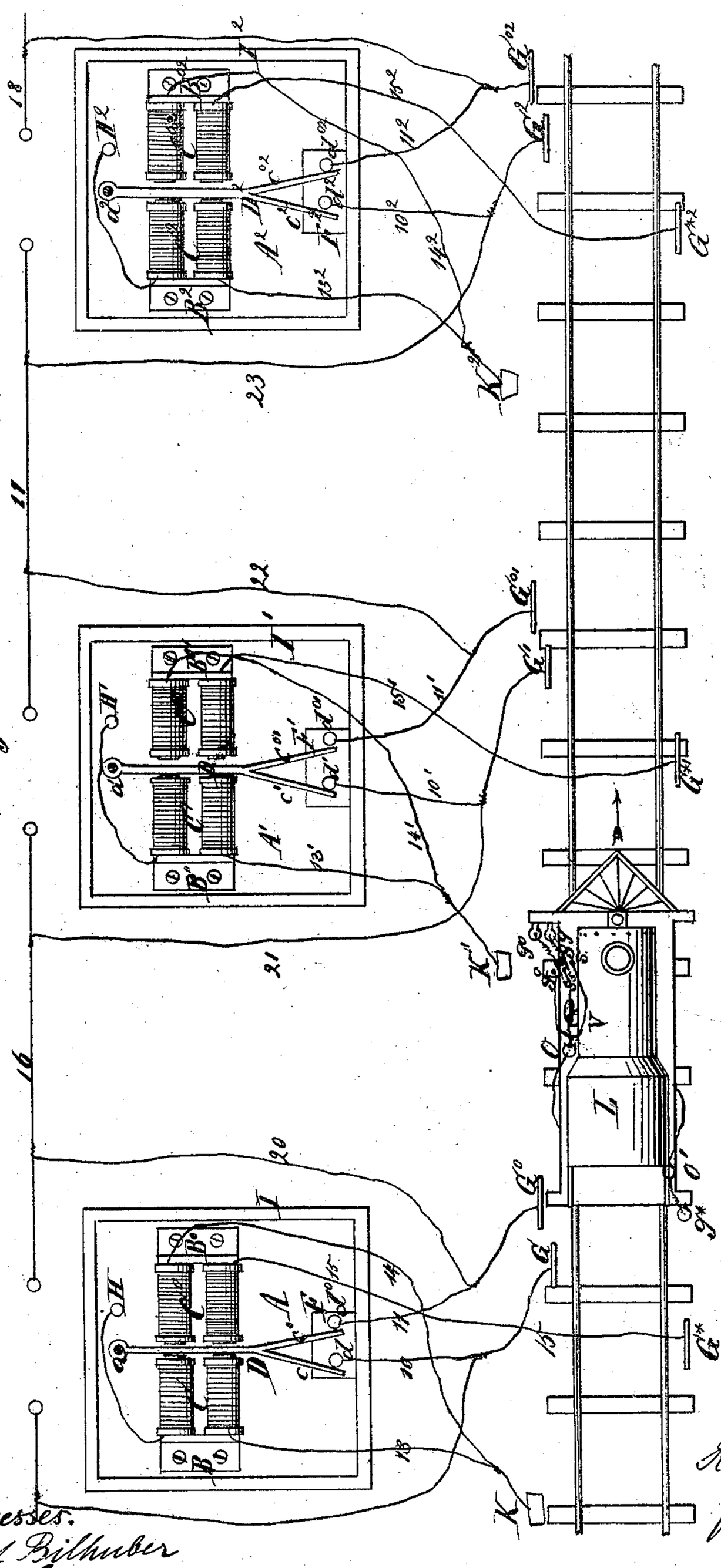
2 Sheets--Sheet 1.

R. K. BOYLE.

Electric Apparatus for Signalling Between Railroad Trains.

No. 143,663. Patented Oct. 14, 1873.

Fig. 1.



Witnesses.
Ernst Bilhuber
Henry Gentner

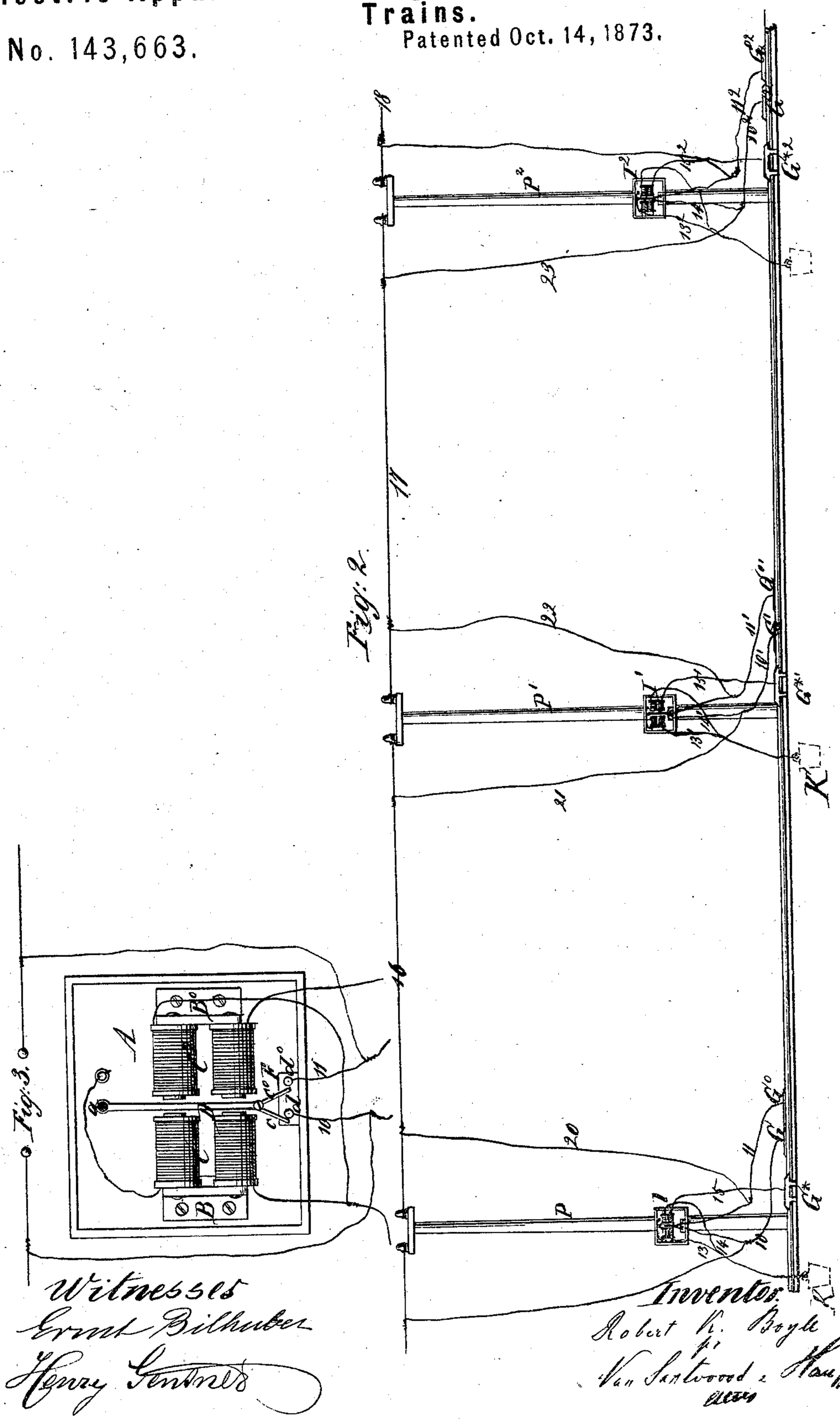
Inventor.
Robert K. Boyle
by
Van Santvoord & Hauff
Attys

2 Sheets--Sheet 2.

R. K. BOYLE.

Electric Apparatus for Signalling Between Railroad Trains.

No. 143,663. Patented Oct. 14, 1873.



Witnesses
Ernst Bilhuber
Henry Sentner

Inventor.
Robert K. Boyle
by
Van Santwood & Hauff
Attys

UNITED STATES PATENT OFFICE.

ROBERT K. BOYLE, OF NEW YORK, N. Y.

IMPROVEMENT IN ELECTRIC APPARATUS FOR SIGNALING BETWEEN RAILWAY-TRAINS.

Specification forming part of Letters Patent No. **143,663**, dated October 14, 1873; application filed August 28, 1873.

To all whom it may concern:

Be it known that I, ROBERT K. BOYLE, of the city, county, and State of New York, have invented a new and useful Improvement in Railway-Telegraphs; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification, in which drawing—

Figure 1 represents a plan or top view of my invention, showing front views of the electro-magnetic instruments in a larger scale than the other parts. Fig. 2 is a side view of the same. Fig. 3 is a front view of the electro-magnetic instrument, which forms the principal part of my invention, in a larger scale than the previous figures.

Similar letters indicate corresponding parts.

This invention consists in a soft-iron switch, which is situated between the poles of two electro-magnets, and secured on posts erected at suitable distances apart along the line of a railroad, in combination with line-wires which are detached from each other and run alongside the railroad, and with anvils which are secured in (but insulated from) the ground close to the rails, and with keys secured to the locomotive in such a manner that, by suitable connections of the keys and of the electro-magnets, an audible or visible signal on the locomotive is set in motion whenever another train should stand or move on the track within a certain distance (say one mile) in front of the advancing train, or move in a direction opposite to this train, and thereby the engineer is enabled to stop his train in time, and collisions of trains are effectually avoided.

In the drawing, the letter A designates a metallic bed-plate, from which rise two standards, B B^0, each of which supports a pair of electro-magnets, C or C^0. Between the poles of these electro-magnets is situated a soft-iron switch, D, which extends from an arbor, *a*, that has one of its bearings in the bed-plate A, and the other in a screw, which extends through a standard that rises from the bed-plate, so that the switch can swing freely between the poles of the electro-magnets C C^0. From the outer end of said switch extend two elastic fingers, *c* c^0, which bear down upon an insulated block, F; and through this block extend two metallic studs, *d* d^0, the upper ends of which are flush with the surface of the block F, and so situated that, when the switch D is attracted by the electro-magnet C^0, the fingers *c* c^0 will bear upon said studs. From the stud *d* extends a wire, 10, to an anvil, G, which is secured in the ground close to the railroad-track; and from the stud d^0 extends a wire, 11, to a similar anvil, G^0, which is situated on the same side of the track as the anvil G, but at a short distance in advance of the same. Both these anvils are insulated from the ground. The helix of the electro-magnet C connects at one end by a wire, 12, with a stud, H, that is in metallic contact with the bed-plate A, while the other end of said helix connects by a wire, 13, with a ground-plate, K. This ground-plate connects also by a wire, 14, with one end of the helix of the electro-magnet C^0, and the other end of this helix connects by a wire, 15, with an anvil, G*, which is situated on the side of the track opposite to the anvils G G^0, and which is also insulated from the ground. A series of electro-magnetic instruments, constructed as above described, are secured to posts P P^1 P^2, &c., at suitable distances apart alongside the track, and the posts P P^1 are connected by a wire, 16, the posts P^1 P^2 by a wire, 17, the posts P^2 P^3 by a wire, 18, &c. These wires are detached from each other, and each of them connects with two of the anvils G G^0—that is to say, the line-wire 16 connects by a wire, 20, with the anvil G^0 of the electro-magnetic instrument I, and by a wire, 21, with the anvil G^1 of the electro-magnetic instrument I^1. The line-wire 17 connects by a wire, 22, with the anvil G^{01}, and by a wire, 23, with the anvil G^2 of the instrument I^2, &c., as will be readily seen from Figs. 2 and 3. On the locomotive L, Fig. 1, are three brushes or keys, *g* g^0 g^*, which are so situated that, when the locomotive moves along on the track, the key *g* will successively come in contact with the anvils G G^1 G^2, &c., the key g^0 with anvils G^0 G^{01} G^{02}, &c., and the key g^* with the anvils G* G^{*1} G^{*2}. The key g^* of the locomotive connects with one pole of a battery, O′, which is situated on the locomotive, and the other pole of which is in metallic connection

with an axle, or any other portion of the locomotive which is in connection with the ground. The keys g g^0 connect, respectively, with the ends of a switch, S, which is situated on the locomotive, and which can be brought in contact either with anvils s s^5 or with anvils s^0 s^5, the anvil s^5 being connected with a signal apparatus, V, and through this with one pole of a battery, O, which also connects with the anvils s s^0. The other pole of this battery connects through the engine with the ground. By moving the switch S either of the keys g or g^0 can be thrown in the circuit of the signal apparatus.

When the locomotive moves on the track in the direction of the arrow marked thereon in Fig. 1, the key g^0 is thrown in the circuit of the signal apparatus; and if the key g comes in contact with the anvil G^1 of the instrument I^1, a current passes from battery O, through key g, wire 21, wire 16, wire 20, switch-bar D, stud H, helix C of instrument I, to the ground, and through the ground back to the battery, provided the switch-bar D is in contact with the studs d d^0 of instrument I. As soon as the circuit through the electro-magnets C is closed, the switch-bar D is attracted, and the fingers c c^0 are thrown off the studs d d^0. During this operation the signal apparatus on the locomotive is not moved, being not in the circuit, and the switch-bar of the instrument back of the locomotive is thrown off from the studs d d^1; but if the key g^0 strikes the anvil G^{01}, the current from the battery O passes, through signal apparatus S, key g^0, anvil G^{01}, wires 22, 17, and 23, to wire 10^2; and if the switch-bar D^2 of instrument I^2 is in contact with the studs d^2 d^{02}, the current passes through helix C^2 to the ground and back to the battery, the signal is agitated, and immediately the switch-bar D^2 is attracted and the circuit is opened. As the locomotive moves ahead the key g^* comes in contact with anvil G^{*1}, the circuit of the battery O′ through helix C^{01} is closed, and the switch-bar D^1 is attracted by electro-magnets C^{01}.

If the locomotive in passing anvil G^{01} finds the switch-bar D^2 next ahead in contact with studs d^2 d^{02}, the engineer knows that a train is in the next section ahead, and he will stop or go slow. If his signal is not agitated he knows he can go ahead. Of course the signals on two locomotives moving in opposite direction on the same track will also be agitated in time to prevent collisions.

What I claim as new, and desire to secure by Letters Patent, is—

The soft-iron switch D, situated between two electro-magnets, C C^0, in combination with insulated anvils G G^0 G^* and sectional line-wires 16 17 18, &c., on the side of a railroad-track, and with keys g g^0 g^*, or their equivalents, attached to a locomotive, the whole constructed and operating substantially as shown and described.

R. K. BOYLE.

Witnesses:
W. HAUFF,
E. F. KASTENHUBER.