

of freight who objected to the large cars, and asked them to tell the administration what they wanted. These had held conferences and had declared in favor of 25 and 30-ton cars (55,000 and 66,000 lbs.), on condition that rates be reduced for shipments in such cars. Negotiations were still pending. The administration had ordered 200 cars of 44,000 lbs. capacity, in which the proportion of dead weight to load is as favorable as in the American 50-ton cars. The 10-ton (22,000 lbs.) cars now in use (chiefly old) have 42 per cent. dead weight; the 15-ton cars (the present German standard), 36 per cent.; the new 20-ton cars, 25 per cent.

Low Pressure Power Interlocking at Salisbury, England.

The British Pneumatic Railway Signal Company, organized in 1900, using the patents of the Pneumatic Signal

and controlled by electric slot from the other are indicated by a special symbol, as at signal 43, west cabin. The compressed air for working the whole of the switches and signals is obtained from one power house situated near the east cabin. All the levers operating the running signals are replaced electro-pneumatically by apparatus controlled by track circuits with which all the running lines of the station are provided. For example, a train on the up through line will get the distant No. 3, home signal 6 (west box), signals 2 and 5 (east box); on passing 6 the lever in the cabin will be replaced electro-pneumatically since the train has broken the circuit, by entering the section past the signal. As long as the train is in the section between signal 6 and switch 14 the lever of signal 6 will be held by the air pressure; and the signalman in the east box cannot pull No. 2 signal again until the

No. 61, which when pulled over is locked in that position as long as there is a train on the main line between signal 62-63 and the switch. This is done by means of the track circuit. If the lever of switch No. 39 is reversed, 24 is not held by 61, so that movements can be made through 24 and 26. No. 61 will release signals 27, 48, 52, 56, 62 and 63, but will be left free of all retaining points. At the west cabin there is a similar retaining lock lever (No. 5) for the up local and through lines. It holds switch No. 32 and when pulled over is locked in the same manner as in the case of No. 61. (For straight through movements on the down through line, signal 63 is cleared.)

The dwarf signals used at Salisbury are of the semaphore type, though they are shown on the drawing as round disks. The dwarf semaphore arms are made of rubber, more convenient and safe where the space between

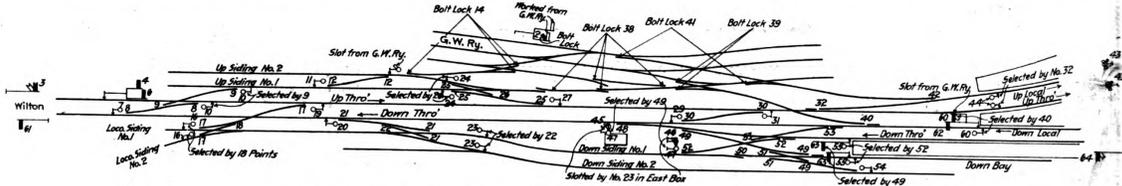


Fig. 1.—Interlocking at Salisbury—London & South Western Railway—West Cabin.

Company, has installed electro-pneumatic automatic signals on the London & South Western from Grately to Andover Junction, as heretofore told of in the *Railroad Gazette* together with interlocking at Grately, and the road has decided to work all block signals and interlocking plants between Woking and Basingstok Junction, 23 miles, by the low pressure pneumatic system. Two large inter-

locking plants at Salisbury were completed and put into operation in November last, and the lay-out of tracks at this place is shown in the accompanying drawings. At each end of the station there is a cabin; the cabins are known as the east and west boxes. These two cabins and the ground frame, which is shown at the extreme right

tracks is narrow. All the signals, both on the ground and on the high posts are lit by electricity, and the lamps themselves, fitted to a hard rubber base, connected with flexible wire to the main, are contained in a cast-iron lamp case so that in case of need these can be lifted out by a handle, which is provided, and an ordinary oil lamp be substituted. The current for the lights and also for running the motor driven compressor is supplied by the City Electric Light Company. Fig. 3 shows two of the electro pneumatic automatic block signals put by the British Pneumatic on the London & South Western.

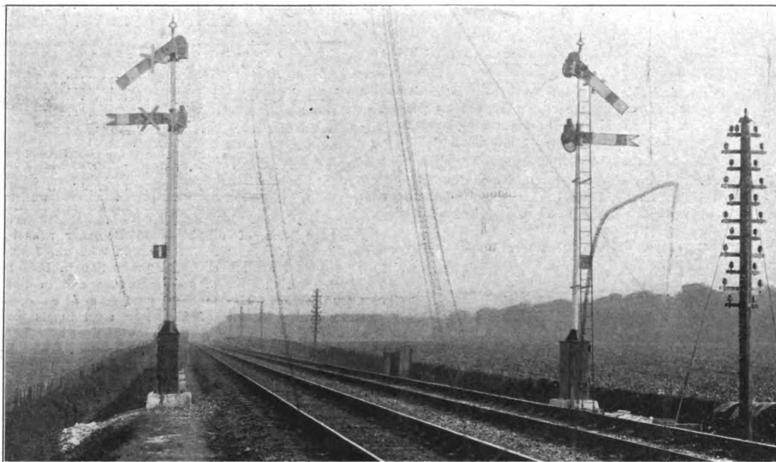


Fig. 3.—Automatic Signals on the London & South Western, Between Andover Junction and Grately. Trains Run on Left-hand Track.

locking plants at Salisbury were completed and put into operation in November last, and the lay-out of tracks at this place is shown in the accompanying drawings.

At each end of the station there is a cabin; the cabins are known as the east and west boxes. These two cabins and the ground frame, which is shown at the extreme right

and it would be possible, unless some other means were employed to lock these, to move conflicting switches and so run the risk of a collision. Therefore a lever is provided which, when pulled, mechanically locks all conflicting signals and switches immediately fouling the up through line. This lever is held electro-pneumatically by the cir-

Drainage of English Railroads.

BY EDWARD DAVY PAIN, *Student Inst. C. E.*

Undoubtedly the portion of a line where suitable and adequate drainage is most needed is where the formation of the ground necessitates a cutting. For, at the outset, if good temporary drainage of cuttings be insisted on by the engineer during the progress of excavation, endless bother and trouble with the bank will be saved, owing to the material being kept more or less dry and thus being less likely to be converted into slurry (semi-fluid clay) during its passage to and over the tip-head.

Often a good deal of modification and improvement upon the original plan is necessary before the stability of the slopes is ensured.

An instance of this is recorded on the London & Birmingham Railway, where it was found necessary to bore horizontally through a retaining wall between Edlston Square and Camden Town. Perforated iron pipes were then introduced in an upward inclined direction, which effectually drained the water out of the clay at the back of the wall and prevented any further bulging. Curiously enough, when the wall was removed in parts the clay stood well without showing any fissures. The movement was supposed to have been caused by the combined action of the air upon the surface, and that of rain and surface water percolating through the upper strata and acting behind them, forcing the earth forward in the least line of resistance. In some other parts on this same line benches on the face of the slopes were when formed

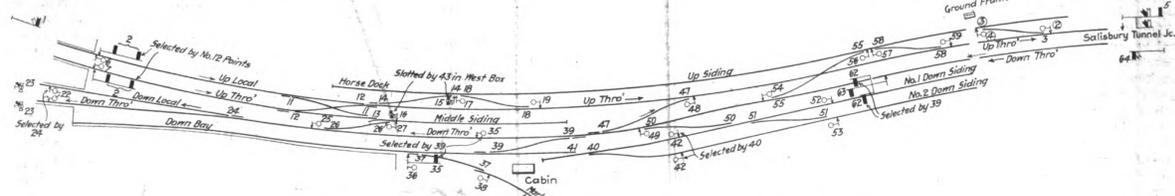


Fig. 2.—Interlocking at Salisbury—London & South Western Railway—East Cabin.

in Fig. 2, do all the work which formerly was done by four mechanical machines. The ground frame is only used during the time that shunting is going on at that point, and has been rendered necessary to meet the requirements of the Board of Trade.

The west cabin contains a 64-lever frame of the usual pneumatic type. Twenty-two of these levers work 30 signals, 19 are for switches and five for bolt locks between the Great Western Railway and the west box; in addition to these there are two special lock levers controlling signals operated from the east cabin, similar to those for the east box and ground frame, and 16 spare spaces. The east cabin contains a 64-lever frame, 27 of which work 32 signals, 17 are for switches, three special lock levers and 17 spare spaces. Signals connected with one cabin

cut in the track between 2 and 5; and as long as this portion of the track is fouled in any way this extra lever is electro-pneumatically locked.

In several cases in this station one lever will operate one of two signals. Which one it works is dependent on the position of the switch leading to the track over which these signals give permission to run. For example, in the east box lever 62 of the signal for the down through line, works one of two home signals, depending on the position of the switch 39; when 39 is normal the right hand signal is operated, giving the train permission to run to the down local line, diverging at switch 24. If 39 be changed the left hand, 62, comes off, indicating to the driver that the train will have to run to the down bay. Switch No. 24 is held by a special "retaining lock lever"

found to act injuriously in draining them, as they were too apt to catch the rain and surface water.

In Blisworth cutting the movement was treated as one mass slipping upon another. The mass was divided into vertical sections by excavating perpendicular chases 3 ft. wide right through the slip into solid clay below. These chases, now usually spoken of as counterforts, were 15 ft. apart, being filled with rubble masonry or with chalk and gravel well rammed down, forming a solid immovable mass. The slip was thus divided into small portions, and restrained from further movement by the friction against the counterforts. The trouble in this cutting was attributed to the presence of large spoil banks on the top of the slope which effectually prevented the surface water from draining away, aggravating the movement at the same