(No Model.)

T. S. NICHOLSON.

RAILWAY SIGNAL.

No. 377,634. Patented Feb. 7, 1888.

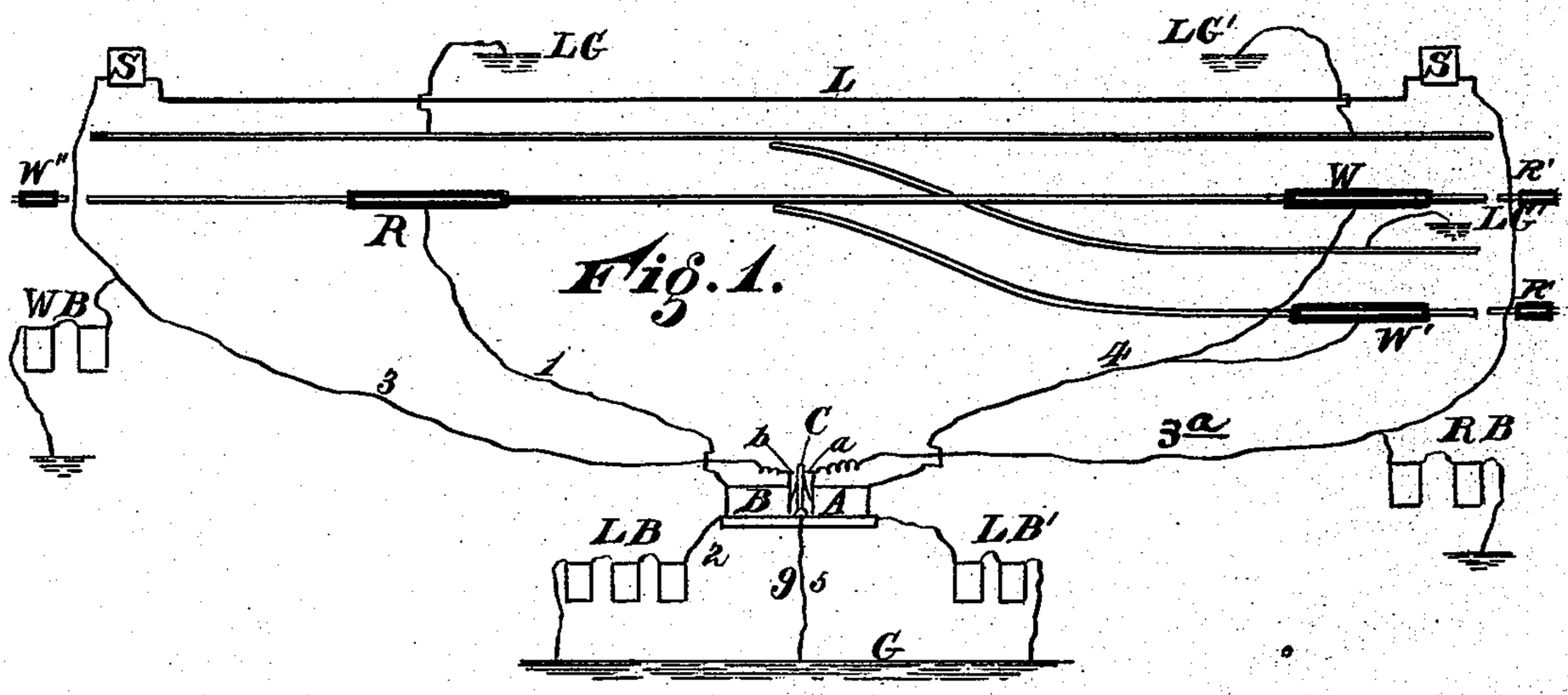


Fig. 1.

Fig. 2.

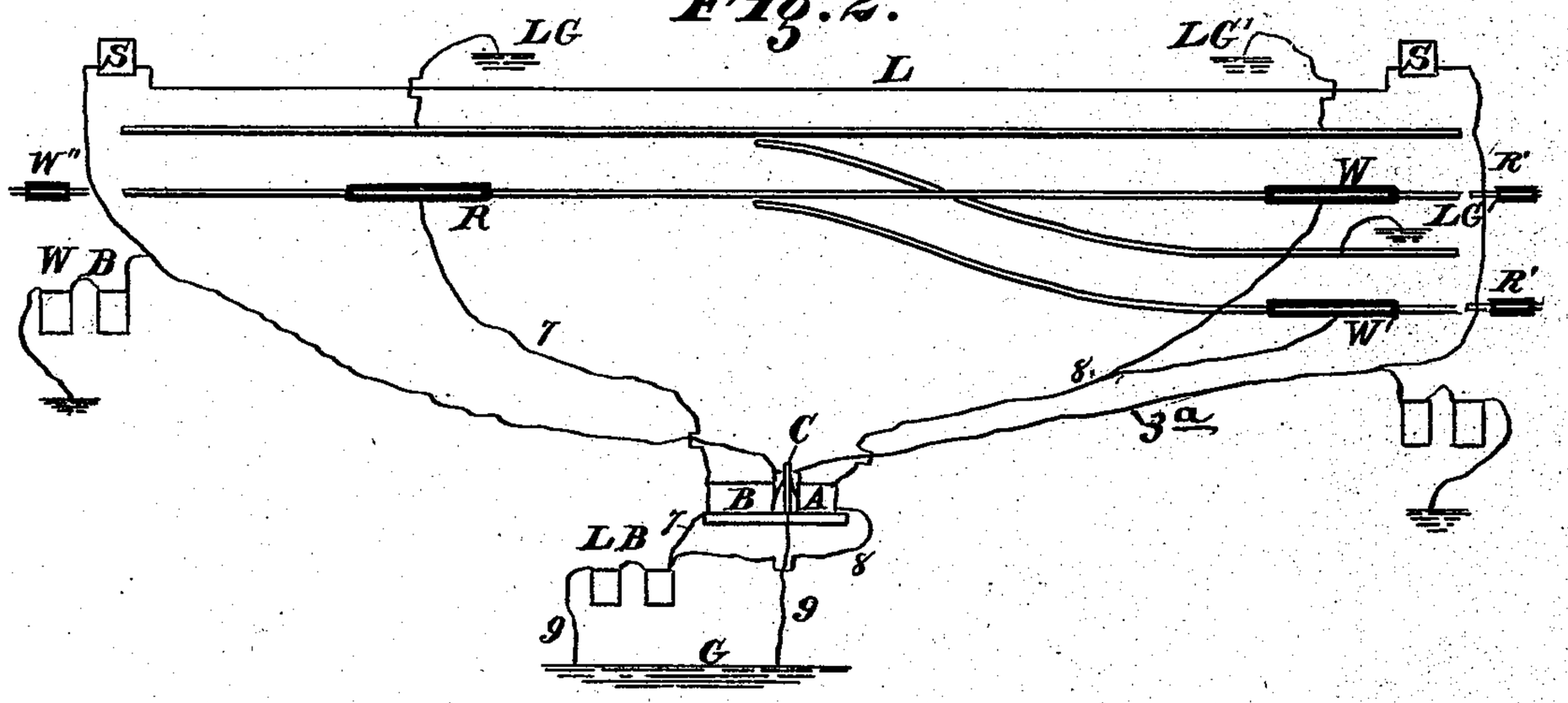


Fig. 3.

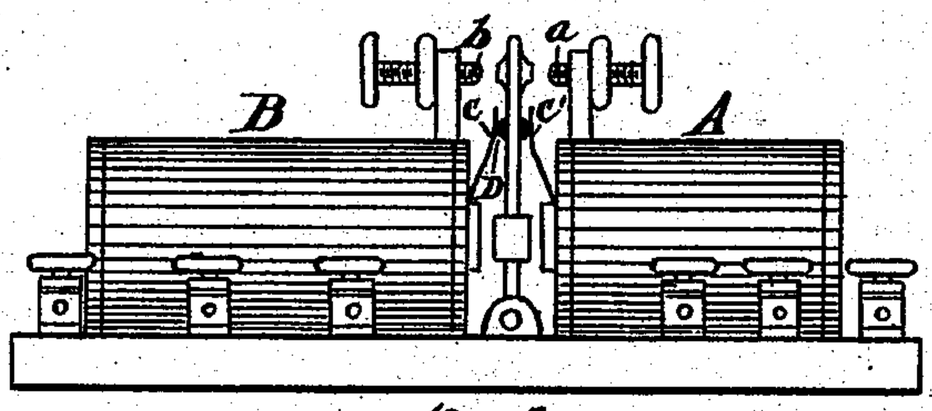
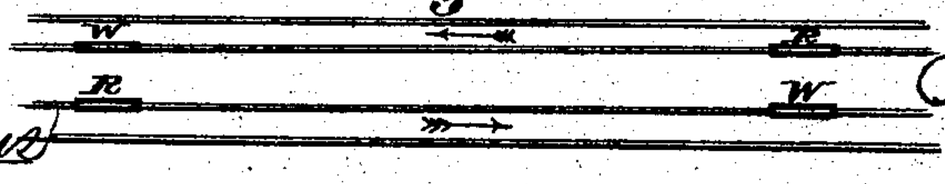


Fig. 4.



Attest

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UNITED STATES PATENT OFFICE.

THOMAS S. NICHOLSON, OF MOUNT WASHINGTON, OHIO.

RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 377,634, dated February 7, 1888.

Application filed December 4, 1885. Serial No. 184,733. (No model.)

To all whom it may concern:

Be it known that I, THOMAS S. NICHOLSON, a resident of Mount Washington, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Railway-Signal Devices, of which the following is a specification.

My invention relates, first, to the construction of a double relay, the armature of which is alternately attracted by two different magnets operated by two different local circuits, and a battery to form alternately a part of two different main circuits.

My invention relates, secondly, to the method of connecting said double relay in circuit, so that the magnetic force on one side of the relay is always greater than the magnetic force exerted upon the other side of the relay. This may be accomplished either by a differential relay or a differential local battery, all of which will be fully set forth in the description of the accompanying drawings, making a part of this specification, in which—

Figure 1 is a plan view of my improvement connected up in circuit. Fig. 2 is a diagram showing another mode of connecting the relay in circuit. Fig. 3 is an enlarged view of the relay. Fig. 4 is a plan showing the arrangement of the danger and safety rails upon a double track.

In the operation of railway-signals by electricity it is oftentimes necessary to put a safety and danger rail for grounding alternately the danger and safety circuits, to operate the respective signals, so close together that a train passing over the track is at one and the same time on both rails or connections, which prevents the perfect operation of the signals. Such is the case, for instance, where the side track or switch comes into the main track, as illustrated in Figs. 1 and 2, in which W W′ indicate the rails setting the signals to "safety," and R the danger-signal connection-rail.

I have shown my invention as adapted to be operated in accordance with the system of electric railway-signals shown in Letters Patent No. 329,478, granted H. C. Nicholson, November 3, 1885; but I do not wish to confine myself in the use of my invention to this system of signals, as it is adapted to various other uses and methods of operating signals.

In the drawings, Fig. 1, S S represent two railway-signals which are adapted to be set at either "safety" or "danger," W B representing one main battery, which operates, say, the white or safety signal, and R B representing the opposing main battery, which operates the red or danger signal when the white battery-signal is cut out.

R represents, say, the insulated danger-rail and W W′ the safety-rail connection on the main and side tracks, respectively. These rails are insulated and grounded as shown in said above-named patent; but instead of grounding the batteries direct they are grounded by means of a local circuit and my improved relay, which may be operated by either of the two following modes of construction.

The object to be attained is, first, to have the current operating the red or danger signal prevail, so that when the train is upon both white and red insulating-rails, thereby grounding both circuit-connections, the danger-signal will be exposed, and as soon as the train has passed off the red rail and runs still on the white the current will be reversed and the white signal exposed, or when the train has passed off the white rail and is still upon the red rail it will still continue to prevail and expose the danger-signal until the train has passed over another white or reversing rail. To accomplish this I provide two separate local circuits operating the armature of the double relay, which armature comprises alternately a part of the two different circuits operating the signals. This I accomplish in two ways. The first is shown in Fig. 1, in which A represents the helices on one side of the double relay; B, equal but opposed helices on the opposite side of said relay; C, an armature pivoted midway between the contact-points *a b* upon the two sides of the relay.

c c′ represent two springs applied upon the opposite sides of the armature C, so as to normally hold it midway between the contact-points *a b*. These springs are insulated by rubber, D, from metallic contact with the armature.

L B represent a local battery in circuit with the coil of magnet B, and L B′ represent another local battery in circuit with the coil of magnet A.

G represents one of the ground-connections of both of the local batteries, and L G or L G′

the other ground of the local batteries, either one of which is brought into use by circuit-connection through the rail R W or W′.

The batteries W B and R B are normally connected, say, with the positive poles opposed to each other on the line-wire L. As soon as a ground-connection is made through the rail R, battery W B is cut out and R B is in circuit, operating signals S. The grounding of rail R through local ground L G brings the local battery L B in circuit through wire 1, coil B, wire 2, and ground G, attracting armature C against the stop *b*, which armature then is in circuit with battery R B through line-wire L, wire 3, and ground G. In order to have the red battery prevail over the white when either one of the rails W or W′ is also in circuit, I make the local battery L B of greater quantity than the opposing local battery, L B′, operating the coil A. The magnetism therefore developed by the magnet B is greater than that developed by magnet A, and the armature is of course attracted to magnet B, furnishing the circuit for the main battery R B, as before stated. When the rail R and local battery L B are out of circuit and the local battery L B′ brought into circuit by the ground L G′ through rail W or W′, then the magnetism developed by magnet A will operate the armature C and bring the main battery W B in circuit through line L, wire 3ª, stop *a*, armature C, and ground G, wire 9.

An equivalent means of developing greater magnetism upon one side of the relay than the other is shown in Fig. 2. The construction of the instrument and the connections, circuits, lines, and grounds are all the same as that shown in Fig. 1, except that the magnet B, which connects and disconnects the danger-signal circuit by operating the armature C, is made of greater resistance, preferably by winding it with that much more wire of the same resistance or diameter; and I also employ a single local battery to operate both local circuits, which are connected as follows, as shown in Fig. 2:

G represents the ground of the local battery; also of the main battery. L G represent the opposing ground for the danger-signal, and L G′ the other local ground for the safety-signal. Ground L G is obtained by connecting the red rail R in circuit through wire 7, thence through the helices of magnet B, wire 7, to battery L B and ground G, which attracts the armature C to the greater magnet B and stop *b*.

The opposing magnet is operated only when the ground L G is out of circuit and the ground L G′ obtained by metallic connection through rail W or W′, thence through wire 8, magnet A, thence by wire 8 to local battery L B and ground G by wire 9, when the armature C is attracted and a metallic connection made through stop *a*, armature C having the main-battery circuit W B. When no circuit is established and the batteries R B and W B oppose each other, the armature C is held normally by the springs *c* midway between the stops *a b*, ready for operation when either one of the circuit-connections through the rails is established, as before explained.

It is obvious that my unequal duplex magnetic circuit may be applied to various other uses of similar character to the one here shown and illustrated.

The invention, as shown, is intended to be applied to a double trackway where the regular trains run upon each track in the same direction. In the drawings I have shown but one main track, the other being merely a duplicate, save that the rails W and R are arranged in reverse order. When used as a single track for trains running in both directions, I place a white rail, W², to the left of the rail R in Fig. 1, and a red rail, R′, to the right. It will be understood, however, that in the case of a double track, where trains on each line run in the same direction, I employ a red rail on the side from which the train approaches and a white rail on the other side, the arrangement on one line being simply the reverse of that upon the other, as shown in Fig. 4 of the rail W, and make the usual connection from the former to wire 4 and from the latter to wire 1. This arrangement will operate and restore the signals for trains moving in both directions.

Having described my invention, what I claim as new is—

1. In a railway-signal, the combination, with a double relay, A B, having an armature, C, pivoted centrally between the contact-points of the magnets, of springs *c*, for holding said armature normally between said contacts, local batteries L B and L B′, of different strength, and the two different local circuits, whereby two different currents are sent through the armature C, substantially as described.

2. In combination with the main-line circuit operated by one or more main batteries, the double magnet A B, having its contact-points and armature for establishing two different circuits in the main line and the coils A B in two different local circuits, whereby two different currents are sent through the armature C, substantially as specified.

3. In combination with two main-line circuits and two local circuits, the double magnet A B, having a common armature for making and breaking two main circuits, and the coils A B in the local circuits, the making and breaking of which local circuits operates the armature to make and break the main-line circuits, substantially as herein specified.

4. In combination with a main-line circuit operated by two equal and opposed batteries, the double magnet A B, having a common armature, C, adapted to make and break the main-line circuits, and having the coils of the magnet in two different local circuits, one of which locals develops greater magnetism on one side of the magnet than the local on the other side, to prevent the breaking of the main-line current when both branches of the local and the coils of the magnet are in circuit

at the same time, substantially as herein specified.

5. In a railway-signal, the combination, with a double relay, A B, having an armature, C, pivoted centrally between the contact-points of the magnets, of local batteries L B and L B′, of different strength, and the two different local circuits, whereby two different currents are sent through the armature C, substantially as described.

In testimony whereof I have hereunto set my hand.

THOS. S. NICHOLSON.

Witnesses:

JNO. S. ROEBUCK, Jr.,

ROBERT ZAHNER.