(No Model.) 2 Sheets—Sheet 1.

H. D. WINTON.

SINGLE RAIL CIRCUIT FOR ELECTRIC RAILWAY SIGNALS.

No. 311,050. Patented Jan. 20, 1885.

Fig. 1.

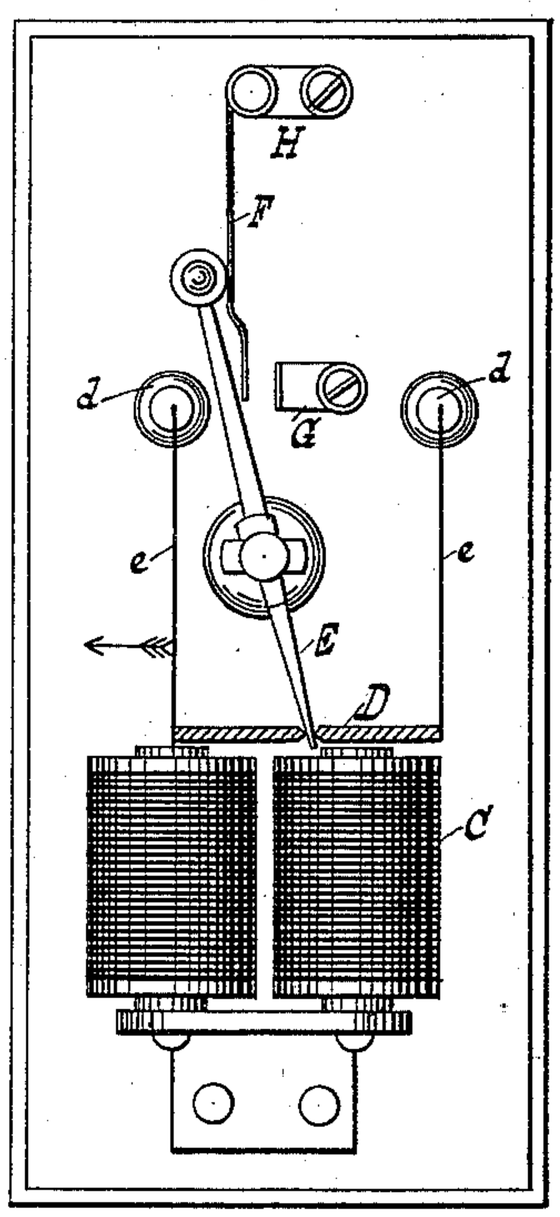


Fig. 2.

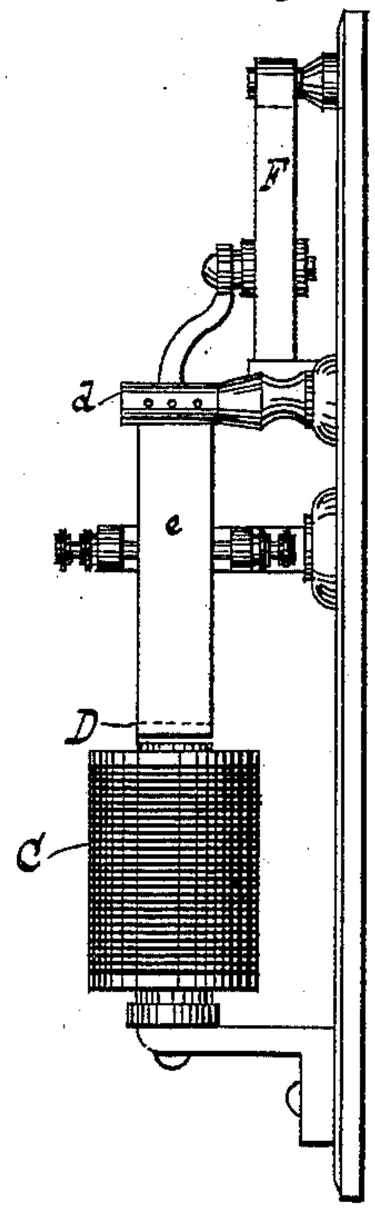


Fig. 3.

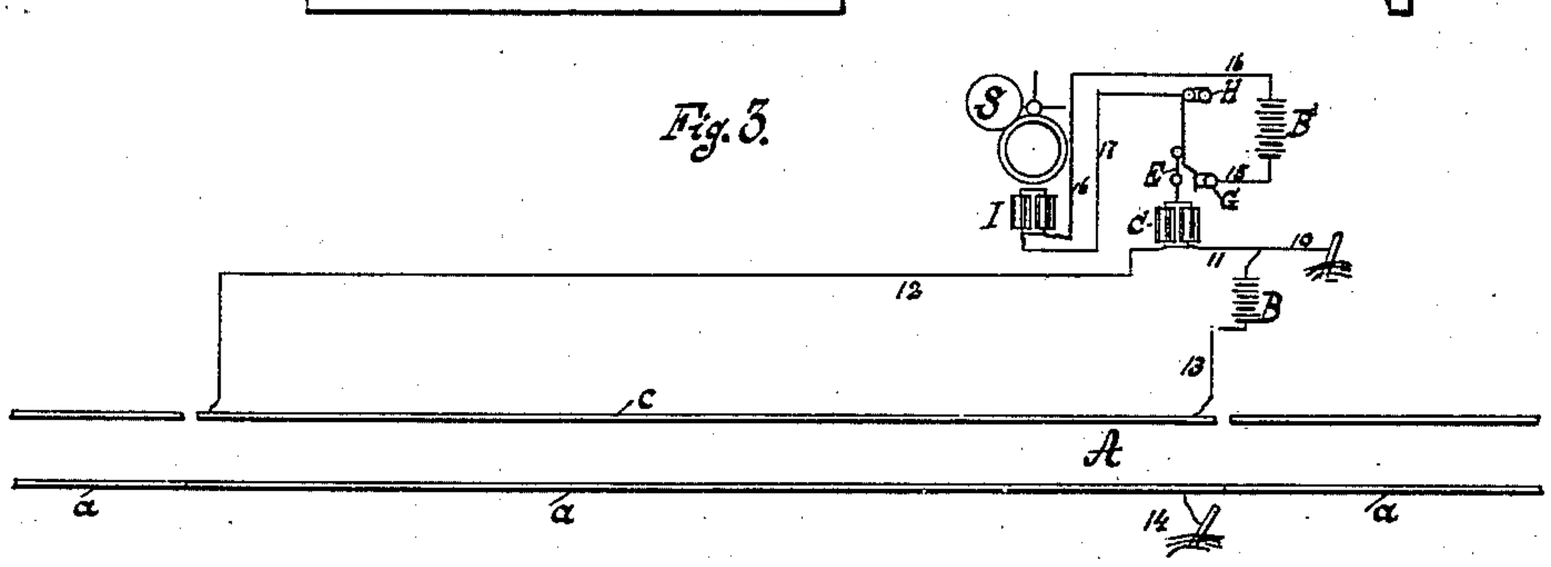
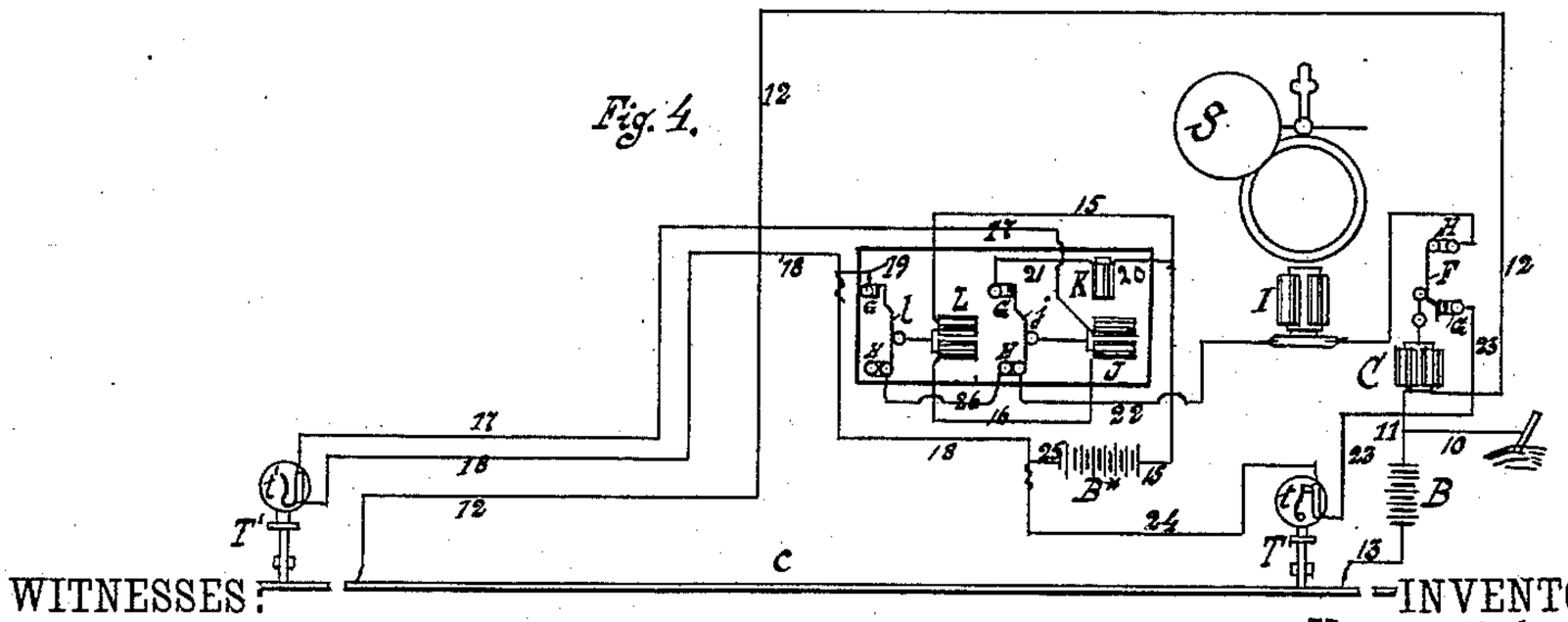


Fig. 4.



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INVENTOR

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(No Model.) 2 Sheets—Sheet 2.

H. D. WINTON.

SINGLE RAIL CIRCUIT FOR ELECTRIC RAILWAY SIGNALS.

No. 311,050 Patented Jan. 20, 1885.

Fig. 6.

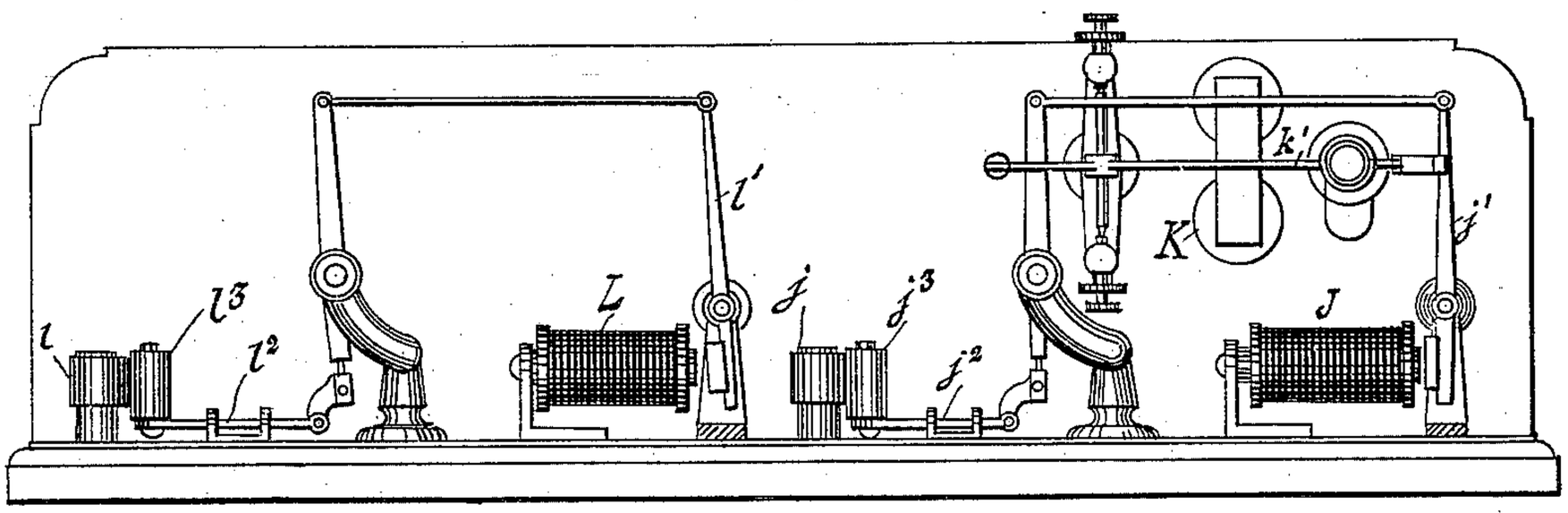
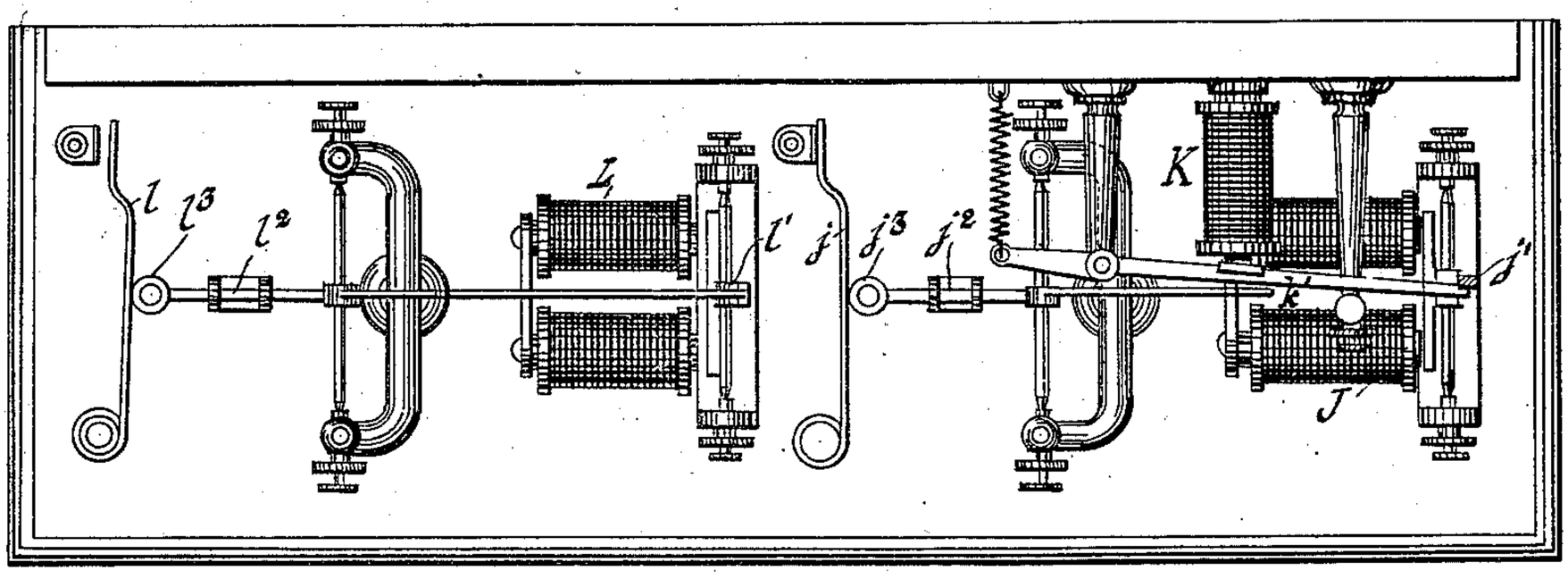


Fig. 5.



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UNITED STATES PATENT OFFICE.

HENRY D. WINTON, OF WELLESLEY HILLS, MASSACHUSETTS.

SINGLE-RAIL CIRCUIT FOR ELECTRIC RAILWAY-SIGNALS.

SPECIFICATION forming part of Letters Patent No. 311,050, dated January 20, 1885.

Application filed March 20, 1884. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. WINTON, a citizen of the United States, residing at Wellesley Hills, in the county of Norfolk and State of Massachusetts, have invented new and useful Improvements in Single-Rail Circuits for Electric Railway-Signals, of which the following is a specification.

This invention relates to a circuit for electric railway-signals, which includes an insulated single-rail section in contradistinction to the insulated double-rail section already known and used in circuits for electric railway-signals.

The peculiar and novel arrangement of the parts which compose my new circuit is pointed out in the following specification and illustrated in the accompanying drawings, in which—

Figure 1 represents a face view of an electro-magnet which forms part of the single-rail-section circuit. Fig. 2 is a side elevation of the same. Fig. 3 is a diagram of the single-rail-section circuit as applied to a railway-signal. Fig. 4 is a diagram of the same, including the means for reversing the signal. Fig. 5 is a plan of the double-circuit instrument on a larger scale than Figs. 3 and 4. Fig. 6 is a side view of the same.

Similar letters indicate corresponding parts.

In the drawings, the letter A designates a railroad-track, one branch or side of which is constructed of rails *a a a*, placed upon sleepers in the usual manner—that is to say, not insulated from the ground. The opposite side of the track is composed partly of non-insulated rails *b b*, placed upon sleepers in the usual manner, and partly of insulated single-rail sections *c*, which are placed in line with the non-insulated rails *b b*, but are insulated from them and also from the ground. These insulated single-rail sections *c* are at such distances apart as circumstances may require, said distances being dependent upon the points at which it is desired to put the signals.

With each of the insulated single-rail sections are combined a battery, B, and an electro-magnet, C. One pole of this battery connects by a wire, 10, with the ground, and also by wire 11 with one end of the helix of the electro-magnet C. The other end of this helix connects by a wire, 12, with the insulated single-rail section *c*, and the second pole of the battery B connects also with this insulated rail-section by a wire, 13. The non-insulated rail *a* also is in metallic contact with the ground, as indicated by the wire 14.

Detached views of the electro-magnet C are shown in Figs. 1 and 2. From these figures it will be seen that the armature D is suspended by blades *e e* from pivots *d d*, which turn in suitable sockets, so that when the electro-magnet is vitalized the armature swings in the direction of the arrow marked near it in Fig. 1. By this movement of the armature an oscillating motion is imparted to a lever, E, which acts upon a spring, F, so as to retain this spring in contact with its anvil G as long as the electro-magnet C is vitalized. Any other electro-magnet may, however, be used, the armature-lever of which acts upon a circuit-closer, so as to retain the same in a closed position so long as the electro-magnet is vitalized. The anvil G of the circuit-closing spring F connects by a wire, 15, with one pole of the signal-battery B*, and the other pole of this battery connects by a wire, 16, with one end of the helix of the signal-magnet I, the second end of which connects by a wire, 17, with the support H and the spring F. The signal S is so constructed that it is concealed or in the position indicating "safety" as long as the signal-magnet I is vitalized; but when the circuit through this magnet is broken the signal drops into sight (indicating "danger") by its own gravity.

By referring to Fig. 3 it will be seen that the circuit of battery B* through the signal-magnet I remains closed as long as the spring F is held in contact with its anvil G, and since said spring occupies this position as long as the electro-magnet C is vitalized, the signal remains in a position of "safety" until the circuit of the battery B through the electro-magnet C is broken. Whenever a locomotive or a train passes the insulated single-rail section *c*, this insulated section is brought in metallic contact with the non-insulated rail *a*, and the battery B becomes short-circuited through wires 10 13 14 and the ground, the circuit through electro-magnet C is broken, the spring F recedes from its anvil G, the circuit through signal-magnet I is broken, and the signal S drops into sight, indicating "dan-

ger." The train moving on the insulated section *c* is thus protected against a following train; but as soon as the train leaves the insulated single-rail section *c*, the signal-magnet I is again vitalized, and the signal is restored to "safety."

Fig. 4 is for the purpose of illustrating the combination of the insulated single-rail-section circuit above denoted with the regular wire-circuit block-section, such wire circuit being in common use, and forming no part of my present invention. By inspecting Fig. 4 it will be seen that a circuit is complete from battery B, through wire 11, magnet C, wire 12, insulated single-rail section *c*, wire 13, to battery. This closes a secondary circuit from battery B*, through wire 15, wire 20, locking-magnet K of the double-circuit instrument, (detached views of which are shown in Figs. 5 and 6,) wire 21, spring *j*, wire 22, signal-magnet I, circuit-closer F, wire 23, track-instrument breaker *t*, (which is normally closed,) wire 24, wire 25, to battery B*. Both these circuits are normally closed. Consequently the signal is out of sight. A train entering the section will ground the insulated single-rail circuit, as explained in the description of Fig. 3, circuit-closer F is opened, the main-signal circuit is broken, and at the same time spring *j* will be unlocked, because the circuit through locking-magnet K is broken, and the signal drops to "danger" and remains there. Should the single-rail circuit fail to ground from any cause, the signal-circuit will be broken at track-instrument T, as well known in the block system. It will be seen, then, that it is impossible to enter the section without setting the signal to "danger." If the rail-circuit fails to perform its duty, the track-instrument T will operate the signal. On going out of the section it will be seen that the circuit will be closed at track-instrument T′ from battery B*, through wire 15, magnet L, wire 16, magnet J, wire 17, circuit-closer *t′*, wire 18, wire 25, to battery B*. This will restore the spring *j* and complete the signal again, as in the well-known block-circuit; but it cannot be completed unless the train has entirely left the section, because as long as the rail-circuit is grounded by the train the spring F will be open and the signal-circuit cannot be closed; but when the last pair of wheels of the train have left the rail-section the track-instrument T′ will restore the signal to "safety." If the rail-circuit should fail to return to its normal condition or remain grounded from any cause, the track-instrument T′ will not return the signal to "safety." The magnet L keeps the spring *l* closed so long as it is vitalized, so that if the signal-restoring circuit is grounded, crossed, or permanently closed in any way at any point, the main signal-circuit will be shunted or short-circuited from wire 22, through wire 26, spring *l*, wire 19, wire 18, wire 25, to battery B*. This device, however, is also part of the block system above mentioned, and forms no part of my invention.

The double-circuit instrument above referred to, and illustrated in Figs. 5 and 6, consists of a main magnet, J, and a locking-magnet, K, which are combined so that the armature-lever *k′* of the locking-magnet locks the armature-lever *j′* of the main magnet whenever said locking-magnet is vitalized—that is to say, if the main magnet is temporarily vitalized, so that its armature is attracted and a circuit through the locking-magnet is then closed, the armature-lever *k′* locks the armature-lever *j′* of the main magnet, and retains the same in the position shown in Figs. 5 and 6 until the circuit through the locking-magnet is broken. The armature-lever *j′* connects with a rod, j^2, which carries a tappet, j^3, that acts upon the circuit-closing spring *j*, and closes the same whenever the main magnet J is vitalized, and this spring remains closed as long as the armature-lever *j′* is locked by the armature-lever *k′* of the locking-magnet, Fig. 4. With the two magnets J and K is combined the additional magnet L, which is in the circuit of the main magnet J. The armature-lever *l′* of the additional magnet L is connected with a rod, l^2, which carries the tappet l^3, that acts on the circuit-closing spring *l*, so as to close the same whenever the additional magnet L is vitalized.

This double-circuit instrument forms no part of my invention, and as far as I know has been invented by Alvah W. Hall, of Meriden, Connecticut. I have illustrated and described the same simply for the purpose of rendering the parts shown in Fig. 4 fully intelligible.

I do not claim an electric circuit composed of one line or section of rails connected to the battery, the other line or section being grounded; nor do I claim a circuit for electric railroad-signals in which the metallic connection of the two lines of rails by the wheels and axles of a train forms a shunt-circuit to the circuit containing the signal apparatus or signal-controlling apparatus, as such have been known and used.

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

1. The combination, substantially as hereinbefore described, of the insulated single-rail section forming part of one rail of a railroad-track, the rail which forms the other part of the railroad-track and is grounded, the battery having one pole connected to the insulated rail-section and the other pole to the ground, and also to one end of the helix of an electro-magnet, the other end of which is connected to the insulated single-rail section, the circuit-closer controlled by the armature of the electro-magnet, and the signal-battery, the circuit of which is controlled by the circuit-closer.

2. The combination, substantially as hereinbefore described, of the insulated single-rail section forming part of one rail of a railroad-track, the rail which forms the other part of the railroad-track and is grounded, the battery B, the electro-magnet C, the connections of these parts, as shown, the circuit-closer F, controlled by the electro-magnet C, the signal-

battery B*, the signal-magnet I, signal S, and their connections, as shown.

3. The combination, substantially as hereinbefore described, of the insulated single-rail-section circuit comprising the rail-section *c*, battery B, and electro-magnet C, with the signal-magnet I, signal S, and with the regular wire-circuit block-section comprising the battery B*, electro-magnets J K L, track-instruments T T′, and the connections of these parts, as shown.

In testimony whereof I have hereunto set my hand and seal in the presence of two subscribing witnesses.

HENRY D. WINTON. [L. S.]

Witnesses:

ALBERT JENNINGS,

SARAH F. JENNINGS.