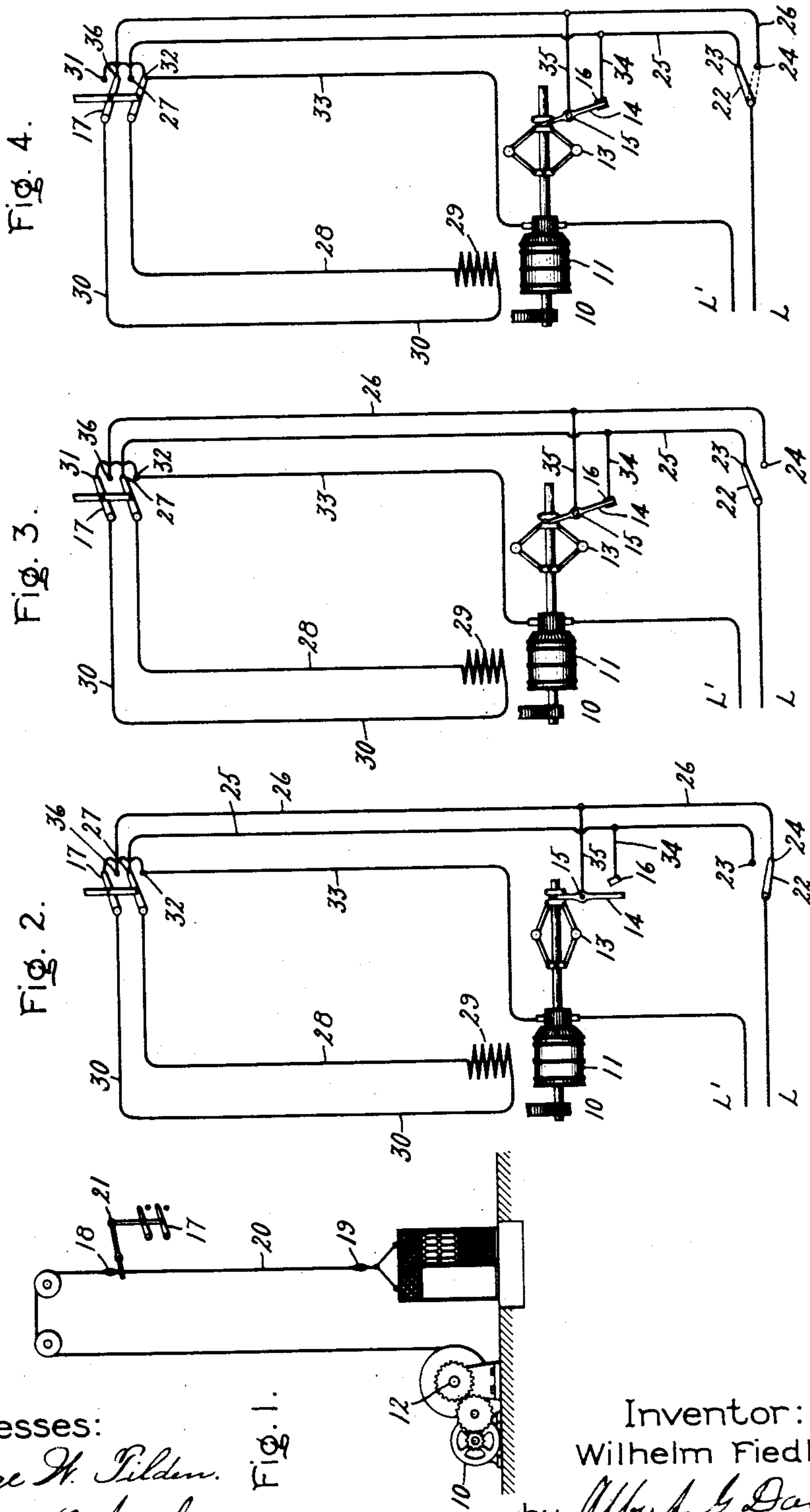


No. 869,356.

PATENTED OCT. 29, 1907.

W. FIEDLER.
MOTOR CONTROLLER.
APPLICATION FILED APR. 3, 1906.



Witnesses:

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UNITED STATES PATENT OFFICE.

WILHELM FIEDLER, OF BERLIN, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY,
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MOTOR-CONTROLLER.

No. 869,356.

Specification of Letters Patent.

Patented Dec. 29, 1907.

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To all whom it may concern:

Be it known that I, WILHELM FIEDLER, a subject of the German Emperor, residing at Berlin, Germany, have invented certain new and useful Improvements in Motor-Controllers, of which the following is a specification.

This invention relates to devices for controlling electric motor circuits and has for its object the provision of means whereby the motor may be retarded or quickly brought to rest in a reliable, safe and efficient manner.

In the application of electric motors to certain uses it is frequently found desirable to stop the motor almost at the instant of breaking the circuit. When a motor is running at a high speed and, consequently, has a large inertia, this result is not easy to accomplish and various methods have been devised for bringing this about, such, for instance, as brakes, both mechanical and short-circuiting brakes, and also the reverse current control. The last-named method has been found to bring the motor to a stop very quickly, but, in order to prevent the motor from running backward, it is essential that some means be provided for cutting off the reverse current when the motor reaches the desired speed or when it comes to rest, as desired.

My invention relates, therefore, more specifically to means whereby a motor is stopped by reversing the current therethrough and means for automatically cutting off the reverse current before the motor starts to run in the reverse direction. A device of this character is found to be useful in various connections, such as hoisting machinery and signaling apparatus, and I have shown it in connection with the former merely for purposes of illustration, but it should be understood that my invention is in no sense limited as to its field of application, except in so far as it is limited by the claims annexed hereto.

In the accompanying drawings, in which I have shown one embodiment of my invention, Figure 1 shows an elevator or hoist to which my invention has been applied, the circuits not being shown, and Figs. 2, 3 and 4 show diagrammatic representations of my invention together with the circuits therefor the parts being in different positions in the figures as hereinafter set forth.

Referring to the drawings, 10 is an electric motor provided with an armature 11 and geared to a hoisting drum 12. Secured to the armature shaft is a centrifugal governor 13, arranged to operate a switch-arm 14 pivoted at 15, so as to open and close an electric circuit at the contact 16. A double-pole double-throw switch 17 is arranged to be operated in any desired manner, as for instance, by means of the stop buttons 18 and 19 on the hoisting cable 20, so that when the hoist reaches the limits of its movement it will automatically throw the switch by engaging the bell-crank arm 21 so as to

engage the opposite set of contacts. The switch-arm 22 is adapted to engage either of the contacts 23 and 24 of the parallel branch circuits 25 and 26 at will.

The operation of my invention is as follows: The two-way switch 22 being in the position shown in Fig. 2, no current is passing and the motor is at rest. If it is desired to start the motor, the switch-arm 22 is shifted to the contact 23, as shown in Fig. 3, whereupon current will pass from the main L, through conductor 25 to contact 27 of the switch 17, thence through the switch and conductor 28, motor field 29, conductor 30, to contact 31 of the reversing-switch 17, thence to contact 32 and through conductor 33, to armature 11, and back to line at L'. The motor circuit being closed, the motor starts to operate, and as it speeds up the centrifugal governor 13 is caused to operate so as to shift the switch arm 14 on to the contact 16, as shown in Fig. 3. A circuit is thus established from conductor 25, through conductor 34, contact 16, switch-arm 14, and conductor 35, back to branch conductor 26. This, however, does not affect the operation of the motor, since no current is passing through the branch conductor 26. When it is desired to stop the motor, as, for instance, when the hoist reaches one of the limits of its movement, the switch 17 is shifted from contacts 31 and 27 to contacts 36 and 32, as shown in Fig. 4. This movement reverses the current through the motor-field, which operates to retard or quickly stop the motor, the direction of the reverse current being as follows: from main L, through conductor 25, conductor 34, switch arm 14, conductor 35, conductor 26, contact 36, thence through switch 17, conductor 30, field 29, conductor 28, back to the switch and contact 32 and conductor 33 to the armature 11, and back to line at L'. It will be noted that the direction of current through the field is thus reversed, the reverse current passing through the switch 14, which is held closed by the speed of the motor through the centrifugal governor 13. The motor is thus quickly stopped, but as soon as it comes to rest the weights on the governor 13 retract, as shown in Fig. 2, to open the circuit at 17, so as to prevent the reverse current from driving the motor in the opposite direction. If it is desired to drive the motor in the opposite direction to that in which it runs when the parts are in the position, shown in Fig. 2, the switch 17 being shifted to the position shown in Fig. 4, it is simply necessary to move the switch 22 on to the contact 24, as shown in dotted lines in Fig. 4. The motor will then be operated in the opposite direction and reversed as before by reversing the direction of current; the operations being reversed.

It will thus be seen that I have provided a very simple and efficient means of stopping a motor almost instantaneously without danger of operating the motor in the wrong direction so as to cause injury. The operation is automatic, since the reversing-switch may be

shifted by any part of a machine when it reaches the limit of its movement, or the switch may be operated by hand, if so desired. It is to be understood, of course, that the arrangement shown is merely typical and that all such changes as would suggest themselves to those skilled in the art will come within the spirit of my invention as set forth in the annexed claims.

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

- 10 1. The combination with an electric motor, of means for reversing the same, and means controlled by the speed of the motor for interrupting the reverse current.
2. The combination with an electric motor of means for reversing the same, and a centrifugally-actuated cut-out
- 15 for interrupting the reverse current.
3. The combination with an electric motor of a reversing-switch therefor, and means controlled by the speed of the motor for interrupting the reverse current.
4. The combination with an electric motor of a reversing-switch therefor and a centrifugally-actuated cut-out
- 20 for interrupting the reverse current.
5. The combination with an electric motor of means for closing the motor-circuit, a cut-out controlled by the speed of the motor, and means for reversing the current to the
- 25 motor through said cut-out.
6. In combination, an electric motor, means controllable from a distance for closing the motor-circuit, a switch for reversing the direction of current in said circuit, and means controlled by the speed of the motor for interrupt-
- 30 ing the reverse current.
7. The combination with an electric motor of means for retarding the speed thereof, comprising means for reversing the current through said motor, and means for automatically interrupting the reverse current when the motor is re-
- 35 duced to the desired speed.
8. The combination with an electric motor of means for quickly stopping the same comprising a reversing-switch and a cut-out controlled by the speed of the motor for in-
- 40 terrupting the reverse current when the motor substan-

9. The combination with an electric motor of means for closing the motor-circuit, a centrifugally-operated cut-out and means for reversing the current through the motor and including the cut-out in the reverse circuit.

10. The combination with an electric motor of a circuit therefor having parallel branches, a centrifugally-actuated cut-out connected across said branches and a double-pole reversing-switch arranged to complete the circuit through either branch.

11. The combination with an electric motor of a circuit therefor having parallel branches, a cut-out controlled by the speed of the motor connected across said branches and a reversing switch arranged to complete the circuit through either branch.

12. The combination with an electric motor of a circuit therefor having different branches, a reversing-switch arranged to complete the circuit through either branch, a centrifugally-actuated cut-out connected across said branches and a second switch cooperating with the reversing-switch to shift the current from one branch to the other.

13. The combination with an electric motor of a circuit therefor having parallel branches provided with independent contacts, a switch-arm mounted to engage either of said contacts, a centrifugally-actuated cut-out connected across said branches and a double-pole reversing switch having contacts arranged in parallel with said first-mentioned contacts.

14. The combination with an electric motor of a reversing switch therefor, and means for operating the same after a definite range of motor operation, a pair of leads connecting with said switch, a two-way control switch for connecting either lead in circuit, and a centrifugally-operated circuit-closer for connecting the leads in parallel whereby the current is reversed in the motor before it comes to rest and the motor may always be reversed by the control switch.

In witness whereof, I have hereunto set my hand this 20th day of March, 1906.

WILHELM FIEDLER.

Witnesses:

JULIUS RUMLAND,
KARL RICKEBEN.