

NOTES ON SOME WORLD'S FAIR SIGNALING MACHINES.*

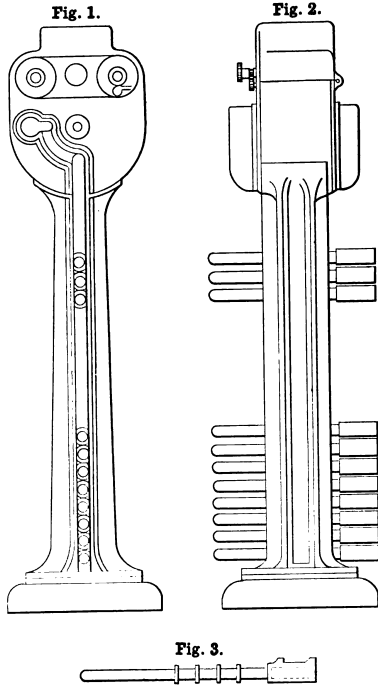
By W. L. DEER.

It is not my intention to trouble you with a long list of signaling appliances exhibited at the world's fair. I have simply selected a few of the exhibits which seem to me to embody interesting features. That there are others more interesting than these I shall attempt to describe in a probable, and I hope that if such is the case the gentlemen here to-day who have noted them will give us the benefit of their observations.

Among the Pennsylvania Railroad exhibits is found the Union Switch & Signal Co.'s pneumatic interlocking system, of which so much has been written that I fear I shall be unable to bring out any new points relating thereto. The use of electrically controlled valves at switch movements; the application of storage batteries instead of gravity cells for furnishing currents to control the switches and signals; and the application of the Saxby & Farmer improved locking (one-half the usual size) are some of the newer and more interesting features of the pneumatic machine.

The use of electric valves permits the abandonment of all pipes leading to the signal station, resulting in much economy and facility of operation and maintenance. The stations, signals and switches are now connected only by electric wires. In the original machine two pipes ran from each switch lever in the station to the switch on the ground. The use of storage batteries permits a closer regulation of quantity and pressure of current, and results in a considerable economy in cost of operation. The application of the Saxby & Farmer improved locking to the pneumatic machine permits the closest and most accurate interlocking of levers, and dispenses with a large amount of costly electrical work in the machine.

The exhibit of the Johnson Railroad Signal Co. is most complete and interesting. Their standard No. 1 interlocking machine is noticeable on account of its strong, well designed parts. A low dwarf signal specially designed for placing between tracks so as to clear passing trains is an exceedingly handy little machine. The mechanical slot,



other interesting detail, is an arrangement whereby two, or for that matter an unlimited number of signalmen stationed at different points, control one signal. This is often desirable in order to avoid multiplication of signals. With this machine the consent of all signalmen is required to place the signal to clear. Any signalman can, however, put it at danger.

Another interesting machine is the signal repeater, for indicating the position of an obscure signal. It consists of a bell and miniature semaphore operated by electro-magnets. Magnets and signals are connected by wire, the circuit being formed or broken by the signal arm and the movement of the latter repeated on the miniature signal in the station. The employment of electricity to denote to the signalman that the signal light is "in" or "out" is shown in the "light commutator." The contraction of certain rods in the machine caused by the light being out breaks a circuit, thereby releasing the armature of a magnet located in the signal station. This causes a bell to ring and also gives visual notice, by showing the word "out" on the miniature signal, that the light is out.

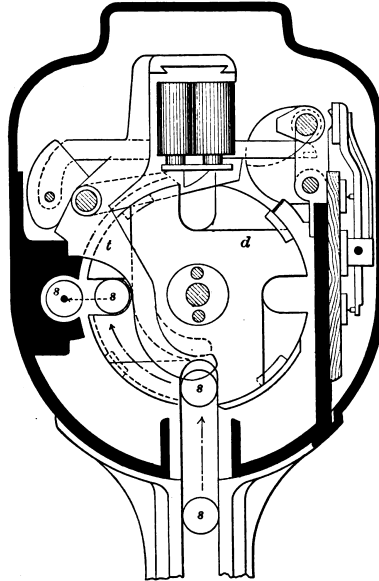
The Skyes system and Patenall's improved locking and blocking instruments are both shown. These instruments are so well known that I shall not attempt any description of them, but will simply remind you that in addition to their use in ordinary blocking they are especially valuable appliances in the operation of terminal and other large yards.

Two block instruments exhibited by the Johnson Co. and deserving more than passing notice are the "Webb & Thompson train staff machine," and "Tyer's train tablet machine," both designed for single track blocking. These machines are worked mechanically except that they are unlocked by electricity. Either system requires two machines for each block station—one for each block. The machines at both ends of block are connected by an electric circuit. In operating with these machines the engineman must carry a staff or tablet, as the case may be. Being the chief agent in the movement of a train he is made the key to the whole situation.

The Webb & Thompson machine consists of an iron pillar with a vertical slot, through nearly its entire length, in

*A paper presented to the American Society of Railroad Superintendents.

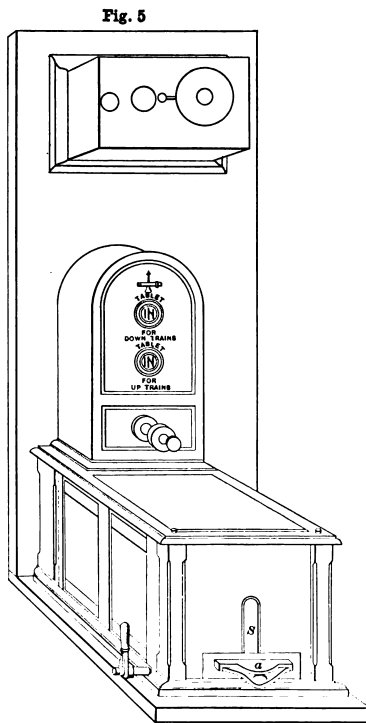
Fig. 4



which is a supply of staves. The head of the machine, called the locking case, contains the electrical apparatus. Only one staff at a time can be withdrawn from the two machines governing a block and then only with the consent of the signalman at the receiving station who alone controls the staves at the sending station, those staves being beyond the control of the signalman at the latter station. Another staff cannot be removed from either machine until the one already out is restored at either end of block. Thus, when a staff has been taken out at station A, another cannot be taken out at station B, nor can a second staff be taken out at A, until the staff previously withdrawn has been restored in the machine at A or B. Each block has its peculiar form of staff. The staves for one block cannot be placed in machines belonging to another block. However, a staff can be replaced in a machine without previous communication with opposite end of block. Communication between block stations is effected by means of electric bells. In practice each block station should be provided with ordinary out-door semaphore signals.

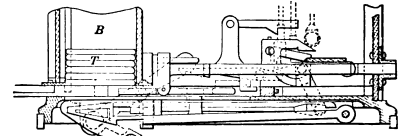
For the purpose of illustrating the method of working the staff machine, let A and B represent two block stations. Before starting a train from A towards B the situation with reference to the block is cleared up by means of bell code. If block is clear of trains and obstructions B, when asked, unlocks A's machine by holding down his key, which allows A to withdraw one staff. This staff is given to the engineman, who on arrival at B hands it over to the signalman to place in his machine. As the machine at either end of block cannot be unlocked while the engineman has the staff it is of course impossible to furnish a staff for another train until the first train has cleared the block.

The London & North Western Railway Company exhibit a Webb & Thompson machine so arranged that more than one train can be sent into a block in same direction at one time. This machine has a special staff contained in a sepa-



rate slot. The special staff is used in connection with six metal train tickets, providing for the movement of seven trains. It is a key to unlock a box containing the train tickets, and is withdrawn from machine in same manner as the ordinary staves. After unlocking the box and taking out all the tickets the box is again locked. The tickets are given out to trains, permitting the train to enter the block. The last train takes the staff and any remaining tickets. After all the tickets and the special staff are delivered at either end of block the tickets are locked up and staff placed in machine. Line is then again clear. The machine is so arranged that the special staff cannot be restored until

Fig. 6.



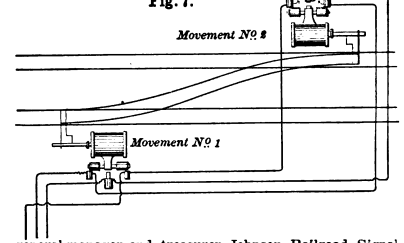
all the tickets have been locked up in one box. When special staff is withdrawn no other staff can be removed, and vice versa. There is but one special staff and set of tickets for each block and they must always be in one machine. Both the ordinary and special staves are keys to unlock switches, and are so arranged that they cannot be withdrawn from switch lock without locking the switch for main track.

Tyer's train tablet machine is operated similarly to the W. & T. machine. A metal tablet is used instead of a staff, the tablet being simply a train staff in another form. As these two instruments are so nearly alike in their operations it is not considered necessary to go into details with them both.

Besides being absolute blocking instruments these machines are peculiarly adapted to the protection of drawbridges and junctions, and would seem to make such places as absolutely safe as human foresight can provide.

I desire to thank Mr. Geo. H. Paine, general agent Union Switch & Signal Co., and Mr. Henry Johnson, assistant

Fig. 7.



general manager and treasurer Johnson Railroad Signal Co., for information furnished which has been of great assistance to me in the preparation of this paper.

DESCRIPTION OF DRAWINGS.

Webb & Thompson Electric Train Staff Machine.

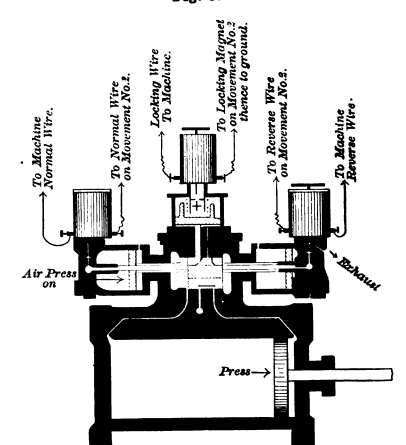
Fig. 1 is front elevation of Webb & Thompson machine.

Fig. 2 side elevation.

Fig. 3 staff.

Fig. 4, section of staff machine locking case. Movement of staff when being withdrawn from machine is shown by dotted line passing through s, t, s, t, (t being a staff). In withdrawing the staff "t" the tail piece "u," which is attached a magnet, is lifted. This action unlocks the disc "v" which is then free to revolve, allowing the staff to be moved to final opening "w" shown in Fig. 1.

Fig. 8.



Tyer's Block Machine.

Fig. 5 general view of the Tyer machine. "v" is the slide for withdrawing the tablets, "u" is slot through which tablets are passed when replacing them in machine.

Fig. 6 longitudinal section. "b" is the chamber in which the tablets "T" are placed.

Union Switch & Signal Co.'s Electric-Pneumatic Machine.

Fig. 7 location and wiring of electrically controlled valves for working a crossover.

Fig. 8 section of electrically controlled valve, normal position.

East-bound shipments for last week footed up 54,073 tons against 55,062 tons for the previous week and 77,524 tons for the corresponding week last year. Lake shipments amounted to 140,101 tons against 137,736 tons for the previous week. Last week's through shipments were divided among the competing roads in the following percentages: Baltimore & Ohio, 7.1; "Big Four," 9.3; Chicago & Erie, 8.6; Grand Trunk, 6.5; Lake Shore, 19.4; Michigan Central, 10.2; Nickel Plate, 9.1; Panhandle, 7.5; Fort Wayne, 14.1, and Wabash, 8.2 per cent.