(No Model.)

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ELECTRIC RAILWAY SIGNAL.

No. 520,661. Patented May 29, 1894.

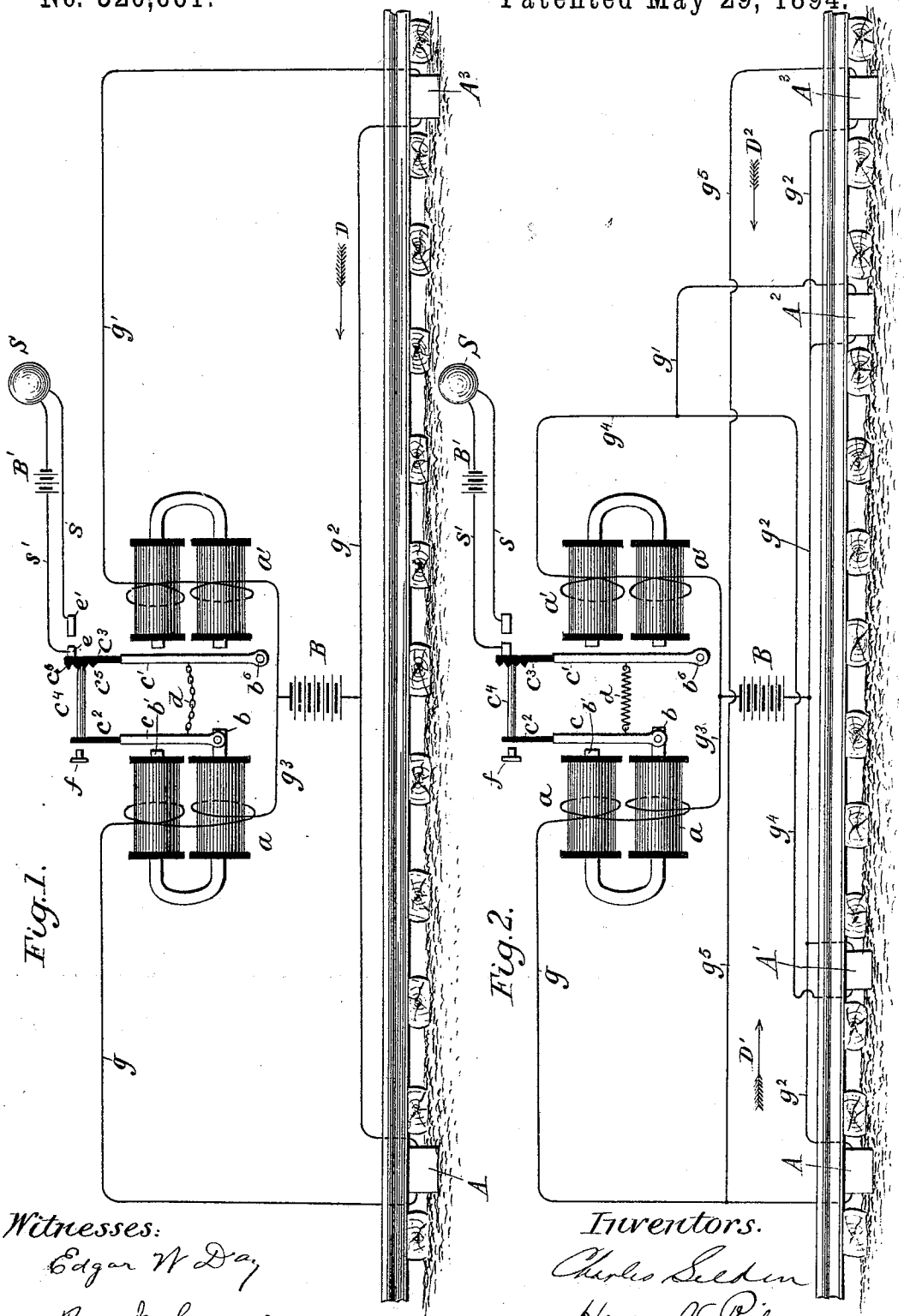

Fig. 1.

Fig. 2.

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ELECTRIC RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 520,661, dated April 29, 1894.

Original application filed February 16, 1894, Serial No. 500,863. Divided and this application filed April 12, 1894. Serial No. 507,329. (No model.)

To all whom it may concern:

Be it known that we, CHARLES SELDEN and HENRY V. RILEY, residents of the city of Baltimore, State of Maryland, have invented certain new and useful Improvements in Electric Signals for Railways, of which the following, in connection with the accompanying drawings, is a specification.

Our invention relates to that class of signals employed for the purpose of causing a visual or audible signal to be operated by railway trains or cars approaching in either direction on a railroad, and is especially useful as a warning signal at a road way crossing, this case being a division of our application, Serial No. 500,863, filed February 16, 1894.

In order to carry out our invention, we have designed a peculiar construction of electro-magnet and armature, track circuit closers and circuits therefor.

Referring to the drawings, Figure 1 is a diagrammatic view of the circuits for the track and signals, also the instrument for operating the said signal circuit, the whole being designed for a double track railway, or where trains ordinarily move in one direction. Fig. 2 is a diagrammatic view, similar to Fig. 1, but designed for a single track railway, or where trains of cars ordinarily move in both directions.

In detail the signal circuit controlling instrument consists of two pairs of electro-magnets a, a' oppositely arranged. The core b of magnet a is extended beyond the core b', and has hinged to such extension an armature c, thereby providing electro-magnets that when energized by the passage of an electric current therethrough the armature becomes polarized. The opposite magnets a' are of the ordinary structure and operate an ordinary armature c', pivoted at b^6 to any suitable base for the instrument as is usual. We will hereinafter call this armature neutral, in order to distinguish from the polarized armature. Thus we are enabled to produce an instrument consisting of two pairs of magnets, each pair being of the same size, and when energized by the same amount of battery power the attraction of the polarized armature is much stronger than that of the neutral, thereby establishing a bias always in favor of the stronger. Secured to the upper ends of the armatures are extensions c^2, c^3, preferably of non-magnetic material; to the extensions c^2 and arranged at right angles thereto is a bar c^4 with a tapered end. Arranged upon the upper end c^3 opposite the bar c^4 are projections c^5 c^6 adapted to engage the tapered end of the bar c^4. Connecting the armatures c, c' is a spiral spring or chain d. On the opposite side from the teeth or projections c^5 is a contact point e and opposite this is another contact point e'. Extending from contact points e, e' is a circuit s, s' including a battery B' and a signal S.

Reference letter f represents a back stop for armature extension c^2.

The arrangements of circuits differ in Fig. 1 from those in Fig. 2. In Fig. 1 running from magnet a to circuit closing box A is a wire g, and from magnet a' to box A^3 is a wire g'. Connecting the two magnets is a wire g^3; the wire g^2 connects the circuit closing boxes A, A^3 and the battery B connects the wires, g^2, g^3. The boxes A, A^3 are arranged upon either end of a section of road to be protected, and are placed at a suitable distance from a surface grade crossing or other desired point. It will be seen that a train or car in the direction indicated by the arrow D closes the circuit through magnet a' thereby attracting its armature c' by reason of the action of the spring or chain d, the armature c will also be drawn toward magnet a', and the beveled end of the rod or bar c^4 would fall between the lower set of projections c^5 thereby locking said armatures in engagement, and bringing together contact points e, e', and closing the signal circuit s, s', and thereby operating the signal S. As the train passes out of the protected section the circuit is closed in box A, the current then flows through magnet a attracting armature c, and by action of the spring or chain d armature c' is also drawn toward or caused to follow armature c, causing bar c^4 to ride its end into engagement with the upper pair of projections c^6, and thereby lock said armatures in a reversed position from that assumed by the energization of magnet a', and also separating contact points e, e', and thereby discontinuing the operation of the signal.

We have above described the system in connection with the double track. We will now describe the operation in connection with a single track railroad.

The magnet instrument, armatures, the signal and its circuit in this instance are the same as shown in Fig. 1, but the circuits between the magnets and track contacts are different. In this case, a train approaching in the direction indicated by the arrow D′, the circuit in track box A would be closed and the current would flow through the wire g, through magnet a, by wire g^3, through battery B, wire g^2 back to box A. When the train reaches box A′, the current flows through wire g^4, magnet a', wire g^3, battery B, wire g^2, back to box A′. It will thus be seen that the moment the circuit is closed through magnet a, the armature c is attracted and the operation of the armatures would be like that described in connection with Fig. 1. At the next moment as above stated, the train reaching box A′ the circuit is then through magnet a', therefore at certain intervals during the passage of a train over both boxes A and A′ both magnets would be energized, but by reason of the fact that the armatures have become locked toward magnet a, a mechanical bias is created in favor of that magnet. In addition to this, a bias is created by the polarization of the armature c, thus the armatures will remain in this position until the last pair of wheels of the train or car have entirely passed off of box A, when the circuit will then flow through magnet a' only, the armatures then being free from the effects of magnet a, the mechanical bias of itself will not be sufficient to keep the armatures in the former position, and they will therefore be drawn toward magnet a', and locked in this position as described, thereby closing the signal circuit, and operating signal S.

It will readily be seen that the signal will be operated until the train has passed over track boxes A^2, A^3, and the last pair of wheels of the train has passed over box A^3 energizing magnet a only thereby throwing the armatures in reversed position, breaking the signal circuit, and by reason of the fact that they are locked said armatures remain in this position until again attracted by magnet a'. It can readily be seen that the same operation would take place when a train is passing in the opposite direction indicated by arrow D^2.

If desired an earth connection may be used for battery and contact points instead of the return wire g^2.

While our invention is shown as applicable to an alarm or signal usually placed at a road crossing, we do not wish to be understood as limiting ourselves to such use as the device may be used effectively in block signaling and for other forms and purposes of signals now in use.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. An instrument for controlling electric signals for railways, consisting of two pairs of electro-magnets oppositely arranged and in the same circuit, the armatures thereof connected together and adapted to be moved in unison and locked together, the armature of one pair adapted to be polarized during the energization of the magnets controlling the same, whereby upon the simultaneous energization of both pairs of magnets a bias is created in favor of the magnet operating the polarized armature, substantially as described.

2. In an electric signal for railways, a signal circuit controlling instrument consisting of two pairs of electro-magnets oppositely arranged, two armatures suitably connected and arranged therebetween, the armature of one pair adapted to be polarized upon the flow of current therethrough, suitable track circuit adapted to be operated upon the passage of a train in either direction upon a section of railway to be protected, said circuits containing therein the two pairs of electro-magnets, and a battery common to both of said pairs, whereby upon the closing of the track circuits and the energization of each pair of magnets a bias is created in favor of the polarized armature magnets substantially as described.

3. In an electric signal for railways two pairs of electro-magnets oppositely arranged, one pair containing an armature adapted to be polarized during the flow of current through said magnets, the other pair operating a neutral armature, means for causing said armatures to move in unison and for locking the same in rigid contact, a signal circuit controlled by the movement of said armatures and suitable circuits and railway track instruments, whereby upon the passage of a train or car in either direction upon said railway the signal circuit is opened or closed and the signal operated substantially as described.

4. In an electric signal for railways two electro-magnets the armature of one of said magnets adapted to become polarized during the flow of a current through said magnet the armature of the other remaining neutral, a spiral spring or other yielding device connecting said armatures and suitable locking mechanism therefor in combination with battery wires and circuit closers whereby when both circuits are closed during the same interval of time and owing to the polarization of one armature during the flow of current a bias is created in favor of the polarized armature magnet as and for the purpose set forth.

5. In an electric signal for railways two pairs of electro magnets oppositely arranged, the pole piece of one of the magnets of one pair being extended and containing therein an orifice or recess, an armature pivoted in said orifice and adapted to face the pole piece of the other magnet of the same pair and thereby become polarized during the energization of said magnets, a neutral armature suitably placed before the pole pieces of the opposite

pair of electro-magnets, means for securing said armatures in yielding contact near the base thereof and means consisting of a bar projecting at right angles from the upper end of one armature, and a corrugated surface on the upper end of the other armature and adapted to engage the end of said bar whereby said armatures are locked in rigid contact substantially as described.

6. In an electric signal for railways, two electro-magnets oppositely arranged, the armature of one adapted to be polarized during the energization of its magnet, the armature of the opposite magnet being neutral, means for causing the said armatures to move in unison and mechanically locking in rigid contact, a signal circuit controlled by the vibration of said armatures, suitable track instruments and circuits whereby the passage of a train in either direction will cause the energization of one or both of said magnets and by action of the polarized armature and mechanical locking device a bias is given in favor of one magnet until the other magnet is solely energized thereby displaying and discontinuing a signal substantially as described.

7. In an electric signal for railways an instrument consisting of a polarized and a non-polarized relay, common to a single battery, the armatures thereof being oppositely arranged and adapted to be mechanically locked together in either position assumed by the attraction of said relays, a signal circuit controlled by the vibration of said armatures, suitable track circuit closing instruments located at each end of a section of railroad to be protected, and circuits connecting said relays and track instruments, whereby upon the entrance of a train in either direction into the protected section the polarized relay is first energized and the armatures locked toward that relay until said polarized relay is wholly de-energized and the non-polarized relay energized, thereby closing the signal circuit and operating the signal until said train has passed out of said protected section when the polarized relay is again actuated and the signal restored to normal substantially as described.

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