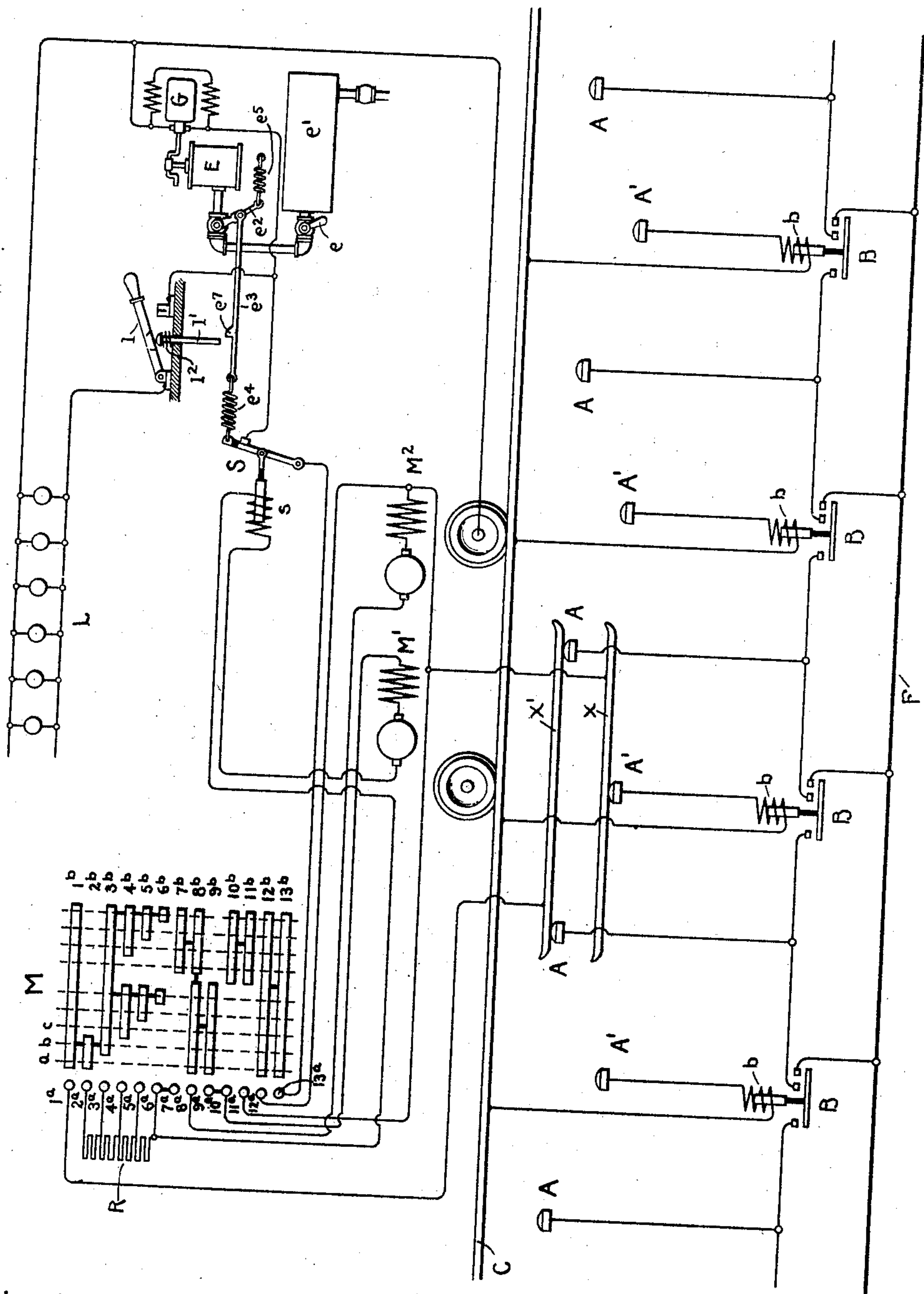


No. 812,725.

PATENTED FEB. 13, 1906.

F. E. CASE.  
SURFACE CONTACT SYSTEM.  
APPLICATION FILED JULY 22, 1904.



Witnesses.  
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# UNITED STATES PATENT OFFICE.

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## SURFACE-CONTACT SYSTEM.

No. 812,725.

Specification of Letters Patent.

Patented Feb. 13, 1906.

Application filed July 22, 1904. Serial No. 217,600.

*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 Surface-Contact Systems, of which the following is a specification.

The present invention relates to systems of electric control, and more particularly to a system of operating pick-up switches of surface-contact or sectional-rail railway systems.

One object of the present invention is to provide means for automatically cutting out the auxiliary source of current-supply which is employed for the purpose of operating the pick-up switches in a sectional-rail railway system when the connection with the main line has been completed.

A further object of the present invention is to provide a novel interlocking system between the means for operating the generator and a number of distributing-circuits whereby the breaking of one circuit stops the generator subject to control by the other circuit.

The present invention further consists in the peculiar construction whereby the interlocking is effected. To this end I have provided the car or locomotive with an auxiliary generator, operated in any suitable manner—as, for instance, by compressed air—together with such circuit connections that when the generator is set in operation and the controller is moved to its first position, current passes from the generator to the operating-magnets of one or more pick-up switches, causing the switch or switches to be closed, completing the motor-circuit for the main line and then cutting out the auxiliary generator.

I intend employing the auxiliary generator for lighting, heating, or other auxiliary purposes, and therefore provide interlocking means which enables the main-line current when established to stop the generator when it is not required for auxiliary purposes, or when it is desired to further operate the generator then to simply break the circuit through the pick-up switch.

Further objects of the present invention will appear in connection with the following description thereof and from the appended claims.

The accompanying drawing represents di-

grammatically and conventionally a surface-contact railway system with which my present invention is associated.

F represents the feeder, which is electromagnetically connected to the contacts A by means of switches B. The actuating-coils of the switches B have their one terminal connected to contacts A' and the other to the track C. This arrangement may be of any usual or preferred form, as it constitutes no part of the present invention.

M is a motor-controller of any usual or desired form for controlling the motors M' and M<sup>2</sup> and has a number of running positions, as is common in such devices.

A low-potential generator G is placed at a suitable point upon the car or locomotive and is operatively connected to an air-engine E of suitable construction. The engine and generator may be set in operation by opening a valve e, which admits compressed air or other fluid from a reservoir e' to the engine. If it is now desired to start the car or train, the motor-controller is moved to its first position and a circuit is established from one terminal of generator G to controller-contacts 13<sup>a</sup>, 13<sup>b</sup>, 12<sup>b</sup>, and 12<sup>a</sup> to collector-shoe X, line-contact A', through the coil b of one of the electromagnets, and thence to the track. The other terminal of the generator being connected with the track, current passes through the electromagnet and energizes it, closing the switch B. As soon as the switch B is closed current flows from the feeder F through the contacts of switch B, through contacts A, collector-shoe X', controller-contacts 1<sup>a</sup>, 1<sup>b</sup>, 2<sup>b</sup>, and 2<sup>a</sup>, through resistance R, coil s, motor M', controller-contacts 10<sup>a</sup>, 9<sup>a</sup>, 9<sup>b</sup>, 8<sup>b</sup>, and 8<sup>a</sup>, through motor M<sup>2</sup>, to collector-shoe X, contact A', through coil b and to the track. Therefore the line-current passes through the coil of switch B in the proper direction for maintaining the switch closed without the aid of the generator or the car and through the motors connected in series with full resistance in circuit. Sections of resistance are then cut out, and the motors are connected in parallel in the usual manner by moving the controller through its various steps.

Not only is the generator no longer required after the line-contact is completed, but it is seen that when the current leaves motor M<sup>2</sup> it may either follow the path just described or it may pass through controller-



contacts 12<sup>a</sup>, 12<sup>b</sup>, 13<sup>b</sup>, and 13<sup>a</sup> back to the generator G, tending to drive it as a motor and rendering it useless for other purposes. To prevent this, there is placed in the line between the generator G and the controller-contact 13<sup>a</sup> a switch S, electromagnetically operated by the passage of the current in the motor-circuit through the coil s. Therefore as soon as the auxiliary generator has performed its function of picking up the switch B its circuit is broken, and the switch is maintained in position by the main-line current. The movable member of the switch S is connected to a valve e<sup>2</sup> between the reservoir e' and the engine e by means of a rod e<sup>3</sup> and a spring e<sup>4</sup>. When otherwise free, the valve e<sup>2</sup> is closed, when the motor-current is established and the switch S opened, thereby automatically shutting off the air-supply to the engine and stopping it. The valve e<sup>2</sup> is preferably provided with a spring e<sup>5</sup>, which tends to hold it open and which opens it whenever the motor-circuit is broken from any cause, so as to deenergize the coil s.

By employing a generator having a low potential it may be employed to advantage to supply the lights of the car or train, the circuit of which is controlled by a switch 1. In order that the operation of the generator shall not be interrupted by the opening of the switch S, if it is desired to use the lights I have provided an interlock between the switch 1 in the lighting-circuit and the valve e<sup>2</sup>, whereby the valve cannot be closed so long as the switch 1 remains closed. This interlock consists of a stop 1', adapted to be moved into the path of a lug e<sup>7</sup> on the rod e<sup>3</sup> upon the closing of the switch. This stop may consist of a pin or stud arranged beneath a portion of switch 1 and held out of its operative position by means of a spring 1<sup>2</sup>, but which is moved into the path of lug e<sup>7</sup> against the spring tension when the switch is closed.

The function of spring e<sup>4</sup> will now be apparent. If the switch S were connected to the valve e<sup>2</sup> by means of a rigid connection, then upon closing the switch 1 the electromagnetic switch could not be operated and current would flow from the main line through the generator, as described, and to the lamps, while if there were no interlock the generator would be stopped. By providing the spring e<sup>4</sup> in the connection between the electromagnetic switch and the valve e<sup>2</sup> the switch serves to close the valve when the lights are not required without being prevented from opening when the light-circuit is closed.

It is evident that the automatic regulation of the generator may be made use of without the interlock where it is not desired to employ the generator for auxiliary purposes, and it is further evident that the interlocking arrangement may be employed in situations

other than upon railway-cars or in connection with the particular type of railway system illustrated.

While I have illustrated the various features of my invention in the best forms known to me, in their broader aspects they are of course not limited to the details of construction illustrated, since many changes in construction may be made without departing from the scope and spirit of my invention.

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

1. In an electric-railway system, a feeder, a pick-up switch, a dynamo-electric machine for closing said switch, and means operative upon the closing of said switch to stop said machine.
2. In an electric-railway system, a feeder, a pick-up switch, a current-generator for closing said switch, means for driving said generator, and means operable upon the closing of the switch to stop the generator.
3. In an electric-railway system, a feeder, a generator, two circuits therefrom, a pick-up switch operated by current in one of said circuits, means operable upon the closing of said switch to stop the generator, and means for rendering said latter means inoperative while the second circuit remains closed.
4. In an electric-railway system, a feeder, a generator, a circuit therefrom, a pick-up switch closed by current in said circuit, means for driving said generator, and means operable upon the closing of said switch to interrupt the circuit and to stop the generator.
5. In combination, a generator, an engine for driving it, a valve for controlling the admission of compressed fluid to said engine, a generator-circuit, a switch in said circuit, and means controlled by said switch for locking said valve in its open position.
6. In an electric system, a motor, a source of current-supply, a generator, means for driving said generator, a switch for connecting said motor to said source of supply and operated by current from the generator, together with means operable upon the closing of the motor-circuit to stop the generator.
7. In an electric system, a motor and a source of current-supply therefor, a dynamo-electric machine, a switch for connecting said motor to said source of supply and operated by current from the machine, together with means operable upon the closing of the motor-circuit to stop the machine.
8. In an electric-railway system, a feeder, a pick-up contact, a dynamo-electric generator for supplying current to operate said contact, an automatically-operated switch for interrupting the current, and means operatively related to said switch for stopping the generator.
9. In an electric-railway system, a feeder, a pick-up contact, a generator for supplying current to operate said contact, a switch for



interrupting the current, a second circuit from the generator having a second switch, and means operatively related to the first switch for stopping the generator when the second switch is open.

10. In combination, an electric circuit including a source of current-supply, a generator, means for driving said generator, means operated by current from said generator for completing said electric circuit, and means operable upon the completion of said circuit to stop the generator.

11. In combination, an electric circuit including a source of current-supply, a dynamo-electric generator, means operated by current from said generator for completing said electric circuit, and means operable upon the completion of said circuit to stop the generator.

12. In combination, an electric circuit including a source of current-supply, a dynamo-electric generator, means operated by current from said generator for completing said electric circuit, and means operable upon the completion of said circuit to break the generator-circuit and to stop the generator.

13. In combination, an electric circuit including a source of current-supply, a generator, means for driving said generator, means operated by current from said generator for completing said electric circuit, and means operable upon the completion of said circuit to stop the generator and to again start it when the first circuit is interrupted.

14. In combination, an electric circuit including a source of current-supply, a dynamo-electric generator, means operated by current from said generator for completing said electric circuit, and means operable upon the completion of said circuit to stop the generator until said circuit is again interrupted.

15. In combination, an electric circuit including a source of current-supply, a dynamo-electric generator, means operated by current from said generator for completing said electric circuit, and means operable upon the completion of said circuit to interrupt the generator-circuit and stop the generator while said first circuit remains closed.

16. In combination, an electric circuit including a source of current-supply, a generator, means operated by current from said generator for completing said electric circuit and means operable upon the completion of said circuit to interrupt the generator-circuit and also to stop the generator, an auxiliary circuit from said generator, and means for preventing the stopping of the generator while said auxiliary circuit remains closed.

17. In combination, an electric generator and its engine, a valve for controlling the admission of compressed fluid to the engine, a generator-circuit and a switch therein, an operative connection between said valve and said switch, an auxiliary generator-circuit

provided with a circuit-closing device, and interlocking means between the valve and said circuit-closing device for holding the valve against movement in one of its positions.

18. In combination, an electric generator and its engine, a valve for controlling the admission of compressed fluid to the engine, a generator-circuit and a switch therein, an operative connection between said valve and said switch, an auxiliary generator-circuit provided with a switch, and interlocking means between the latter switch and the valve whereby the valve is at times held against movement during the operation of the first switch.

19. In combination, an electric generator and its engine, a valve for controlling the admission of compressed fluid to the engine, a generator-circuit and a switch therein, an operative connection between the valve and the switch whereby the opening of the switch causes the valve to be opened, a second generator-circuit provided with a switch, and interlocking means between said latter switch and said valve, whereby the valve is prevented from being opened upon the opening of the first switch while second switch remains closed.

20. In an electric system, an electric generator, two circuits therefor, a switch in each circuit, means connected with one of said switches for stopping the generator when the switch is opened, and an interlock which prevents such stopping of the generator while the other switch remains closed.

21. In an electric system, an electric generator and its engine, a valve for controlling the admission of compressed fluid to said engine, a generator-circuit and a switch therein, a yielding connection between the valve and switch whereby the opening of the switch closes the valve, and means for locking the valve against being closed by the switch.

22. In an electric system, an electric generator and its engine, a valve for controlling the admission of compressed fluid to the engine, two generator-circuits, a switch in each circuit, an operative connection between one of said switches and said valve whereby the switch and valve may move in unison, and means controlled by the other switch for rendering said connection inoperative.

23. In an electric system, an electric generator and its engine, a valve for controlling the admission of compressed fluid to the engine, two generator-circuits, a switch in each circuit, an operative connection between one of the switches and the valve, and interlocking means between the valve and the other switch.

24. In an electric system, an electric generator and its engine, a valve for controlling the admission of compressed fluid to the engine, two generator-circuits, a resilient con-



nection between one of said switches and the valve, and interlocking means between the valve and the other switch.

25. In an electric system, an electric circuit including a source of current-supply, a generator, means operated by current from the generator to close said circuit, and means operable upon the closing of the current to stop the generator and upon the interruption of the circuit for starting the generator.

26. In a control system, a motor-circuit including a source of current-supply, a generator, means operated by current from the

generator for closing the motor-circuit, a motor-controller in the generator-circuit, and means operable upon the closing of the motor-circuit to stop the generator and upon the interruption of the motor-circuit to start the generator provided the motor-controller is in one of its running positions.

In witness whereof I have hereunto set my hand this 21st day of July, 1904.

FRANK E. CASE.

Witnesses:

BENJAMIN B. HULL,  
HELEN ORFORD.