F. E. CASE.

EMERGENCY OPERATING MEANS FOR REVERSING SWITCHES.

APPLICATION FILED SEPT. 30, 1909.

982,033. Patented Jan. 17, 1911.

2 SHEETS—SHEET 1.

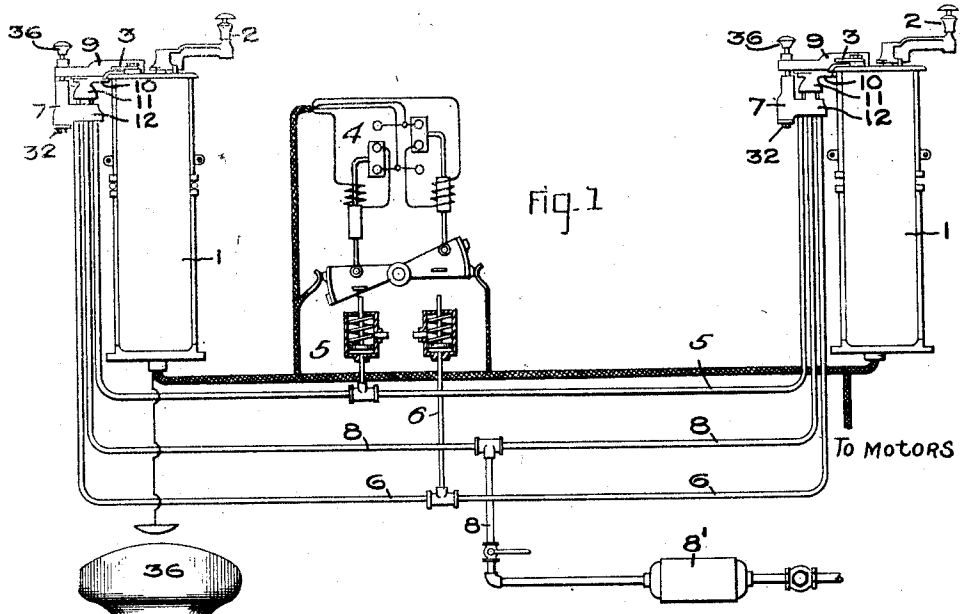

Fig. 1.

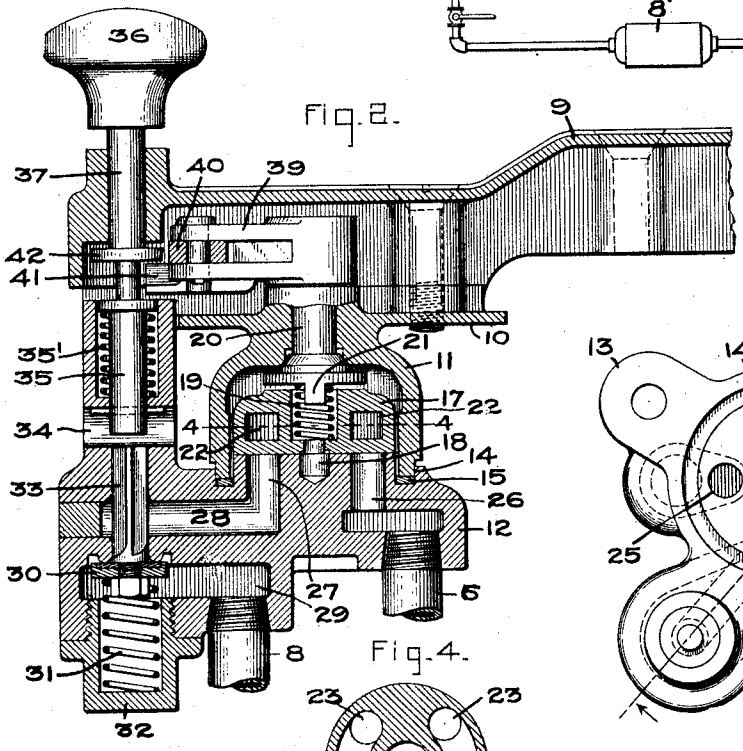

Fig. 2.

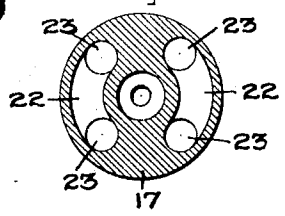

Fig. 4.

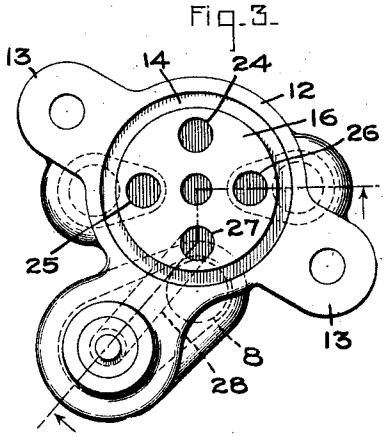

Fig. 3.

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2 SHEETS—SHEET 2.

Fig. 5.

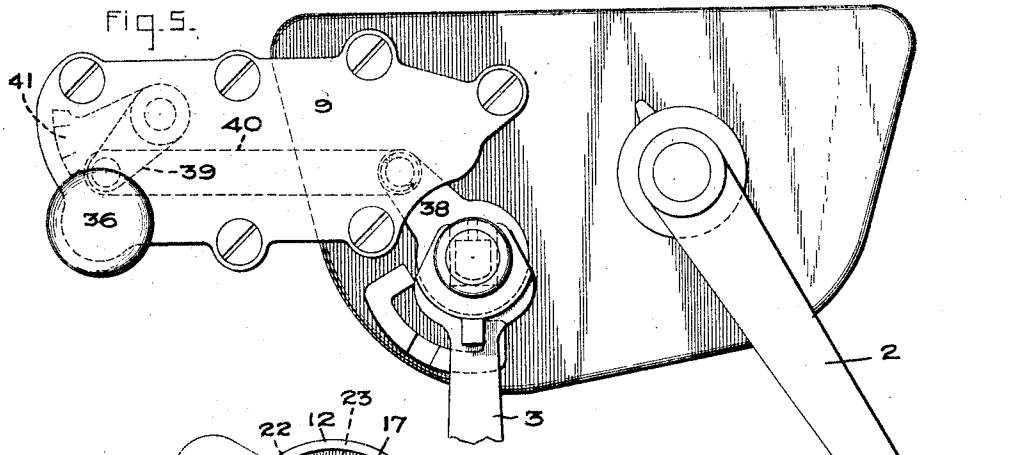


Fig. 6.

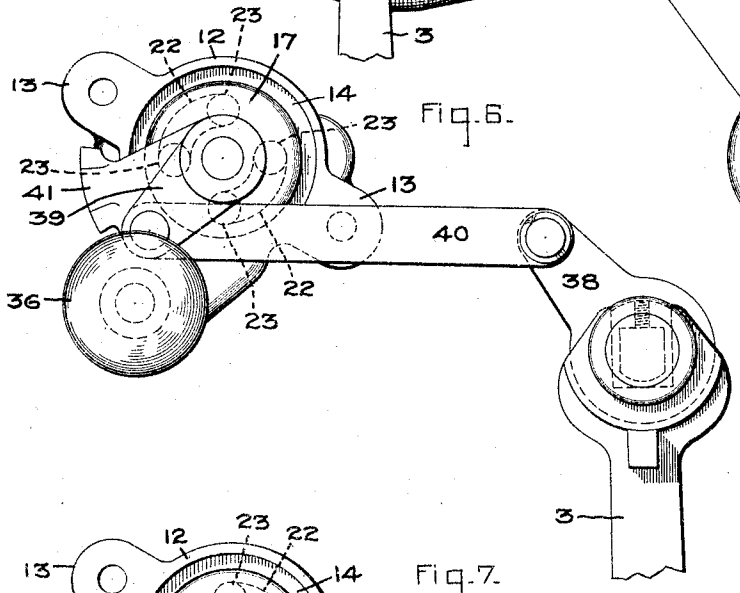
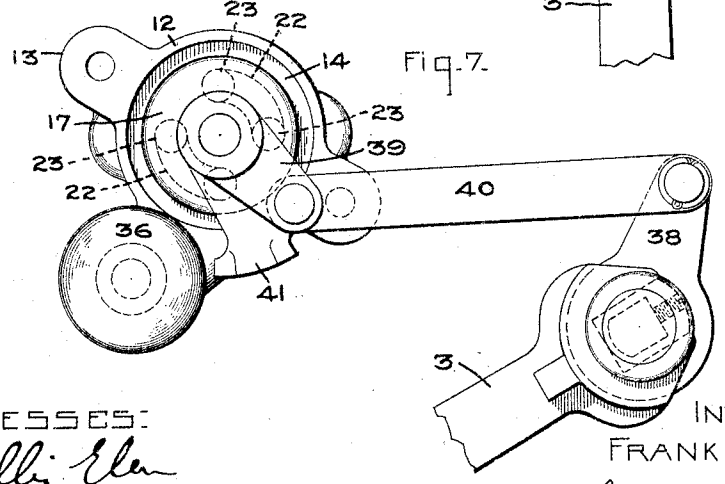


Fig. 7.



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UNITED STATES PATENT OFFICE.

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

EMERGENCY OPERATING MEANS FOR REVERSING-SWITCHES.

982,033. Specification of Letters Patent. Patented Jan. 17, 1911.

Application filed September 30, 1909. Serial No. 520,353.

To all whom it may concern:

Be it known that I, FRANK E. CASE, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Emergency Operating Means for Reversing-Switches, of which the following is a specification.

This invention relates to controllers for electric railway motors, and its object is to provide an emergency means for reversing the motors when they are to be used as generators to produce a braking effect. Large electric cars are usually equipped with air brakes, but in case this brake system becomes disabled, resort may be had to the retarding effect produced by reversing the motors and letting the momentum of the car operate them as generators. The reversing is usually done by an electromagnetic reverser controlled by a switch lever on the master controller. But should the current fail, either on account of the current collector leaving the conductor, or for any other reason, it would be impossible for the motorman to effect any reversal of the motors. Therefore the car could not be stopped in event of a failure of both air brakes and current.

My invention aims to remedy this defect by providing auxiliary operating devices for the reverser, utilizing fluid pressure, preferably compressed air taken from an auxiliary reservoir connected with the train pipe through a check valve. The motorman is thus enabled to reverse the motors to stop the car even if the air brakes refuse to work and the line current goes off, or the collector leaves the wire.

In carrying the invention into effect I use in part the mechanism shown in my Patent No. 844,777, where the reverser is provided with two solenoids for actuating it and also with two movable abutments, preferably pistons in suitable cylinders, one for throwing the reverser into the position for causing the car to go forward and the other for moving it to the position required when the car is to go backward. Each cylinder is piped to two valve casings, one at each end of the car and adjacent to the controller there located. In the present instance the valve is attached to the controller, and is a species of rotary valve adapted to select one cylinder or the other depending on the position of said valve, which is determined by the position of the regular reversing handle of the controller, to which said valve is connected. When said handle is in either the forward or back position, air can be admitted to the corresponding cylinder by means of a hand-operated valve located near the reversing handle. But when the reversing handle is in its intermediate or "off" position, the handle of said admission valve is locked and cannot be operated.

In the accompanying drawings, Figure 1 is a diagram of the piping; Fig. 2 is a vertical section of the valves; Fig. 3 is a plan view of the rotary valve seat; Fig. 4 is a section of the rotary valve on the line 4—4, Fig. 2; Fig. 5 is a plan view of a controller equipped with my attachment; Fig. 6 is a plan view of the valve and its operating mechanism in one of the running positions, and Fig. 7 is a similar view showing the same parts in the other running position.

At each end of the car is a master controller 1 of any approved type, whereby the motors can be connected in a closed circuit with the connections of the armatures and field coils reversed for the purpose of causing them to act as generators in order to retard or stop the car. The handle 2 operates the motor-controlling drum, and the handle 3 the reversing switch drum, as usual.

The reverser 4 is the electrically-operated switch which is controlled by the handle 3. Inasmuch as the electrical apparatus and circuit connections are of the usual construction, they are not illustrated in detail. Reference may be made to my Patent No. 844,777 for a drawing of such a switch and its connections. As shown, the switch is seen to be provided with two cylinders containing pistons for actuating said switch. In the present arrangement the two pipes 5, 6 connect said cylinders respectively with valve casings 7, there being one casing on each controller. A pipe 8 leads from each casing to a source of fluid pressure, preferably a small auxiliary reservoir 8′ charged from the train brake through a check valve. Bolted to the top plate of each controller is a box-like bracket 9 having a top and side flanges, to which is secured a bottom 10 carrying the upper part 11 of the valve casing. The lower part 12 of said casing has lugs 13, by which it can be bolted to the upper part. An annular groove 14 and a packing ring 15 make an air-tight joint be-

tween said parts. The lower part 12 has a flat circular seat 16 for the circular rotary selective valve 17, rotatable on a pin 18 at the center of the seat 16. A helical spring 19 presses said valve upon its seat, abutting at one end in a socket in said valve and at the other end against a stem 20, which is journaled in the upper part 11 of the valve casing and has lugs 21 interlocking with a notch in said valve to enable said stem to rotate it. The valve has two chambers 22, each of which has two ports 23 spaced ninety degrees apart, to coöperate with four equally spaced ports in the valve seat. One of these 24 leads to the atmosphere. Two opposite ports 25, 26 communicate respectively with the pipes 5, 6. The fourth port 27 connects with the supply pipe 8 by means of passages 28, 29, which communicate by means of a port controlled by a valve 30 biased to its seat by a spring 31 held in a socket in a plug 32 screwed into a hole in the casing. The winged stem 33 of the self-closing valve 30 extends up part way through the casing, to a transverse aperture 34 therein and in line with a plunger 35 mounted in said casing and urged upward by a helical spring 35'. A knob 36 has a stem 37 in line with the plunger and supported in a hole in the bracket 9. By depressing the knob the admission valve 30 will be opened and air will flow to the rotary valve. When depressed, the plunger 35 enters and fills the hole in which the valve stem 33 plays and prevents any serious leakage of air therefrom. The preferred means for actuating said rotary valve consists of a lever arm 38 on the spindle of the reversing handle 3, a crank 39 in the stem 20 of the rotary valve, and a link 40 connecting said lever arm and crank, the link and the crank being housed under the top of the box-like bracket 9. On the crank 39 is a lip 41, which projects far enough to pass under a collar 42 on the stem of the knob 36 when said crank is swung over. When the crank comes to rest at either end of its throw, the lug is out of the path of movement of said collar, and offers no hindrance to the opening of the admission valve 30. But when the reversing handle is brought to its midway or "off" position, the lip interlocks with the collar and prevents the operation of the knob 36. It thus appears that so long as there is current available the controller can be operated as usual to make the proper circuit connections and to operate the reverser to utilize the motors as braking generators. At each throw of the reversing handle 3 the rotary selective valve makes the proper connection of the air pipes to operate the reverser pneumatically, so that if the current fails the motorman has merely to turn the controller handle to the proper position for braking and then depress the knob 36, which admits air to the rotary valve and thence to the proper cylinder and piston to actuate the reverser.

It will be observed that the lip 41 is beveled each way from a flat middle portion. The object of this is to enable the motorman to throw the reversing handle 3 even if he makes the mistake of depressing the knob 36 before attempting to turn said handle. In such case, the bevel on the lip will enter under the collar 42 and forcibly lift the knob as the crank is thrown over by the reversing handle. In the "off" position the lip 41 stands with its flat middle portion under the collar 42, so that the valve 30 cannot be opened by accident or by meddlesome persons. In this position, too, the ports 23 of the rotary valve lie between the ports in the valve seat, so that no air can get to the reverser cylinders. Any air which may leak past the valve 30 will escape to atmosphere along the winged stem 33 and out through the aperture 34.

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

1. The combination with an electrically-operated reverser having also operative abutments actuated by fluid pressure, of a controller, and valve mechanism connected with the reversing handle of said controller for admitting fluid pressure to said abutments.

2. The combination with an electrically-operated reverser, having also operative abutments actuated by fluid pressure, of a controller provided with a reversing switch electrically controlling said reverser, a source of fluid pressure, valve mechanism for selecting the proper abutment, and connections between said valve mechanism and the reversing switch handle for properly setting said valve mechanism at each movement of said handle.

3. The combination with an electrically-operated reverser, having also operative abutments actuated by fluid pressure, of a rotary selective valve controlling the flow of fluid pressure to said abutments, a handle controlling the electric operating means, and connections between said valve and said handle whereby the former is set to effect the same operation of the reverser as the latter.

4. The combination with an electrically-operated reverser, having also operative abutments actuated by fluid pressure, of a rotary selective valve controlling the flow of fluid pressure to said abutments, a handle controlling the electric operating means, connections between said valve and said handle whereby the former is set to effect the same operation of the reverser as the latter and a hand actuated valve controlling the admission of fluid pressure to said rotary valve.

5. The combination with an electrically-operated reverser, having also operative

abutments actuated by fluid pressure, of a controller having a reversing handle for the electric circuits of said reverser, a rotary selective valve controlling the flow of fluid pressure to said abutments, a crank on the stem of said valve, an arm on the reversing handle, and a link connecting said crank and arm.

6. The combination with an electrically-operated reverser, having also operative abutments actuated by fluid pressure, of a controller having a reversing handle for the electric circuits of said reverser, a rotary selective valve controlling the flow of fluid pressure to said abutments, a crank on the stem of said valve, an arm on the reversing handle, a link connecting said crank and arm, a valve controlling the admission of fluid pressure to said rotary valve, and a knobbed stem for opening said admission valve.

7. The combination with an electrically-operated reverser, having also operative abutments actuated by fluid pressure, of a controller having a reversing handle for the electric circuits of said reverser, a rotary selective valve controlling the flow of fluid pressure to said abutments, a crank on the stem of said valve, an arm on the reversing handle, a link connecting said crank and arm, a valve controlling the admission of fluid pressure to said rotary valve, a knobbed stem for opening said admission valve, and a lip on said crank interlocking with said stem as said crank passes from end to end of its throw.

8. The combination with a controller, of a bracket extending from the top thereof, a valve casing supported by said bracket, a rotary selective valve in said casing, a reversing switch handle on said controller, operative connections between said handle and the rotary valve stem, a self-closing valve controlling the flow of fluid pressure to said selective valve, and a spring plunger for opening said self-closing valve.

9. The combination with an electrically-actuated reverser for electric motors, of an auxiliary pneumatic device for actuating said reverser, a valve for admitting air to said device, a depressible stem for opening said valve, and means actuated by the electric reversing switch handle for lifting said stem in case it is erroneously depressed.

10. The combination with a motor controller having an electric reversing switch handle controlling an electric reverser, an auxiliary pneumatic device for actuating said reverser, a selective valve having a crank connected to said reversing handle, a beveled lip on said crank, and a depressible stem for admitting air to said selective valve, adapted to be engaged by said bevel in case the stem is depressed at the wrong time.

11. The combination with a motor reverser, of pneumatic means for operating it, a selective valve controlling the flow of air to said means, a valve controlling the admission of air to the selective valve, a winged stem for said valve in a passage leading to the atmosphere, and a plunger adapted to engage and depress said stem and also fit into the passage and prevent air from escaping therefrom when the valve is open.

In witness whereof, I have hereunto set my hand this 28th day of September, 1909.

FRANK E. CASE.

Witnesses:
BENJAMIN B. HULL,
HELEN ORFORD.