

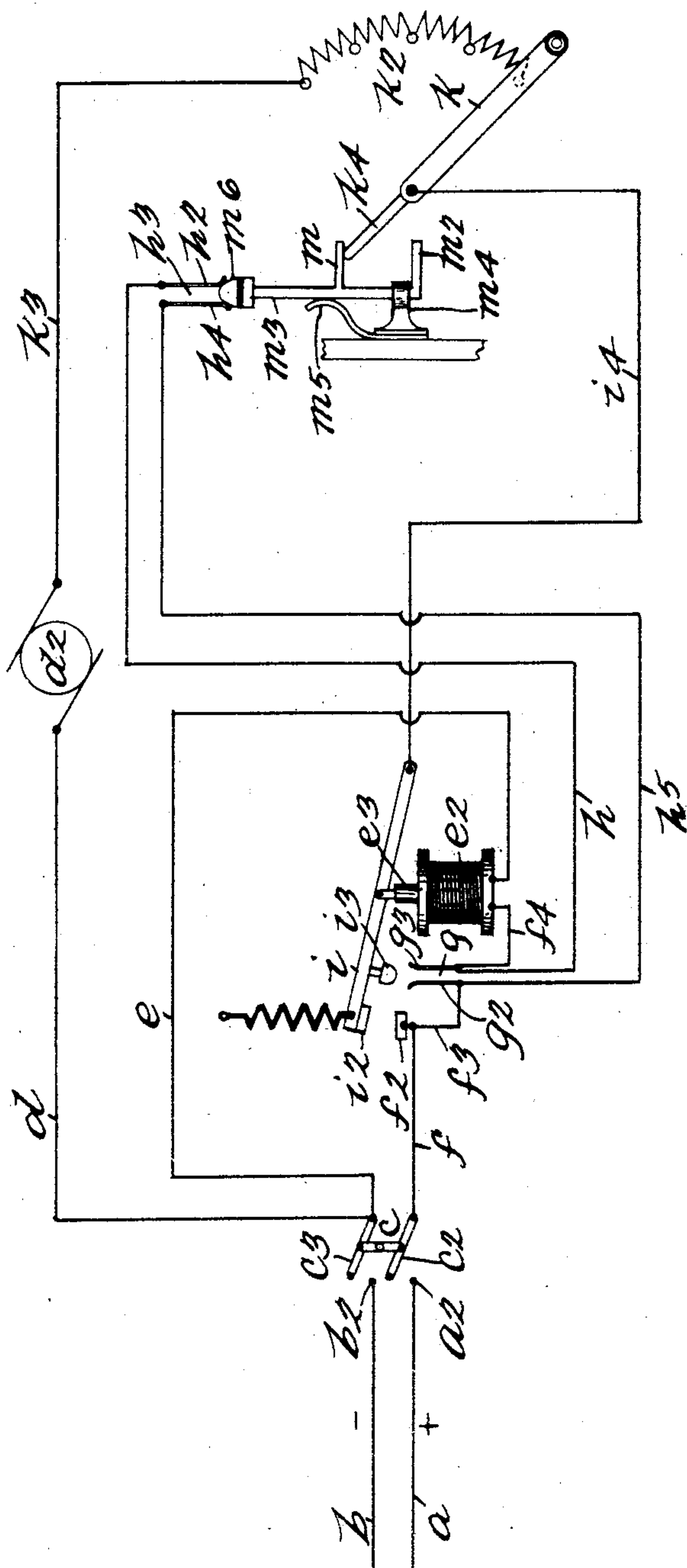
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F. G. BILL.

SAFETY DEVICE FOR MOTOR STARTERS.

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WITNESSES

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SAFETY DEVICE FOR MOTOR-STARTERS.

SPECIFICATION forming part of Letters Patent No. 790,100, dated May 16, 1905.

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To all whom it may concern:

Be it known that I, FREDERICK G. BILL, a citizen of the United States, residing at Long Island City, in the county of Queens and State of New York, have invented certain new and useful Improvements in Safety Devices for Motor-Starters, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

The object of this invention is to provide a device for use in connection with starting devices for electric motors and by means of which the burning out of fuses, rheostats, or armatures is obviated in the event of the rheostat-arm being engaged in any manner in its outward position, as frequently occurs, a further object being to provide a supplemental electrical circuit adapted to operate electrical circuit-closers when the rheostat-arm is in its normal position, and thereby close the main circuit in which the motor is arranged, said supplemental circuit being open when the rheostat-arm is out of its normal position and being closed only when said rheostat-arm is in its normal position.

It will be understood that rheostats are generally employed in an electrical motor-circuit, said rheostat gradually increasing the amount of current through the motor as the arm thereof approaches its outward position, and it frequently happens that the rheostat-arm sticks in its outward position and is overlooked by the operator, and if the main switch of the motor-circuit be opened the motor stops; but if the switch be again closed the motor receives the full force of the electric current directly when the rheostat-arm is in its outward position, and the burning out of fuses or armatures frequently results; and my invention is intended to obviate this possibility, as will be readily understood from the following description, when taken in connection with the accompanying drawing, said drawing representing a diagrammatic view of the main circuit and of the supplemental circuit as well as the mechanical parts which I employ.

In the drawing I have indicated a feed electrical conductor a and a return electrical conductor b , said conductor being connected with an electrical generator in the usual or any desired manner, said generator not being indicated in the drawing, and the conductor a is provided with a contact a^2 and the conductor b with a contact b^2 , with each of which a double switch c is adapted to operate, said switch being composed of two members c^2 and c^3 , the member c^2 thereof being adapted to operate in connection with the contact a^2 and the member c^3 with the contact b^2 , and connected with the member c^3 is an electrical conductor d , connected with one side of a motor d^2 , and also in connection with the member c^3 is an electrical conductor e , which is connected at its other end with an electromagnet e^2 .

Connected with the member c^2 of the switch c is a conductor f , which is connected at its other end with a contact f^2 and with a conductor f^3 , in electrical connection with one of the members g^2 of a plug-box g , the other member g^3 thereof being connected with the electromagnet e^2 by means of an electrical conductor f^4 , and also in electrical connection with the member g^3 of the plug-box g is a conductor h , the other end of which is connected with the member h^2 of a plug-box h^3 , similar to the plug-box g , and the member h^4 of the plug-box h^3 is connected with the member g^2 of the plug-box g by means of a conductor h^5 .

Pivotaly connected with the core e^3 of the electromagnet e^2 is a lever i , provided with a contact i^2 , adapted to operate in connection with the contact f^2 , and the lever i is also provided with a plug i^3 , which is adapted to pass between the spring members g^2 and g^3 of the plug-box g , thereby placing the same in electrical communication, and in electrical communication with the lever i is a conductor j , the other end of which is in electrical connection with a rheostat-arm k of a rheostat k^2 , and connecting the outer contact of the rheostat k^2 with a motor d^2 is a conductor k^3 .

The rheostat-arm k is provided with a projecting member k^4 , which is adapted to bear

against one of two vertical members m or m^2 of a slide m^3 , mounted in a suitable guide m^4 , and connected with the guide m^4 is a spring or other friction device m^5 , which bears against the bottom of the slide m^3 , and the outer end of the slide m^3 is provided with a plug m^6 , which is insulated therefrom and is adapted to enter the plug-box h^3 and place the members h^2 and h^4 thereof in electrical communication.

In the drawing forming part of this specification the parts of my apparatus are shown in an open position, and if at this time the switch c be moved to the contacts a^2 and b^2 the current passes through the wire a , member c^2 of the switch c , wires f , f^3 , and h^5 to the member h^4 of the plug-box h^3 , and if the rheostat-arm k be in the position shown in the drawing the current passes through the plug h^6 , member h^2 of the plug-box h^3 , wires h and f^4 , through the electromagnet e^2 and wire e to the member c^3 of the switch c , and thence through the wire b to the generator, and the circuit is complete. When the electromagnet e^2 is energized in the manner just described, the lever i is drawn outwardly until the contacts i^2 and f^2 touch each other, at which time the plug i^3 enters the plug-box g , thereby placing the members thereof in electrical communication with each other, and the current then passes through the wire a , member c^2 of the switch c , wire f , lever i , wire i^4 , rheostat k^2 , wire k^3 to the motor d^2 , and thence through the wire d , member c^3 of the switch c , and wire b to the generator, and the motor d^2 is energized through the resistance of the rheostat k^2 , and as the arm k of the rheostat k^2 is moved toward its outward position the resistance is cut out and the motor d^2 gains momentum and power until the extreme outer position of the arm k has been reached, at which time the resistance is entirely cut out; but in this movement of the arm k the member h^4 thereof has forced the slide m^3 backwardly, thereby releasing the plug m^6 from the plug-box h^3 , and the members h^2 and h^4 of the plug-box h^3 are no longer in electrical communication, and when it is desired to stop the motor d^2 the switch c is operated to break the circuit in the usual manner. When the current is thus shut off from the main or motor circuit, the arm k is in its extreme outward position, and, as previously stated, it frequently happens that the arm k sticks in this position. If there are mechanical means for returning it to its normal position or if manual means are employed for returning the arm k to its normal position, the return thereof is liable to be overlooked by the operator, and if the switch were to be closed with the arm k in this position the motor d^2 would receive the full force of the current at once if the main circuit were complete; but when the slide m^3 is moved backwardly and the members h^2 and h^4 of the plug-box h^3 are

out of electrical communication the supplemental circuit is broken through the plug-box h^3 and a supplemental circuit is completed through the conductor a , member c^2 of the switch c , wires f and f^3 , plug-box g and plug i^3 , wire f^4 , electromagnet e^2 , wire e , the member c^3 of the switch c , and wire b to the generator, thus serving to hold the lever i in its innermost position, and when the switch c is open the electromagnet e^2 is deenergized and the lever i rises, thereby separating the contacts i^2 and f^2 , and the main or motor circuit is thereby broken, and if the switch c be closed at this time and the arm k of the rheostat k^2 be in its outer position or adjacent thereto the supplemental circuit is incomplete because of the removal of the plug m^6 from the plug-box h^3 , and neither the electromagnet e^2 nor the motor d^2 are energized until the arm k is returned to its normal position manually, thereby forcing the plug m^6 into the plug-box h^3 , at which time the operation first described is repeated and the motor is energized and the power thereof gradually increased according to the movement of the arm k . It will therefore be seen that I provide positive means for preventing the closing of a main or motor circuit when the rheostat-arm thereof is out of its normal position and also provide means whereby the main or motor circuit is automatically closed when the rheostat-arm is in its normal position, and in this way a great saving of fuses and other portions of the electrical apparatus results, and it will also be understood that my invention may be adapted to electrical circuits of any kind or class wherein a rheostat is employed, and various changes in and modifications of the mechanical elements shown and described in this specification may be made without departing from the spirit of my invention or sacrificing its advantages.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a motor-circuit, a circuit-closer, comprising a lever, an electromagnet in operative connection therewith, a rheostat, an arm therefor, and devices in operative connection with said arm for completing a circuit through said electromagnet when said arm is in its normal position, substantially as shown and described.

2. In a motor-circuit provided with a switch and rheostat, a circuit-closer, an electromagnet in operative connection therewith, a supplemental circuit through said switch and said electromagnet, and devices connected with a lever for closing said supplemental circuit, substantially as shown and described.

3. In a motor-circuit provided with the usual switch and rheostat, a circuit-closer comprising a lever, an electromagnet in operative connection therewith, a plug-box, a plug adapted to operate therewith, a supplemental electrical circuit through said switch, electromagnet and

plug-box adapted to be completed and broken
by said plug, and devices connected with said
rheostat and said plug for completing said
supplemental circuit when the arm of said rhe-
5 ostat is in its normal position and for break-
ing said supplemental circuit when said rhe-
ostat-arm is out of its normal position, sub-
stantially as shown and described.

In testimony that I claim the foregoing as
my invention I have signed my name, in pres- 10
ence of the subscribing witnesses, this 20th
day of February, 1905.

FREDERICK G. BILL.

Witnesses:

F. A. STEWART,
C. J. KLEIN.