No. 741,955. PATENTED OCT. 20, 1903.

H. BROOKS.

ELECTRIC RAILWAY SIGNAL.

APPLICATION FILED NOV. 14, 1902.

NO MODEL.

Fig. 1.

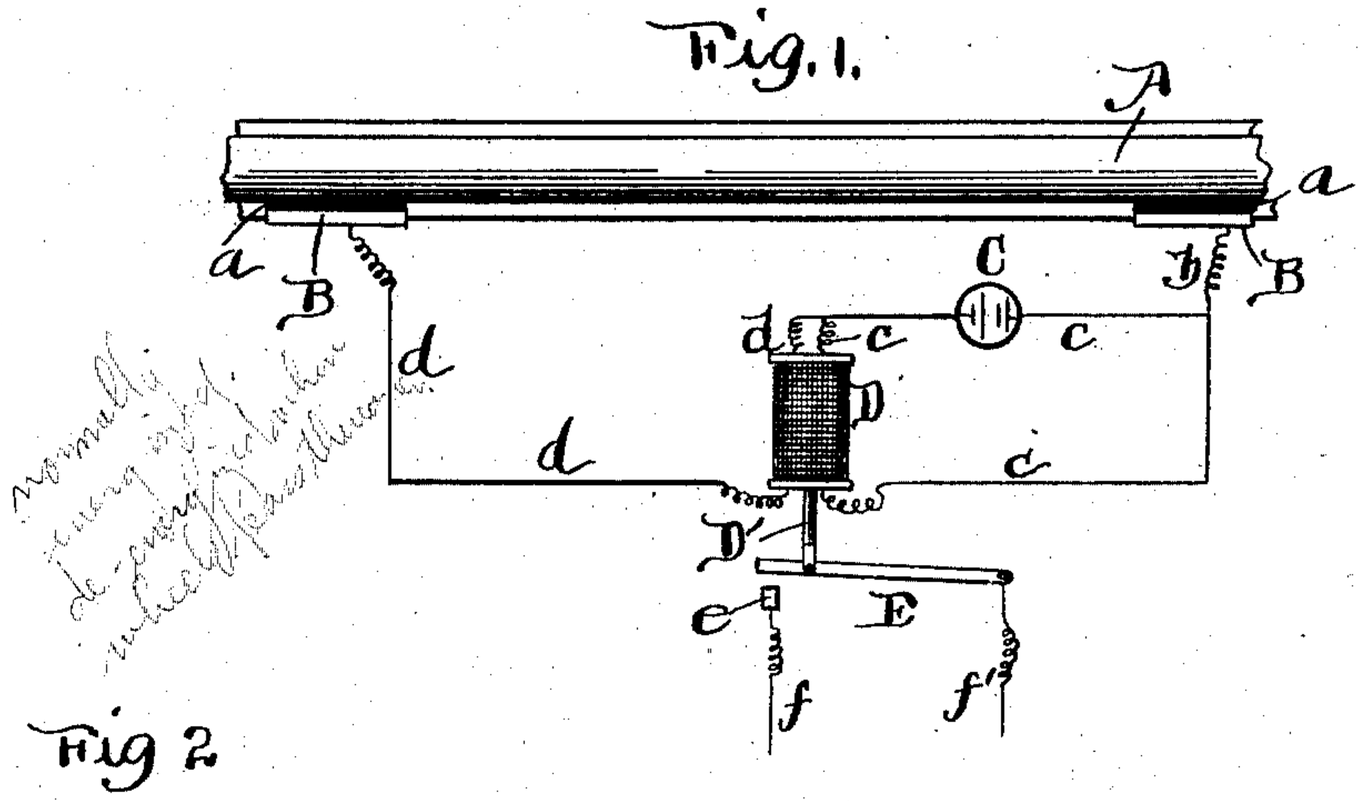
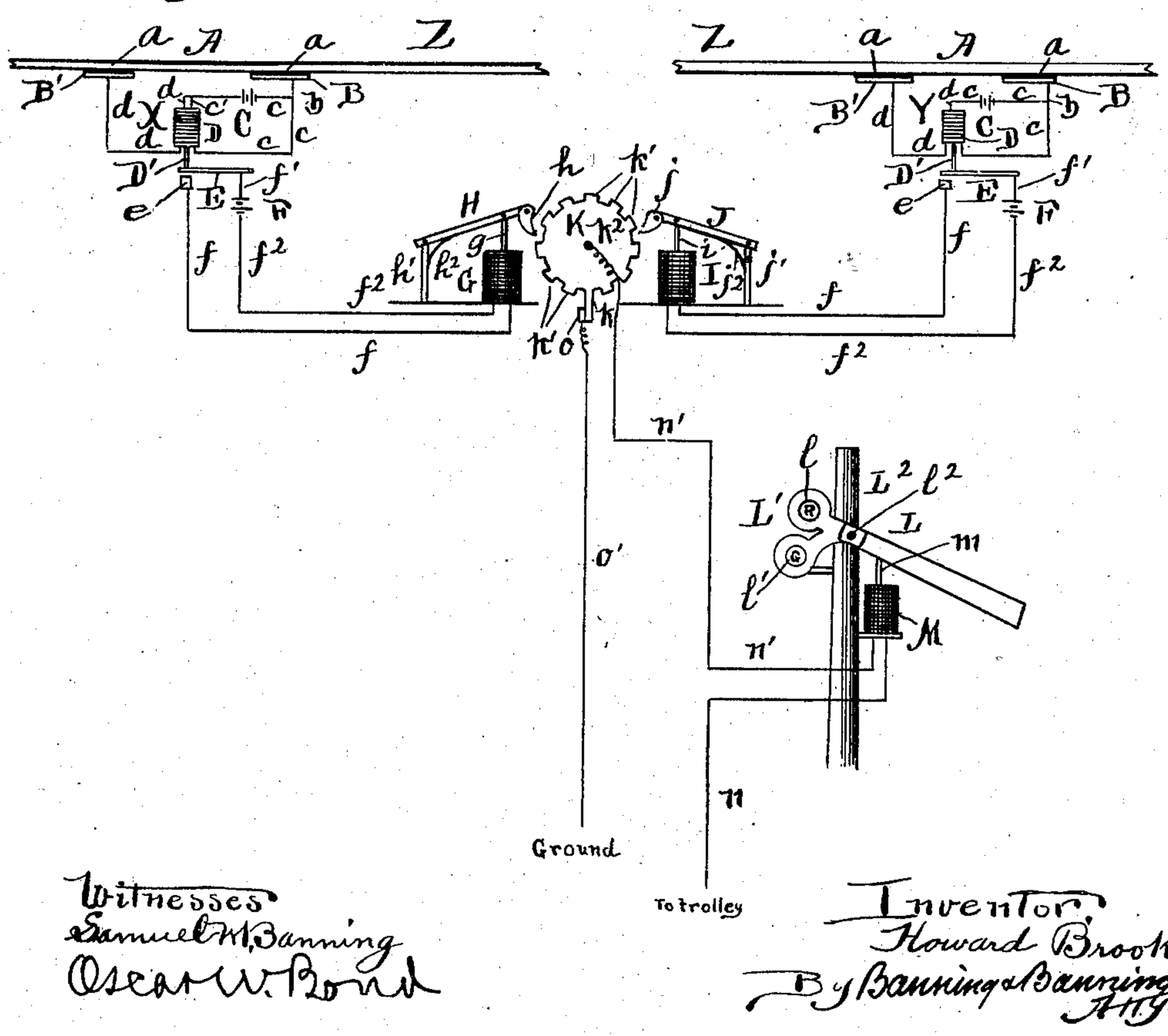


Fig 2.



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UNITED STATES PATENT OFFICE.

HOWARD BROOKS, OF WHEATON, ILLINOIS.

ELECTRIC RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 741,955, dated October 20, 1903.

Application filed November 14, 1902. Serial No. 131,323. (No model.)

To all whom it may concern:

Be it known that I, HOWARD BROOKS, a citizen of the United States, residing at Wheaton, in the county of Dupage and State of Illinois, have invented a certain new and useful Improvement in Electric Railway-Signals, of which the following is a specification.

This invention relates more particularly to electric railway-signals adapted for use in connection with what is generally known as the "block system" on railroads, and is especially designed for use with surface or elevated roads operated by electricity.

The objects of the invention are to insure the operation of the signal to show "danger" as the train enters a block, station, or stopping-place and with the departure of the train from the block, station, or stopping-place have the signal returned to normal position, showing "safety;" to enable the signal to be operated and show "danger" by the passage of the train on the track as it enters the block, station, or stopping-place; to indicate a breakage or interference from any cause with the electric circuit controlling the signal by displaying the danger-signal, and to improve generally the construction and operation of the devices entering into the construction of the signal as a whole.

The invention consists in the features of construction and combinations of parts hereinafter described, and pointed out in the claims.

In the drawings, Figure 1 is a plan view, partly diagrammatic, showing one rail of the track and the arrangement of the signaling devices in connection therewith; and Fig. 2, a diagrammatic view showing an arrangement of signals for a block, station, or stopping-place.

The drawings show only one rail of a railway-track, as such showing is sufficient for illustrating the invention, and the track is to have the rails A supported upon ties or otherwise, as in the ordinary way of laying the tracks of railways. Adjacent to the outer face of the rail is located a pair of contact blocks or plates B of a sufficient height and in such close relation to the rail as to have the treads of the wheels in passing thereover to ride on or be in contact with the upper surface of the blocks or plates, and each block or plate B and B′ is insulated by any suitable insulating material *a*, so arranged as to prevent the current from passing onto the rail or otherwise leaving the plates or blocks except by the predetermined route. An electric battery C or other suitable source of electric energy is located in proper relation to the plates or blocks, and from one pole of this source of energy a wire *c* leads to and forms a winding of a magnet D, and from the magnet the wire returns to the opposite pole of the source of energy, so that with the current passing from the battery and returning thereto the magnet D will be properly magnetized, and a wire *b* connects the block or plate B with the circuit-wire *c* of the source of energy. A wire *d* leads from the plate or block B′ and is wound around the magnet reversely to the winding of the wire *c*, making of the magnet D a reversely-wound magnet which, with the electric current passing only through the wire *c*, is magnetized and which, with the electric current passing through both the wires *c d*, becomes demagnetized and neutral. The core D of the magnet is hollow and into the core is entered a stem, pivotally connected at its outer end with a switch bar or lever E, carried at one end by a suitable pivot, so that the switch bar or lever is free to rise and fall, and the free end of the switch lever or bar is arranged to drop or come into engagement with a contact *e*, from which contact a wire *f* leads to the magnet G, and the companion wire *f′* for completing the circuit leads from the pivot of the lever or arm E, which pivot may be in the form of a binding-post or other connection that will furnish a pivot for the lever or arm and a connection for the wire *f′*. The signal shown is of the semaphore type, but can be any usual and well-known form of signals operated by an electric current.

The plates or blocks B and B′ are located at the distance apart where the wheels of a truck will rest one on each plate or block, completing a connection between the two plates or blocks, by which the electric current from the source of energy will pass through the wire *c* and the wire *b* to the plate or block B and thence by the wheels of the truck to the plate or block B′ and thence through the wire *d* to the magnet, so that

both circuits will carry the current, causing the magnet to be demagnetized and become neutral, and with the magnet neutral the stem *d*, which has been held by the magnet, is free to drop, allowing the switch lever or arm to descend and rest on the contact *e*, completing the circuit for the wires *f* and *f'*. The passage of the wheels of the truck from engagement with the plates or blocks B and B' breaks the circuit through the wire *d*, allowing the electric current to pass only through the circuit of the wire *c*, again magnetizing the magnet D and causing the magnet to attract and raise the stem and with it the switch lever or arm E, breaking the contact between the wires *f* and *f'*.

The track-signal of the present invention is operative in connection with a semaphore or other type of signals actuated from an electric circuit, and in Fig. 2 is illustrated diagrammatically an arrangement of the track-signals in connection with electric circuits operating a semaphore, only one block being shown, and for convenience of reference one track circuit or relay is represented by X, the coöperating track circuit or relay is represented by Y, and the block or section of track between the two circuits or relays is represented by Z. It will be understood that a track circuit or relay is located at each end of a block, and each track circuit or relay has coöperating therewith an electric circuit. The electric circuit for each track circuit or relay in the arrangement shown consists of a battery F or other source of electric energy, leading from one pole of which is a wire f^2, forming a companion wire for the wire *f*, leading to the contact *e*, and leading from the other pole of the battery F is the wire *f'*, connected with the switch lever or arm E, as already described. The wires *f* and f^2 from the battery F of the circuit or relay X lead to a magnet G, having a sliding armature *g*, connected with an arm H, at the free end of which is a dog or pawl *h*, and the arm is pivotally mounted on a standard *h'*, and, as shown, a spring h^2 acts to hold the arm H in its elevated position and to return the arm after each depression thereof. The wires *f* and f^2 from the battery F of the track circuit or relay Y lead to a magnet I, having a sliding armature *i*, which is connected with an arm J, having at its free end a dog or pawl *j*. The arm is pivotally mounted on a standard *j'*, and a spring j^2 serves to hold the arm in its elevated position and to return the arm after each depression thereof. A disk K is located between the magnets G and I, and this disk has an extended finger *k* and a series of teeth *k'* and is mounted on a journal pin or pivot k^2, so as to be free to revolve or turn in either direction. The disk is so located in relation to the pawls or dogs *h* and *j* that with both arms H and J elevated the disk is clear of the pawls or dogs; but with the depression of either arm H or J the pawl or dog of the depressed arm will engage a tooth *k'* of the disk and move the disk in one direction or the other, according as to which pawl or dog is the acting one.

A semaphore of the usual construction, having an arm or wing L and a weighted head L', is pivotally mounted on a post L^2 by a suitable pin or pivot l^2, and the weighted head carries a danger-signal *l* and a safety-signal *l'*, as usual. A magnet M, having a sliding armature *m*, connected with the arm or wing L, is supported, as shown, from the post L^2, and leading to the magnet M from the trolley-wire is a wire *n*, and leading from the magnet to the pin or pivot k^2 of the disk K is a wire *n'*, and from a contact *o*, with which the finger *k* can be brought into engagement, a wire *o'* leads to the ground, forming a circuit from the trolley-wire through the magnet, the disk, and the contact *o* to the ground when the finger *k* is engaged with the contact *o*, which circuit is broken with the disengagement of the finger *k* from the contact *o* and is restored with the reëngagement of the finger with the contact. The engagement between the finger *k* and the contact *o* is broken by the passage of a train over the plates B of the track circuit or relay X by deënergizing the magnet D, allowing the switch arm or lever E to drop into engagement with the contact *e*, completing the circuit from the battery F to the magnet G for the magnet to inwardly draw its armature *g*, depressing the arm H and causing the pawl or dog *h* to engage a tooth of the disk K and move the finger *k* away from the contact *o*, breaking the circuit of the magnet M, deënergizing said magnet, and allowing the arm or wing L to rise, displaying the danger-signal X. The engagement between the finger *k* and the contact *o* is restored as the wheels of the train pass over the plates B of the track circuit or relay Y, deënergizing the magnet D of said track-signal for the switch arm or lever E to drop into engagement with the contact *e*, completing the circuit from the battery F of the track-signal Y to the magnet I for the magnet to inwardly draw its armature *i* and depress the arm J for the pawl or dog of the arm to engage a tooth of the disk K and turn the disk backwardly, bringing the finger *k* into engagement with the contact *o*, restoring the circuit from the trolley-wire through the magnet M for the magnet to inwardly draw its armature *m* and depress or lower the arm L, displaying a safety-signal.

It will be understood that with the parts normal and no train on the block the safety-signal will be shown or displayed, but that with the passage of a train over the track circuit or relay X onto the block the trucks as they pass over the plates B will deënergize the magnet D, and each time the magnet D is deënergized the circuit from the battery F will be completed, and the magnet G will act to depress the arm H and advance the disk K; but with the passage of the train over the plates of the track-circuit or relay Y the

trucks of the cars will deënergize the magnet D of the track-signal Y the same number of times as the magnet D of the track-signal X was deënergized, causing the magnet I to actuate the arm J a number of times equal to the operation of the arm H from the magnet G, turning the disk K backwardly the same distance it was advanced and restoring the engagement between the finger *k* and the contact *o* for the circuit through the magnet M from the trolley-wire. The track circuit or relay is only shown diagramatically in order to illustrate a complete arrangement, and the construction illustrated for operating the semaphore or other signal from the track-controlling devices is to form the subject-matter of a separate application, the present application relating specifically to the track circuit or relay of Fig. 1.

It will be seen that with the devices of the present invention the operation of the signal as to displaying "danger" or "safety" is controlled by the passage of the train over the plates or blocks B and B′, thus holding the danger-signal displayed until the train leaves the block, station, or stopping-place and releasing the danger-signal and showing the safety-signal with the departure of the train from the station or stopping-place. The operation of the signal depends on the incoming and outgoing of a train at the block, station, or stopping-place where the plates or blocks are located, and the operation will occur only when both plates have a connection through the wheels of a truck or other contact on the train, rendering it impossible to operate the signal accidentally by making a connection with one block or plate only, as the current cannot pass on the rail to the other plate or block to complete the second circuit for dropping the switch lever or arm, owing to the insulation of the blocks or plates from the rail, nor will an accidental connection of the rail with a plate or block complete the second circuit, as it requirès a connection between both plates or blocks in order to complete the second circuit. The loss of energy at the battery or other source of energy supply is at once indicated, as without the source of electric energy in working order the magnet D is not magnetized, and the stem *d* is free to drop for the switch lever or arm to engage the contact and display the danger-signal, thus showing that something is wrong with the circuit.

The appliance is simple in nature and can be readily placed in operative position at any point desired adjacent to the track, and when in position the signal will be displayed for "danger" with the passage of a train over the track for the wheels of the truck to run over the plates or blocks and in contact therewith to complete a circuit, making a positive action in displaying the danger-signal with the entrance of the train into a block, station, or stopping-place by the engagement of the wheel or other contact on the train with the plates or blocks to complete the double circuit, by which the magnet will become demagnetized and neutral, and the switch lever or arm will drop to complete the circuit for displaying the signal.

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

1. In an electric railway-signal, the combination of a track-rail, conducting-plates located adjacent to the rail, a source of electric energy, a magnet composed of two coils electrically opposed to each other, a wire leading from the source of energy connected to one of the coils of the magnet, a wire returning to the source of energy from the opposite end of the same coil forming a normally closed circuit, a wire connecting one of the conducting-plates with the aforesaid circuit, a wire connecting the other conducting-plate with one end of the electrically-opposed coil, and a wire connecting the other end of the last-aforesaid coil with the source of energy forming a normally open circuit, substantially as described.

2. In an electric railway-signal, the combination of a track-rail, conducting-plates located adjacent to the rail and spaced a proper distance for simultaneous engagement with the truck-wheels on a train, a source of electric energy, a magnet composed of two coils electrically opposed to each other, a wire leading from the source of energy connected to one of the coils of the magnet, a wire returning to the source of energy from the opposite end of the same coil forming a normally closed circuit, a wire connecting one of the conducting-plates with the aforesaid circuit, a wire connecting the other conducting-plate with one end of the electrically-opposed coil, and a wire connecting the other end of the last-aforesaid coil with the source of energy forming a normally open circuit, substantially as described.

3. In an electric railway-signal, the combination of a track-rail, conducting-plates located adjacent to the rail, a source of electric energy, a magnet composed of two coils electrically opposed to each other having a hollow core, a wire leading from the source of energy and connected to one of the coils of the magnet, a wire returning to the source of energy from the opposite end of the same coil forming a closed circuit, a wire connecting one of the conducting-plates with the said circuit, a wire connecting the other conducting-plate with one end of the electrically-opposed coil, a wire connecting the other end of the said coil with the source of energy forming a normally open circuit, a stem entered into the hollow core of the magnet, and actuating means connected with the same for operating the signal from the magnetization and demagnetization of the magnet, substantially as described.

4. In an electric railway-signal, the combination of a track-rail, conducting-plates located adjacent to the rail, a source of electric

energy, a magnet composed of two coils electrically opposed to each other having a hollow core, a wire leading from the source of energy and connected to one of the coils of the magnet, a wire returning to the source of energy from the opposite end of the same coil forming a closed circuit, a wire connecting one of the conducting-plates with the said circuit, a wire connecting the other conducting-plate with one end of the electrically-opposed coil, a wire connecting the other end of the said coil with the source of energy forming a normally open circuit, a stem entered into the hollow core of the magnet, a lever or arm pivotally connected with the stem, and a contact for the lever or arm for operating the signal by the magnetization and demagnetization of the magnet, substantially as described.

5. In an electric railway-signal, the combination of a track-rail, conducting-plates located adjacent to the rail, a source of electric energy, a magnet composed of two coils electrically opposed to each other having a hollow core, a wire leading from the source of energy and connected to one of the coils of the magnet, a wire returning to the source of energy from the opposite end of the same coil forming a closed circuit, a wire connecting one of the conducting-plates with the said circuit, a wire connecting the other conducting-plate with one end of the electrically-opposed coil, a wire connecting the other end of the said coil with the source of energy forming a normally open circuit, a stem entered into the hollow core of the magnet, a lever or arm pivotally connected with the same, a contact for the lever or arm, and an electric circuit from the contact and lever or arm for operating the signal by the magnetization and demagnetization of the magnet, substantially as described.

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