(No Model.) 3 Sheets—Sheet 1.

G. W. BOSS.

ELECTRIC RAILWAY SIGNAL.

No. 420,858. Patented Feb. 4, 1890.

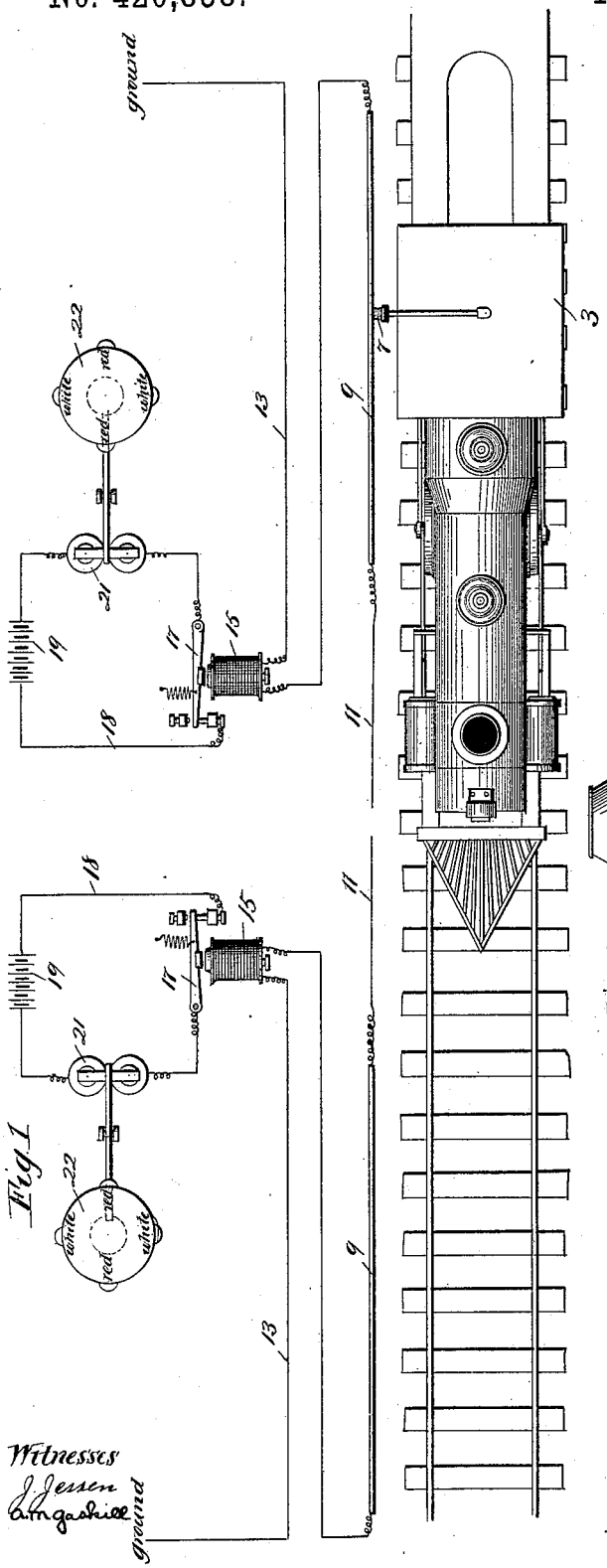


Fig. 1.

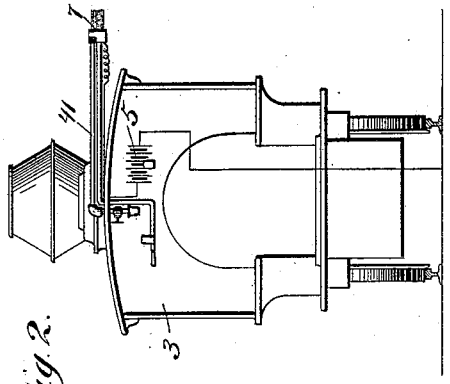


Fig. 2.

Witnesses
J. Jensen
A. M. Gaskill

Inventor.
George W. Boss.
By Paul & Wenwo Att'ys

(No Model.) 3 Sheets—Sheet 2.

G. W. BOSS.

ELECTRIC RAILWAY SIGNAL.

No. 420,858. Patented Feb. 4, 1890.

Fig. 3.

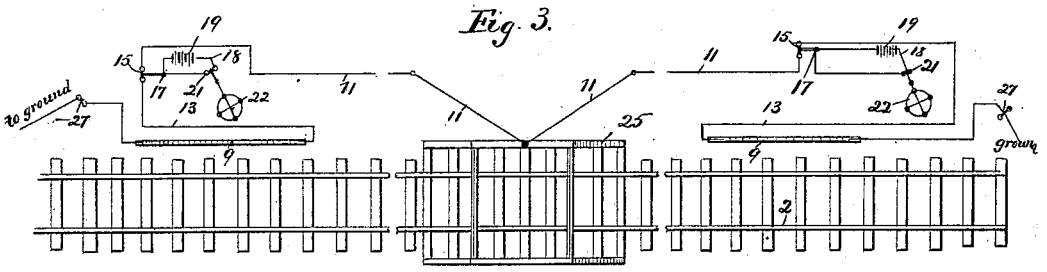
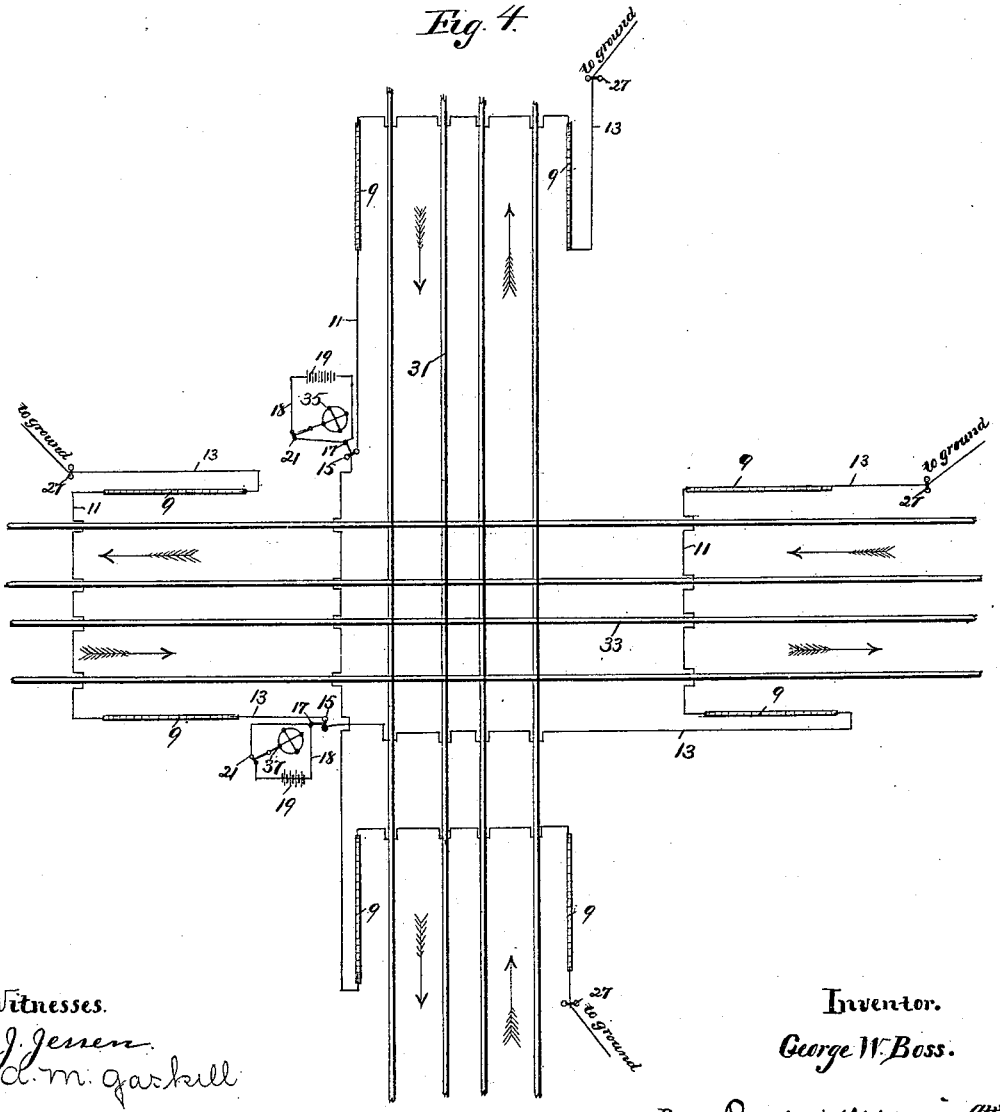


Fig. 4.



Witnesses.
J. Jensen
A. M. Gaskill

Inventor.
George W. Boss.
By Paul & Sherman Attys

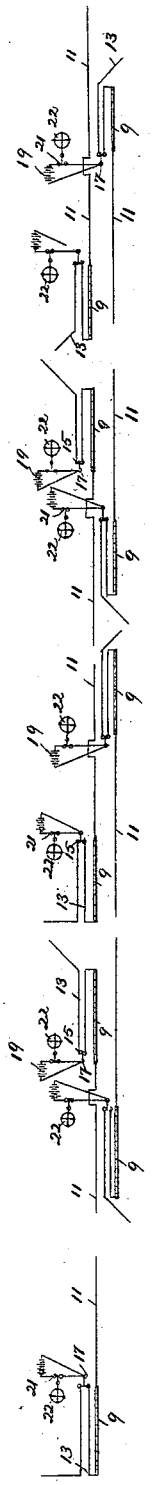
(No Model.) 3 Sheets—Sheet 3.

G. W. BOSS.

ELECTRIC RAILWAY SIGNAL.

No. 420,858. Patented Feb. 4, 1890.

Fig. 5.



Witnesses.
J. Jessen.
A. M. Gaskill

Inventor.
George W. Boss.
By Paul & Mennin attys.

UNITED STATES PATENT OFFICE.

GEORGE W. BOSS, OF MINNEAPOLIS, MINNESOTA.

ELECTRIC RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 420,858, dated February 4, 1890.

Application filed March 8, 1889. Serial No. 302,477. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. BOSS, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain Improvements in Electric Railway-Signals, of which the following is a specification.

This invention relates to improvements in electric signaling apparatus in which a passing train sets one or more signals and afterward restores them to their normal condition.

The object I have in view is to provide a block system of signals, in which each train as it passes onto a block will set signals at both ends of the block, and as it leaves the block will again operate the signals at both ends of the block and restore them to their former or normal condition so as to show that the track in this block is clear.

Other objects of the invention will appear from the following detailed description.

In the accompanying drawings, forming part of this specification, Figure 1 is a plan view showing a portion of a railroad-track with improved signaling apparatus arranged in connection therewith. Fig. 2 is a detail of the brush device on the engine. Fig. 3 is a plan showing the manner of connecting the signal with a bridge. Fig. 4 is a plan showing the application of the signal to a railway-crossing, and Fig. 5 is a diagram showing the arrangement of the blocks.

In the drawings, 2 represents an ordinary railway-track, and 3 a locomotive or car adapted to travel thereon. The car or engine 3 is provided with a suitable battery 5 or other generator of electricity. The battery 5 may be either a galvanic battery or a suitable secondary or storage battery. One pole of the battery is grounded through the frame of the engine. The other pole is connected by a suitable insulated connection with an insulated brush 7, suitably supported upon the engine or car and preferably arranged to project from the side thereof.

A metallic strip 9, preferably formed of copper or other suitable electrical conductor, is arranged to extend lengthwise of the track in such position that the brush 7 will come in contact therewith. One of these conducting-strips 9 is arranged at each end of each block, and they are connected by a wire 11. To the opposite ends of the strips 9 are connected the wires 13, each of which is grounded. In each of the wires 13 is arranged an electro-magnet 15, which operates a local circuit-closer 17. Local circuits 18 are provided and are arranged to be closed by the circuit-closers 17. Each of these local circuits is provided with a battery 19 and an electro-magnet 21 which operates a signal 22.

In order to bring the signals in position where they may be readily seen I prefer to arrange a loop in each of the wires 13 and to locate the signal at a point near the inner end of the contact-strip 9. Any suitable signal may be arranged in the local circuit. The signals are arranged at the ends of the blocks, and, if preferred, the blocks may be arranged to lap each other.

The operation is as follows: When the train reaches a block, the brush on the train is brought in contact with the contact-strip and an electric-current passes from the battery on the train through the brush to the contact-strip. The electro-magnet nearest this contact-strip offers sufficient resistance to cause the current to be divided and a part of it to pass through the wire and the contact-strip at the other end of the block, and then to the ground through the wire at that end of the block. By this means both of the electro-magnets will be magnetized and both local circuits will be closed. The magnets in the local circuits will be magnetized, and thereby the signal mechanism will be operated, and will display signals at both ends of the block that will indicate that this block of the track is occupied. When the train reaches the other end of the block, the brush will come in contact with the other contact-strip, and an electric current will pass from the train to the strip and then to the ground at both ends of the wire, energizing again the electro-magnets and closing both local circuits. The signal mechanisms will be again operated, and both signals will be set to indicate that the block of track governed by these signals is now clear.

It will be seen that the electro-magnets in the main line, when located, as described, between the contact-strips and the ground, have two functions—they operate as electro-magnets to close the local circuits, and they also act as resistance-coils to divide the current

and cause it to pass to the ground through both of the ground connections of the main line. While I prefer this arrangement, it is evident that the same result may be obtained by using two sets of coils, one set to serve as electro-magnets to operate the circuit-closers, and the other having simply the functions of resistance-coils to divide the current, as hereinafter described.

In Fig. 3 I have shown the manner of connecting this mechanism to bridges which, from high water, ice, or other causes, are deemed unsafe. In this figure, 25 represents a bridge over which the track passes. A contact-strip is arranged at each side of the bridge. These strips are connected by a wire, which is connected to the bridge, so that if the bridge is swept away the wire will be broken. The electro-magnets for operating the local circuit-closers are in this instance located in the wire between the contact-strips and the bridge. In order that the current may be sent from either strip through both ends of the wire, I locate in this instance the resistance-coils 27 between the contact-strips and the grounded ends of the wire. The current will then pass from either strip to both ends of the wire, and thus cause both sets of signals to operate. Should the bridge be swept away and the wire between the signals become broken, the signal will not operate, and the train-men will thereby know that the bridge has been swept away and the wire thereby broken.

It will be understood that, in this instance, as in the other, the electro-magnets which operate the circuit-closers may be located between the contact-strips and the ground connection, and that then the extra resistance-coils may be dispensed with, as already described, the electro-magnets serving then both as resistance-coils and to close the circuits.

In Fig. 4 I have shown the manner of applying my signal to railroad-crossings. In this figure 31 and 33 represent the railway-tracks, which cross each other. These tracks may be either single or double. A signal 35 for the track 31 is arranged to be operated by a train on the track 33, and a signal 37 for the track 33 is arranged to be operated by a train on the track 31. Where there is a double-track crossing, as represented in Fig. 4, the contact-strips may be arranged alongside of both tracks with an electro-magnet between the contact-strip and the ground. A train passing over either track of either road will first set the signal for the other road, and then, after crossing the other road, will again operate the signal to restore it to its former position.

It is preferable, in applying the signals to a railway-crossing, to locate the contact-strips upon one road farther from the crossing than they are upon the other road, in order that both signals cannot be operated by trains at the same distance from the crossing, and for this purpose the contact-strip for one road may be farther from the crossing than for the other. For example, the contact-strips for one road may be a quarter of a mile from the crossing and for the other three-eighths of a mile from the crossing. The manner of applying the signals will be substantially the same for single-track crossings, except that there need be only two contact-strips for each signal. A similar application of the signal may be made for highway-crossings.

In Fig. 5 I have illustrated the preferred manner of arranging the blocks. As here shown the blocks lap each other, and there is preferably a long lap at one end of each block and a short lap at the other end. With this arrangement trains approaching each other from opposite directions on the same track will not simultaneously set the signals at the opposite ends of the block.

The contact-strip, which is arranged by the side of the track, may be mounted upon any suitable insulators, and should be protected from sleet in some suitable manner.

A steam-pipe 41 may be arranged on the engine or train in position to supply a jet of steam to the brush to clear it of ice, snow, &c.

A suitable dynamo may be substituted for the battery on the engine or train.

I claim as my invention—

1. A railway-signal system comprising, in combination, a main wire provided with ground connections and contact-strips at each end, a local circuit provided with a suitable signal, a local-circuit-closer magnet arranged in said main wire, and a train or engine carrying a battery or equivalent having a ground connection and a brush adapted to be brought into contact with said contact-strips, whereby as said engine or train passes either of said contact-strips said local circuit will be closed and the signal in said local circuit will be operated.

2. A railway-signal system comprising, in combination, a main wire provided with ground connections and with contact-strips at each end, a local circuit at each end of the main wire, provided with a suitable signal, a local-circuit-closer magnet in the main wire for each of said local circuits, and a train or engine provided with a suitable battery or equivalent having a ground connection and a brush adapted to make contact with said contact-strips, substantially as described.

3. A block railway-signal system comprising, in combination, a main wire for each block extending the length of the block and provided at the ends of the block with ground connections and with contact-strips, local circuits at each end of the block provided with suitable signals, circuit-closer magnets for said local circuits arranged in said main wire, and an engine or train provided with a battery or other generator of electricity having a ground connection, and a brush adapted to make contact with said contact-strips, substantially as described.

4. In a railway-signal system, the combination of a main wire having contact-strips and ground connections at both ends and having resistance-coils between said contact-strips and the ground-connections, local circuits provided with suitable signals, and circuit-closer magnets for said local circuits arranged in said main wire, substantially as described.

5. In a railway block signal system, the combination, with a main wire provided with contact-strips and ground connections at each end of the block, of signals located at each end of the block and arranged to be operated by the passage of an electric current through said main wire, and an engine or train provided with a suitable brush adapted to be brought in contact with said contact-strips, and a battery or equivalent on said engine or train connected with said brush and having a ground connection, substantially as described, whereby, when contact is made by said brush with either of said contact-strips, the signals at both ends of the block will be operated, substantially as described.

6. In a electric railway-signal, the combination of a main wire having ground connections at each end, signals arranged at each end of the wire and adapted to be operated by the passage of an electric current through said wire, contact-strips connected with said wire, resistance-coils at each end of said wire between the contact-strip and the ground connection, and a brush carried by an engine or train and adapted to be brought in contact with either of said contact-strips and thereby to operate the signals at both ends of said block.

7. In an electric railway block-signal, the combination, with signals arranged at each end of the block, of contact-strips at each end of the block adapted to be engaged by a brush or circuit-closer upon a passing train, and resistance-coils between said contact-strips and the ground connection at each end of the block, substantially as described, whereby, when contact is made with the strip at either end of the block, the signals at both ends of the block will be operated.

8. A block signal system comprising a series of blocks, each provided with a signal at each end of the block, said blocks overlapping each other with a short lap at one end of the block and a long lap at the other end of the block, substantially as described.

9. The combination, in a railway-signal system, of a main wire provided at each end with ground connections and with contact-strips, resistance-coils in said wire between said contact-strips and the ground connections, signal mechanism between said contact-strips, and an engine or train provided with a battery or other generator of electricity having a ground connection, and a brush adapted to make contact with said contact-strips, substantially as described.

In testimony whereof I have hereunto set my hand this 4th day of March, 1889.

GEORGE W. BOSS.

In presence of—
A. C. PAUL,
A. M. GASKILL.