J. F. McELROY, DEC'D.
S. H. McELROY, EXECUTRIX.
ELECTRIC SIGNAL.
APPLICATION FILED JAN. 22, 1910.

1,185,814.

Patented June 6, 1916.

2 SHEETS—SHEET 1.

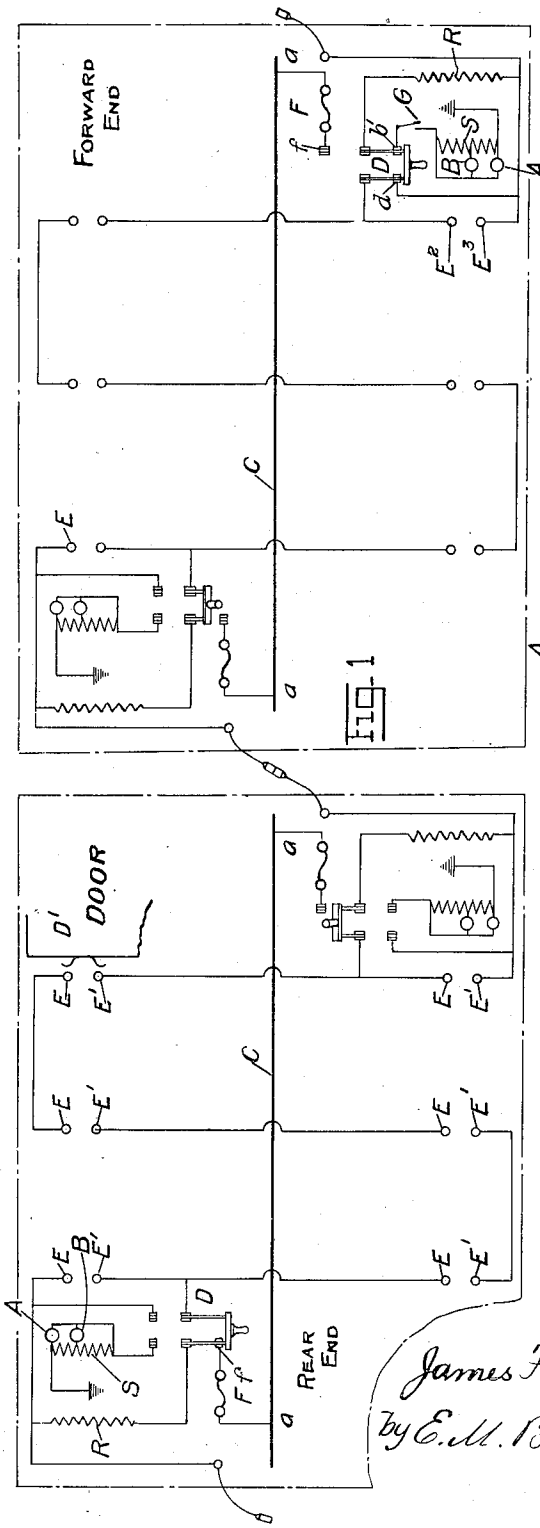


Fig. 1.

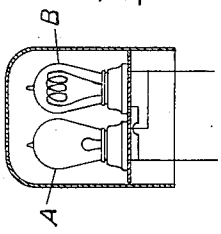


Fig. 2.

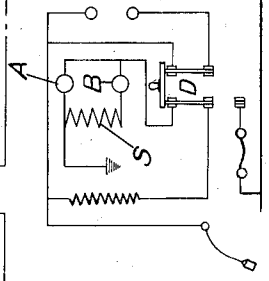


Fig. 3.

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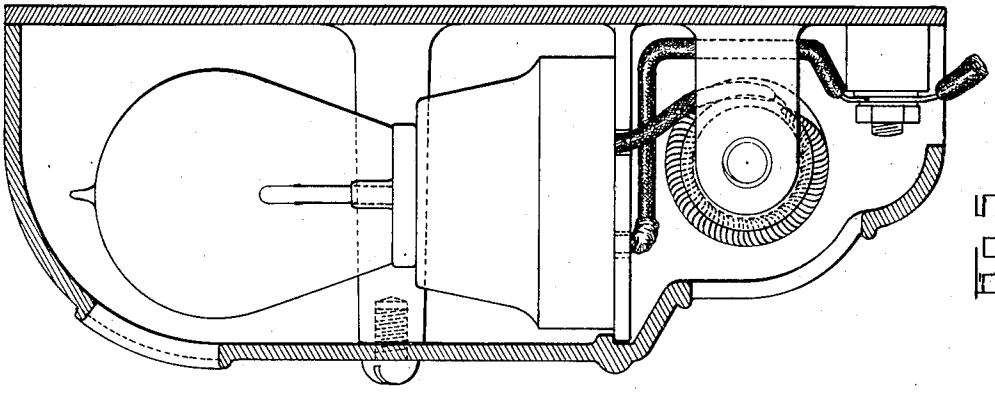


Fig. 5.

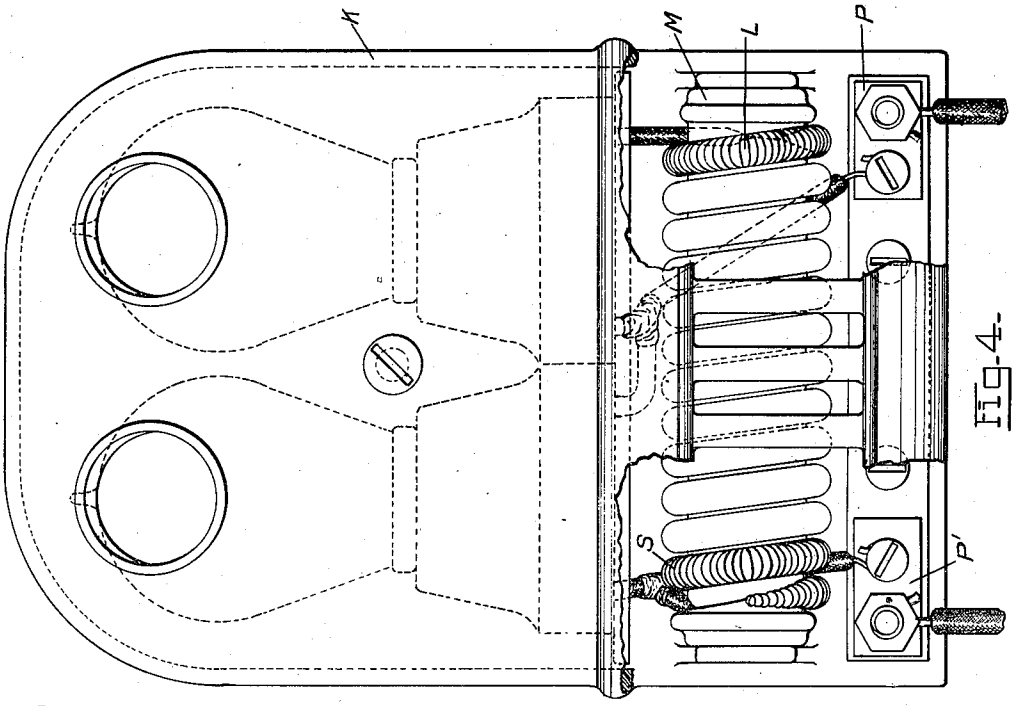


Fig. 4.

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UNITED STATES PATENT OFFICE.

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ELECTRIC SIGNAL.

1,185,814. Specification of Letters Patent. Patented June 6, 1916.

Application filed January 22, 1910. Serial No. 539,536.

To all whom it may concern:

Be it known that I, JAMES F. McELROY, a citizen of the United States, residing at Albany, county of Albany, State of New York, have invented certain new and useful Improvements in Electric Signals, the following being a full, clear, and exact disclosure of the one form of my invention which I at present deem preferable.

For a detailed description of the present form of my invention, reference may be had to the following specification and the accompanying drawings forming a part thereof, in which—

Figure 1 is a diagram of circuits used in one embodiment of my invention; Fig. 2 is a detail thereof; Fig. 3 is a modification; Figs. 4 and 5 show the signal-indicating device.

My invention relates to electric signals including an electric circuit which leads to a receiving device designed to give the required indications, and which is subjected at a distant point to the conditions which determine the character of the indication shown by the receiver.

In particular I have devised a novel means for bringing into action a reserve signal in event of the working one being disabled. This consists in connecting to the circuit at the receiving point both the reserve and a working device in multiple, the working device being of such low resistance with respect to the reserve device that the latter is normally short circuited thereby, and only comes into action upon the disability of the working signal and because of the break thereby produced in its circuit.

My invention also includes certain arrangements for utilizing such a signal receiver as I have just mentioned on a railway train to show the closure of the several doors on the cars composing the train, although it is my intention that the above mentioned arrangement of working and reserve signals shall be used in any situation wherein the condition of the circuit produced at some distant point is to be shown at the receiving point by signals.

Turning to the diagram appearing in Fig. 1, I have indicated therein the circuit of a door-closing signal, using for the receiving indicators two electric lamps contained in multiple circuits of differing resistance. In this diagram C C represent the supply wires of two electric cars to which the current is delivered by a trolley or third rail contact in a well known manner. At the point *a* in each car a branch circuit is taken for signaling purposes. These branch or signal circuits on each car will, however, be connected in series to form a common single circuit derived from the supply wire at a point *a* of one car only, the opposite end of the series of connected circuits being connected to the ground or return circuit. In my case I derive the said connected circuits from the point *a* at the rear end of the train and ground the opposite end of that circuit at the front end of the train. By this means it becomes impossible for a false indication to be caused by the grounding of the circuit at any point along the train. In my arrangement such a ground or short circuit would disable the entire line of signaling circuits and thereby prevent the starting of the train, whereas if the said circuit was derived at the forward end of the train and grounded at the rear end, such ground or short circuit would only disable that portion of the circuit lying between the ground and the rear of the train and afford no indication to the motorman at the forward end of the train that the system was not in proper condition.

Starting from the point of derivation *a* at the rear end of the train, which is at the left-hand end of the drawing, the signal circuit passes first through a fuse F and thence to one of the contacts *f* of a double throw switch D. This switch at all of the intermediate points on the train is left open, that is, with the switch blades in the middle position out of contact with the terminals on either side but at the rear end is thrown to one of its two positions, as indicated in the drawing, to connect the circuit to its point of derivation and at the opposite end of the train it is thrown to the other one of its two positions to connect the signal line to ground. Resuming the tracing of the signal circuit from its point of derivation *a* at the rear end of the train, it passes from the switch D through the resistance R to the first set of contacts E E^1 which are to be bridged by a contact on the door when

the door is in its closed position, as indicated by the representation of the door at D^1. Thence the circuit passes through the entire series of contacts E E^1 at each one of the several doors of the train to the forward end of the train where the switch D is indicated as thrown to its opposite position to connect the circuit to ground. That is to say, it passes through the left-hand blade of the switch D to the contact *d* thence to the resistance R, to the right-hand blade of the switch, to the contact b^1 and thence through a press-button switch G to the signal lamps and thence to ground. It will be observed that this arrangement affords a shunt about the gap between the final set of door contacts E^2 E^3 which is for the purpose of allowing that door to remain open without affecting the system, it being manifest that the signal circuit just traced will not be closed until every one of the remaining doors on the train is shut and all the contacts E E^1 thereby bridged. Until all the doors are shut the motorman at the end of the train will not receive his starting signal. If desired, however, the contacts E^2 E^3 of the last door may also be included in the circuit by connecting the switch at a point below instead of above those two contacts, as would be obvious to an electrician.

The press-button switch G may be used or not, according to whether it is desired to have the signal lamps constantly burning so long as the train is in motion, or whether it is desired to use them only during the signal period. In the latter case the motorman will merely press the button of switch G at about the time he expects to receive the starting signal and when he receives that signal, showing that the doors are all closed and the train ready to start, he will then release the button and the system will remain inactive until the next stop, when the described operation is repeated. The two signal-receivers are in this case two incandescent lamps A and B, the lamp B being shunted by a portion of the resistance S and the lamp A being shunted by the whole of that resistance. This means that the current from press-button switch G will go directly to lamp A and pass thence directly to ground, whereas the current which goes to the lamp B must pass through the lower half of resistance S before it can reach the ground. If the two lamps are of equal resistance, the resistance of the circuit of lamp B will be increased over that of lamp A by the lower portion of the resistance S through which its current must pass before going to ground. The lamp A will therefore short circuit the lamp B, in that the resistance of lamp A is so low as to put the high resistance lamp B out of action, the object of the resistance S shunting both lamps being to prevent any sparking at the contacts when the lamps are unscrewed from their sockets, since the resistance S will prevent a rise in voltage at the terminal of the last lamp at the moment when that lamp is unscrewed. I have found this particular arrangement to be of advantage when miniature lamps having small sockets and bases are employed, but when standard Edison lamps are used it is not necessary and the arrangement may then be as shown in Fig. 3. In this Fig. 3 the press-button switch G is omitted and the current goes directly from switch D to the lamps A and B which are in multiple, the resistance S being included in the branch containing the lamp B. The two lamps A and B are shown at Fig. 2.

I have stated that the lamp circuit of lower resistance short circuits the one of higher resistance. To this end I preferably use a lamp requiring about 3/10ths of an ampere and 7 volts, but the resistance in series with the reserve lamp is such that it will not light up until about 65 or 70 volts are applied to it. Under these conditions the acting lamp will burn normally at a pressure of 7 volts, the reserve lamp being effectively short circuited thereby. If, however, the acting lamp is broken, its circuit being thereby interrupted, the reserve lamp will automatically light up and, being suitably differentiated in appearance from the acting lamp, will show at once that the latter has burned out and should be replaced. The system as a whole is therefore not interfered with by the failure of the lamp as would be the case if no reserve lamp were available. I call attention to the fact that I thus secure the advantage of a reserve lamp without the use of any contacts or moving parts, which would be objectionable under such circumstances. Of course, the resistance might be in the lamp itself, but I prefer to use standard lamps of the same resistance and to increase the resistance of the reserve lamp by an external resistance. In the event of the resistance being in the lamp itself, both lamps should for the best results take approximately the same current.

In Figs. 4 and 5 I have shown a practical way of mounting the two lamps according to the arrangement shown in Fig. 3. K represents a box containing the lamps with a bull's eye opening opposite each lamp. The lower part of the box K is formed with grated opening for purposes of ventilation and contains the resistance S. This resistance which forms the subject matter of a separate application filed by me May 10, 1910, Serial Number 562,008 is formed by winding a fine wire on an asbestos cord L and then winding the cord on a porcelain mandrel M. One terminal of both lamps is connected to the junction plate P, while the opposite terminals of the two lamps are connected, one to

one end of resistance S, and the other to the junction plate P^1, to which is also connected the other end of resistance S.

It will be observed that the resistance R between the supply circuit and the lamps produces a drop which will be large when lamp A is burning. When lamp A fails, however, the resistance of the path through the lamp B being larger, the current will be smaller, and consequently the drop in R will be smaller. The resulting potential across B and part of S will therefore be larger.

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

1. An electrical signal comprising a circuit containing two branches in multiple, one branch being of higher resistance than the other, a constant potential source of current supply for said circuit, a lamp in each branch, and a resistance between the source of current supply and said branches and in series with both of the latter, whereby upon opening one of said branches the voltage impressed upon the other branch will be increased.

2. The combination with a signal circuit and controlling devices therefor, of a signal comprising two electric lamps in multiple branches of different resistance, a resistance in series with both lamps, and a constant-potential source of current supply for said circuit, whereby the voltage applied at the branching point will be automatically raised on the breakage of the branch of lower resistance.

3. The combination with a signal-circuit, and controlling devices therefor, of a signal-receiver consisting of two translating devices and a shunting resistance therefor, a part of said resistance being in series with one of the two devices.

4. In an electrical signal comprising a supply conductor, a series of supplemental signal conductors each provided with sets of separated stationary contacts forming breaks therein, means for connecting said signal conductors in series to form a main signal conductor, a connection with said supply conductor and the rearmost supplemental signal conductor adjacent the rear end of the latter, a plurality of movable contacts coöperating with the respective sets of stationary contacts, and all of them controlling the circuit through the main signal conductor, a signal receiver adjacent the foremost contact of each supplemental signal conductor, and a push button controlling said signal.

5. In an electrical signal comprising a supply conductor, a series of supplemental signal conductors each provided with sets of separated stationary contacts forming breaks therein, means for connecting said signal conductors in series to form a main signal conductor, a connection with said supply conductor and the rearmost supplemental signal conductor adjacent the rear end of the latter, a plurality of movable contacts coöperating with the respective sets of stationary contacts, and all of them controlling the circuit through the main signal conductor, a signal receiver adjacent the foremost contact of each supplemental signal conductor, a push button controlling said signal, and means adjacent each signal for shunting the current around the latter.

In witness whereof I have hereunto set my hand, before two subscribing witnesses, this 19th day of January, 1910.

JAMES F. McELROY.

Witnesses:
AVERILL E. COOK,
J. E. SCARLET.