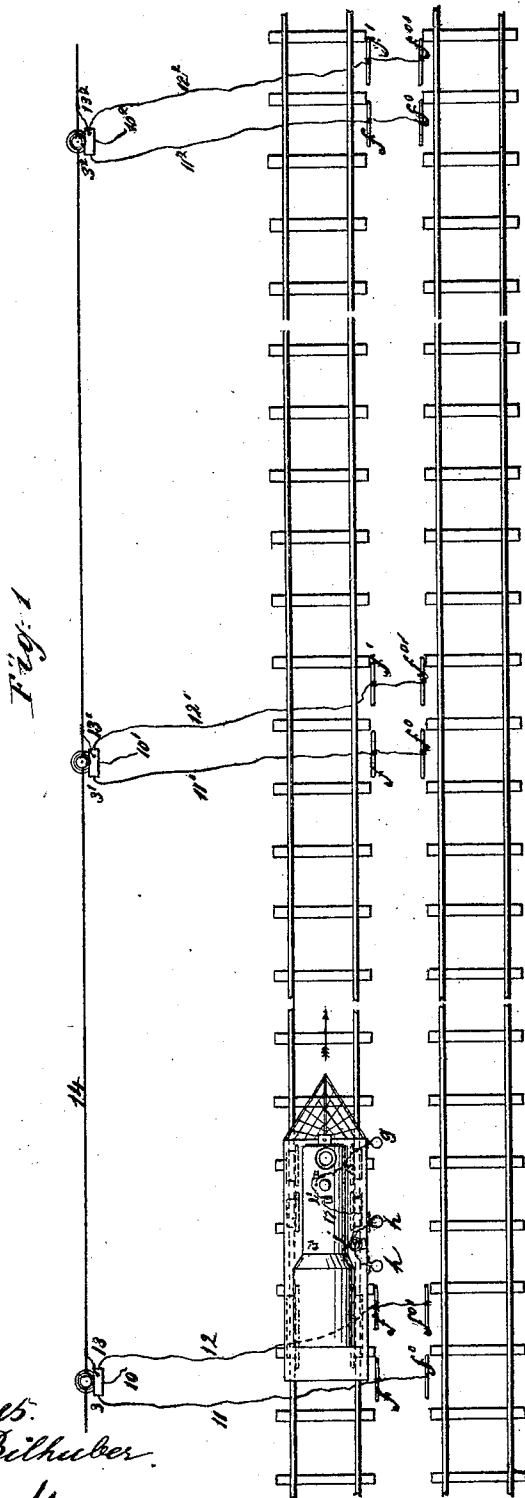


R. K. BOYLE.
Electric Apparatus for Signalling between Railway
Trains.

No. 141,755.

Patented August 12, 1873.



Witnesses:
Ernst Bilhuber.
Chas. Watkins.

Inventor:
Robert K. Boyle
By J. Santwood & Hump
Attorneys

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Fig. 4.

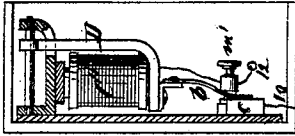


Fig. 3²

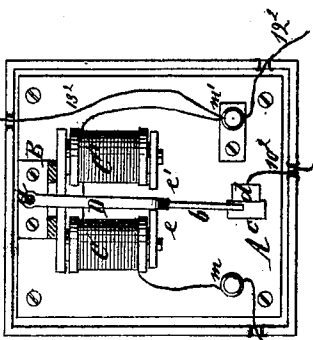


Fig. 3¹

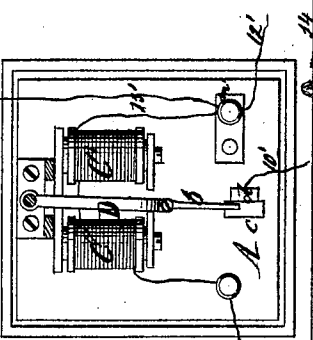


Fig. 3.

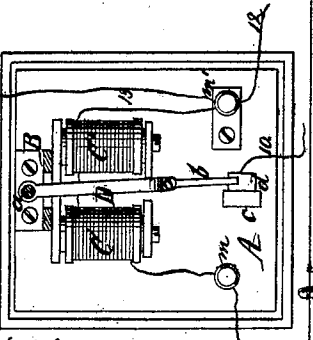
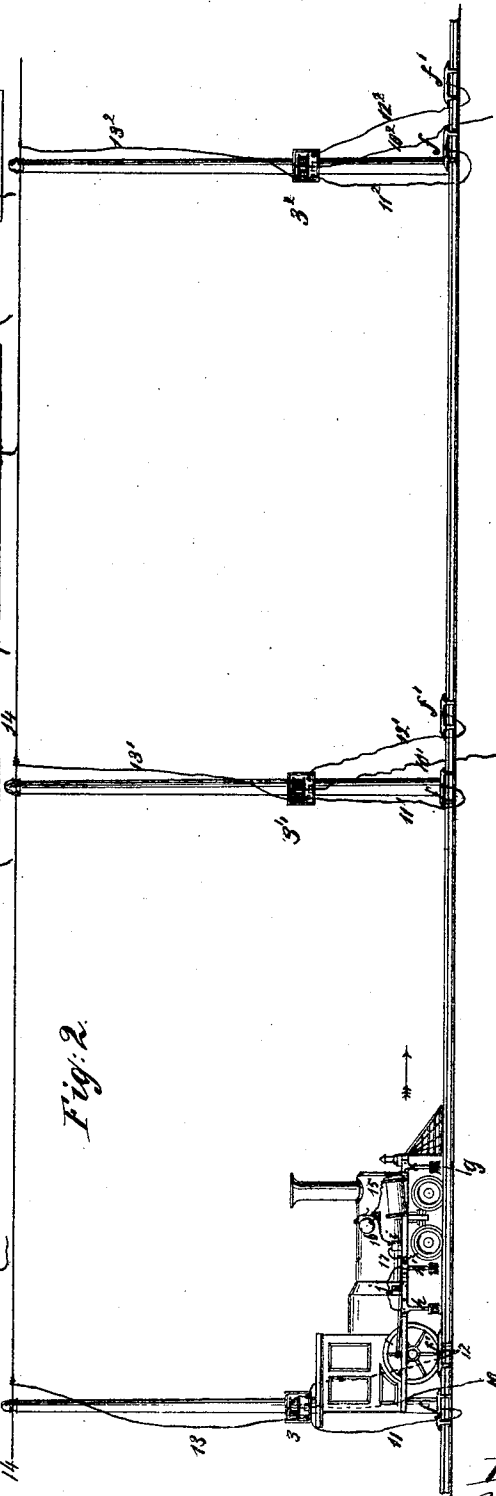


Fig. 2.



Witnesses:
Ernst Bilhuber
Chas. Wickers.

Inventor.
Robert K. Boyle
Van Santvoord & Hunt

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. **141,755**, dated August 12, 1873; application filed July 1, 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 Improved Electro-Magnetic Train-Telegraph; 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 of my invention. 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; Figs. 3¹ and 3², same, with varying positions of polarized switch. Fig. 4 is a transverse section of the same.

Similar letters indicate corresponding parts.

This invention consists in a polarized switch, 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 a line-wire running 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 on the track 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, Fig. 3, the letter A designates a metallic bed-plate, from which rises a standard, B, to which are firmly secured two electro-magnets, C C'. Between the poles of these electro-magnets is situated a polarized bar, D, which swings freely on a pin, *a*, that has its bearings in the standard B, and is in metallic contact with the bed-plate A, and from said polarized bar extends a metallic spring, *b*, which bears upon a block made of two parts, *c d*, one part being made of a non-conductor, and the other of metal, but also insulated from the bed-plate. To the cores of the electro-magnets are secured steel blocks

ee', and the polarized switch D is turned down between these blocks, so that if the polarity of the block *c*, for instance, corresponds to the polarity of the bent portion of the switch-lever D, said switch will be repulsed by this block, and attracted by the block *e'*, and the spring *b* will be brought to bear on the metallic block *d*; but if the polarity of the core *e'* corresponds to that of the switch-lever D, the switch-spring *b* will be carried on the insulated block *c*. The metallic block *d* connects by a wire, 10, with the ground, while the ends of the helix of the electro-magnets C C' are secured in posts *m m'*, from which wires 11 and 12 lead, respectively, to anvils *f f'*, which are insulated from and secured in the ground close to the rails. The end of the helix C' is also in metallic contact with a wire, 13, that connects with the line-wire 14. The post *m* is in metallic contact with the bed-plate A; but the post *m'* is insulated therefrom. The signal instruments are secured at intervals of one mile (more or less) to the poles which support the line-wire 14, and in double-track roads two sets of anvils, *f f'*, *f⁰ f⁰¹*, are used for each signal instrument, as shown in Fig. 2, the insulated anvils *f f⁰* and *f' f⁰¹* being, respectively, connected by metal wires. On the locomotive-engine I secure three metallic brushes or keys, *g, h, and h'*, which are so situated that, when the locomotive moves along on the track, said brushes sweep over the insulated anvils secured on the side of the track. The brush *g* connects, by wire 15, with one end of the helix of a visible or audible electro-magnetic alarm, Fig. 2, while the other end of said helix connects, by a wire, 16, with one pole of a battery, *i*. The other pole of this battery connects, by a wire, 17, with one of the axles or wheels of the locomotive, or with any other part thereof that is in metallic contact with the ground. The brushes or keys *h h'* are connected to the poles of a battery, *j*.

If the switch-springs *b* of the line instrument are all on the insulated blocks *c*, and the locomotive moves on the track, the brush *g* will first come in contact with the anvil *f* of the first line instrument-3, and no signal is given; but when the brushes *h h'* sweep over the anvils *f f'*, the circuit through the wire 11, helices C C', and wire 12 is closed, and the

switch-spring is thrown on the metallic block *d*. As the brush *g* of the locomotive comes in contact with the insulated anvil under the second line instrument 3^1 , the circuit is closed from the battery *i*, through wires 16 and 15 to the anvil; thence, through the wires 11' 13', line-wire 14 13, insulated post *m'*, helices *C' C*, metallic post *m*, bed-plate *A*, standard *B*, switch-lever *D*, metallic block *d*, ground-wires 10 and 17, back to the battery, and thereby the switch-spring is immediately thrown on the insulated block *c*. The same effect will be produced by the contact of the brush *g* with the insulated anvil f^1 of the second line instrument, and consequently the switch-spring of each signal instrument in the rear of the locomotive will be thrown on the insulated block as soon as the locomotive passes the next signal instrument ahead. But if the locomotive remains standing on the track between two signal instruments, the switch-spring of the instrument already passed will remain on the ground, and if a train following comes up, it will receive a signal as follows: Suppose the first locomotive stands between the posts 3^1 and 3^2 , Fig. 2, so that the switch-spring of the instrument 3^1 is on the ground, and as the brush of the succeeding locomotive comes in contact with the insulated anvil *f* of the instrument 3, then the circuit of the battery *i* in the last-named locomotive will be closed, through wires 16 and 15, brush *g*, anvil *f*, wire 11, helices *C C'*, wire 13, line-wire 14, wire 13', helices *C C'*, post *m*, plate *A*, switch-lever *D*, and metal block *d* of instru-

ment 3^1 , to ground-wire 10', and through the ground and wire 17 back to the battery *i*. The signal situated in this circuit will thereby be agitated, and the engineer of the second locomotive will see danger ahead. The same effect will be produced if two trains move on the same track in opposite directions; but in this case both locomotives will receive a signal.

From this explanation, it will be seen that the signal in each locomotive is agitated whenever one of the switch-levers ahead of said locomotive is on the ground, and by a suitable construction of the signal the distance of the danger ahead can at once be ascertained.

For the restoring-brushes *h h'* and their battery *j*, I can substitute a magneto-electric machine of any suitable construction, driven by the running gear of the engine, or by spring or other power, which is released at proper intervals by suitable means.

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

The polarized switch *D*, situated between the poles of two electro-magnets, *C C'*, in combination with insulated anvils $f f^1$ on the side of a railroad track, and with an audible or visible signal and keys *g h h'*, or their equivalents, attached to a locomotive, the whole constructed and operating substantially as shown and described.

R. K. BOYLE.

Witnesses:

W. HAUFF,

E. G. KASTENHUBER.