No. 645,839. Patented Mar. 20, 1900.

C. A. STIMPSON.

SIGNAL FOR RAILWAYS.

(Application filed Aug. 8, 1899.)

(No Model.)

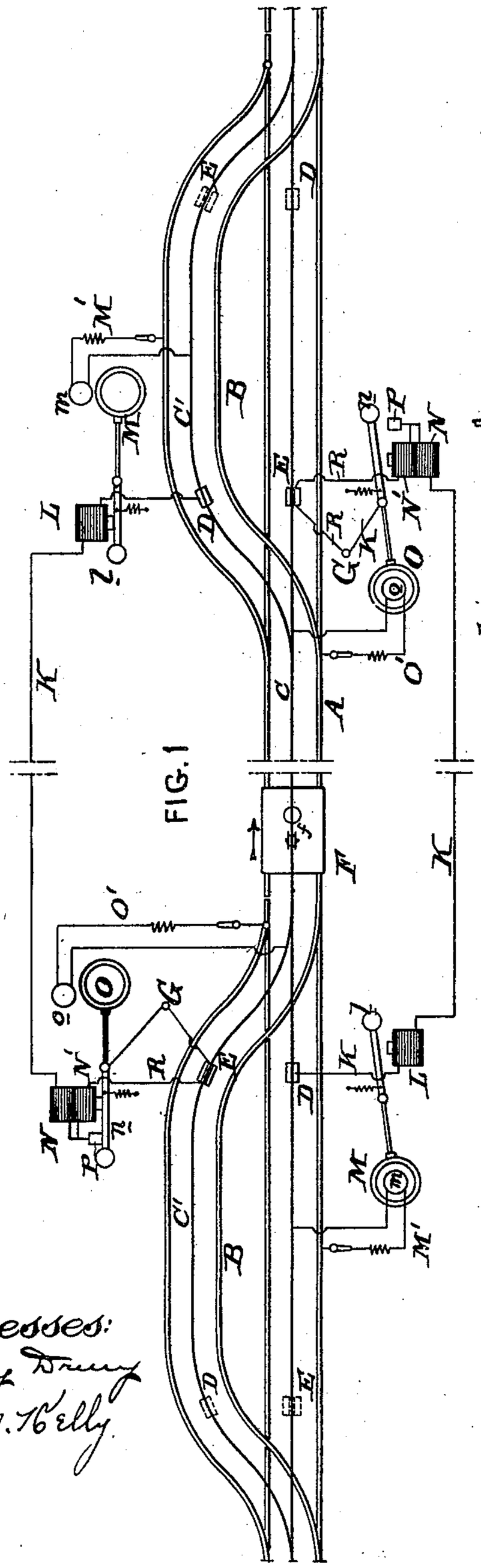

FIG. 1.

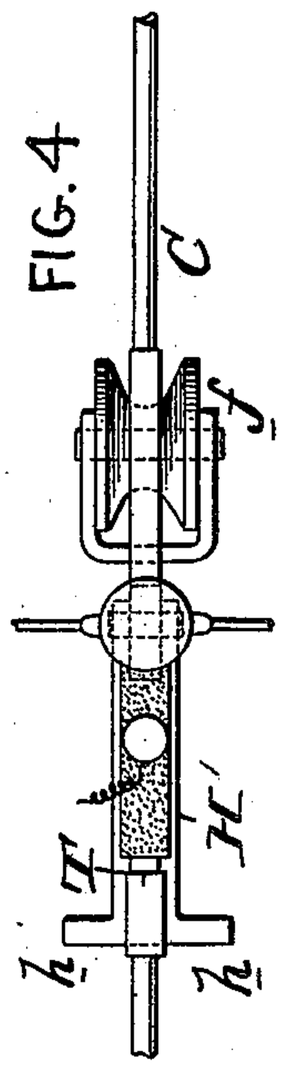

FIG. 4.

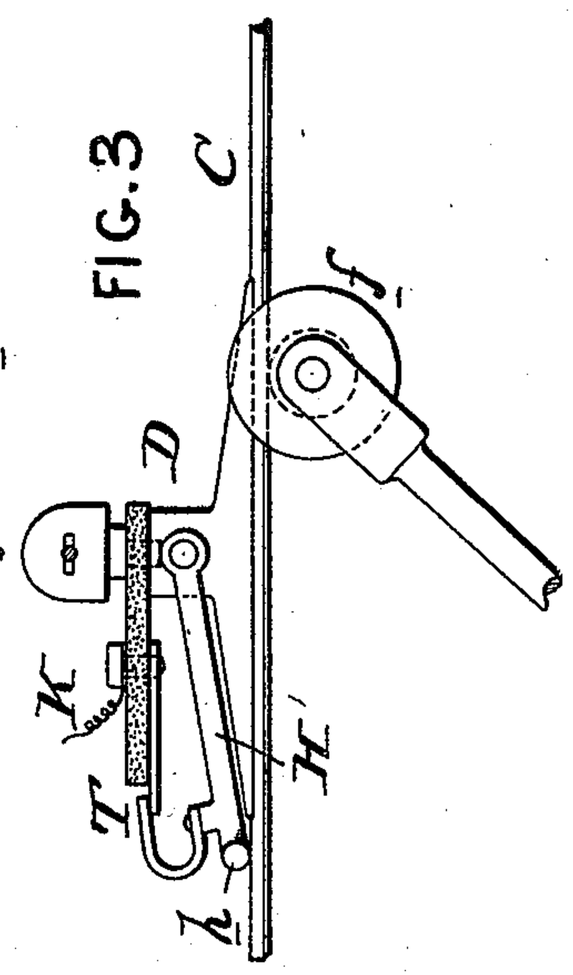

FIG. 3.

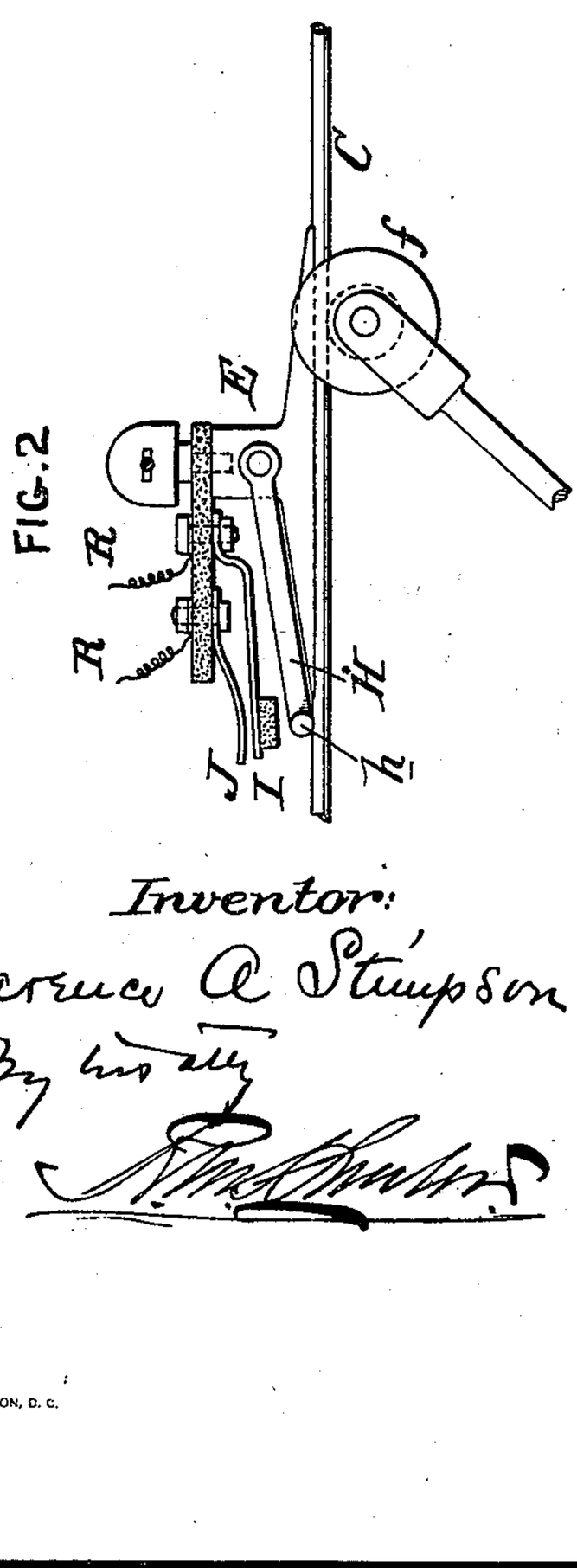

FIG. 2.

Witnesses:
Henry Dewey
R. M. Kelly

Inventor:
Clarence A. Stimpson
By his Atty
S. Whittemore

UNITED STATES PATENT OFFICE.

CLARENCE A. STIMPSON, OF PHILADELPHIA, PENNSYLVANIA.

SIGNAL FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 645,839, dated March 20, 1900.

Application filed August 8, 1899. Serial No. 726,525. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE A. STIMPSON, of the city and county of Philadelphia, State of Pennsylvania, have invented an Improvement in Signals for Railways, of which the following is a specification.

My invention has reference to block-signals for electric railroads; and it consists of certain improvements, which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

The object of my invention is to provide a suitable system of electric signaling especially adapted to control railways, and more particularly those in which single tracks with turnouts at intervals are employed and upon which the cars run in opposite directions.

In carrying out my invention I provide a normally-closed circuit extending between the turnout-sections and also a similar circuit between the portions of the main line adjacent to the turnout-sections. These circuits I provide on one end with a normally-closed switch, whereby the line-circuit may receive current from the trolley-wire or suitable source of energy, said switch being adapted to be opened on the passage of the trolley to interrupt the current. The other end of the said circuits is grounded and includes an electromagnet operating a ground-switch and a "distant" semaphore or signal. I furthermore employ a shunt-circuit including coils of the electromagnet last described, adapted to energize the same upon closing a second ground-switch operated by the passing trolley-arm. The first-mentioned end of the line-circuit may also include an electromagnet to operate a semaphore or signal arm adjacent to the section where the car starts and which may be termed the "home" signal.

The operation of the device is such that when a car passes down the main line it first opens the normally-closed switch, thus destroying the magnetism of the home-signal magnet and causing a danger-signal to be given, and, furthermore, the opening of said circuit destroys the energy of the distant electromagnet operating upon the distant semaphore or signal, which also goes to "danger." After the car has passed over the line and is about to pass to the next section the trolley-arm closes a ground-switch, which energizes the magnet of the distant signal and causes its armature to be attracted. This action also closes the other ground-switch and maintains the line-circuit closed after the trolley-car has passed on. The action of this is to throw both the home and distant signals once more to "safety." The same action takes place on a similar set of circuits when a car passes from the turnout or siding onto the main line in the opposite direction and again onto the distant turnout.

My improvements will be better understood by reference to the accompanying drawings, in which—

Figure 1 is a plan view of the track and circuits embodying my invention. Fig. 2 is an enlarged view of the distant trolley ground-switch. Fig. 3 is the home normally-closed switch, and Fig. 4 is a plan view of same.

A is the main-line track, which has at intervals in its length turnout-sections B B.

C is the main trolley-conductor, and C′ the turnout trolley-conductors, these being constructed in any well-known manner.

F is a trolley-car, and *f* the trolley-pole.

I will first describe the signal-circuits in connection with the main line, and it is to be understood that the signal-circuits between the successive turnouts are precisely the same as those of the main line, with the exception that they are reversed, because the cars are running in opposite directions in the two instances.

K is the main-line signal-circuit, which connects at one end with a normally-closed switch D, (more clearly shown in Figs. 3 and 4,) and at the other or distant end the line-circuit connects, through an electromagnet N and a ground-switch made up of a contact P and an armature *n*, with the ground at G. A shunt-circuit R connects with the main line K adjacent to the ground-contact P and includes the coils N′ of the electromagnet N and also connects with the ground through a normally-open ground-switch E. (Best shown in Fig. 2.) The armature *n* operates a semaphore O, which may be of red glass or red fabric and which passes in front of or to one side of an electric or other lamp *o*. If an electric lamp is employed, it may be energized from the trolley-circuit by a light-circuit O′. Any ordinary

white light may be employed, if desired. At the other or home end of the circuit I arrange an electromagnet L, which operates an armature *l*, connected with a semaphore M similar to that last described and adapted to change the color of the white light *m* to the red danger-signal whenever the magnet L is demagnetized. If an electric lamp *m* is employed as the white light, it may be energized by an electric circuit M′ from the trolley-circuit.

The normally-closed home switch D consists of an arm H′, pivoted and having lateral projections *h*, adapted to be pressed upward by the wheel of the trolley *f* as the car passes under it. When the arm H′ is pressed upward, it opens the normally-closed switch T and interrupts the current in the line-signal circuit K, thereby simultaneously demagnetizing the electromagnet L and the electromagnet N. Both armatures of these electromagnets then fall away from their magnets and throw the semaphore to "danger." The distant ground-switch E (best known in Fig. 2) comprises a similar pivoted arm H, which is raised by the passing trolley and brings the track-switch terminals I J into contact for closing the shunt ground-circuit R. The operation of this switch takes place when the car *f* F passes under it. Upon closing the circuit R it will be seen that the current will then pass over the line K, through the main coils of magnet N, then through the coils N′ of said magnet N, and by circuit R to ground. This will instantly cause the armature *l* at the home station and the armature *n* at the distant station to be drawn up and the signals thrown to "safety." As soon as the armatures *n* at the distant station close the circuit K on the contact P the main line L is grounded through N, P, *n*, K, and G, and the opening of the ground-switch E after the car has passed does not disturb the safety position of the several parts.

Precisely a similar set of circuits, switch-magnets, and signals is employed in connection with the turnouts B B, only in this case the home and distant signals are reversed to suit the opposite direction in which the cars are run. In Fig. 1 the circuits are shown between two adjacent turnouts, which may be half a mile or more apart, and a similar set of signals and circuits are employed between the said turnouts and the next distant turnouts in either direction on the line. The switches for these additional circuits are indicated in dotted lines at D E.

It will be observed that the switches D E on the main line are so located that they are not disturbed by a trolley-car which is required to use the turnouts, and likewise the switches E D of the turnouts are not disturbed by the trolley on the cars which are required to remain on the main line.

I have shown the signal-circuits as receiving their energizing-current from the trolley-wire; but it is evident that I am not confined to this source of energy, as any suitable source would answer the requirements. I prefer, however, to employ a current from the trolley-wire, as it overcomes the necessity of additional sources of energy and the resulting work and labor in looking after the same. While I have also shown my invention as especially adapted to single-track railways with turnouts, it is self-evident that it may be employed simply as a block system for single tracks without turnouts or for straight double tracks, though its greatest utility will be found in cases where the cars are simultaneously running in opposite directions on different portions of the same main track, which constructions are largely used in suburban railways and trolley-lines traversing country districts.

While I prefer the construction shown, I do not limit myself to the details thereof, as these may be modified in various ways without departing from the spirit of the invention.

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

1. In an electric signal for an electric railway, the combination of the main track and trolley-wire, of a signal-circuit extending between distant points on the railway one end of the circuit being connected with the trolley-wire and the other end with the ground or return circuit, a normally-closed switch connecting the signal-circuit with the trolley-wire and adapted to be opened on the passing of the trolley or current-collector of the car, an electromagnet and armature at the distant end of the signal-circuit adapted to control a danger-signal, a ground-switch controlled by the armature to open or close the signal-circuit, and means adjacent to the danger-signal operated by the trolley of the car for closing the said ground-switch and causing the danger-signal to be thrown to safety position.

2. In an electric signal for an electric railway, the combination of the main track and trolley-wire, of a signal-circuit extending between distant points on the railway one end of the circuit being connected with the trolley-wire and the other end with the ground or return circuit, a normally-closed switch connecting the signal-circuit with the trolley-wire and adapted to be opened on the passage of the trolley or current-collector of the car, an electromagnet and armature at the distant end of the signal-circuit adapted to control a danger-signal, a ground-switch controlled by the armature to open or close the signal-circuit, and means adjacent to the danger-signal operated by the trolley of the car for closing the said ground-switch and causing the danger-signal to be thrown to safety position consisting of an additional electromagnet energizing-coil for operating the armature of the ground-switch, a shunt ground-circuit and

a magnetically-operated and normally-open switch operated by the trolley in passing to temporarily close the shunt ground-circuit.

3. In an electric signal for an electric railway, the combination of the main track and trolley-wire, of a signal-circuit extending between distant points on the railway one end of the circuit being connected with the trolley-wire and the other end with the ground or return circuit, a normally-closed home switch connecting the signal-circuit with the trolley-wire and adapted to be opened on the passage of the trolley or current-collector of the car, an electromagnet and armature at the distant end of the signal-circuit adapted to control a distant danger-signal, a ground-switch controlled by the armature to open or close the signal-circuit, means operated by the trolley or collector of the car for closing the said ground-switch and causing the danger-signal to be thrown to safety position, and an electromagnetically-operated home signal arranged adjacent to the normally-closed home switch.

4. In an electric signal for an electric railway, the combination of the main track and trolley-wire, of a signal-circuit extending between distant points on the railway one end of the circuit being connected with the trolley-wire and the other end with the ground or return circuit, a normally-closed home switch connecting the signal-circuit with the trolley-wire and adapted to be opened on the passage of the trolley or current-collector of the car, an electromagnetically-operated home signal arranged adjacent to the normally-closed home switch, an electromagnet and armature at the distant end of the signal-circuit adapted to control a distant danger-signal, a ground-switch controlled by the armature to open or close the signal-circuit, and means adjacent to the distant signal operated by the trolley of the car for closing the said ground-switch and causing the distant danger-signal to be thrown to safety position consisting of an additional electromagnetic energizing-coil for operating the armature of the ground-switch, a shunt ground-circuit including said coil and connecting with the line-circuit and a magnetically-operated and normally-opened switch operated by the trolley in passing to temporarily close the shunt ground-circuit.

5. In a single-track electric railway having turnouts at intervals, the combination of the main track and turnouts, the trolley-conductors for said main line and turnouts, and two systems of distant signals oppositely arranged and each consisting of a signal-circuit extending between distant points on the railway one end of the circuit being connected with the trolley-wire and the other end with the ground or return circuit, a normally-closed switch connecting the signal-circuit with the trolley-wire and adapted to be opened on the passage of the trolley or current-collector of the car, an electromagnet and armature at the distant end of the signal-circuit adapted to control a danger-signal, a ground-switch controlled by the armature to open or close the signal-circuit, and means operated by the trolley of the car for closing the said ground-switch and causing the danger-signal to be thrown to safety position, the construction being such that the normally-closed trolley-interrupting switches are arranged in connection with the main-line trolley-conductor and turnout trolley-conductor so as to be operated only by the corresponding cars, and likewise the means operated by the cars for closing the ground-switch on the distant signal are also arranged to be actuated only by the corresponding cars.

6. In a block-signal system for railways, the combination of a line-circuit extending between two distant parts of the railway, a source of electric energy for supplying current to one end of the line-circuit, a normally-closed circuit-interrupting switch adapted to be temporarily opened by the passage of a car on the railway, a ground connection for the line-conductor at the distant end thereof, an electromagnetically-operated distant signal energized by the current in the line-circuit, a ground-switch for interrupting the line-circuit and normally held closed by an electromagnetic device, and means under the control of the car in passing the distant signal for positively closing the ground-switch for the purpose of closing the line-circuit and throwing the distant signal to "safety."

7. In a block-signal system for railways, the combination of a line-circuit extending between two distant parts of the railway, a source of electric energy for supplying current to one end of the line-circuit, a normally-closed circuit-interrupting switch adapted to be temporarily opened by the passage of a car on the railway, a ground connection for the line conductor at the distant end thereof, an electromagnetically-operated distant signal energized by the current in the line-circuit, a ground-switch for interrupting the line-circuit and normally held closed by an electromagnetic device, means under the control of the car in passing the distant signal for positively closing the ground-switch for the purpose of closing the line-circuit and throwing the distant signal to "safety," and a home electromagnetically-operated signal energized by the current in the line-circuit and arranged adjacent to the normally-closed switch for connecting the line conductor and the source of energy.

8. In a block-signal system for railways, the combination of a line-circuit extending between two distant parts of the railway, a source of electric energy for supplying current to one end of the line-circuit, a normally-closed circuit-interrupting switch adapted to be temporarily opened by the passage of a car on the railway, a ground connection for the line conductor at the distant end thereof, an electromagnetically-operated distant signal energized by the current in the line-circuit,

a ground-switch for interrupting the line-circuit and normally held closed by an electromagnetic device, and means under the control of the car in passing the distant signal for positively closing the ground-switch and thereby closing the line-circuit and throwing the distant signal to "safety," said means comprising an electromagnetic device for operating the ground-switch, a ground-circuit connecting with a source of energy on one side and the ground on the other and including the electromagnetic device, and a mechanically-operated circuit-closing switch moved by the passage of the car for temporarily closing the ground-circuit as the car passes the distant signal.

In testimony of which invention I have hereunto set my hand.

CLARENCE A. STIMPSON.

Witnesses:

J. W. KENWORTHY,

R. M. KELLY.