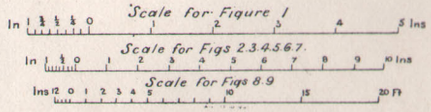
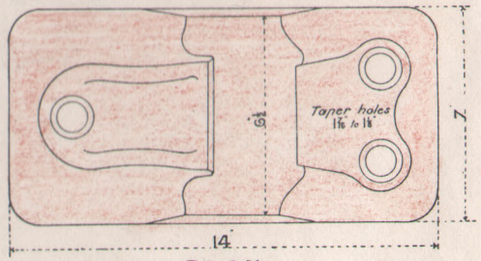


FIG 8





PLAN
FIG 7

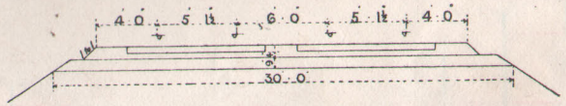


FIG 9

London and South Western.

Echelle 1/2.

Coussinet. Fig. 1 à 3.

Poids - 18 ± 140.

Fig. 1. Elévation

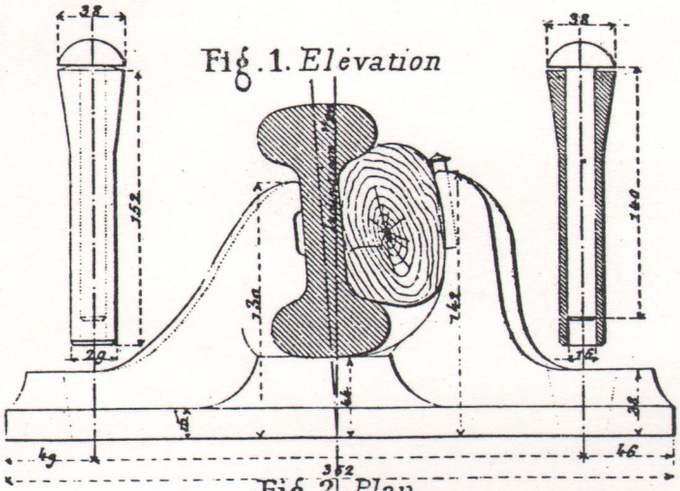


Fig. 3. Vue par bout.

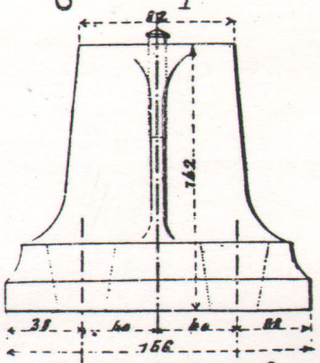


Fig. 2. Plan.

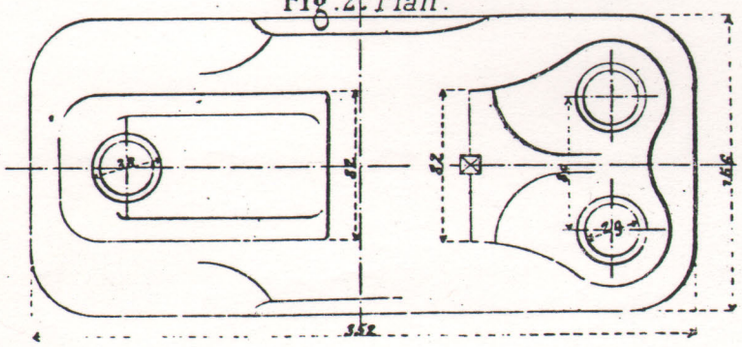


Fig. 4. Eclissage.

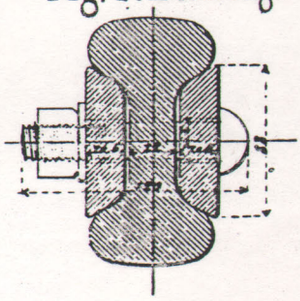


fig 1

Brentwood. It forces a scoop into the earth, which acts upwards, filling itself, and when full, is turned round by a crane, and its contents, about 1¼ cubic yard of earth, are then discharged into a wagon of the usual form. This machine, invented by Mr Otis of New York, appears to me not only very ingenious, but efficient, for I think that it would remove with ease almost any sort of soil that I have seen in railway cuttings, excepting rock or chalk.

The ECR was the first railway in the world to join rails by means of fishplates. On all the early railways the rails were held by 'joint chairs' where they butted end to end, both ends being supported by the chair and the sleeper beneath. The rails being of iron, their ends were inclined to bend somewhat readily, not downwards but sideways, and so the rails, or their ends if they were fish bellied, were accordingly made with as little depth as the axleloads permitted; it might have been thought that the idea of bolting the rail ends together with fishplates was an obvious one but any drilling through shallow rail ends would have weakened them to excess. However, in 1847 an inventor, William B. Adams,* patented the 'fish joint' and in 1849 James Samuel, the ECR's resident engineer from 1846 to 1850, fitted fishplates of his own design to a stretch of track between Shoreditch and Stratford. The rails were of iron and of 'double T' section, 5in deep and weighing 92 lb/yd. To prevent the ends from bending which, with a 5in depth, they were very liable to do, each outer fishplate had a foot that rested on a sleeper beneath the joint. The whole story of how the railway fishplate was developed is recorded in a paper read by Adams at the Institution of Civil Engineers; it can be found in Volume 11 of the Proceedings, and Volume 16 contains another paper on the same subject. It was many years, however, before all the railways adopted the 'fished joint'; the companies could not relay every track overnight. For a long time the BOT's Inspectors recommended rail joints secured by fishplates and in a Report by Capt G. Wynne on an accident that had occurred near Mossley, LNWR, on 10 April 1854, when a train ran off the track because a key had fallen out of a joint chair holding two adjacent rail ends, he said:

* Both claimed to have invented the fishplate.

Would the accident have occurred had the rails been fished as is very generally the case throughout the LNWR lines? Certainly not. There can be no doubt that the practice of fishing rails is a great element of safety and the principle cannot be too much encouraged

Keys.

Rails are held in chairs by keys. Oak or teak keys are still largely used, but steel keys are generally more satisfactory as they are less affected by climatic conditions, though they do tend to fall out during very cold weather. Wooden keys are liable to shrink during hot and dry weather, and thus their hold on the rails is weakened, and the tendency of rails to creep is not checked.

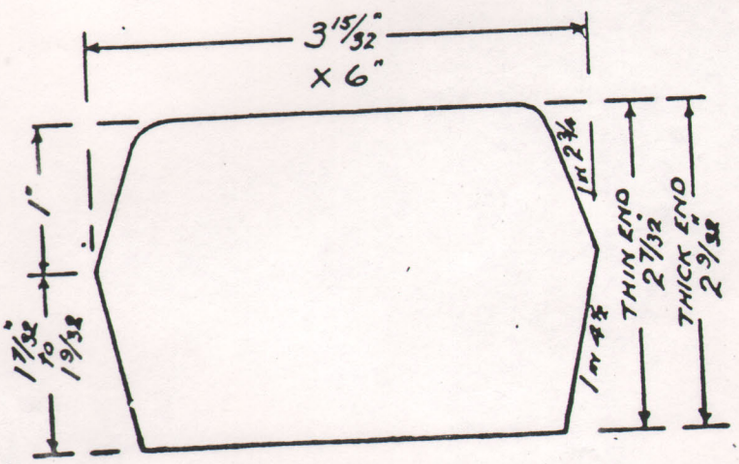


FIG. 17. OAK KEY.

Steel keys remain tight for long periods, and give very good results in checking rail creep. There are two main types of steel keys in use, one type is fitted with a wedge, which when

FIG. 18.

Permanent Way Institution - Southampton (then Bishopstoke) Section.

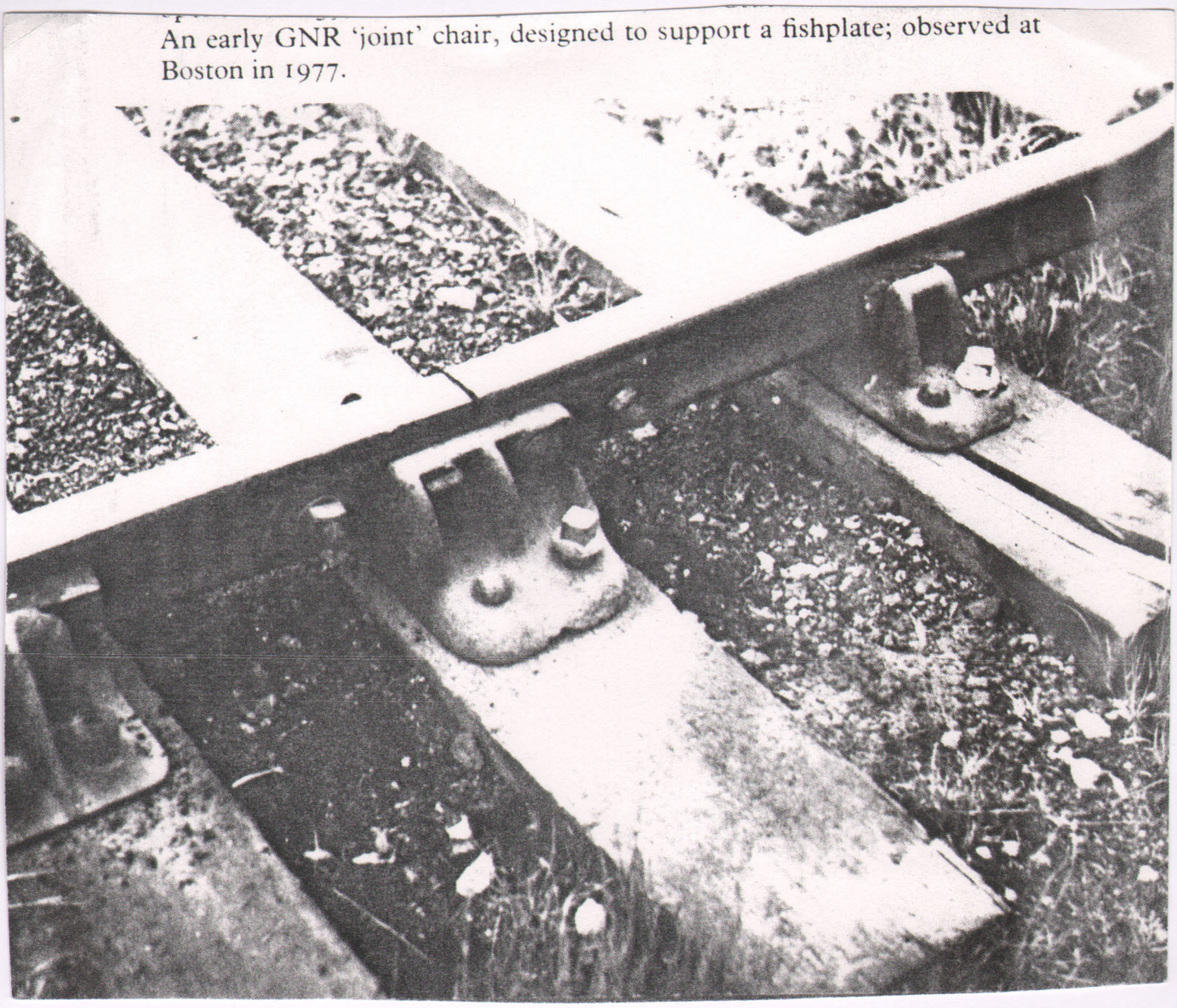
Part of Minutes of Meeting held at Railway Institute, Eastleigh, 19/11/09

Mr Treacher followed with notes on slips - principally in cuttings - which had occured on his length, and various methods of dealing with them. Mr Baines referred to the slips which he had had to deal with at Spittlegate, Grantham; Denham; and at Sway Bank and a cutting near Brockenhurst.

He also gave some particulars with regard to the piling used on the Swanage Branch.

With reference to the burning of clay several members gave their experiences. Mr Treacher referred to a 6 ft layer of clay on top of chalk which had been burnt successfully into good hard clinker and had given no further trouble. Mr Rowland estimated that it would cost 3/6 per cubic yard to burn clay and it was generally cheaper to put in substantial chalk buttresses. On embankments it was better to let the bank slip and keep lifting the road on ashes and such light material.

The members were all agreed that chalk drains, when not exposed to weather did not get clogged up or solidified.



An early GNR 'joint' chair, designed to support a fishplate; observed at Boston in 1977.

Date	Section	lb/yd	Length	Sleepers per length	(-) Holes Chairs	Joint Chairs	(Pairs) Fishplates	Spacing
1842	DH(W)	63/73 (c)	15'	6	5/8" bolts	15	—	3'
1857	DH(W)	70 (80?)	21'	7	20(2)	26*(2)	(d)	*Some Adams (Mod) 53lb.
1859	DH(W)	80	16'	5	23(2)	32(2)	(d)	3'6" & 4'6"
1860	DH(W)	75	21'	Some 4½ rows 7	23 20(2)	32 26*(2)	(d)	3' or 3'2" (Branches = 3'6")
1864	DH(W)	80	21'	7	26(2)	28(2)	—	
1870	DH(W)	75	24'	8	40(3)	—	23lb. 28lb.	1'6" & 2'8"
1880	DH {W (b) S}	82	24'†	9 (10) Curves	40(3)	—	23lb. 28lb	1'1" & 2'8½" (2)
1890	BH(S)	87 & —	30' 27'(a)	11 (12) (Curves)	40(3) 46(3)		18" 1" (2 hole)	1'1" + 2'5" + 2'10½
1903	BH(S)	87 (BS)	45'	18	46(3)		28lb (Short) 40lb (Flanged)	1-1 + 2-4½ 2-6½
1903	BH(S)	90 (BSφ)	30'	12	45(3) 48(3)		35lb 22" 20"	
1916								
1919	BH(S)	95	45'	18	46(3)		18"	

DH Double-Headed or Parallel
BH Bull Head
W Wrought Iron
S Steel (Bessemer Acid 'BA')

Trenails and spikes were used separately early on.

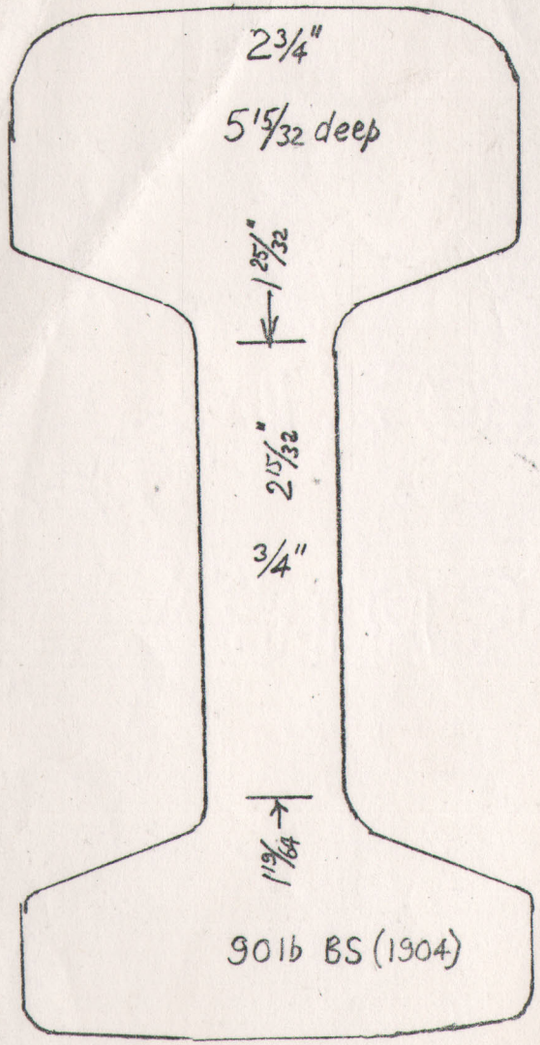
Sleepers
1840 9" dia (half round #) × 8'
{1846 {10" " (") × 9'
1857 {10" × 5" × 9'}
#½ round still used in 1870s.

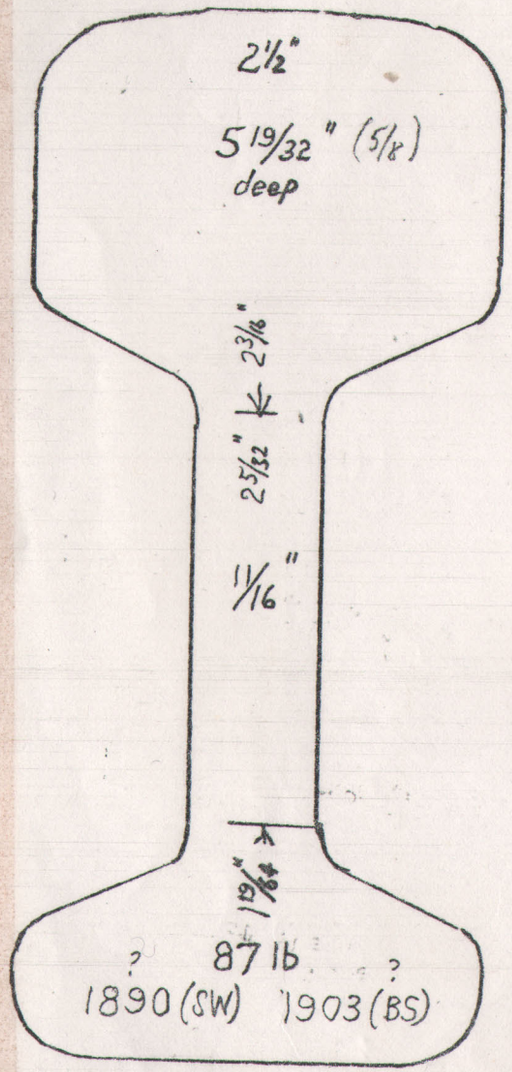
Spikes 6" × ¾" (or 5/8")
Keys 6" long. (Oak)

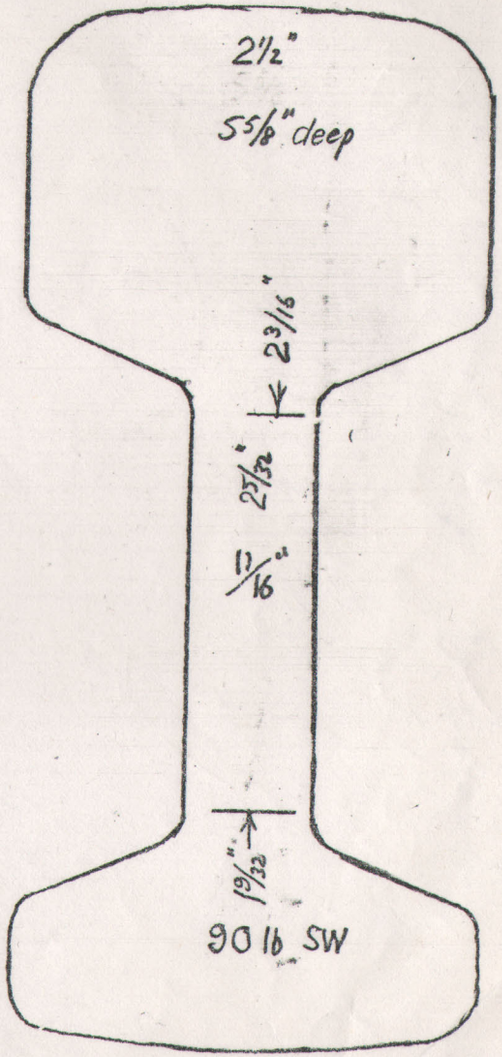
6" × 3/8" (1890s)

(a) Holsworthy Branch
† Some 30's in 1880s
φ Engineering Standards Committee (1904)
(b) Steel from 1882
(c) Possibly 50lb as well
(d) Some Fished Joints used c. 1857 (4 bolt 15") "Brackets"

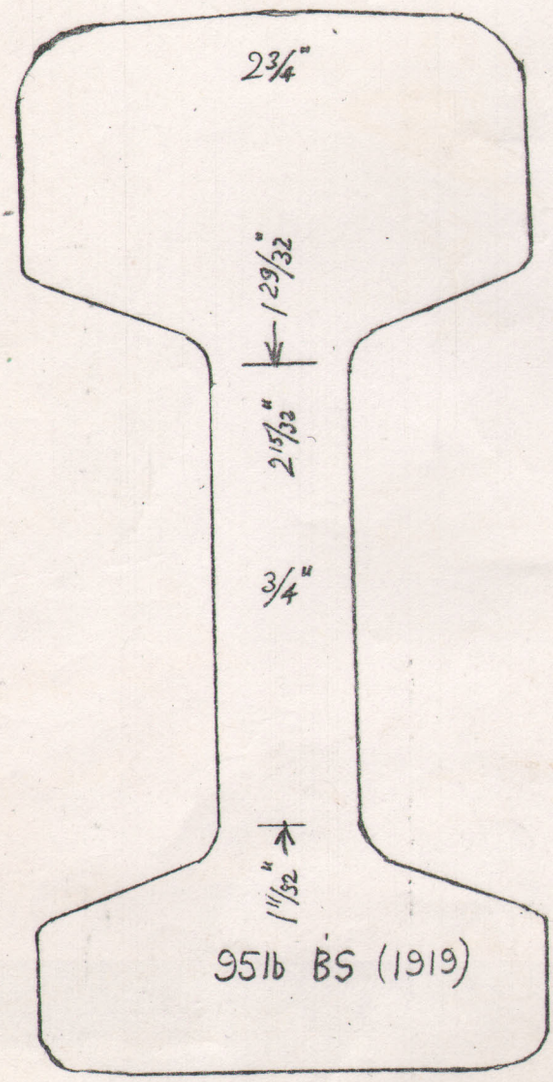
220







LONDON & SOUTH WESTERN RAILWAY
Bull-Head Rail (BS = British Standard)


2 3/4"
1 29/32"
2 15/32"
3/4"
1 11/32"
95lb BS (1919)