(No Model.) 2 Sheets—Sheet 1.

W. G. ROOME.

BLOCK SIGNAL FOR RAILWAYS.

No. 541,949. Patented July 2, 1895.

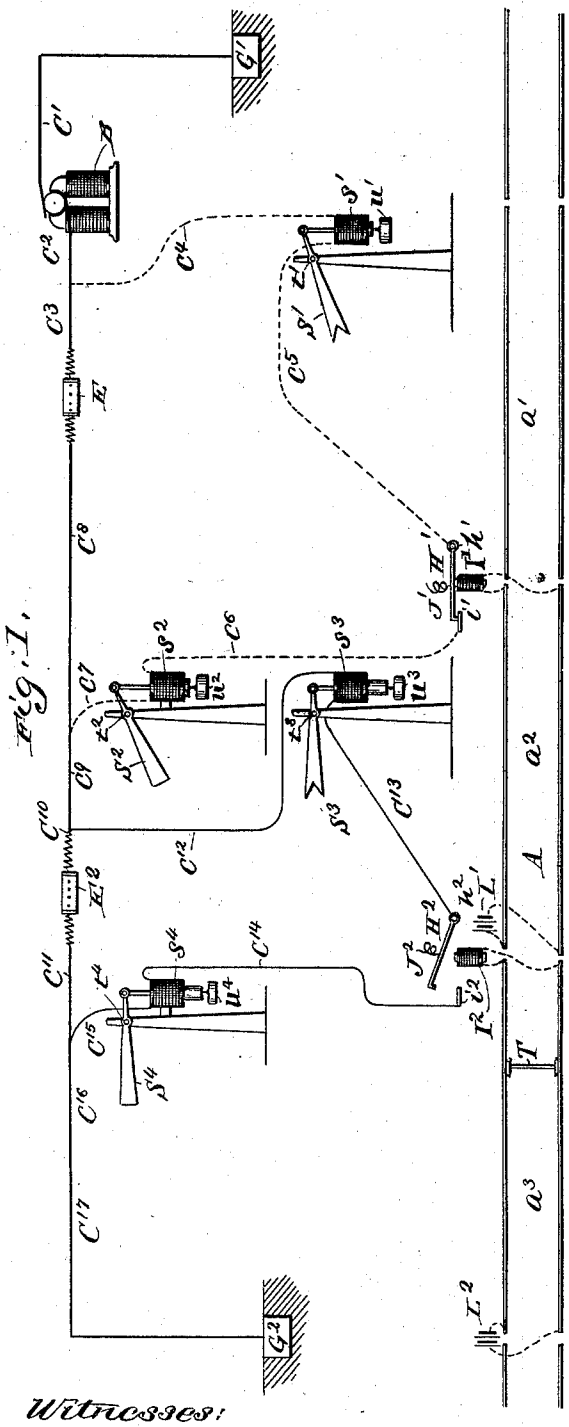

Fig. 1.

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Inventor:
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(No Model.) 2 Sheets—Sheet 2.

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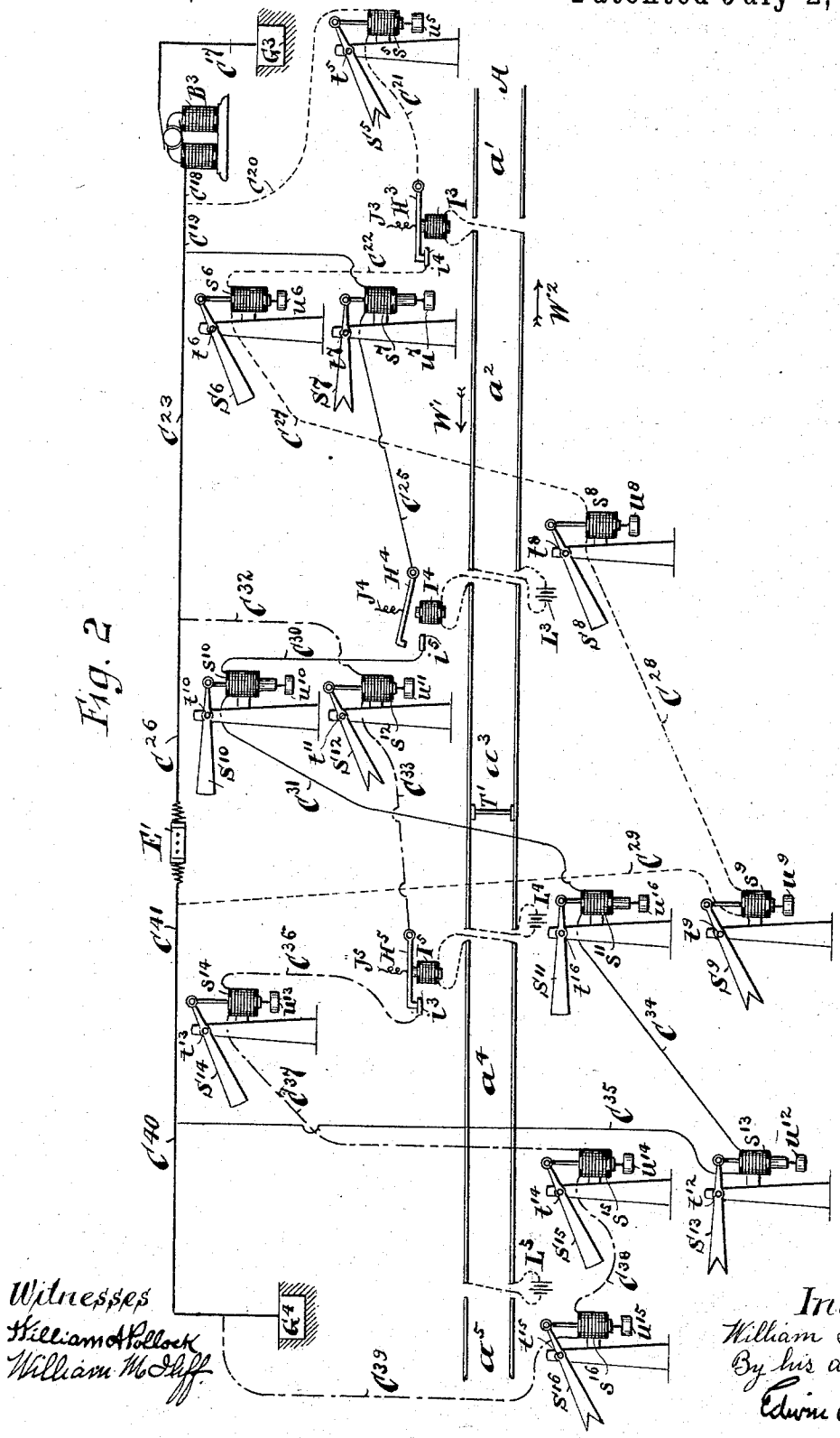

Fig. 2

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UNITED STATES PATENT OFFICE.

WILLIAM G. ROOME, OF JERSEY CITY, NEW JERSEY.

BLOCK-SIGNAL FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 541,949, dated July 2, 1895.

Application filed April 28, 1892. Serial No. 430,974. (No model.)

To all whom it may concern.

Be it known that I, WILLIAM G. ROOME, of Jersey City, Hudson county, and State of New Jersey, have invented a certain new and useful Improvement in Block-Signals and other Protecting Devices for Railways, of which the following is a specification.

I will describe my improvement in detail and then point out the novel features in the claims.

In the accompanying drawings, Figure 1 is a diagrammatic view of a portion of a railway and appurtenances embodying my improvement. Fig. 2 is a diagrammatic view of a single-track railway having two systems of signal devices for protecting the track in different directions, and showing a modification.

Similar letters of reference designate corresponding parts in both the figures.

Referring first to Fig. 1, A designates a railway track of ordinary or any suitable construction. It may be regarded as one of the tracks of a double track railroad.

B designates an arbitrary representation of a dynamo electric machine. The machine I use may be of any desired type. This dynamo s intended to supply current for certain signaling devices employed in the system.

The track A comprises a number of sections a', a^2, a^3. The section a', may be regarded as a section extending from a depot or station. The rails comprised in each section are intended to be made continuous electrically. This may be done by means of fish plates, chairs or other devices made of metal and electrically connecting the ends of abutting pieces of rail. A simple way of connecting adjacent rails in a track section is to fasten a wire to their ends. The rails comprised in each track section, are, in this example of my invention electrically independent of those comprised in every other track section. Their electrical independence may be secured by employing chairs, or fish plates of insulating material, such as wood, between the rails comprised in one track section, and those comprised in each adjacent track section.

In my improvement I use what may be regarded as a main circuit comprising all the signals and also protecting devices, if such be used, and I also use a track circuit or circuits. In each track circuit, the rails of one of the track sections are comprised.

I will first describe the main circuit and its appurtenances.

C′ designates a wire leading from one pole or electrode of the dynamo electric machine B to the ground. As here shown it is represented as connecting with a ground plate G.′

C^2 designates another wire extending from the other pole or electrode of the machine. This wire extends to a point where the main circuit branches, one branch C^3 extending to one terminal or contact point of a resistance device E, and the other branch C^4 extending to one end of the coil of an electro-magnet s' belonging to a signal S′. The electro-magnet s' will preferably be of the solenoid type, so as to be capable of producing a long range of movement. The signal S′ is represented as consisting of a lever fulcrumed between its ends on a pin t'. One end is provided with a signal board or other signal contrivance, and the other end is connected to the armature of the magnet. The magnet represented being of the solenoid type, its armature is consequently made in the form of a movable core. A weight u' is combined with the magnet armature and signal lever for moving the latter in the opposite direction to that in which it will be moved by the magnet. It is intended that the magnet shall normally influence the signal and hence set it and maintain it at the position indicative of safety, and that whenever the magnet is de-energized, the weight shall set the signal to the position indicative of danger. When the signal lever is tilted out of the horizontal position, it indicates safety and to indicate danger it is adjusted to a horizontal position. From the other end of the coil of the electro-magnet s', a wire C^5 extends to a circuit changer H′, here shown as consisting of a lever fulcrumed at one end to a pin h', and having at the other end a contact piece which is adapted to co-act with the contact piece i'. A magnet I′ is employed for maintaining the lever H′ in contact with the contact piece i' and a spring J′ is employed to adjust the lever H′, so as to withdraw it from the contact piece i' whenever the magnet I′ is de-energized.

It may be remarked in passing that the magnet I′ is not in the main circuit, but in a

track circuit. From the contact piece i' a wire C^6 extends to one end of the coil of an electro-magnet s^2, belonging to a signal S^2. The signal S^2 and the electro-magnet s^2 may be exactly like the corresponding parts of the signal S′ already described and similarly combined with a weight. The other end of the coil of the electro-magnet s^2 is connected to a wire C^7 which is united with a wire C^8 extending from the resistance device E. From the wires C^7, C^8, a wire C^9 extends.

Before proceeding further, I may remark that the signal S′ is to be a cautionary signal and the signal S^2 a danger signal. Owing to this it is desirable that the signal boards or devices of these two signals should be distinctive either in shape or color, or both. I have indicated a difference of shape and would add that ordinarily to conform to existing practices the board or device of the cautionary signal S′ would be green and that of the danger signal S^2, red.

The signal S′ would be located adjacent to the first section a' of the track A at a considerable distance from the second section a^2 of said track. The signal S^2 will preferably be located at about the junction of the two sections a', a^2.

In order that the function of the circuit changer H′ may be readily understood, I will remark here that the magnet I′ has the two ends of its coils connected by wires with the rails comprised in the track section a^2; the opposite ends of the rails of the track section a^2 being connected to the poles of a track battery L′.

Obviously, while there is no train, car or locomotive on the track section a^2 the magnet I′ will be energized and the circuit changer H′ will be caused to impinge upon the contact piece i' thus continuing the signal circuit. As the electro-magnet s', s^2, of the signals S′, S^2, will be energized, these signals will be maintained at the positions indicative of safety. This will be the normal condition of the signals and reference to the drawings will show that this is the condition in which they are illustrated, there being no train, car, or locomotive represented as located upon the track section a^2. I may add as a further explanation of the conditions in which the track sections a', a^2 and their appurtenances are illustrated that the engineer of a train passing over the track section a' will be informed first by the cautionary signal S′ long before his train reaches the second track section, a^2 and later by the danger signal S^2 at the time his train arrives at the second track section a^2 that there is no train on the second track section a^2 and consequently that he may proceed in safety.

The resistance piece E in that branch of the main circuit comprising the wires C^3, C^8, is employed to make this circuit branch approximately correspond in resistance with the other branch of the main circuit consisting of the wires C^4, C^5, C^6, C^7, and comprising the coils of the magnets s', s^2 belonging to the signals S′, S^2 and the circuit changer H′.

From the wire C^9, the wire C^{10} extends to one terminal or contact point of a resistance device E^2 which may be similar to the resistance device E and from the other terminal of the resistance device E^2 a wire C^{11} extends.

From the wire C^9 at a point whence the wire C^{10} extends from it a wire C^{12} extends to one end of the coil of an electro-magnet belonging to the signal S^3. This is a cautionary signal intended to indicate to the engineer of a train, car, or locomotive passing along the second track section a^2 whether any train, car, or locomotive is located upon the third track section a^3. This signal may be, like the signal S′, fulcrumed in the same manner to a pin t^3 and combined with an electro-magnet s^3 and a weight u^3, like the corresponding appurtenances of the signal S′. From the other end of the coil of the electro-magnet s^3 of the signal S^3 a wire C^{13} extends to a circuit changer H^2. This circuit changer consists of a lever corresponding with that forming the circuit changer H′, similarly fulcrumed at one end to a pin h^2 and is adapted at the other end to coact with a contact piece i^2. This lever is combined with a spring J^2 and an electro-magnet I^2. The magnet I^2 has its coils connected with the rails comprised in the track section a^3.

From the contact piece i^2 a wire C^{14} extends to one end of the coil of an electro-magnet s^4 belonging to a signal S^4. From the other end of the coil of the magnet s^4 a wire C^{15} extends. The wire C^{15} joins the wire C^{11} and from these two wires the main circuit is continued by a wire C^{16}. The signal S^4 is intended to be a danger signal like the danger signal S^2 and capable of indicating to the engineer of a train, car, or locomotive reaching the end of the second track section a^2 whether any train, car, or locomotive is located upon the third track section a^3. This signal S^4 is fulcrumed to a pin t^4 and combined with a weight u^4. Normally the magnet I^2 will hold the circuit changer lever H^2 against the contact piece i^2, but whenever a train, car, or locomotive is located upon the track section a^3 it will form a short circuit between the parallel rails of this track section and so de-energize the magnet I^2, whereupon the spring J^2 will move the circuit changer H^2 away from the contact piece i^2 and de-energize the magnet s^3 of the cautionary signal S^3 and the magnet s^4 of the danger signal S^4. This is the condition of things illustrated in connection with the third track section a^3 and the signals appertaining thereto, T being an arbitrary representation of a train, car, or locomotive. The engineer of a train, car, or locomotive passing while this condition of things exists along the second track section a^2 will be informed by the cautionary signal S^3 that a train, car, or locomotive is located upon the third track section a^3 and will thus receive such information before arriving at the beginning of the third track

section a^3 when it will be seen that he will again receive this information from the danger signal S^4 on arriving at the beginning of the third track section a^3.

Obviously the electrical resistance of that branch of the main circuit consisting of the wires C^{10}, C^{11} including the resistance device E^2 should be made, by properly proportioning the resistance device E^2 or by any other means, to approximately correspond with the other branch of the main circuit consisting of the wires C^{12}, C^{13}, C^{14}, C^{15}, and including the coils of the magnets s^3, s^4 and the circuit changer H^2. A track battery L^2 is connected with the parallel rails of the track section a^3 near their forward extremities and thus a current of low potential is furnished to the track circuit comprising the rails of this track section a^3, together with the coils of the electro-magnet I^2.

The wire C^{16} will extend to the appurtenances of another track section in advance of the track section a^3. At the end of the system, connection will be made with the ground. To illustrate this, I have shown the wire C^{16} extending to a ground plate G^2.

It will be seen that in this example of my improvement there is a main circuit comprising the magnets of all the signals and furnishing them with electricity from a common source also that there are a number of track circuits which are independent of the main circuit and are supplied with electricity of low potential so as to render it practicable to utilize the rails of the several track sections. These track sections control the signals.

In Fig. 2 I have illustrated my invention as applied to a single track railroad having two sets of signaling devices for trains running in reverse directions. In this figure, A designates a track composed of track sections a', a^2, a^3, a^4, a^5. B^3 designates a dynamo connected by one of its poles or electrodes to the ground by a wire C^{17} represented as extending to a ground plate G^3. The other pole or electrode of the dynamo has a wire C^{18} connected to it. From the wire C^{18} a wire C^{19} extends and a wire C^{20} extends from the wire C^{18} to the end of the coil of the electro-magnet s^5 belonging to a cautionary signal S^5. This signal is fulcrumed between its ends upon a pin t^5 and has combined with it a weight u^5. Preferably the magnet s^5 will be of the solenoid type to afford suitable range of movement. It is intended that the magnet shall normally hold the signal in the position indicative of safety and that whenever the magnet is de-energized the weight will adjust the signal to indicate danger. All the signals in my system may operate in this manner. From the other end of the coil of the electro-magnet s^5 a wire C^{21} extends to a circuit changer H^3 represented as consisting of a pivoted lever; the wire C^{21} extending to the pivot of the lever. The circuit changer lever H^3 co-acts with a contact piece i^4 from which a wire C^{22} extends to one end of the coil of an electro-magnet s^6 belonging to a danger signal S^6. The circuit changer H^3 has combined with it a spring J^3 for moving it away from the contact piece i^4 and a magnet I^3 for moving it to the said contact piece. The ends of the coil of the magnet I^3 are connected with the adjacent ends of the rails comprised in the track section a^2. The signal S^6 is fulcrumed to a pin t^6 and combined with a weight u^6. From the wire C^{19} a wire C^{23} extends. In this example of my improvement the wire C^{23} connects with the wire C^{26} and also communicates with a wire C^{24} leading to one end of the coil of the electro-magnet s^7 belonging to the cautionary signal S^7. The other end of the coil of the electro-magnet s^7 is connected by a wire C^{25} with a circuit changer H^4. The signal S^7 is fulcrumed between its ends to a pin t^7 and combined with a weight u^7. A track battery L^3 is connected with the adjacent ends of the rails comprised in the track section a^2. From the other end of the coil of the magnet s^6 belonging to the danger signal S^6, a wire C^{27} extends to one end of the coil of a magnet s^8 belonging to a danger signal S^8 arranged on the opposite side of the track A. This signal is fulcrumed between its ends to a pin t^8 and combined with a weight u^8. From the other end of the coil of the electro-magnet s^8 belonging to the danger signal S^8 a wire C^{28} extends to one end of the coil of an electro-magnet s^9 belonging to a signal S^9. The signal S^9 is fulcrumed between its ends to a pin t^9 and combined with a weight u^9. From the other end of the coil of the magnet s^9 a wire C^{29} extends to the wire C^{41}. The wire C^{26} extends to one of the terminal or contact points of a resistance device E'. From the other terminal of the resistance device E' a wire C^{41} extends to the wire C^{40}. A track battery L^4 is connected to the adjacent ends of these rails comprised in the track section a^3. The other ends of these rails are connected by wires with the ends of the coil of an electro-magnet I^4 which is combined with a circuit changer H^4. A spring J^4 is also combined with this circuit changer. This circuit changer coacts with a contact piece i^5. From the contact piece i^5 a wire C^{30} extends to one end of the coil of the magnet s^{10} belonging to a danger signal S^{10}. The signal S^{10} is fulcrumed to a pin t^{10} and combined with a weight u^{10}. From the other end of the coil of the magnet s^{10} a wire C^{31} extends to one end of the coil of an electro-magnet s^{11} belonging to a danger signal S^{11}. This signal S^{11} is fulcrumed upon a pin t^{16} and combined with a weight u^{16}. From the wire C^{26} a wire C^{32} extends to one end of the coil of an electro magnet s^{12} belonging to a cautionary signal S^{12}. This signal S^{12} is fulcrumed upon a pin t^{11} and combined with a weight u^{11}. A wire C^{33} extends from the other end of the coil of the magnet s^{12} to a circuit changer H^5 which coacts with a contact piece i^3 and has combined with it a spring J^5 and a magnet I^5. This magnet I^5 has the ends of its coil connected with the rails comprised in the track section a^4; the other ends of these

rails being connected with a track battery L^5. The wire C^{40} is represented as extending to a ground plate G^4. From the other end of the coil of the electro-magnet s^{11} belonging to the signal S^{11} a wire C^{34} extends to and connects with one of the ends of the coil of an electro-magnet s^{13} belonging to a cautionary signal S^{13}. This signal is fulcrumed between its ends to a pin t^{12} and combined with a weight u^{12}. From the other end of the coil of the magnet s^{13} a wire C^{35} extends to the wire C^{40}. From the contact piece i^3 a wire C^{36} extends to one end of the coil of an electro-magnet s^{14} belonging to a danger signal S^{14} which is fulcrumed between its ends to a pin t^{13} and combined with a weight u^{13}. From the other end of the coil of the electro-magnet s^{14} a wire C^{37} extends to one end of the coil of an electro-magnet s^{15} belonging to a danger signal S^{15}, which is fulcrumed between its ends to a pin t^{14} and combined with a weight u^{14}. From the other end of the coil of the electro-magnet of the signal S^{15} a wire C^{38} extends to one end of the coil of an electro-magnet s^{16} belonging to a cautionary signal S^{16} which between its ends is fulcrumed to a pin t^{15} and combined with a weight u^{15}. From the other end of the coil of the magnet s^{16} a wire C^{39} extends to the wire C^{40}. To facilitate an understanding of the different branch circuits comprised in the main circuit I have delineated certain wires differently. It will be observed that the signals S^5, S^6, S^7, S^{10}, S^{12} and S^{14} are on one side of the track and that the signals S^8, S^9, S^{11}, S^{13}, S^{15}, S^{16}, are on the other side of the track. These two series of signals are intended for trains running in opposite directions. The signals S^5, S^6, S^7, S^{10}, S^{12} and S^{14} are intended for trains running in the direction indicated by the arrow W′; and the signals S^8, S^9, S^{11}, S^{13}, S^{15}, S^{16} for trains running in the direction indicated by the arrow W^2. The signal S^5 is intended to be located adjacent to the track section a' at some considerable distance from the meeting ends of the track sections a', a^2. The signals S^6, S^7 are intended to be located adjacent to the meeting ends of these track sections a', a^2. The signals S^{10}, S^{12} are intended to be located adjacent to the meeting ends of the track sections a^2, a^3. The signal S^{14} is intended to be located adjacent to the meeting ends of the track sections a^3, a^4. The signal S^{16} is intended to be arranged adjacent to the track section a^5 at a considerable distance from the track section a^4. The signals S^{13} and S^{15} are intended to be located adjacent to the meeting ends of the track sections a^4, a^5, and the signals S^9, S^{11}, are intended to be located adjacent to the meeting ends of the track section a^3, a^4. The signal S^8 is intended to be located adjacent to the meeting ends of the track sections a^2, a^3. It will be seen in this example of my improvement as well as in the one previously described all the signals are supplied with electricity from a common source and are in a single main circuit. It will be observed that in this example of my improvement I have represented independent track circuits.

Normally the electro-magnets I^3, I^4, I^5 will be in the track circuit and consequently energized. This is represented in connection with the magnets I^3, I^5 belonging to the track sections a^2 a^4. T′ is an arbitrary representation of a train located upon the track section a^3. As represented this short circuits out the magnet I^4 and by de-energizing such magnet causes the circuit changer H^4 to interrupt the communication between the wires C^{25} and C^{30}. This has the effect of de-energizing the magnet belonging to the danger signal S^{10} and that belonging to the danger signal S^{11} which are located adjacent to the different ends of the track section a^3. It will also have the effect of de-energizing the magnets belonging to the cautionary signals S^7, and S^{13} located respectively adjacent to the distant ends of the track sections a^4, a^2. Manifestly a danger signal and a cautionary signal are given in front of the train, and a danger signal and a cautionary signal are given at the rear of the train, the danger signal in each case being given at the end of the track section a^3 and the cautionary signal at the distant end of the next adjacent track section in each direction. Thus safety will be insured to trains running in opposite directions or in the same direction upon a single track.

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

1. A railway signal system comprising the combination of a dynamo electric machine, an electric circuit leading therefrom, signals or groups of signals serially arranged in said circuit, a series branch for each signal or group of signals, a track circuit and a track instrument controlling the signals, substantially as specified.

2. A railway signal system comprising the combination of a dynamo electric machine, an electric circuit leading therefrom, signals or groups of signals serially arranged in said circuit, a resistance for each signal or group of signals, a track circuit and a track instrument controlling the signals, substantially as specified.

3. A railway signal system comprising the combination of a dynamo electric machine, an electric circuit leading therefrom, signals or groups of signals serially arranged in said circuit, a series branch for each signal or group of signals, a track circuit comprising the rails of the block, and a track circuit relay arranged to shift the flow of current in one of the series branches to the other series branch so as to operate the signals, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM G. ROOME.

Witnesses:
EDWIN H. BROWN,
S. O. EDMONDS.