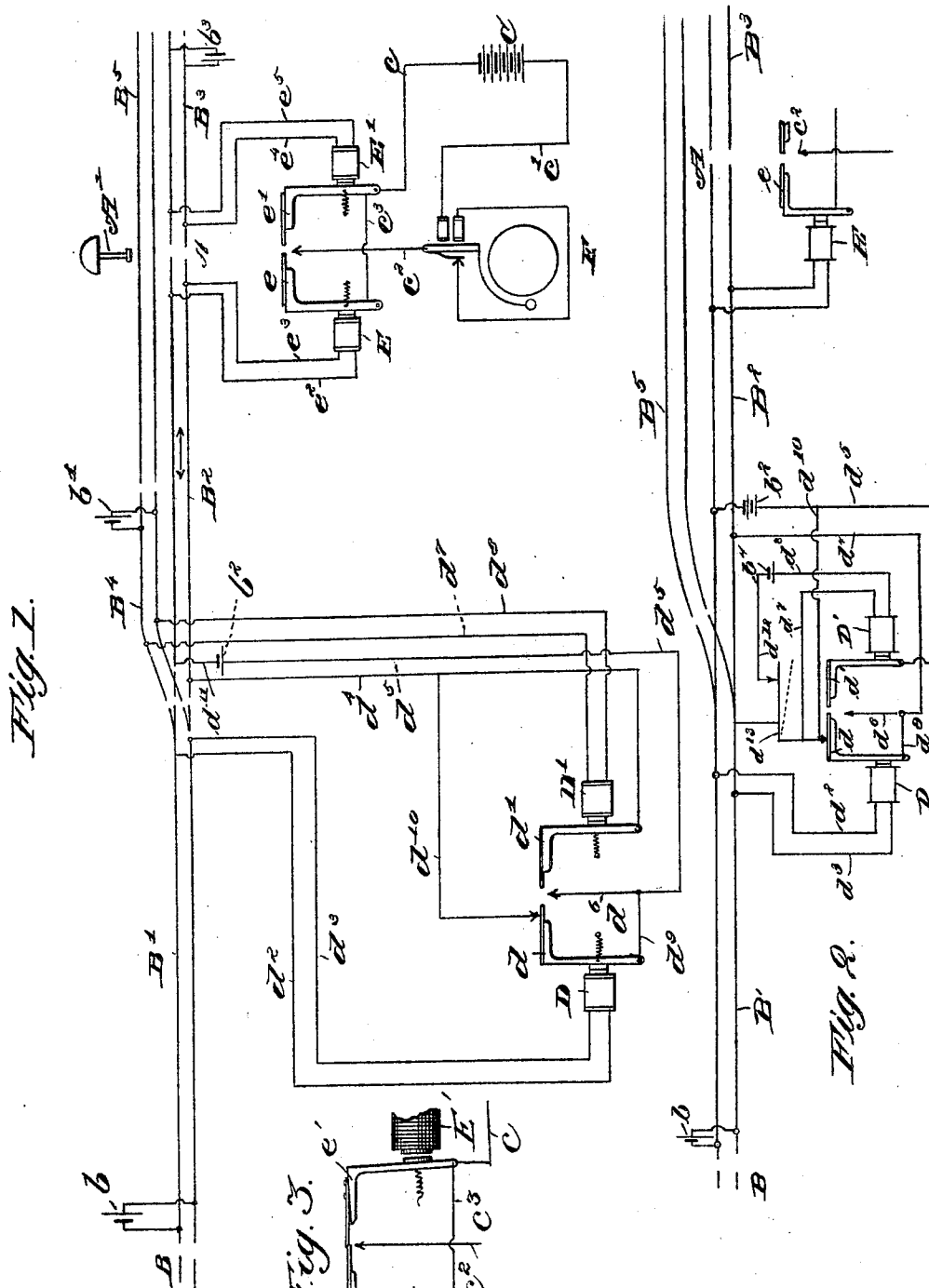


E. W. VOGEL.
ELECTRICAL SIGNAL CIRCUIT.
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UNITED STATES PATENT OFFICE.

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ELECTRICAL SIGNAL-CIRCUIT.

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To all whom it may concern:

Be it known that I, EUGENE W. VOGEL, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electrical Signal-Circuits; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in electrical signal-circuits, and more particularly to an electrically-actuated signal-circuit so arranged as to automatically give a signal upon the approach of a train, but preventing said signal operating for trains not actually approaching the said position or when not desired—as, for instance, when the train runs onto the main track out of a switch.

The invention consists of the matters hereinafter described, and more fully pointed out and defined in the appended claims.

In the drawings, Figure 1 is a somewhat diagrammatic view illustrating an arrangement of various circuits and appliances embodying my invention. Fig. 2 is a diagrammatic view illustrating a modification, and Fig. 3 a large detail view of one of the interfering relays.

In carrying out my invention, A indicates the end of the block, and for convenience I have shown a crossing thereat and a crossing-signal.

B indicates a main track, herein shown as a single track.

B³ indicates a side track connected with the main track by the switch, which, as shown, enters the main track, so that a train passing therefrom will move away from the crossing. An insulated track-section B⁴ is provided in said switch, extending to a point where the switch connects the side track with the main line. Said main line is provided with the insulated section B' beyond the switch on the side opposite the crossing and the insulated sections B² and B³, respectively, on each side of the crossing, of which B² is located between the crossing and the switch. Each of said insulated sections of track is provided with its own battery, (indicated, respectively, b² b³.)

C indicates a main battery connected in circuit with a bell F and the armatures e e' of an interlocking or interfering relay of any de-

sired or preferred type. As shown, however, the relay is similar to the Hovey relay, for which United States Letters Patent No. 552,181, issued December 31, 1895, and the construction thereof will be readily understood from an inspection of Fig. 3, in which it will be seen that the armatures are provided with rigid inwardly-extending portions, to which are rigidly secured flexible tongues adapted to engage a fixed contact upon the deenergization of the magnets. The electromagnets E and E' are respectively connected in circuit with the battery b² through the insulated track-section B² and with the battery b³ through the insulated track-section B³, so that the respective armatures are normally supported by current from the batteries b² and b³. Between said armatures e and e' of said relay is a contact-point connected by a conductor c² with the bell F. The armatures e e' are also connected at their lower ends with a conductor c³, and a conductor c leads from one of said armatures to the battery C. A conductor c' leads to the electromagnetic bell F. A similar relay consisting of the electromagnets D and D', provided with armatures d and d', is connected in circuit with the insulated track-section B' and battery b' and the insulated track-section B⁴ and battery b' of the switch. As shown, the electromagnet D is connected with the rails of the insulated section B' by the conductors d² and d³. The electromagnet D' is connected with the respective rails of the track-section B⁴ of the switch by the conductors d⁷ d⁸. A conductor d⁶ extends between the armatures d d' and is adapted for electrical contact therewith when the respective electromagnets are deenergized. Said conductor is connected by means of a conductor d⁵ with the battery b², and a conductor d¹¹ connects said battery with one of the track-rails of the section B². A conductor d⁹ leads from the conductor d⁶ to the armature d. From the armature d' a conductor d⁴ leads to the other track-rail of said section B². A conductor d¹⁰ leads from the conductor d⁴ into operative relation with the armature d and is provided with a contact-point adapted for engagement therewith when the armature is supported by its magnet.

The operation of the device described is as follows: A train moving over the insulated section B³ toward the crossing short-circuits the battery b³, deenergizing the electromagnet

E', permitting the armature e' to drop upon the contact c' , as shown in Fig. 2 of the Hovey patent above referred to, thereby completing the signal-circuit as follows: armature e' , lead c , battery C, lead c' , magnets of the bell F, back to armature e' , and causing the bell to ring or other signal to operate. If the train continues past said crossing, the front truck thereof by short-circuiting the battery b^2 causes the armature e to drop upon the armature e' , as shown in Fig. 3 of said Hovey patent. When the train entirely passes the crossing and is clear of the section B³, the armature e' is lifted by its electromagnet, lifting therewith the armature e , thereby breaking the bell-circuit and silencing the bell. The train will now be able to continue onward from the crossing without further signal. If the train enters section B', moving toward the crossing and switch leading to the insulated section B⁴, the battery b is short-circuited, thereby deenergizing the electromagnet D, dropping the armature d upon the contact of the conductor d^5 . This breaks the circuit of battery b^2 , thus deenergizing the electromagnet E, permitting its armature e to fall and close the signal-circuit, causing the signal to operate. Should the train, however, pass upon the switch instead of beyond the same, when the front truck thereof strikes the insulated section B⁴ the battery b' is short-circuited, deenergizing the electromagnet D', permitting its armature to fall upon the armature d , thereby closing the circuit of the track-section B² and energizing the magnet E, the current passing through said armatures, the conductor d^9 , the conductor d^5 , battery b^2 of the section B² to one rail thereof, and from the other rail to the armature d' through the conductor d^4 and lifting the armature e , breaking the bell-circuit and silencing the same. Should the train, however, be upon the switch-section B⁵ and run out upon the main track, the battery b' is short-circuited by the first truck striking the insulated section B⁴. The electromagnet D' is thereby deenergized, permitting the armature d' to fall. This will not affect the bell, inasmuch as the circuit for the battery b^2 is still unbroken, the conductors d^5 and d^6 , armature d' , and conductor d^4 still carrying the current. When the first truck strikes the insulated section B', the electromagnet D is deenergized, thereby permitting the armature d to fall. This, however, has no effect upon the bell, inasmuch as the same falls upon the armature d' . The train may thus continue out of the circuit toward B without affecting the signal. When the train clears B⁴, the electromagnet D' is again energized by the battery b' and the armature d' is lifted, supporting thereon the armature d , thereby holding the circuit of b^2 closed, whereby the electromagnet E acts to prevent the operation of the signal. When the train passes out of section B' toward B, the magnet D is again

energized by its battery, thereby closing the circuit for battery b^2 through said armature d and conductor d^{10} , thereby returning the circuits to normal. Should the train, however, after coming upon the section B' move toward the crossing, the first trucks thereof coming upon the insulated section B² short-circuits the battery b^2 , causing the armature e to drop, with the effect of ringing the bell, moving the semaphore, or giving whatever signals the circuit may be provided with.

Obviously, if preferred, in lieu of insulated track-sections a track instrument of any desired kind may be connected at the switch, and the throwing of the switch itself may make or break the desired circuit, with an effect similar to that before described, and such an arrangement is diagrammatically illustrated in Fig. 2, in which the switch is insulated from the main track, and a track instrument d^{13} , connected with the switch in such a manner as to break a contact in the circuit of the battery b^4 , connected with the electric magnet D' when the switch is opened and make the contact when the switch is closed. The effect is similar to the short-circuiting of the battery b' —that is to say, it deenergizes the magnet D', thereby closing the circuit for the battery b^2 , and lifts the armature e , thereby silencing the bell. As well-known mechanical means may be employed in practically embodying this modification of my invention, I have deemed it sufficient to merely illustrate the same diagrammatically.

While the Hovey relay is shown, obviously any desired relay may be used. The method of insulating the track is entirely immaterial. The kind and number of instruments used and the means of connecting the same may be varied.

Many details of construction and arrangement of parts may be modified without departing from the principle of my invention.

Having now fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a signaling system, the combination with a signal-circuit, of signal mechanism located therein, controlling means for opening and closing said signal-circuit, a normally closed track-circuit adapted when closed and opened to actuate said controlling means to respectively open and close said signal-circuit and a second track-circuit, governing said first track-circuit, substantially as described.

2. In a signaling system, the combination with a signal-circuit, of signal mechanism located therein, controlling means for opening and closing said signal-circuit, a track-circuit adapted when closed and open to actuate said controlling means to respectively open and close said signal-circuit, and automatically-operating means controlling said track-circuit, substantially as described.

3. In a signaling system, the combination

with a signal-circuit, of signal mechanism located therein, controlling means for opening and closing said signal-circuit, a track-circuit adapted when closed and open to actuate said
 5 controlling means to respectively open and close said signal-circuit, a second track-circuit, a magnetic automatically-operated circuit-controller for opening and closing said first track-circuit, said controller being included
 10 in said second track-circuit, substantially as described.

4. In a crossing-signal for railroads, the combination with a signal-circuit, signal mechanism located therein, controlling means
 15 for said circuit, track-circuits including said controlling means and actuating the same upon the approach of a train to the crossing, means operated by a train at a predetermined point distant from the crossing to break one
 20 of said track-circuits and thereby operate the signal-circuit-controlling means, and other means operated by the train after passing said predetermined point and no longer approaching the signal to close said track-circuit and
 25 thereby discontinue the signal, substantially as described.

5. In a railroad signal system, the combination with a signal, of means for operating said signal actuated by a train approaching a pre-
 30 determined point distant from said signal, means for discontinuing the signal when the train ceases to approach the signal upon reaching said predetermined point, and means for continuing the operation of the signal actuated by the train after passing said pre-
 35 determined point and approaching the signal, substantially as described.

6. In a railroad signal system, the combination with a main track, of a track leading from
 40 said main track, a signal located on said main track, means for operating said signal actuated by a train on the main track approaching said predetermined point distant from the signal, and means for discontinuing the signal actuated by the train entering said track leading
 45 from the main track at the predetermined point, said means cooperating to render the signal inoperative when a train enters the main track from said switch, substantially as
 50 described.

7. In a railroad signal system, the combination with a main track, of a track leading from

said main track, a signal located on said main track, means for operating said signal actuated by a train on the main track approaching said
 55 predetermined point distant from the signal, means for discontinuing the signal actuated by the train entering said track leading from the main track at said predetermined point, said means cooperating to render the signal
 60 inoperative when a train enters the main track from said switch, and means operating said signal when a train passes said predetermined point and continues to approach the signal, substantially as described.
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8. In a signaling system, the combination with an interlocking relay comprising a pair of armatures and magnets for actuating the same, of a circuit controlled thereby, one terminal of said circuit having a lead connected
 70 to one of said armatures and a second lead connected to a fixed contact located between and in the path of said armatures, the other terminal of said circuit having a lead connected to the other of said armatures and a
 75 second lead connected to the fixed contact normally engaged by the first armature, substantially as described.

9. In a signaling system, the combination with an interlocking relay comprising a pair
 80 of armatures and magnets for actuating the same, a circuit including an insulated section of a main track for energizing one of said magnets, a circuit including an insulated section of a track connected to the main track by
 85 a switch for energizing the other of said magnets, a circuit for operating a signal controlled by said interlocking relay, one terminal of said circuit having a lead connected to one of said armatures and a second lead connected to
 90 a fixed contact located between and in the path of said armatures, the other terminal of said circuit having a lead connected to the other of said armatures and a second lead connected to the fixed contact normally engaged by the first
 95 armature, substantially as described.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

EUGENE W. VOGEL.

In presence of—

GEO. L. WILKINSON,

CLARA C. CUNNINGHAM.