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E. I. ORCUTT.

ELECTRICAL SIGNALING DEVICE FOR RAILROADS.

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Fig. 2.

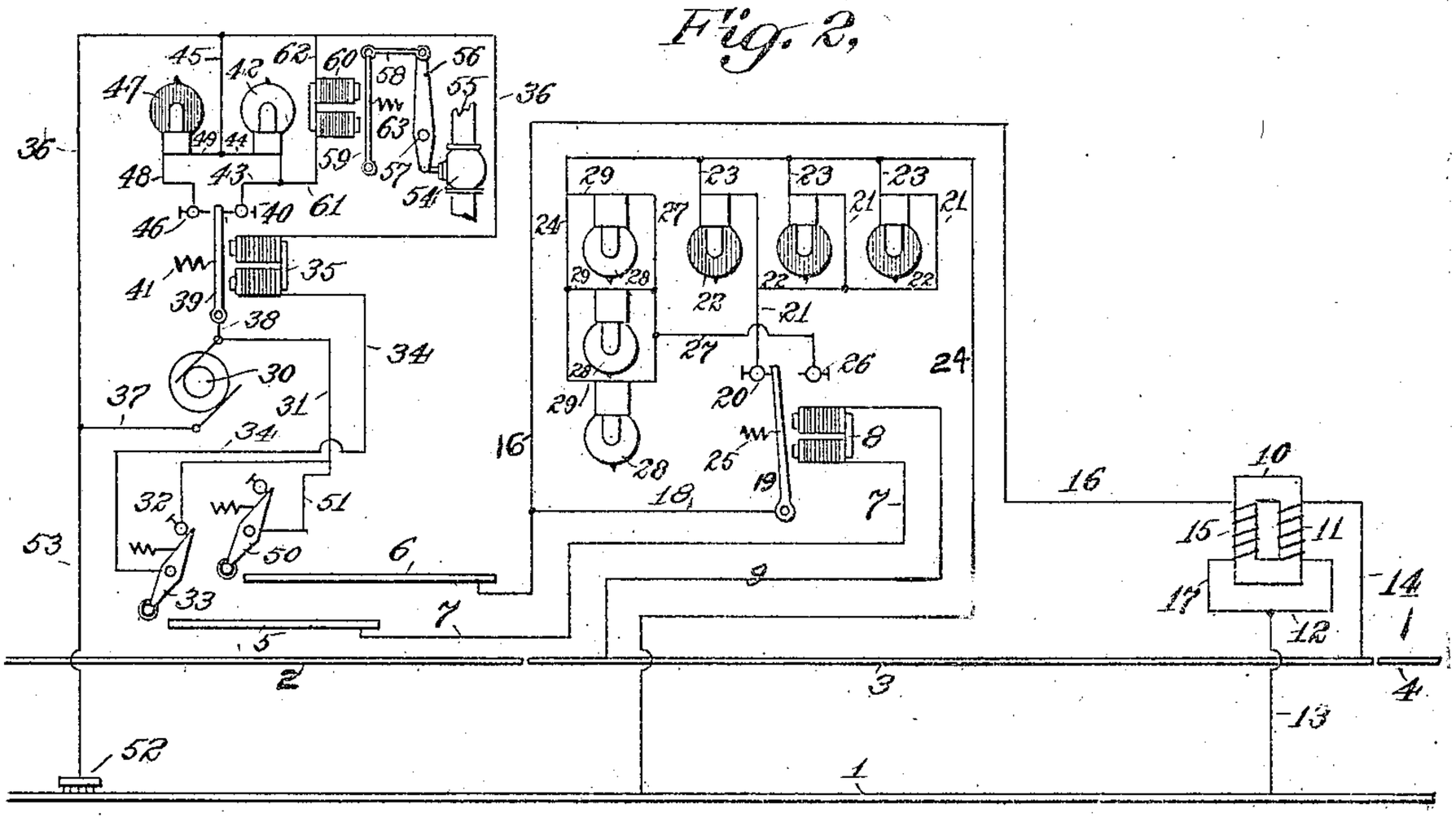

Fig. 1.

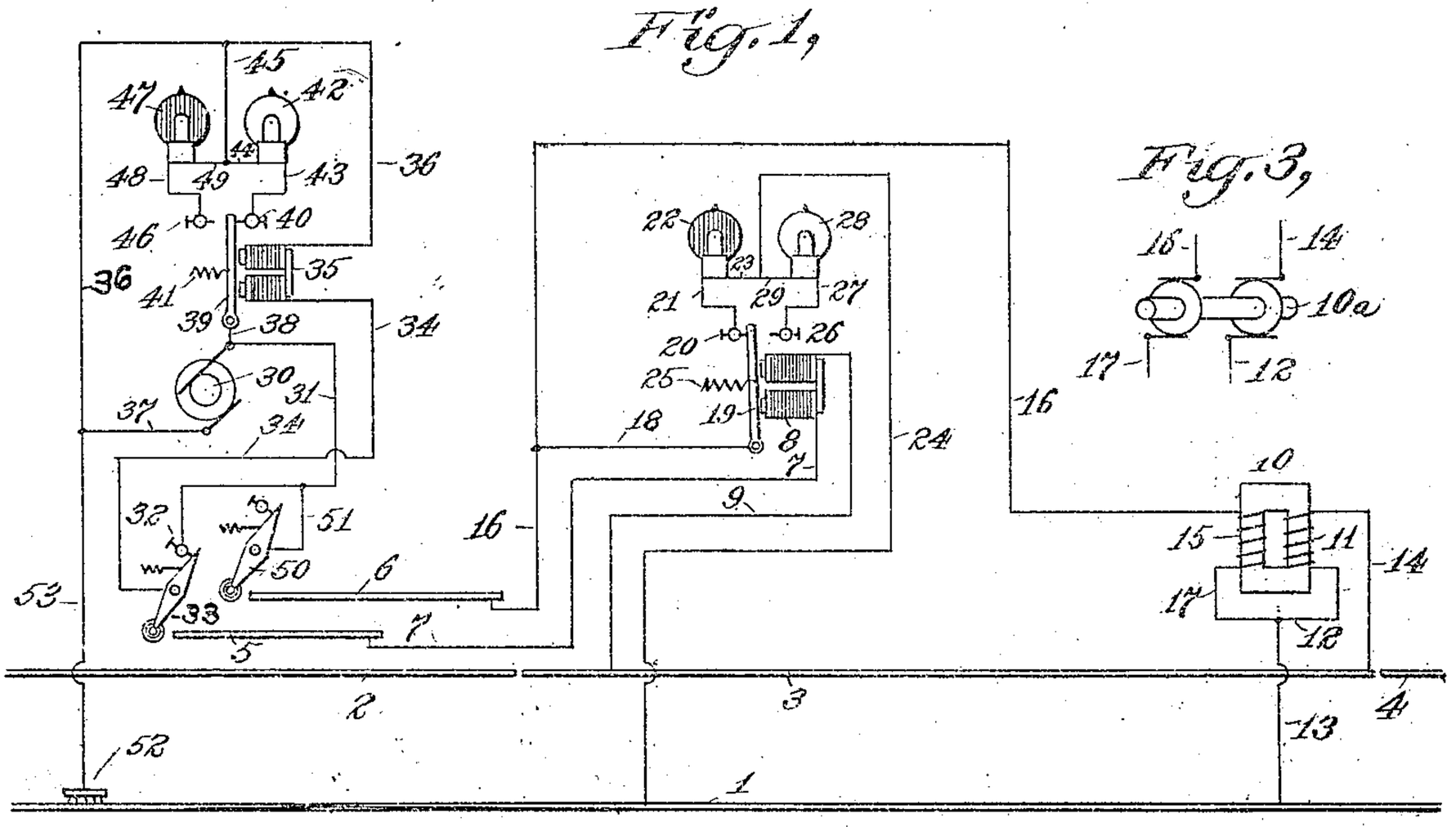

Fig. 3.

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ELECTRICAL SIGNALING DEVICE FOR RAILROADS.

No. 856,094. Specification of Letters Patent. Patented June 4, 1907.

Application filed October 13, 1905. Renewed September 1, 1906. Serial No. 332,996.

To all whom it may concern:

Be it known that I, EDWARD L. ORCUTT, a citizen of the United States, and a resident of New York city, in the county and State of New York, have invented certain new and useful Improvements in Electrical Signaling Devices for Railroads, 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 arranged in blocks along the track, and also cab or train signals carried on the train may be utilized.

The invention also seeks to provide an efficient, reliable and economical arrangement by means of which the brakes may be applied to stop the train 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 and showing a single track signal for the block; Fig. 2 is a similar view showing a plurality of track signals for a block and associated means on the train for stopping the train; and Fig. 3 is a diagrammatic representative 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 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 6 are two separate track contacts associated with the block to which rails 1 and 3 belong. These track contacts 5 and 6 consist of suitable electric conductors which extend along the track for a suitable distance in advance of the block to which they belong. They are preferably formed of rails fixed on the road-bed. At the opposite end of the block is transformer 10, whose secondary coil 11 is connected by wire 14 to rail 3 and by wires 12 and 13 to rail 1. Primary coil 15 of transformer 10 is connected by wire 17 to wire 13 and is connected by wire 16 to track contact 6. Track magnet 8 is connected by wires 9 and 7 to rails 3 and track contact 5, respectively. Thus magnet 8 is connected in the track circuit which includes track contact 5, rails 1 and 3 and the secondary coil 11 of the transformer, magnet 8 and track contact 5 being in series. This track magnet 8 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. One lamp lights up to show that the guarded block is dangerous, as for example when a train is occupying this block. The other lamp lights up to show that the guarded block is safe, as for example when there is no train in this block. As shown in the accompanying drawings, the signal consists of these danger and safety lamps and is operated from the supply circuit for the transformer, said supply circuit including the track contact 6, wire 16, primary coil of transformer 10, and rail 1. Armature 19 of magnet 8 is connected by wire 18 to wire 16. Back contact 20 is connected by wires 21 and 23 to wire 24 and includes lamp 22. Front contact 26 is connected by wires 27 and 29 to wire 24 and includes lamp 28. Wire 24 is connected to rail 1. Thus lamps 22 and 28 are arranged to be connected alternately in a shunt or bridge across the supply circuit. When magnet 8 is deënergized and armature 19 is retracted by its spring 25, the shunt is closed through lamp 22. When, however, magnet 8 is energized, the armature 19 moves over to contact 26, lamp 28 is included in the shunt and lamp 22 is cut out. In the preferred arrangement of the system, the generator for the supply circuit 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 31 and 51 to a traveling contact 50, carried by the train. This traveling contact, as the train advances, is arranged to make connection with track contact 6. The opposite side of the generator is connected by wires 27 and 53 to a traveling contact 52 ar-

ranged to travel in electric connection with rail 1. When the train reaches contact 6, the supply circuit for transformer 10 is completed as follows—from generator 30 through wires 31 and 51, traveling contact 50, track contact 6, wire 16, primary coil 15, wires 17 and 13, rail 1, traveling contact 52, and wires 53 and 37, back to generator 30. This circuit, of course, energizes secondary coil 11 of the transformer thereby energizing magnet 8, as will presently be seen. 42 and 47 indicate electric lamps carried on the train, and preferably in the engine cab, and constitute a train signal. This signal is controlled by magnet 35 carried in the train, the arrangement being such that when the magnet is energized the lamp 42 will be lighted to indicate safety, and when this magnet is deënergized the lamp 47 will be lighted to indicate danger. Magnet 35 is connected on one side by wire 34 to traveling contact 33 carried on the train, and is connected on its other side by wires 36 and 53 to traveling contact 52. Traveling contact 33 is arranged to make electric connection with track contact 5. When the train reaches track contact 5, magnet 35 is connected in the track circuit as follows—from magnet 35 through wire 34, traveling contact 33, track contact 5, wire 7, magnet 8, rail 3, secondary coil 11 of transformer 10, rail 1, traveling contact 52 and wires 53 and 36 to magnet 35. It will be seen that magnets 35 and 8 which control, respectively, the train signal and the track signal, are arranged in series. If, at this time, the primary coil of the transformer is energized and there is no train in the block, magnet 35 will be energized and will cause the safety lamp 42 to light up. If, however, primary coil 13 is energized and a train is occupying the block, and thereby shunting the current in the track circuit, magnet 35 will be deënergized and danger lamp 47 will light up. The circuit for these lamps will be presently explained. 39 is the armature of magnet 35 and is connected by wire 38 to one side of the generator 30. Back contact 46 is connected by wires 48 and 49 to wire 45 and includes lamps 47. Front contact 40 is connected by wires 43 and 44 to wire 45 and includes lamp 42. Wire 45 is connected by wires 36 and 37 to the opposite side of generator 30. The spring 41 holds its armature 39 on the back contact 46 when magnet 35 is not energized. The generator is designed to be continuously active so as to light up either lamp 42 or 47 depending upon the condition of magnet 35. Wire 34 is connected to back stop 32 of the traveling contact 33. This traveling contact 33, when it makes connection with the stationary contact 5, opens the connection with back stop 32. At other times, the spring of this traveling contact keeps the connection with back stop 32 closed as shown in the drawings. Before the train reaches track contact 5, the magnet 35 is energized from generator 30 by the following circuit—from generator 30, wire 31, back stop 32, contact 33, wire 34, magnet 35, wires 36 and 37, back to generator.

The operation of the system is as follows—Before the train reaches the track contacts 5 and 6, the local train circuit through magnet 35, just above traced, energizes the magnet and closes the circuit through lamp 42, which is a white lamp and gives a safety indication. When the train reaches track contacts 5 and 6, traveling contact 50 makes connection with track contact 6 thereby connecting generator 30 with the supply circuit, as heretofore traced. This circuit operates transformer 10 and energizes the track circuit which has just been completed by the connection established between contacts 33 and 5. This circuit has been traced above. This energizes magnet 8 which thereby cuts out lamp 22 and cuts in lamp 28, which latter thereupon lights up to show safety. It also energizes magnet 35 thereby cutting out danger lamp 47 from connection with generator 30 and cutting in safety lamp 42, which latter thereupon lights up. When traveling contact 33 made connection with track contact 5, it broke at back stop 32 the local train circuit through magnet 35 heretofore traced so that said magnet 35 became thereupon dependent for its energization upon the track circuit. If, at this time, a train is occupying the block, the track magnet 8 will be deënergized thereby causing track lamp 22 to light up to indicate danger. The presence of the train in the block also prevents magnet 35 from being energized by the track circuit so that armature 39 cuts out safety lamp 42 and cuts in danger lamp 47 causing the latter to light up.

The resistance of the various lamps and magnets, especially those on the train, can be adjusted in a way so as to secure the best results.

In Fig. 2 are shown three track signals, each consisting of a danger and safety lamp. The danger lamps 22 are connected in multiple by wires 21 and 23 to back contact 20 on one side and to wire 24 on the other side. The safety lamps 28 are connected in multiple by wires 27 and 29 to front contact 26 on one side and to wire 25 on the other side. Each pair of danger and safety lamps 22 and 28 constitutes a signal. In Fig. 2, 60 is a magnet carried on the train and connected by wires 61 and 62, respectively, to contact 40 on one side and to wire 36 on the other side. The armature 59 of this magnet is connected by link 58 to lever 56 fulcrumed at 57 and operating a valve 54 in fluid pressure pipe 55. This fluid pressure pipe may control or operate a whistle, or other signal, or serve to apply the brakes. Magnet 61 is en-

ergized concurrently with safety lamp 42. When magnet 35 is deënergized and lamp 47 lights up to indicate danger, magnet 60 is deenergized, its armature is retracted by spring 63 thereby operating valve 54 to apply the brakes or blow the whistle, as desired.

In Fig. 3 is shown a diagram of a rotary transformer or motor-dynamo 64. This may be substituted for the stationary transformer 10 shown in Figs. 1 and 2, in which case wires 12, 13, 14 and 17 will be connected in the track circuit and in the supply circuit in substantially the same way as shown in Figs. 1 and 2.

It is to be understood that the varions 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, the combination of a track circuit including a transformer, both rails of the track, a magnet and a track contact, said magnet and track contact being arranged in series; a supply circuit for the transformer; a generator for the supply circuit; a track signal controlled by said magnet of the track circuit; a signal on a train; a magnet on said train controlling the train signal; contacts on said train connected with said magnet on the train and arranged to make connection with said track contact and one rail of the track.

2. In an electric signaling system, the combination of a track circuit including a transformer, both rails of the track, a magnet and a track contact, said magnet and track contact being arranged in series; a supply circuit for the transformer; a generator for the supply circuit a plurality of track signals controlled by said magnet of the track circuit; a signal on a train; a magnet on said train controlling the train signal; contacts on said train connected with said magnet on the train and arranged to make connection with said track contact and one rail of the track.

3. In an electric signaling system, the combination of a track circuit including a transformer, both rails of the track, a magnet and a track contact, said magnet and track contact being arranged in series; a supply circuit for the transformer; a generator on a train for the supply circuit; a track signal controlled by said magnet of the track circuit; a signal on said train; a magnet on said train controlling the train signal; contacts on said train connected with said magnet on the train and arranged to make connection with said track contact and one rail of the track.

4. In an electric signaling system, the combination of a track circuit including a transformer, both rails of the track, a magnet and a track contact, said magnet and track contact being arranged in series; a supply circuit for the transformer; a generator on a train for the supply circuit; a plurality of track signals controlled by said magnet of the track circuit; a signal on a train; a magnet on said train controlling the train signal; contacts on said train connected with said magnet on the train and arranged to make connection with said track contact and one rail of the track.

5. In an electric signaling system, the combination of a track circuit including a transformer, both rails of the track, a magnet and a track contact, said magnet and track contact being arranged in series; a supply circuit for the transformer; a generator for the supply circuit; a track signal controlled by said magnet of the track circuit and operated by the current in the supply circuit; a signal on a train; a magnet on said train controlling the train signal; contacts on said train connected with said magnet on the train and arranged to make connection with said track contact and one rail of the track.

6. In an electric signaling system, the combination of a track circuit including a transformer, both rails of the track, a magnet and a track contact, said magnet and track contact being arranged in series; a supply circuit for the transformer; a generator for the supply circuit; a plurality of track signals controlled by said magnet of the track circuit and operated by the current in the supply circuit; a signal on a train; a magnet on said train controlling the train signal; contacts on said train connected with said magnet on the train and arranged to make connection with said track contact and one rail of the track.

7. In an electric signaling system, the combination of a track circuit including a transformer, both rails of the track, a magnet and a track contact, said magnet and track contact being arranged in series; a supply circuit for the transformer; a generator on a train for the supply circuit; a track signal controlled by said magnet of the track circuit and operated by the current in the supply circuit; a signal on said train; a magnet on said train controlling the train signal; contacts on said train connected with said magnet on the train and arranged to make connection with said track contact and one rail of the track.

8. In an electric signaling system, the combination of a track circuit including a transformer, both rails of the track, a magnet and a track contact, said magnet and track contact being arranged in series; a supply circuit for the transformer; a generator on a train for the supply circuit; a plurality of track signals controlled by said magnet of the track circuit and operated by the current in the supply circuit; a signal on said train; a magnet on said train controlling the train signal; contacts on said train connected with said magnet on the train and arranged to

make connection with said track contact and one rail of the track.

9. In an electric signaling system for railways, the combination of a track circuit including a transformer, a track magnet, both rails of the track, and a track contact, said track magnet and track contact being arranged in series; a track signal consisting of electric lamps controlled by said track magnet; a signal on a train; a magnet on said train controlling said train signal; a supply circuit for the transformer; a generator for the supply circuit; contacts on said train connected with said train magnet and arranged to make connection with said track contact and one rail of the track, whereby said track magnet and said train magnet will be connected in series for controlling the track and train signals; and a brake applying device on said train controlled by said track circuit.

10. In an electric signaling system for railways, the combination of a track circuit including a transformer, a track magnet, both rails of the track, and a track contact, said track magnet and track contact being arranged in series; a signal on a train; a brake applying device on said train; a magnet on said train controlling said train signal and brake applying device; a supply circuit for the transformer; a generator on said train for the supply circuit; a track signal operated by the supply circuit and controlled by said track magnet; contacts on said train connected with said train magnet and arranged to make connection with said track contact and one rail of the track, whereby said track magnet and said train magnet will be connected in series for controlling said track and train signals.

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

EDWARD L. ORCUTT.

Witnesses:

LEONARD DAY,

EMILY G. GRAVIER.