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ELECTRIC SIGNAL SYSTEM

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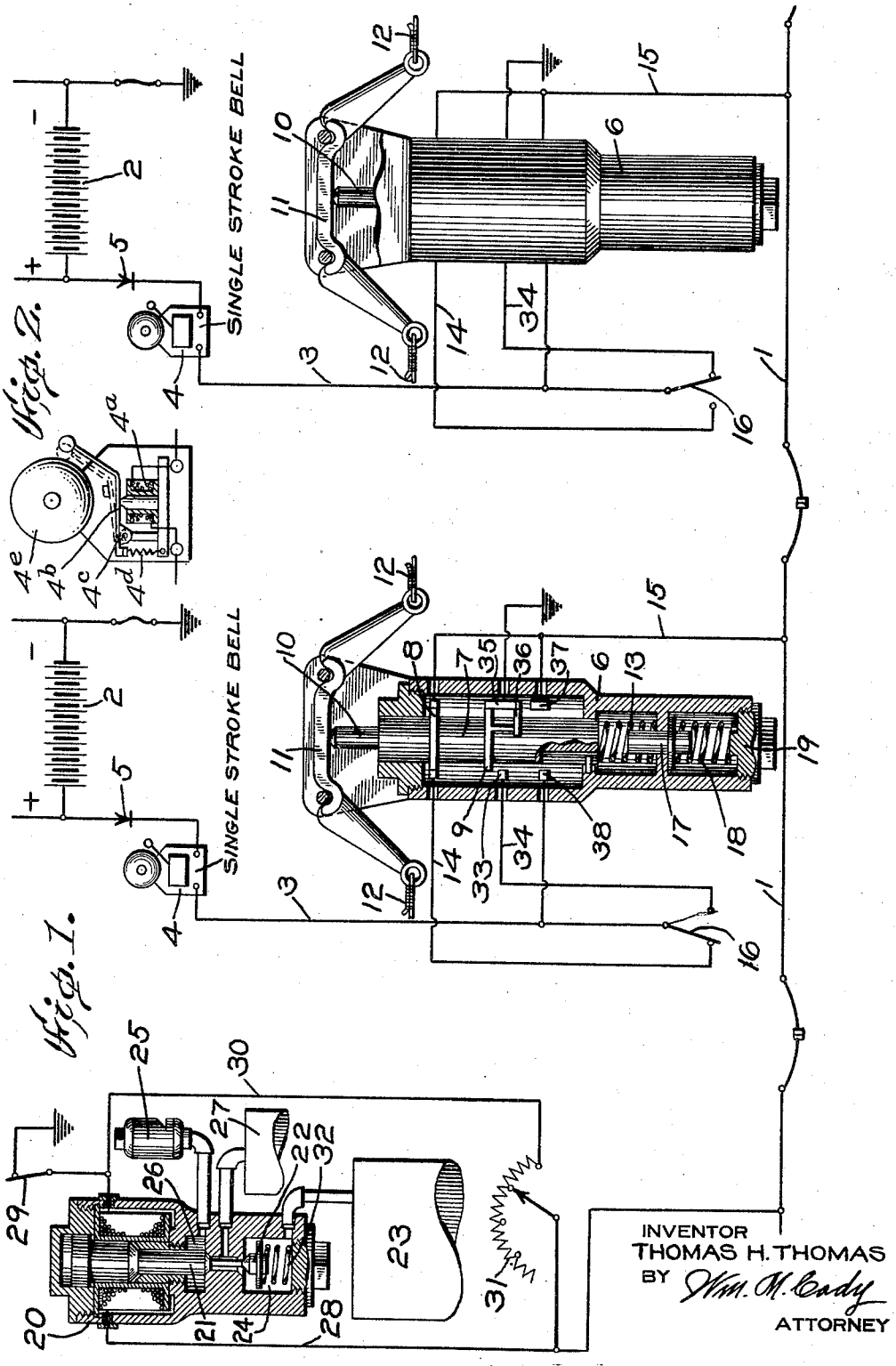


Fig. 2.

Fig. 1.

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ELECTRIC SIGNAL SYSTEM

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This invention relates to an electric train signal system, in which the engineer may signal a trainman or a trainman may signal to the engineer.

One object of my invention is to provide an electric train signal system in which a source of current is provided only on the cars and in which a signal device operating under a small amount of electric power is provided on the locomotive.

Another object of my invention is to provide an electric train signal system in which a trainman may signal to the engineer from a car on which the signal system has been cut out of action.

Another object of my invention is to provide an electric train signal system in which the trainman may receive a signal from the engineer when the signal system on the car is cut out.

Other objects and advantages will appear in the following more detailed description of the invention.

In the accompanying drawings, Fig. 1 is a diagrammatic view of an electric train signal system as applied to a locomotive and two cars of the train, and showing my invention embodied therein; and Fig. 2 is an enlarged elevational view, partly in section, of a signal gong with the cover removed.

The signal system shown in the drawings is of the type employing a single train wire 1, with the return circuit through ground. On each car of the train, a source of electric current 2 is provided, which may conveniently be the storage battery used for the lighting system.

The positive terminal of the source of current is connected to a wire 3, containing a signal device 4, which may be of the single stroke gong type and which operates to sound a signal when the signal system is deenergized. The gong is of the well known type and comprises a coil 4^a which when energized, attracts a magnet armature 4^b which constitutes a resilient hammer arm that is pivoted for oscillation about a pivot shaft 4^c. A spring 4^d serves to move the hammer to strike the bell or gong 4^e when the magnet coil is deenergized and releases the armature. Reenergization of the coil returns the hammer to its retracted position shown in full lines. A current rectifier 5 may be included in the circuit to prevent flow of current except in the direction of the arrow, so that if there should exist any difference of potential of the batteries on other cars, the generator on any one car will not operate to charge the batteries on other cars of the train.

A manually controlled switch device 6 is provided on each car, comprising a casing containing a plunger 7 of insulating material on which are mounted contact rings 8 and 9. A stem 10 extends upwardly from the plunger 7 and is adapted to be engaged by a double lever 11, so arranged that when the cord 12 is pulled, the lever will be actuated to depress the stem 10.

A spring 13 acts on the lower end of the plunger 7 and urges the plunger to its normal position, as shown in the drawings, in which the contact ring 8 connects wire 14, with a wire 15, connected to the train wire 1. A cut out or elevator switch 16 is provided and when the signal system on the car is cut in, the switch 16 is in the position of the switch 16 shown at the left of the drawings, in which the wire 14 is connected to wire 3.

The second position of the switch is determined by the engagement of the plunger 7 with a movable stop 17, normally maintained in position by a spring 18. The third position of the movable stop is determined by the engagement of the lower end of the plunger with the screw plug 19.

On the locomotive, there is provided a magnet valve device comprising an electromagnet 20 and double beat valves 21 and 22 adapted to be operated upon energization and deenergization of the magnet. A source of fluid under pressure, such as the reservoir 23, is connected to valve chamber 24 and a whistle 25 is connected to valve chamber 26. The space intermediate the valves 21 and 22 is connected to a reservoir 27.

One terminal of magnet 20 is connected by wire 28 to the train wire 1 and the other terminal is connected, through a switch 29 with the ground. A shunt circuit wire 30 with an adjustable rheostat 31 is provided,

so that the current flowing through the magnet 20 may be adjusted, according to the number of cars in the train.

In operation, the switch 16 on each car of the train may be either in the cut-out as shown on the second car of the train or cut-in position as shown on the first car, and assuming that at least one car of the train has its switch in the cut-in position, as shown in the drawings, a circuit will be completed from ground, through the source of current 2, through the signal device 4, wire 3, switch 16, wire 14, contact ring 8, wire 15, train wire 1, wire 28 on the locomotive, magnet 20, through switch 29 to ground.

The magnet 20 on the locomotive will thus be normally maintained energized, so that the valve 21 will be held seated while the valve 22 will be unseated.

With the valve 22 unseated, the reservoir 27 will be charged with fluid under pressure, as supplied past the open valve 22 from the reservoir 23.

If the engineer wishes to signal the trainman on a car with the switch 16 in the cut-in position, he opens the switch 29 and thereby the train wire circuit. The magnet 20 on the locomotive is thus deenergized and the valve 22 is then seated by spring 32 while valve 21 is unseated. With valve 21 unseated, fluid under pressure is supplied from the reservoir 27 to the whistle 25, which is then sounded to indicate to the engineer that the signal system is working.

On a car with the switch 16 in the cut-in position, as shown in the drawings, the signal bell device 4 is deenergized and thus sounds a signal. After making a signal, the engineer allows the normally closed switch 29 to close and if the trainman wishes to signal the engineer, he pulls a signal cord 12 so as to operate the lever 11 to depress the plunger 7. The plunger is depressed to the second signaling position, wherein it engages the stop 17 and the switch 8 is open and interrupts the circuit through the switch 16, thereby causing sounding of the signal 4.

The train wire 1 is therefore grounded through contacts 37, 36 and 35. The magnet 20 is therefore shunted from the circuit including a battery 2 and being thus deenergized, the whistle 25 is sounded in the manner hereinbefore described.

After the trainman has signaled the engineer, he permits the switch plunger 7 to return to its normal position, in which position the engineer may again signal the trainman, if he so desires.

The cut-out or selector switch 16 is provided, so that on a particular car, such as a sleeping car where the sounding of a signal might disturb the passengers, the signal apparatus may be cut out of action by moving the switch 16 to the cut-out position as on the second car.

At this time, the signal magnet 20 is energized by batteries 2 in other cars through circuits including the switches 16 that are in the cut-in position. Such circuits may be considered auxiliary circuits for energizing the coil 20 when a battery is cut out of the circuit by its respective switch 16 when it is in cut-out position.

In such cases, however, the trainman may wish to signal the engineer, as in an emergency, without taking the time to throw the switch 16 to its cut-in position. This is provided for in the present system, since with the switch 16 in its cut-out position, the trainman may signal the engineer by depressing the plunger 7 to the second signaling position hereinbefore referred to, and in which the train wire 1 is connected to ground through contacts 37, 36 and 25, so as to cause the deenergization of the magnet 20 on the locomotive. In this case, however, the trainman is informed that the signal system is operative, by the sounding of the signal 4 incident to the momentary energization and subsequent deenergization of a secondary circuit through the signal 4 and switch 16 to ground when the switch contact ring 9 momentarily engages the contact 33 and closes the circuit through switch 16 and contact 35 to ground, as the switch plunger 7 is moved to the second signaling position wherein the ring 9 is out of engagement with the contact 33 and just below it.

As indicated in Fig. 1, when the switch plunger 7 is in its normal position, the contact ring 9 is normally out of engagement with the contact 33 and accordingly the circuit through the signal 4 is open and no current flows through the signal device from its associated battery while the switch 16 is in the cut-out position and the signal magnet 10 is shunted from the circuit due to its connection to ground as above described. When the switch plunger 7 is in its normal position and the switch 16 is in the cut-in position, the magnet coil 20 is connected in series with the signal 4 and the high resistance of the coil 20 limits the flow of current from the battery to a negligible quantity.

If the trainman wishes to receive a responsive signal from the engineer without moving the switch 16 back to its cut-in position, he may shift the plunger 7 to its third signaling position, in which the contact ring 9 connects contact 38 connected to wire 3, with contact 37. The signal device 4 on the car is thus connected to the train wire 1, so that if the engineer opens the switch 29, the signal device 4 on the car will be deenergized to sound a signal.

It will now be seen that with the improved signal system, a trainman may signal the engineer from a car where the signal apparatus is cut out and the trainman may also receive a signal from the engineer.

The improved signal system is also so designed that no source of current is required on the locomotive while at the same time, a signal on the locomotive is always assured, since the magnet 20 is responsive to a small amount of current whereas a direct electrically controlled signal device requires a relatively heavy current to ensure satisfactory operation.

While one illustrative embodiment of the invention has been described in detail, it is not my intention to limit its scope to that embodiment or otherwise than by the terms of the appended claims.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In an electric train signal system, the combination with an electric train wire and a ground conductor, of a signal device on a power vehicle of a train comprising electrically controlled means operated upon deenergization to give a signal and having one terminal connected to said train wire and the other terminal to the ground conductor, a signal apparatus on each of a plurality of cars of the train comprising electrically controlled means operated upon deenergization to give a signal and connected between the train wires and ground conductor, and a source of current on each car connected in series to the ground conductor, its respective signal apparatus and to said train wire, a cut-out switch for connecting and disconnecting said signal apparatus and source of current to and from said train wire, and a manually operated switch on each car for connecting the said train wire to the ground conductor.

2. In an electric train signal system, the combination with an electric train wire and a ground conductor, a signal device on a power vehicle of a train comprising electrically controlled means operated upon deenergization to give a signal and normally connected to said train wire and to the ground conductor, and signal devices on cars of the train, each comprising electrically controlled means operated upon deenergization to give a signal and connected between the train wire and the ground conductor, of a source of current on each car in series with the car signal device and connected between the train wire and the ground conductor, a cut-out switch on each car for connecting and disconnecting both the car signal device and the source of current on the car to and from the train wire, and a manually operable switch on each car for grounding the train wire to deenergize the signal device on the power vehicle independently of the position of the cut-out switch.

3. In an electric train signal system, the combination with an electric train wire and a ground conductor, of a signal device on a power vehicle of a train comprising electrically controlled means operated upon deenergization to give a signal and having one terminal connected to said train wire and the other terminal to the ground conductor, a signal apparatus on each of a plurality of cars of the train comprising electrically controlled means operated upon deenergization to give a signal and connected between the train wire and the ground conductor, and a source of current connected between the signal apparatus and said train wire, a cut-out switch for connecting and disconnecting said signal and source of current to and from said train wire, and a manually operated switch on each car having one position for connecting the car signal device and the associated source of current to said train wire and another position for connecting the train wire to ground.

4. In an electric train signal system including electric circuits, a signal device on a power vehicle of a train comprising electrically controlled means operable upon deenergization to give a signal, a signal device on a car of a train comprising electrically controlled means operable upon deenergization to give a signal, a source of electric current on said car in series with the car signal, a switch device on the car having a position for closing a circuit including said source of current and the signal devices on the power vehicle and the car and a position for deenergizing said circuit and for preparing a circuit through the signal device on the car for completion by another switch, and another switch device on the car having one position in which the source of current and the signal device on the car are connected to said circuit and another position in which the source of current and the signal device on the car are disconnected from said circuit and in which the signal device on the locomotive is shunted from the circuit through the source of electric current.

5. In an electric train signal system, an electric circuit, a signal device on a power vehicle of a train included in said circuit and comprising electrically controlled means operable upon deenergization to give a signal, a signal device on each of a plurality of cars of the train, each comprising electrically controlled means operable upon deenergization to give a signal, a source of electric current on each car connected in series with the car signal, a cut-out switch on each car operative in one position to connect said car and power vehicle signal devices and source of current into said circuit and in another position to disconnect said source of current and said car signal device from said circuit, and a manually operable switch on each car for shunting the signal device on the power vehicle from said circuit.

6. In an electric train signal system having a train wire and a ground conductor, a signal device on a power vehicle of a train comprising electrically controlled means connected between the train wire and the ground conductor and operable upon deenergization to give a signal, a signal device on each of at least two cars of the train, each comprising electrically controlled means operable upon deenergization to give a signal, a source of current in series with each car signal and connected to the ground conductor, a cut-out switch on each of said cars having one position for connecting said source of current and the car signal device to a train wire including the signal device on the power vehicle, and another position in which the source of current and the car signal are disconnected from said train wire and a manually operable switch device on each of said cars having one position in which the source of current and the car signal device are connected to said train wire and another position in which said train wire is connected to the ground conductor, thereby shunting the circuit through the signal device on the power vehicle.

7. In an electric signal system for trains, the combination with an electric circuit including a source of electric current, of a plurality of current responsive signal devices connected in the circuit and operative to signal when deenergized, a signal switch for normally maintaining the circuit closed, a selector switch for selectively connecting the signal devices and the signal switch in series relation or for shunting one of the signal devices and the signal switch from the circuit.

8. In an electric signal system for trains, the combination with an electric circuit including a source of electric current, of a plurality of current responsive signal devices connected in the circuit and operative to signal when deenergized, a signal switch for normally maintaining the circuit closed, a selector switch for selectively connecting the signal devices and the signal switch in series relation or for shunting one of the signal devices and the signal switch from the circuit while preparing a secondary circuit through the other signal device for completion by another switch, and a normally open switch in the secondary circuit.

9. In an electric signal system for trains, the combination with an electric circuit including a source of electric current, of a plurality of current responsive signal devices connected in the circuit and operative to signal when deenergized, a signal switch for normally maintaining the circuit closed, a selector switch for selectively connecting the signal devices and the signal switch in series relation or for shunting one of the signal devices and the signal switch from the circuit while preparing a secondary circuit through the other signal device for completion by another switch, means for establishing an auxiliary circuit through the shunted signal device and signal switch and a second normally open signal switch in the secondary circuit adapted when moved to an operative signalling position to alternately energize and deenergize the secondary circuit to actuate the signal device therein and to shunt the previously shunted signal device and signal switch from the auxiliary circuit to cause its deenergization.

10. In an electric signal system for trains, a pair of conductors, a current supply means for supplying current to the conductors, a current responsive signal device on the locomotive of the train operative when deenergized to give a signal and connected across the conductors, a signal switch on the locomotive for interrupting the circuit through the signal device, a plurality of current responsive signal devices on the cars of the train connected across the said conductors and operative when deenergized to give a signal, and a selector switch on each car for selectively connecting the car signal devices in circuit with the locomotive signal devices and the said supply means whereby the car signal devices are under the control of the signal switch on the locomotive, or shunting the locomotive signal device and the locomotive signal switch from the circuit containing its respective signal device.

11. In an electric signal system for trains, a pair of conductors, a current supply means for supplying current to the conductors, a current responsive signal device on the locomotive of the train operative when deenergized to give a signal and connected across the conductors, a signal switch on the locomotive for interrupting the circuit through the signal device, a plurality of current responsive signal devices on the cars of the train connected across the said conductors and operative when deenergized to give a signal, a selector switch on each car for selectively connecting the car signal devices in circuit with the locomotive signal devices and the said supply means whereby the car signal devices are under the control of the signal switch on the locomotive, or shunting the locomotive signal device and the locomotive signal switch from the circuit containing its respective signal device, and switch means on each car in the circuit containing the signal device thereon, for interrupting the circuit through the signal device on the car and for shunting the signal device on the locomotive from the circuit through the said current supply means regardless of the operative position of the selector switch.

12. In an electric signal system for trains, a pair of conductors, a current supply means for supplying current to the conductors, a

current responsive signal device on the locomotive of the train operative when deenergized to give a signal and connected across the conductors, a signal switch on the locomotive for interrupting the circuit through the signal device, a plurality of current responsive signal devices on the cars of the train connected across the said conductors and operative when deenergized to give a signal, a selector switch on each car for selectively connecting the car signal devices in circuit with the locomotive signal devices and the said supply means whereby the car signal devices are under the control of the signal switch on the locomotive, or shunting the locomotive signal device and the locomotive signal switch from the circuit containing its respective signal device, and switch means on each car in the circuit containing the signal device thereon, operative to establish an energized circuit through the respective signal device on the car and the signal device and signal switch on the locomotive regardless of the operative position of the respective selector switch.

In testimony whereof I have hereunto set my hand, this 7th day of March, 1929.

THOMAS H. THOMAS.