F. S. DENNEEN.

SIGNAL SYSTEM FOR ELECTRIC CARS.

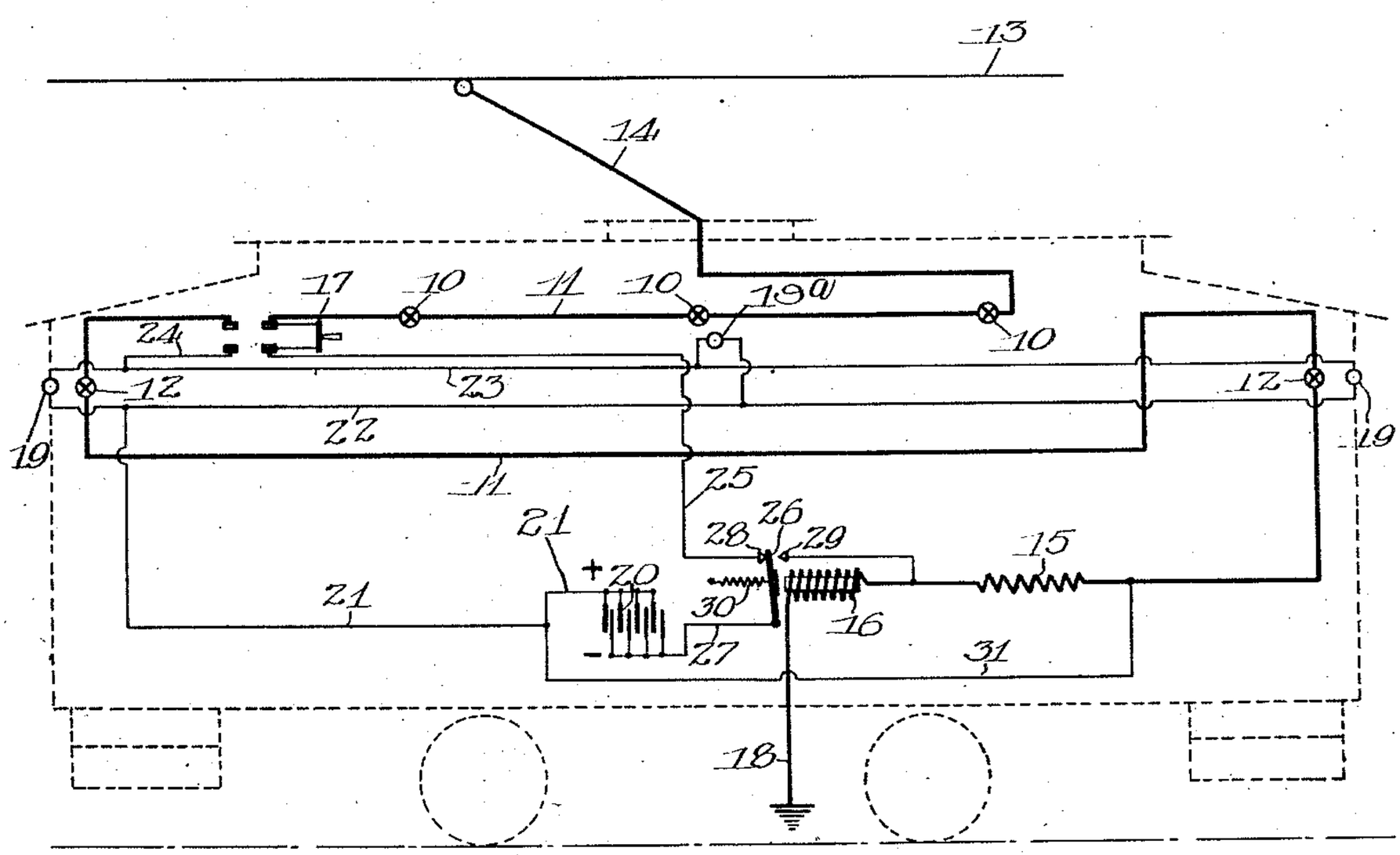
APPLICATION FILED MAR. 13, 1909.

948,758.

Patented Feb. 8, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



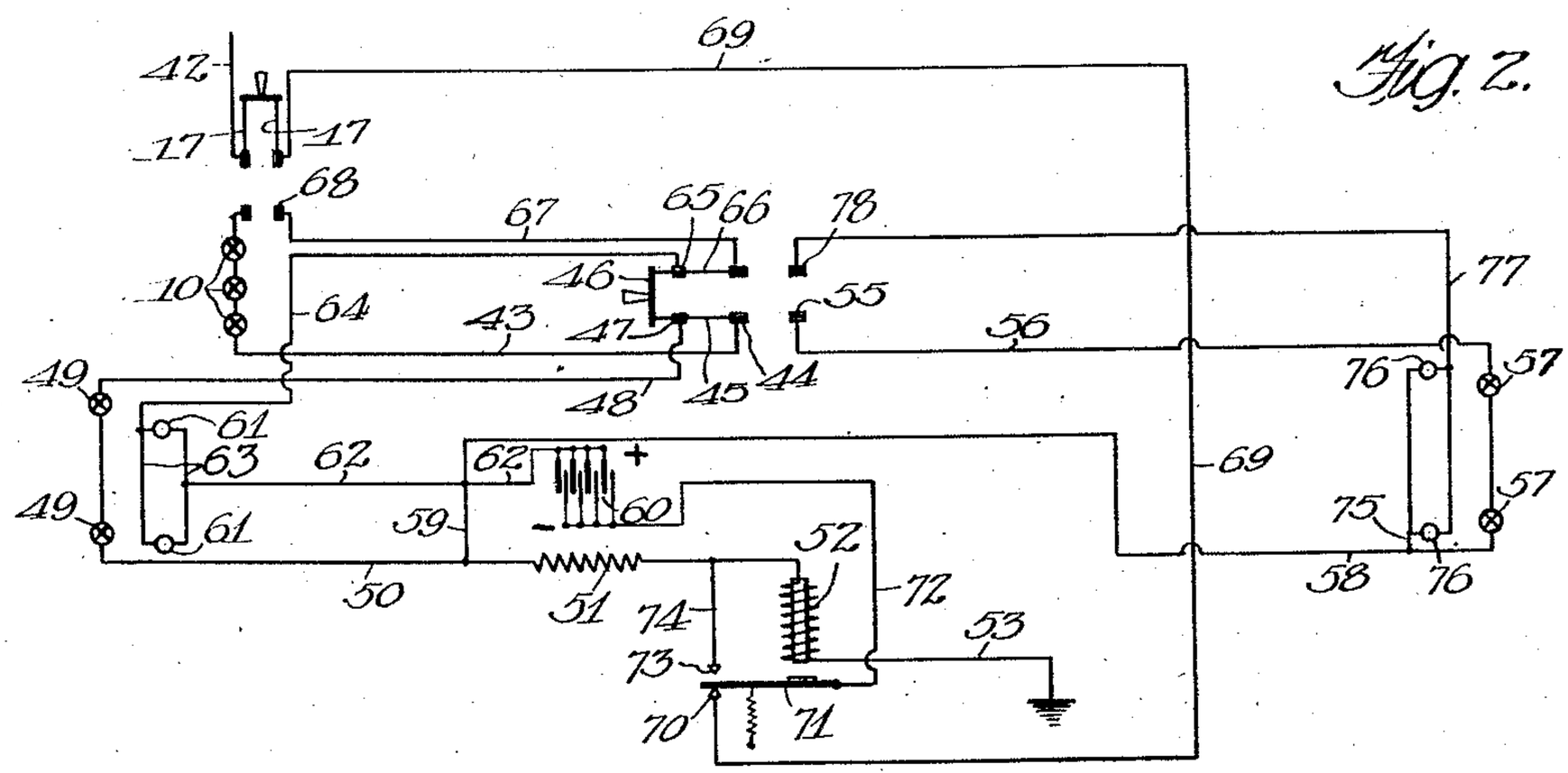


Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3.

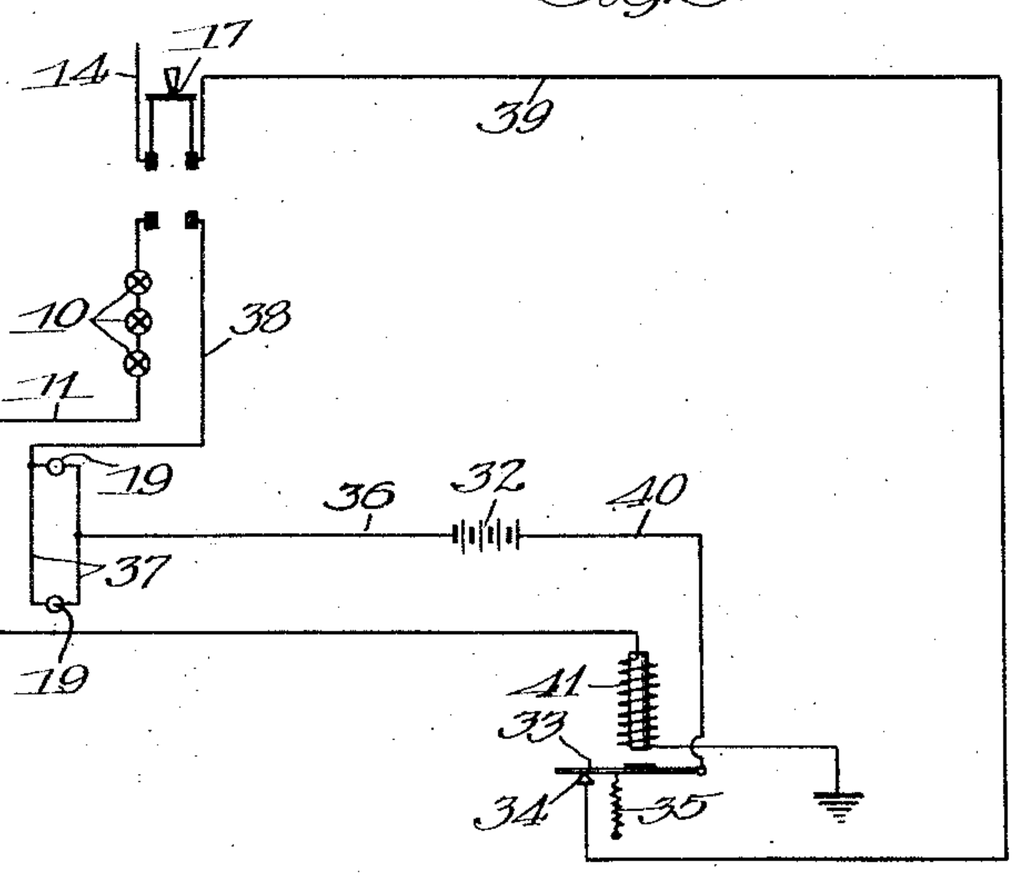


Fig. 4.

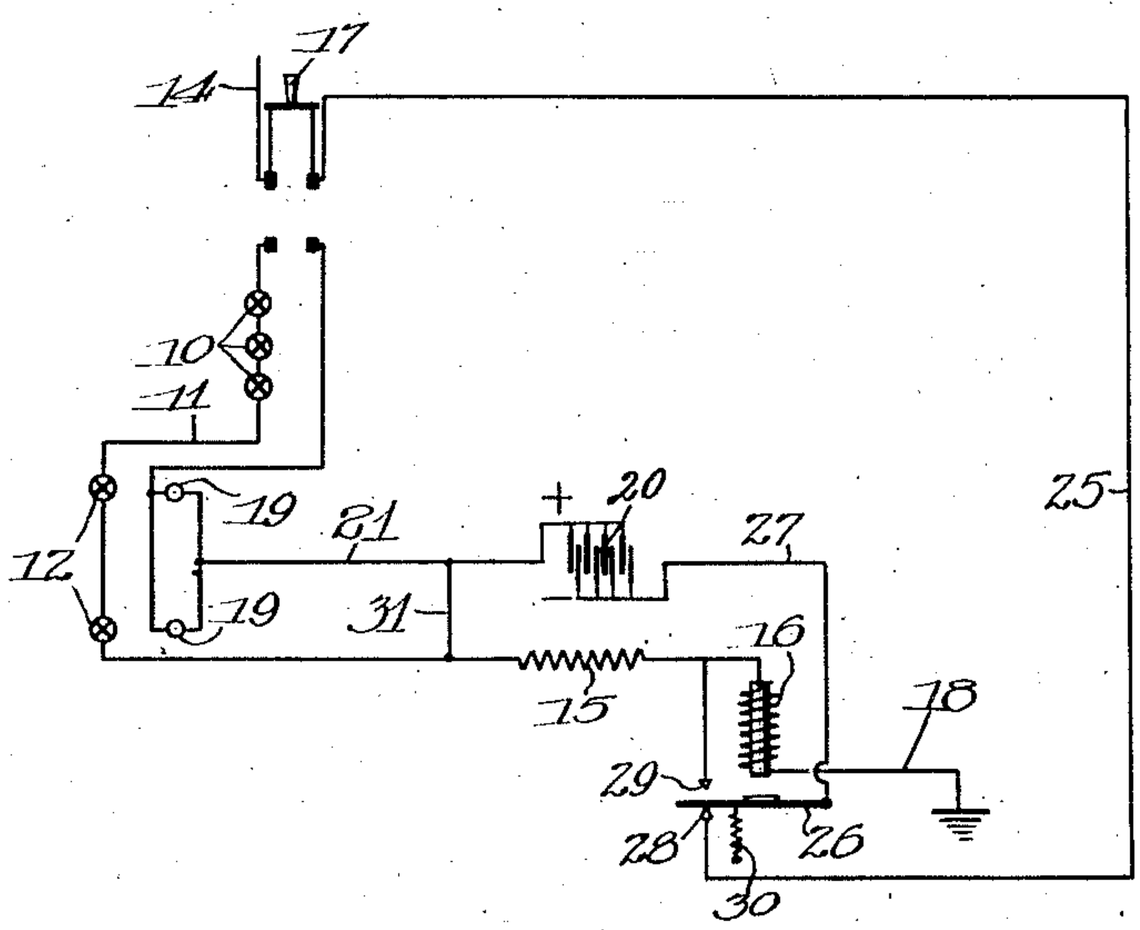


Fig. 5.

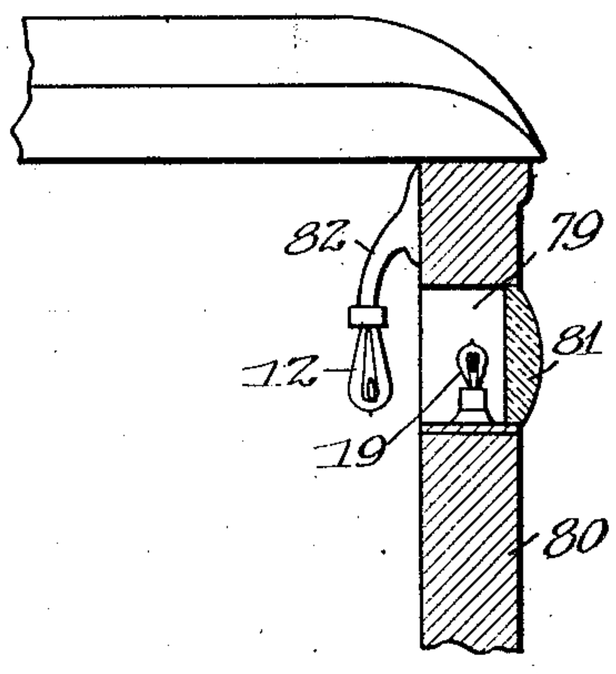
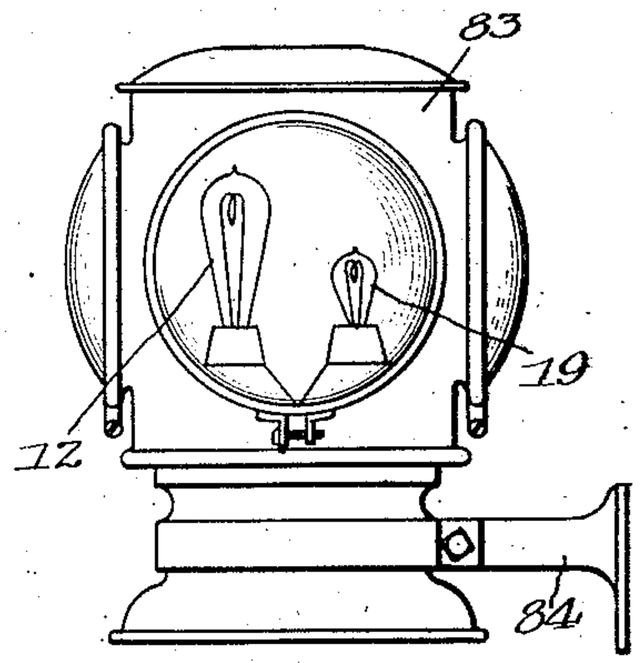


Fig. 6.



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UNITED STATES PATENT OFFICE.

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SIGNAL SYSTEM FOR ELECTRIC CARS.

948,758. Specification of Letters Patent. Patented Feb. 8, 1910.

Application filed March 13, 1909. Serial No. 483,143.

To all whom it may concern:

Be it known that I, FRANCIS S. DENNEEN, a citizen of the United States, residing at Mansfield, in the county of Richland and State of Ohio, have invented certain new and useful Improvements in Signal Systems for Electric Cars, of which the following is a specification.

This invention relates to signal systems for electric cars, in which there is provided a signal at the front and rear ends of the cars adapted to notify cars approaching from either direction of danger, and one of the objects of the invention is to provide auxiliary signal lamps and improved means for maintaining a signal regardless of whether the car is deprived of current or the main signal system is made inoperative in any manner.

A further object is to provide a storage battery for maintaining the auxiliary circuit and improved means whereby the battery may be energized at a predetermined rate so that it will not be necessary to periodically charge the batteries.

A further object is to provide improved means whereby a portion of the current from the main lighting system will be diverted through the batteries during the time that the main signal lights are operated, and improved means for discharging the battery at times, thereby obviating the danger of the batteries being overcharged.

To the attainment of these ends and the accomplishment of other new and useful objects, as will appear, the invention consists in the features of novelty in the combination and arrangement of the several devices hereinafter more fully described and claimed and shown in the accompanying drawings, illustrating the embodiment of the invention, and in which—

Figure 1 is a diagrammatic view of a simple form of the invention as applied to a car and showing the car in dotted lines. Fig. 2 is a diagrammatic view of a system for displaying two lights at each end of the car. Fig. 3 is a diagrammatic view of the circuit for an ordinary electric car. Fig. 4 is a diagrammatic view of a system similar to that shown in Fig. 3, showing the improved means for automatically energizing the battery in the auxiliary light circuit. Fig. 5 is a detail view of one end of the car partly in elevation and partly in section showing one arrangement of the main and auxiliary signal lights. Fig. 6 is an elevation showing the main and auxiliary signal lights arranged within a lantern or casing.

Referring more particularly to the drawings and in the diagram shown in Figs. 1 and 4, the numeral 10 designates the lights arranged within the main light circuit 11 and which lights may be located within the car. Within the main light circuit are signal lights 12, which are placed adjacent the front and rear of the cars for the purpose of serving as signal lights. All of these lights are arranged in series in the ordinary and usual manner and the main light circuit is supplied with current from the conductor or trolley wire 13 through the trolley pole 14 in the usual manner. Arranged within the main light circuit is a resistance 15 and a relay coil 16, and a switch 17 is also provided for interrupting the circuit when it is not desired to use the lights. The current entering the light circuit through the trolley pole 14 will pass through the lights 10 and 12, when the switch 17 is closed, through the resistance 15, relay coil 16 and to the ground through the conductor 18.

In order to maintain a signal at the front and rear end of the car should the main light circuit be deprived of current either by the trolley pole jumping the trolley wire or for any other cause there is provided auxiliary lights 19, which are arranged in an auxiliary circuit which comprises a battery 20, which supplies current to the lights through the conductors 21, 22, 23, 24, 25, armature 26 and conductor 27. The switch 17 is arranged within the auxiliary circuit and is adapted to open and close the circuit simultaneously with the opening and closing of the main light circuit 11 so that when it is not desired to have the lights lighted, the operation of the switch 17 will interrupt both circuits or will simultaneously close both circuits. The armature 26 is adapted to move between two contacts 28, 29, the contact 28 being arranged within the auxiliary circuit and the contact 29 being arranged within the main light circuit.

When the switch 17 is in the position shown in Fig. 1 of the drawings, both the

main light circuit and the auxiliary circuit will be interrupted and therefore the lights will not burn when the trolley pole is in engagement with the trolley wire 13 and the interruption of the main light circuit will deënergize the relay coil 16 to permit the armature 26 to be held in engagement with the contact 28 by means of the spring 30. When it is desired to operate the signals, the switch 17 is closed. This will cause a current to flow from the trolley wire 13 through the trolley pole 14, through the switch 17, through the lights 10, 12, through the resistance 15, through the relay coil 16 and to the ground through the conductor 18, causing the lights 10 and 12 to burn. As the current flows through the coil 16 of the relay magnet, the latter will be energized and will attract the armature 26 so as to move the same out of engagement with the contact 28 and into engagement with the contact 29, thereby breaking the auxiliary circuit. A shunt 31 is provided which connects the battery 20 across the resistance 15 so that when the armature 26 moves into engagement with the contact 29, the battery 20 will be thrown across and in parallel with the resistance 15. The resistance is preferably of some predetermined value and being arranged in parallel with the battery, a portion of the current flowing through the main light circuit will be diverted or shunted through the batteries, thereby keeping the batteries fully charged. With this construction it is possible that the battery 20 may be charged continuously for a long period of time without being called upon for any discharge, but beyond certain limits continued charging of the battery would be injurious.

On electrical railways the voltage generally fluctuates considerably and the resistance 15 may be so designed as to permit the battery to discharge slightly through the resistance coil during the times when the line voltage falls below a predetermined value. This will be the case when the drop of potential in the resistance coil 15 is less than the potential of the battery 20. Usually the battery is of a much lower voltage than that of the main light circuit. In this manner the battery may be charged and discharged to a certain extent automatically and at the same time the battery will be kept ready for immediate service in lighting the auxiliary lights. Assuming now that the signal lights 12 are deprived of current so that they will not burn, the relay coil 16 will also be deprived of current and the same will be deenergized, thereby permitting the spring 30 to draw the armature 26 out of engagement with the contact 29 and into engagement with the contact 28, thereby closing the auxiliary circuit when the switch 17 is closed. With the parts in this position, the current will flow from the battery 20 through the conductor 21, conductor 22, auxiliary signal lights 19, conductor 23, conductor 24, switch 17, conductor 25, contact 28, armature 26, and conductor 27, back to the battery, which will cause the auxiliary signal lights 19 to burn. The switch 17 is adapted to open and close both the main light circuit and the auxiliary light circuit at the same time, so that the battery 20 is charging only when the signal lights are used and can discharge only when needed, that is, when the auxiliary circuit is closed by the interruption of the main light circuit.

By omitting the shunt 31 in Figs. 1 and 4, the system is applicable to cars operated by means of alternating currents, as shown in diagram in Fig. 3, but in this form of the invention the current is not adapted for charging storage batteries and it is therefore not advisable to have the battery 32 connected across the main circuit when the lights are in operation but it is desirable to have the auxiliary circuit operate the signals or classification lights 19 when the lights 10 and 12, which are operated by alternating current, are deprived of their circuit. In this form of the invention the armature 33 is held in engagement with the contact 34 by means of the spring 35 which completes the circuit through the auxiliary circuit from the battery 32, through the conductor 36, conductors 37, auxiliary lights 19, conductor 38, switch 17, conductor 39, contact 34, armature 33, conductor 40, back to the battery, when the switch 17 is closed.

In the event that the main light circuit 11 is interrupted, the relay magnet 41 will be deënergized and the armature 33 will engage the contact 34 and the auxiliary lights 19 will be lighted. When the current is flowing through the main light circuit, the relay magnet 41 will be energized, which will attract the armature 33 and move the same out of engagement with the contact 34, thereby breaking the circuit through the auxiliary lights 19 but the moment the main light circuit is interrupted, the auxiliary circuit will be completed. If desired, a light 19^a may be placed within the car and arranged within the circuit of the signal lights 19. This light will be of the same voltage and operate with the signal lights 19 and serves to supply a small amount of light to the car should the car be deprived of the main source of light. At the same time this additional light 19^a will serve as an indication to the conductor whether the signal system is in working order or not and whether the signal lights are indicating to an approaching car.

Fig. 2 is a diagrammatic view of a system employing two signals at each end of the car and in this exemplification of the invention the current will enter the main light circuit through the conductor 42, switch 17, when

the latter is closed, lights 10, conductor 43, contact 44, blade 45 of the switch 46, contact 47, conductor 48, signal lights 49, conductor 50, resistance 51, relay coil 52, conductor 53 to the ground, this portion of the circuit being arranged at one end of the car. A similar circuit is provided at the other end of the car and comprises a contact 55 into engagement with which the blade 45 of the switch 46 is adapted to be moved to complete the circuit through the conductor 56, signal lights 57, conductor 58 and conductor 59, and to the conductor 50 on one side of the resistance 51, which will complete the circuit through the other end of the car when the switch 46 is shifted from the position shown in Fig. 2. The auxiliary signal light circuit is similar to that shown in the other forms of the invention and comprises the storage battery 60, which is connected to the auxiliary signal lights 61 through the conductor 62, conductor 63, conductor 64, contact 65, arm 66 of switch 46, conductor 67, contact 68, switch 17, conductor 69, contact 70, armature 71, conductor 72, back to the battery. The armature 71 is movable between the contacts 70 and 73, which latter is connected to the resistance 51 and the conductor 59 connects the battery 60 in parallel with the resistance 51. The auxiliary light circuit at this end of the car is established from the battery through the conductor 62, conductor 58, conductor 75, auxiliary lights 76, conductor 77, contact 78, blade 66 of the switch 46, conductor 67, contact 68, switch 17, conductor 69, contact 70, armature 71, conductor 72 back to the battery 60.

In the form of the invention shown in Fig. 5, the auxiliary signal light 19 is preferably arranged within an opening 79 in the wall 80 of the car so as to throw its light both into the interior of the car and also be visible through a lens 81 provided in front of the light. The main signal light 12 is preferably supported by a bracket 82 in the rear of the auxiliary light 19 and in position to also show through the lens 81.

In Fig. 6 both the auxiliary signal light 19 and the main light 12 are arranged within a lamp or casing 83 having the usual lenses and which is adapted to be secured to the car by the usual bracket 84.

By arranging the storage battery in shunt with the resistance, the battery is prevented from being overcharged for when the trolley voltage falls and the current through the resistance decreases, the drop in potential across the resistance decreases correspondingly and the battery is partially discharged in a local circuit including said resistance. But when the trolley voltage again increases and the current in the circuit including the resistance is also increased, the battery is re-charged. Besides, when the potential of the battery approaches in value the potential applied to it, substantially all the current flows through the resistance. The latter thus acts automatically as a safety by-pass while the battery is kept continuously charged.

While in the present exemplification of the invention there is shown and described a relay having a movable armature for making and breaking the auxiliary signal light circuit, it is to be understood that any form of automatically operated switch may be employed for making and breaking the circuit without departing from the spirit of this invention.

It should be particularly noted that all the current which flows through the main signal lamps does not need to flow through the storage battery. If such were the case the batteries might be overcharged unless used to supply current to the auxiliary lights very frequently. If it is attempted to place a resistance in series with the storage battery, the consumption of current is also wasteful and such an arrangement would be more expensive. It is therefore evident that this improved combination will be economical not only in construction but also in operation.

What is claimed as new is—

1. In a signaling system for railway cars, the combination with one or more signal lamps in a normally closed circuit, of one or more auxiliary signal lamps in a normally open circuit, a resistance in said normally closed circuit, a storage battery for supplying current to said auxiliary signal lamps, and switch mechanism automatically connecting said battery across said resistance while sufficient current flows through the main signal lamps to light the same, and closing said normally open circuit to effect the lighting of the auxiliary signal lamps when the main signal lamps go out or become too dim from insufficient current.

2. In a signal system for cars, the combination with signal lamps in a branch from the main line circuit, a resistance, a battery normally in parallel with the resistance and charged from the main line circuit, auxiliary lamps in an open circuit from the battery, and means operable by an interruption of the current in the main line branch to close the circuit of the said auxiliary lamps and for cutting out the resistance from the battery.

3. In a signal system for cars, the combination with signal lamps in a branch from the main line circuit, a battery charged from the main line circuit, auxiliary lights in a normally interrupted circuit from the battery, means operable by an interruption of the current in the main line branch to complete the circuit of the said auxiliary lights, and means for partially discharging the battery when the voltage of the main line branch

falls below a predetermined value and while the circuit of the auxiliary lights is interrupted.

4. In a signal system for cars, the combination with signal lamps in a branch from the main line circuit, a battery charged from the main line circuit, auxiliary lamps in a normally interrupted circuit from the battery, a resistance arranged in parallel with the battery permitting the battery to partially discharge when the voltage of the main line branch falls below a predetermined value and while the circuit of the auxiliary lights is interrupted, and means operable by an interruption or reduction of the current in the main line branch to complete the circuit of the said auxiliary lights and for cutting out the resistance from the battery.

5. In a signal system for cars, the combination with signal lamps in a branch from the main line circuit, a resistance in the main line circuit, a battery charged from the main line circuit, auxiliary lights in a normally interrupted circuit from the battery, said battery being arranged in shunt with the said resistance, and means operable by an interruption or reduction of the current in the main line branch to complete the battery circuit to light the auxiliary lights and break the said shunt connection.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this tenth day of March, A. D. 1909.

FRANCIS S. DENNEEN.

Witnesses:
C. T. ANDERSON,
E. HOPPES.