No. 855,968. PATENTED JUNE 4, 1907.

E. L. ORCUTT.

ELECTRIC SIGNALING DEVICE.

APPLICATION FILED SEPT. 1, 1906.

Fig. 1,

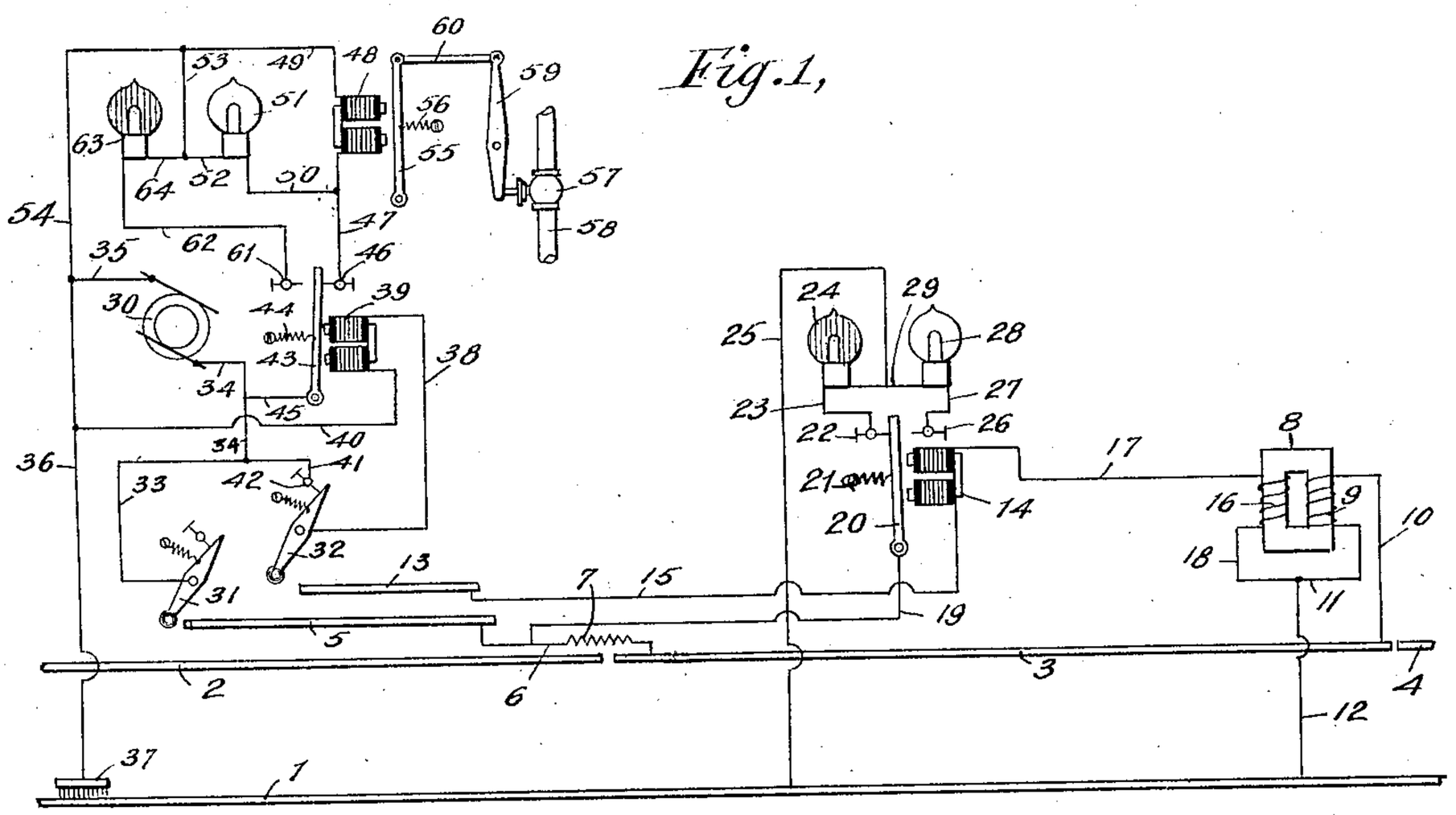


Fig. 2,

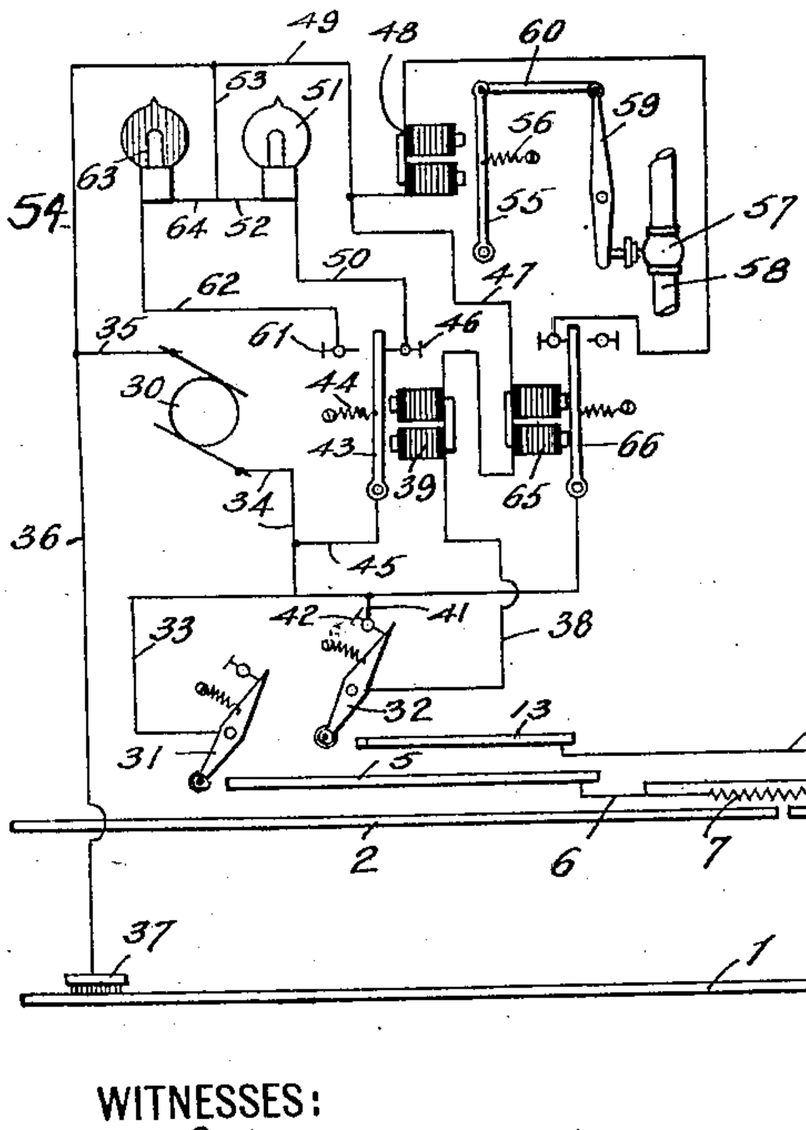
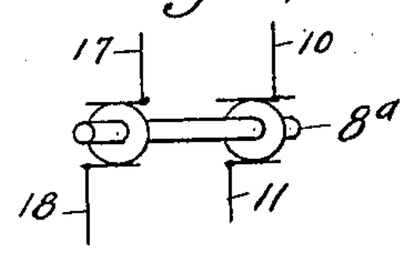


Fig. 3,



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ELECTRIC SIGNALING DEVICE.

No. 855,968. Specification of Letters Patent. Patented June 4, 1907.

Application filed September 1, 1906. Serial No. 333,005.

To all whom it may concern:

Be it known that I, EDWARD L. ORCUTT, a citizen of the United States, and a resident of the borough of Manhattan, in the county, city, and State of New York, have invented certain new and useful Improvements in Electric Signaling Devices for Railways, of which the following is a specification.

This invention relates to electric signaling systems for railways.

It seeks to provide an efficient, economical, and reliable system and also one in which both track signals and cab or train signals may be utilized. The track signals are arranged in blocks along the track.

The invention also seeks to provide an efficient arrangement by means of which the train may be stopped when the block about to be entered is dangerous or occupied by a preceding train.

In the accompanying drawings forming part of this specification, and in which like numerals indicate corresponding parts in the several figures. Figure 1 is a diagram embodying the invention; Fig. 2 is a similar view showing a modification; and Fig. 3 is a diagrammatic representation of a rotary transformer, or motor dynamo, which may be used in place of the stationary transformer shown in Figs. 1 and 2.

Referring now to the drawings and more particularly to Fig. 1, the track is divided into blocks of which the rails 1 and 2 belong to the first block, rails 1 and 3 belong to the second block, and rails 1 and 4 belong to the third block. Rails 2, 3, 4, etc. are insulated from each other. Rail 1 may, as shown, be electrically continuous through the several blocks. 5 and 13 are two separate track contacts associated with the block to which the rails 1 and 3 belong. These track contacts 5 and 13 consist of suitable electric conductors which extend along the track for a considerable distance immediately in advance of the block to which they belong. They are preferably formed of rails fixed to the road-bed. Track contact 5 is connected by wire 6 through resistance 7, or its equivalent, to rail 3 at the entering end of the block. At the opposite end of the block is transformer 8 whose primary coil 9 is connected by wire 10 to rail 3 and by wires 11 and 12 to rail 1. Secondary coil 16 of transformer 8 is connected by wire 18 to wire 12 and is connected by wires 17 and 15 to track contact 13. Wires 17 and 15 include magnet 14 which controls the signal circuit as will be now described. The wire 19 is connected at one end to wire 6 between track contact 5 and resistance 7. At its other end wire 19 is connected to armature 20 which is normally held by spring 21 against back contact 22 and when attracted by magnet 14 moves against front contact 26. Back contact 22 is connected by wire 23 through danger lamp 24 to wire 25, and front contact 26 is connected by wires 27 and 29 through safety lamp 28 to wire 25. Wire 25 is connected to rail 1. Thus magnet 14 is connected in a controlling circuit which includes the secondary of transformer 8, and this magnet 14 is arranged to control the track signal for the block. This track signal may consist of any type of signal capable of giving a danger and safety indication, as required, and this signal may be operated from any convenient source, but preferably from a source of electricity located on the train. As shown in the drawings, this signal consists of two lamps. Lamp 24 lights up to show that the guarded section is dangerous, as for example when a train is occupying the block. Lamp 28 lights up to show that the guarded block is safe, as for example when there is no train in the block.

As shown in the accompanying drawings, the signal consists of the danger and safety lamps 24 and 28, and is operated by the signal circuit which includes wire 19, armature 20, wire 25, and rail 1.

In the preferred arrangement of the system, the generator for energizing the transformer and for furnishing the power to the track signal is carried on the train. Any suitable type of generator may be employed.

30 is the generator on the train. One side of this generator is connected by wires 35 and 36 to a traveling contact 37 carried by the train and arranged to travel in electric connection with rail 1. The other side of the generator is connected by wires 34 and 33 to a traveling contact 31 carried by the train and which is arranged to make electric connection with track contact 5. When the train reaches contact 5, the rail circuit for energizing transformer 8 is completed as follows; from generator 30, through wire 36, contact 37, rail 1, wires 12 and 11, primary 9

of a transformer 8, wire 10, rail 3, resistance 7, wire 6, track contact 5, traveling contact 31, and wires 33 and 34 back to generator 30. At the same time, a circuit connection carried on the train completes the controlling circuit through magnet 14 which is thereupon energized from the secondary coil of transformer 8. The controlling circuit thus completed may be traced as follows—traveling contact 32 carried on the train, stationary contact 13, wire 15, magnet 14, wire 17, secondary coil 16 of transformer, wires 18 and 12, rail 1, traveling contact 37, wires 36 and 40, magnet 39, and wire 38 back to contact 32. At the same time, the signal circuit for the track signal will be completed from generator as follows—from generator 30 through wire 36, contact 37, rail 1, wire 25, through either lamp 24 or 28, armature 20, wires 19 and 6, track contact 5, contact 31, wires 33 and 34, back to generator. If there is no preceding train on rails 1 and 3, then magnet 14 will be energized so as to give a safety signal to the approaching train—that is to say, lamp 28 will light up. If, however, there is a preceding train on rails 1 and 3, then the primary of transformer 8, which is in the rail circuit, will be shunted by this preceding train and a danger signal will be given—that is to say, lamp 24 will light up in advance of the approaching train.

It will be seen that the rail circuit which includes the primary of transformer 8 and the signal circuit which includes armature 20 are arranged in multiple, both deriving their current from generator 30. In order to suitably divide this current between the two circuits, some resistance device, or equivalent device, such as the resistance coil 7, is employed.

In the best embodiment of the complete invention, a signal or signals are carried on the train, and generally in the engineer's cab. These signals also indicate the condition of the track in the same way as does the track signal. 51 and 63 indicate electric lamps which together constitute the train signal and which are arranged in a circuit controlled by magnet 39. Magnet 39 operates armature 43 provided with a retractile spring 44. Back contact 51 of armature 43 is connected by wires 62 and 64 through danger lamp 63 to wire 53, which latter is connected by wires 54 and 35 to generator 30. Front contact 46 of armature 43 is connected by wires 47, 50, and 52 through safety lamp 51 to wire 53. Armature 43 is connected by wires 45 and 34 to the opposite side of generator 30. It will be thus seen that when armature 43 is against front contact 46 safety lamp 51 lights up, and that when armature 43 is against back contact 61 danger lamp 63 lights up. Magnet 39 is included in a circuit on the train which is normally closed, that is, before the train has reached track contacts 5 and 13. This circuit may be traced as follows—from generator 30, through wires 35, 36 and 40, to magnet 39, wire 38, traveling contact 32, back stop 42, wires 41 and 34 to generator 30. Thus armature 43 will be normally held against front contact 46, and lamp 51 will be normally lighted. When traveling contact 32 meets track contact 13, the local circuit through magnet 39 is broken at 42, but magnet 39, being connected on one side to traveling contact 32 and being connected on its other side to traveling contact 37, will be connected in the controlling circuit which includes magnet 14 and secondary coil of transformer 8 so that if there is no preceding train on rails 1 and 3 magnet 39 will continue to be energized, but from secondary coil of transformer 8, thus continuing a safety signal in the cab from lamp 51. If, however, a preceding train is on rails 1 and 3, magnet 39 will receive no current from transformer 8 and armature 43 will shift to back contact 61 thereby energizing danger lamp 63 on the train so as to light up this lamp.

48 is a magnet carried on the train and connected on one side to wire 47 and on the other side by wire 49 to wire 54 so that it is energized whenever lamp 51 is energized. This magnet 48 operates armature 55 provided with the retractile spring 56 and connected by link 60 to lever 59, which lever operates a valve 57 in a fluid pressure pipe 58. This fluid pressure pipe 58 may be utilized to work an additional signal, such as a whistle, or to supply the motive power for the car or train. When the magnet 48 is energized, that is, when the track is safe for the advancing train, fluid pressure would be supplied through pipe 58 to operate the train. When, however, the track is dangerous for the train, then magnet 48 would be de-energized at the same time that danger lamp 63 lights up and fluid pressure in pipe 58 would be cut off so as to stop the train. If fluid pressure pipe 58 is used to operate an additional signal, such as a whistle, then the whistle would be blown to indicate danger when magnet 48 is de-energized.

In the diagram shown in Fig. 2, the arrangement is the same as that shown in Fig. 1 except with reference to some of the circuits on the train. This will be now described. In Fig. 1, magnet 48 is arranged in multiple with lamp 51 so that both are controlled by armature 43. In Fig. 2, magnet 48 is arranged in a separate circuit controlled by armature 66 which is operated by magnet 65. In Fig. 2, wire 50 is connected at one end to front contact 46 and at its other end to lamp 51. Wire 47 is connected at one end to wire 49 and at its other end to one side of magnet 65. The other side of this magnet 65 is connected to one side of magnet 39, the opposite side of this magnet 39 being connected by wire 38 to contact 32.

Thus magnets 39 and 65 are in series. Armature 66, which is operated by magnet 65, is connected by wire 34 to one side of generator 30. The contact point for armature 66 is connected by a wire through magnet 48 with wire 49. Thus magnets 39 and 65 will be simultaneously energized from generator 30 and will be simultaneoulsy deënergized when the circuit through the magnets is broken at contacts 32 and 42. Moreover, it will be noted that magnet 48 will be energized through armature 66 simultaneously with the energizing of lamp 51 through armature 43. Thus magnet 48 operates at the same time and for the same purpose in Fig. 2 as it does in Fig. 1.

In Fig. 3 is shown a diagram of a rotary transformer, or motor dynamo, 8ª. This may be substituted for the stationary transformer 8 shown in Figs. 1 and 2, in which case wires 10, 11, 17 and 18 will be connected in the track circuit and in the controlling circuit in substantially the same way as shown in Figs. 1 and 2.

It is to be understood that the various features of the invention may be modified and combined in different ways without departing from the substance of the invention.

What I claim and desire to secure by Letters Patent is:—

1. In an electric signaling system for railways, the combination of a controlling circuit including a transformer and a magnet; a signal circuit operating a track signal comprising danger and safety lamps and controlled by said magnet; a rail circuit for energizing the transformer and including both rails of the track and said transformer; and a generator on a train arranged to be connected with the rail circuit.

2. In an electric signaling system for railways, the combination of a circuit including a transformer and a magnet; a signal circuit operating a track signal comprising danger and safety lamps and controlled by said magnet; a rail circuit for energizing the transformer and including both rails of the track and said transformer; a generator on a train; and contacts on said train arranged to connect the generator in said signal circuit.

3. In an electric signaling system for railways, the combination of a circuit including a transformer and a magnet; a signal circuit operating a track signal comprising danger and safety lamps and controlled by said magnet; a rail circuit for energizing the transformer and including both rails of the track and said transformer; a generator on a train; and contacts on said train arranged to connect the generator in both the rail and signal circuits.

4. In an electric signaling system for railways, the combination of a circuit including a transformer and a magnet; a signal circuit operating a track signal comprising danger and safety lamps and controlled by said magnet; a rail circuit for energizing the transformer and including both rails of the track and said transformer, said signal circuit and said rail circuit being connected together in multiple; a generator on a train; and contacts on said train arranged to connect the generator in said signal circuit.

5. In an electric signaling system for railways, the combination of a controlling circuit including a transformer and a magnet; a signal circuit operating a track signal and controlled by said magnet; a rail circuit for energizing the transformer and including both rails of the track and said transformer; a generator on a train arranged to be connected with the rail circuit; a signal on the train; a magnet on the train controlling said signal; and contacts on the train connected with said train magnet and arranged to be connected with the controlling circuit.

6. In an electric signaling system for railways, the combination of a controlling circuit including a transformer and a magnet; a signal circuit operating a track signal and controlled by said magnet; a rail circuit for energizing the transformer and including both rails of the track and said transformer; a generator on a train arranged to be connected with the rail circuit; a signal on the train; a magnet on the train controlling said signal and included in a normally closed train circuit; contacts on the train connected with said train magnet and arranged to be connected with the controlling circuit; and a circuit breaker in said train circuit arranged to be opened when the train magnet is connected with the controlling circuit.

7. In an electric signaling system for railways, the combination of a controlling circuit including a transformer and a magnet; a signal circuit operating a track signal and controlled by said magnet; a rail circuit for energizing the transformer and including both rails of the track and said transformer; a generator on a train arranged to be connected with the rail circuit; a train stopping device on the train; a magnet on the train controlling said train stopping device; and contacts on the train connected with said train magnet and arranged to be connected with the controlling circuit.

8. In an electric signaling system for railways, the combination of a controlling circuit including a transformer and a magnet; a signal circuit operating a track signal and controlled by said magnet; a rail circuit for energizing the transformer and including both rails of the track and said transformer; a generator on a train arranged to be connected with the rail circuit; a train stopping device on the train; a magnet on the train controlling said train stopping device and included in a normally closed train circuit; contacts on the train connected with said train

magnet, and arranged to be connected with the controlling circuit; and a circuit breaker in said train circuit arranged to be opened when the train magnet is connected with the controlling circuit.

9. In an electric signaling system for railways the combination of a controlling circuit including a transformer and a magnet; a signal circuit operating a track signal and controlled by said magnet; a rail circuit for energizing the transformer and including both rails of the track and said transformer; a signal on the train; a magnet on the train controlling said signal; and contacts on the train connected with said train magnet and arranged to be connected with the controlling circuit.

10. In an electric signaling system for railways, the combination of a controlling circuit including a transformer and a magnet; a signal circuit operating a track signal and controlled by said magnet; a rail circuit for energizing the transformer and including both rails of the track and said transformer; a signal on the train; a magnet on the train controlling said signal and included in a normally closed train circuit; contacts on the train connected with said train magnet and arranged to be connected with the controlling circuit; and a circuit breaker in said train circuit arranged to be opened when the train magnet is connected with the controlling circuit.

11. In an electric signaling system for railways, the combination of a controlling circuit including a transformer and a magnet; a signal circuit operating a track signal and controlled by said magnet; a rail circuit for energizing the transformer and including both rails of the track and said transformer; a train stopping device on the train; a magnet on the train controlling said train stopping device; and contacts on the train connected with said train magnet and arranged to be connected with the controlling circuit.

12. In an electric signaling system for railways, the combination of a controlling circuit including a transformer and a magnet; a signal circuit operating a track signal and controlled by said magnet; a rail circuit for energizing the transformer and including both rails of the track and said transformer; a train stopping device on the train; a magnet on the train controlling said train stopping device and included in a normally closed train circuit; contacts on the train connected with said train magnet, and arranged to be connected with the controlling circuit; and a circuit breaker in said train circuit arranged tobe opened when the train magnet is connected with the controlling circuit.

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

EDWARD L. ORCUTT.

Witnesses:

RICHARD SHELDON,

LEONARD DAY.