J. D. TAYLOR.

ELECTRIC SIGNALING SYSTEM.

APPLICATION FILED JAN. 11, 1910.

1,036,372.

Patented Aug. 20, 1912.

Fig. 1,

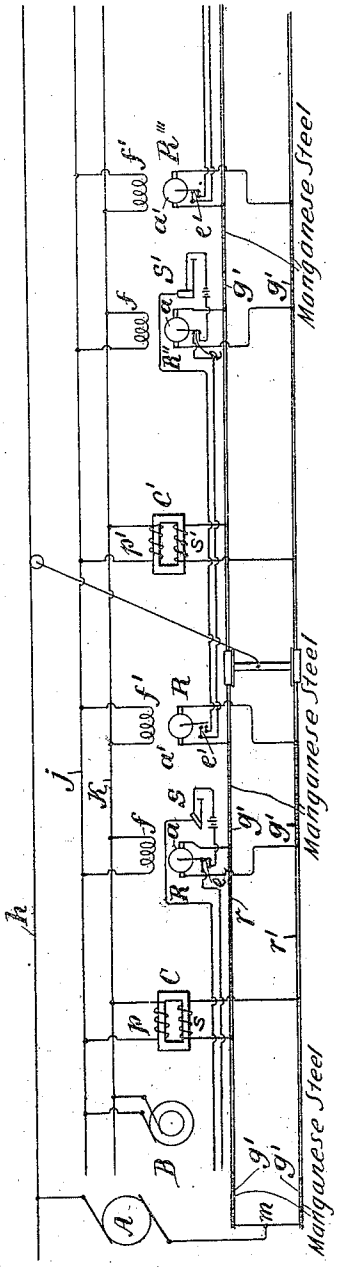


Fig. 3,

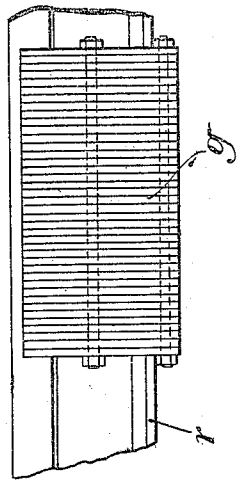
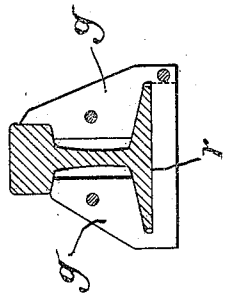


Fig. 2,



WITNESSES:

M. S. Kirkland

A. L. Vernill

INVENTOR

John D. Taylor

BY

Fred E. Gruse

His ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN D. TAYLOR, OF EDGEWOOD PARK, PENNSYLVANIA, ASSIGNOR TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

ELECTRIC SIGNALING SYSTEM.

1,036,372. Specification of Letters Patent. Patented Aug. 20, 1912.

Application filed January 11, 1910. Serial No. 537,389.

To all whom it may concern:

Be it known that I, JOHN D. TAYLOR, a citizen of the United States, and resident of Edgewood Park, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Electric Signaling Systems, of which the following is a specification.

My invention relates to block signaling systems for railways, and more particularly for electric railways the track rails of which are electrically continuous for all currents. It is premised therefore that whenever I use herein the terms "blocks" or "sections" or "block sections" I do not intend to designate actually separated or insulated block sections of track, but only to designate the portions of track between adjacent signals.

I will describe a railway signaling system embodying my invention, and then point out the novel features thereof in claims.

In the accompanying drawings, Figure 1 is a diagrammatic view showing a portion of an electric railway having applied thereto a signaling system embodying my invention. Figs. 2 and 3 are views illustrating a modification of the system shown in Fig. 1.

Similar reference characters refer to similar parts throughout the several views.

Referring now to Fig. 1, r and r' designate the track rails of a portion of an electric railway, which rails are electrically continuous for all currents. A is a generator for propulsion current, which current may be either direct or alternating. One terminal of this generator is connected to the usual third rail or trolley wire h, and the other terminal is preferably connected to a conductor m which connects the two rails of the track. B is an alternating current generator for supplying the signaling current. This generator should be adapted to give a current of different frequency from that supplied for the propulsion current when the latter is alternating. The current from the generator B is led to the various signaling instruments by means of line wires or conductors j, k. C and C′ designate transformers whose primaries p, p' are connected across the conductors j, k, and whose secondaries s, s' are connected across the track rails r, r' at as nearly as may be the middle point of the blocks which they respectively supply. Those portions of these rails at or adjacent to the end of each block are provided with means for increasing their ohmic resistance, which means consists, preferably, in substituting for the ordinary rail a portion of rail of manganese steel or other suitable steel alloy, these portions being designated in the diagram by g'. These substituted portions of rail are located, as stated, at the ends of the blocks, near which are located signals S, S′. These signals are controlled by relays R, R′, R″ and R‴, which are connected across the rails at the extreme ends of the manganese steel sections. These relays are preferably of the type having two elements, one of which is energized from the track circuit and the other from the line wires j, k, although I do not wish to limit myself to the use of this type of relay. In the arrangement shown, the armature elements a, a' of the relays are connected across the track rails. The field elements f, f' are energized from the line conductors j, k, and in such direction that the currents therein coacting with the currents in the armatures derived from the track rails will cause the armature to move and close the contacts e, e' The secondaries of the transformers C and C′ are connected to the rails oppositely. that is to say, the positive terminal of the transformer C is connected to the same track rail as the negative terminal of the transformer C′. The relays between each two transformers are each connected to the line and across the track rails in such sense that the current from any transformer except the one intended to operate the relay, will be in the wrong direction to close its contacts, and will, therefore, tend to open its contacts. The end of each of the blocks is similarly equipped, and each signal is controlled by two relays, one at each end of the block, both of which are supplied with current from the transformer between them; and the two relays of each block have the contacts controlled thereby in series in the local or signal controlling circuits.

When a train stands on any part of a block section between a relay and the transformer supplying the relay, current is cut off from the relay, and the signal circuit is opened, causing the signal to go to danger. The shunting of each relay will, of course,

occur a short time before the train reaches that relay, even when it is not between the relay and its transformer, but by reason of the added ohmic resistance due to the portion of high resistance rail, this distance can be very greatly shortened. When a train stands between a transformer and the relay, this relay will receive current from the next transformer beyond, but, as can easily be traced from the diagram, this current is in the wrong direction to cause a closing of the relay contacts, and will have a tendency to open the contacts. It will also be readily seen that the middle points of the rail sections g' will be at the potential zero.

It will be seen that a train in any portion of any block will always cause the short-circuiting of one of the two relays of this block, and that since these two relays have their contacts in series, in the signal-controlling circuit, that circuit will be held open and the signal guarding the entrance to that block will remain at danger, so long as the block is occupied. In leaving any block, a train before losing control of the last relay of that block gains control of the first relay of the succeeding block, and thereby holds the signal behind the train at danger until such time as it is protected by the signal at the entrance to the next block. As a further means of defining the limiting points of the block sections, and of increasing the potential of the signaling current at the relay terminals, I may surround as much as possible of the substituted rail portions with iron for the purpose of increasing the impedance of those portions of the rails. This iron is preferably laminated to prevent loss from eddy currents and to prevent the current which should be confined to the rail from leaving it and flowing through the surrounding envelop. In Figs. 2 and 3, I have shown portions of rails r surrounded by thin plates of iron g, the plates having portions which fit between the head and base flanges of the rail, and which also preferably extend around the base flanges and underneath the base of the rail. The plates may be secured in a solid group by means of bolts as shown in the drawings. This added iron acts to increase the impedance of the rails, by forming an almost complete magnetic circuit around the current carried by the rails, and in effect multiplies their impedance many times.

Having thus described my invention, what I claim is:

1. A continuous rail block signaling system comprising track rails having portions thereof near the ends of the blocks of increased ohmic resistance.

2. In a block signaling system, track rails which are electrically continuous for all currents, and which are provided with portions of increased ohmic resistance, transformers connected to the track rails midway between the portions thereof of increased ohmic resistance, adjacent transformers being oppositely connected to said rails, signal controlling relays connected to the rails near the ends of the portions thereof of increased ohmic resistance, and signals controlled by the relays; substantially as described.

3. In a block signaling system, track rails which are electrically continuous for all currents, said rails having portions of increased ohmic resistance, two signal controlling relays connected across the track rails between each two adjacent portions of increased ohmic resistance at points near the ends of such portions, said relays having signal controlling contacts in series with each other, and a transformer connected to the track rails, substantially midway between each two relays, adjacent transformers being oppositely connected to the track rails; substantially as described.

4. A continuous rail block signaling system, comprising track rails having portions thereof of increased ohmic resistance, and having at the same points means to increase their impedance.

5. A continuous rail block signaling system, comprising track rails having portions thereof near the ends of the blocks of increased ohmic resistance; and means for increasing the impedance of said portions consisting of a body of iron inclosing the web and base of the rail and extending upwardly on one side of the head.

6. In a railway signaling system, two track sections, a track circuit for each section, and a portion of track rail of increased resistance between the said sections.

7. In a railway signaling system, a plurality of track sections, a track circuit for each section, and a portion of track rail of increased resistance between adjacent sections.

In testimony whereof, I have hereunto signed my name to these specifications, in the presence of two subscribed witnesses, this 10th day of January, 1910.

JOHN D. TAYLOR.

Witnesses:
H. J. DORGELON,
G. M. HOUGHTON.