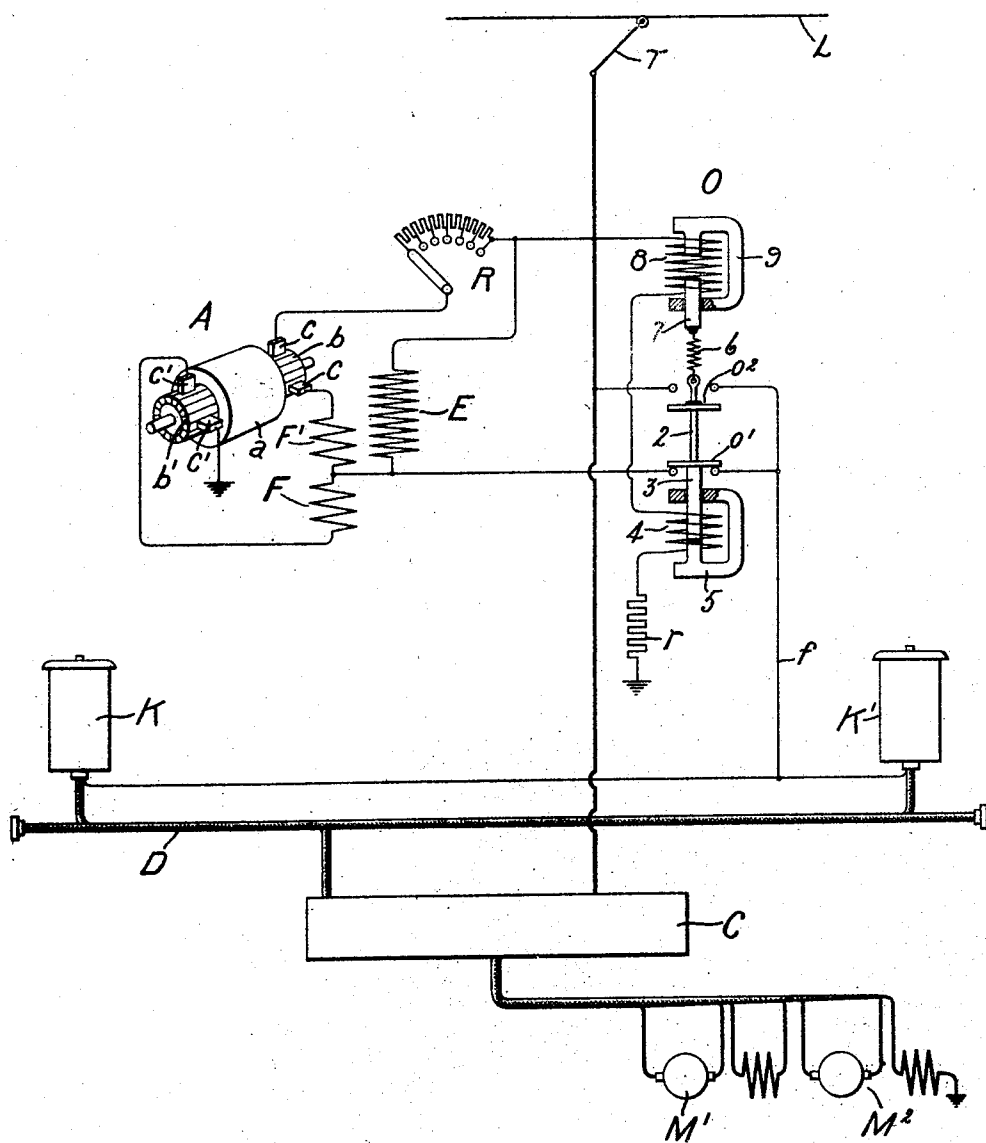


F. E. CASE.
SELECTIVE SWITCH SYSTEM.
APPLICATION FILED AUG. 7, 1908.

1,098,015.

Patented May 26, 1914.



Witnesses:

George W. Tilden
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by *Alfred H. Davis*
Att'y.

UNITED STATES PATENT OFFICE.

FRANK E. CASE, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

SELECTIVE SWITCH SYSTEM.

1,098,015.

Specification of Letters Patent.

Patented May 26, 1914.

Application filed August 7, 1908. Serial No. 447,351.

To all whom it may concern:

Be it known that I, FRANK E. CASE, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Selective Switch Systems, of which the following is a specification.

My invention relates to selective systems of switches and is particularly useful in connection with electrically driven cars designed for operation on roads operated at different places at different potentials, for example, 1200 and 600 volts. In such railway systems it is the custom to provide each car with a small motor generator or dynamotor which, when the car is upon a 1200 volt section of line, serves to reduce the high voltage of the line to a lower voltage, say 600 volts, for the purpose of supplying the control and lighting circuits of the car. When the car is operating upon a 600 volt section of line the control and lighting circuits are disconnected from the dynamotor and are connected directly to the current collecting device. With an equipment of this kind it is desirable that means be provided for automatically connecting the control circuits of the car to the trolley either through the dynamotor or directly, according as the car is on a high or low potential section of line, and it is in service of this kind that my invention is particularly useful, although it is not confined to this particular service. In order that there may be no chance of the higher potential being applied to the control circuits the selective switch device is biased to a position in which it connects the control circuits to the trolley through the dynamotor; that is, it assumes this position when its actuating circuit is de-energized. In order, therefore, that the switch may be open the connection between the control circuits and the dynamotor and close the connection between the control circuit and the trolley under the proper conditions, it is necessary that the switch respond only to the low potential and not to the high potential of the line.

It is an object of my invention to provide a construction and arrangement for accomplishing this purpose.

In the following description taken in connection with the accompanying drawing, I have set forth one form in which my invention may be embodied.

The drawing shows in a diagrammatic way the principal parts of the electrical equipment of a car designed for operation on a line having sections of two potentials and provided with a selective switch constructed and arranged according to my invention.

Referring to the drawing, L is a trolley wire which is at some parts of the line supplied with high potential, and at other portions of the line with low potential current; T is a trolley carried by the car; M¹ and M² are the car motors; K and K¹ are the master-switches, located at either end of the car, by which the operator controls the direction of movement and speed of the car; C represents the contactor box in which are located the contactors, or electromagnetically operated switches, which make and break the connections of the motor circuit under the control of the master-switches K and K¹ to which they are connected by the train wires contained in the cable D.

A motor generator is shown at A and for the purposes of this application is shown as of the type covered by a patent in the name of Max R. Hanna, No. 897,257, dated August 25, 1908. This dynamotor has an armature *a* provided with two armature windings connected, respectively, to commutators *b* and *b*¹ upon which bear the brushes *c* and *c*¹, respectively. A shunt field winding is indicated at E, and at F and F¹ are shown two field windings connected in series with the two armature windings and arranged in normal operation to oppose and neutralize each other. A rheostat shown at R provides for the control of the dynamotor. The construction and mode of operation of the dynamotor need not be further explained since it forms no part of my invention.

The selective switch device by which the control circuits of the car are connected to the trolley, either through the dynamotor or directly, is shown at O. When in the position shown, this device by its lower switch o^1 connects the wire f , through which the control circuits are fed, through the dynamotor a to the trolley T. This is the position which the switch device O assumes when its actuating circuit is deenergized, and also the position in which it is when the car is on a high voltage section of line. The upper switch o^2 serves when closed to connect the control circuits fed through the wire f directly to the trolley T. In the form of selective switch device O illustrated in this application the movable members of the switches o^1 and o^2 are mechanically connected, being mounted upon a rod 2 extending upward from a core of magnetic material 3 arranged for movement in the field produced by a coil 4 mounted in a field frame 5. The upper end of the rod 2 is connected through a spring 6 to a core of magnetic material 7 arranged for movement within the field produced by a coil 8 mounted in a field frame 9. The coils 8 and 4 are connected in series through a resistance r between the trolley T and ground, this circuit thus receiving the potential between trolley and ground whether the car is on a high or low potential section of line. The upper magnet, of which the coil 8 is a part, is so designed that its core 7 will pull up upon the current resulting from the car being on a low potential section of line as well as upon the higher current which flows through it when the car is upon a high potential section. The upper magnet, therefore, serves always to place the spring 6 under a certain tension and thereby exert a certain upward pull tending to open the switch o^1 and close the switch o^2 . The upward pull exerted by the upper electromagnet is resisted by the lower electromagnet, the coil 4 of which has such a number of turns when excited by the current resulting from the trolley being on a low potential section of line that it produces a field insufficient to hold the core 3 down and the switch o^1 therefore opens and switch o^2 closes. When, however, the coil 4 is excited by the greater current resulting from the trolley being on a high potential section, the core 3 will be pulled down and the switches o^1 and o^2 will be moved to and maintained in the position shown against the tension of spring 6. With this arrangement it is clear that the selective switch device O will remain in the position shown at all times, except when the car is upon a low potential section of line. Since the switch

o^1 is, when deenergized, in the position in which it connects the control circuits to the trolley through the dynamotor, there is no danger of the high potential of the line being applied to the control circuits even for an instant, as it might if the switch were normally in its other position.

I do not desire to limit myself to the particular construction and arrangement herein shown, but aim in the appended claims to cover all modifications which are within the scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is,

1. An electrically controlled switch comprising a resiliently mounted contact member having two positions, electromagnetic mechanism for causing said member to move to said two positions comprising two electromagnets having their windings in series, one of said magnets acting upon the member directly to move it to one position while the other magnet acts through the resilient mounting to move it to the other position.

2. An electrically controlled switch comprising a resiliently mounted contact member having two positions, electromagnetic mechanism for causing said members to move to said two positions comprising two electromagnets having their windings in series, one of said magnets acting directly upon the member to move it to one position while the other acts through the resilient mounting to move the member to the other position and has a different number of turns from the other winding.

3. An electrically controlled switch comprising two switch members, mechanical connections between said members whereby when one is in open position the other is in closed position, an electromagnet which when energized tends to move said members to one position, a second electromagnet in circuit with said first magnet having an armature resiliently connected with said members and opposing the action of said first magnet upon the members.

4. An electrically controlled switch comprising two resiliently mounted switch members, mechanical connections between said members whereby when one is in open position the other is in closed position, and electromagnetic means for causing said members to move to said two positions comprising two electromagnets having their windings in series, one of said magnets acting upon the members directly to move them to one position while the other acts through the resilient mounting to move them to the other position.

5. An electrically controlled switch comprising two switch members, mechanical con-

nections between said members whereby when one is in open position the other is in closed position, an electromagnet which when energized tends to move said members to one position, a second electromagnet in series with said first magnet having an armature resiliently connected with said members and opposing the action of said first magnet upon the members, said second

magnet having a greater number of turns than the first magnet.

In witness whereof, I have hereunto set my hand this 5th day of August, 1908.

FRANK E. CASE.

Witnesses:

BENJAMIN B. HULL,
HELEN. ORFORD.

Correction in Letters Patent No. 1,098,015

It is hereby certified that in Letters Patent No. 1,098,015, granted May 26, 1914, upon the application of Frank E. Case, of Schenectady, New York, for an improvement in "Selective Switch Systems," an error appears in the printed specification requiring correction as follows: Page 1, line 43, after the word "may" strike out the word "be;" and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 23rd day of June, A. D., 1914.

[SEAL.]

R. F. WHITEHEAD,

Acting Commissioner of Patents.