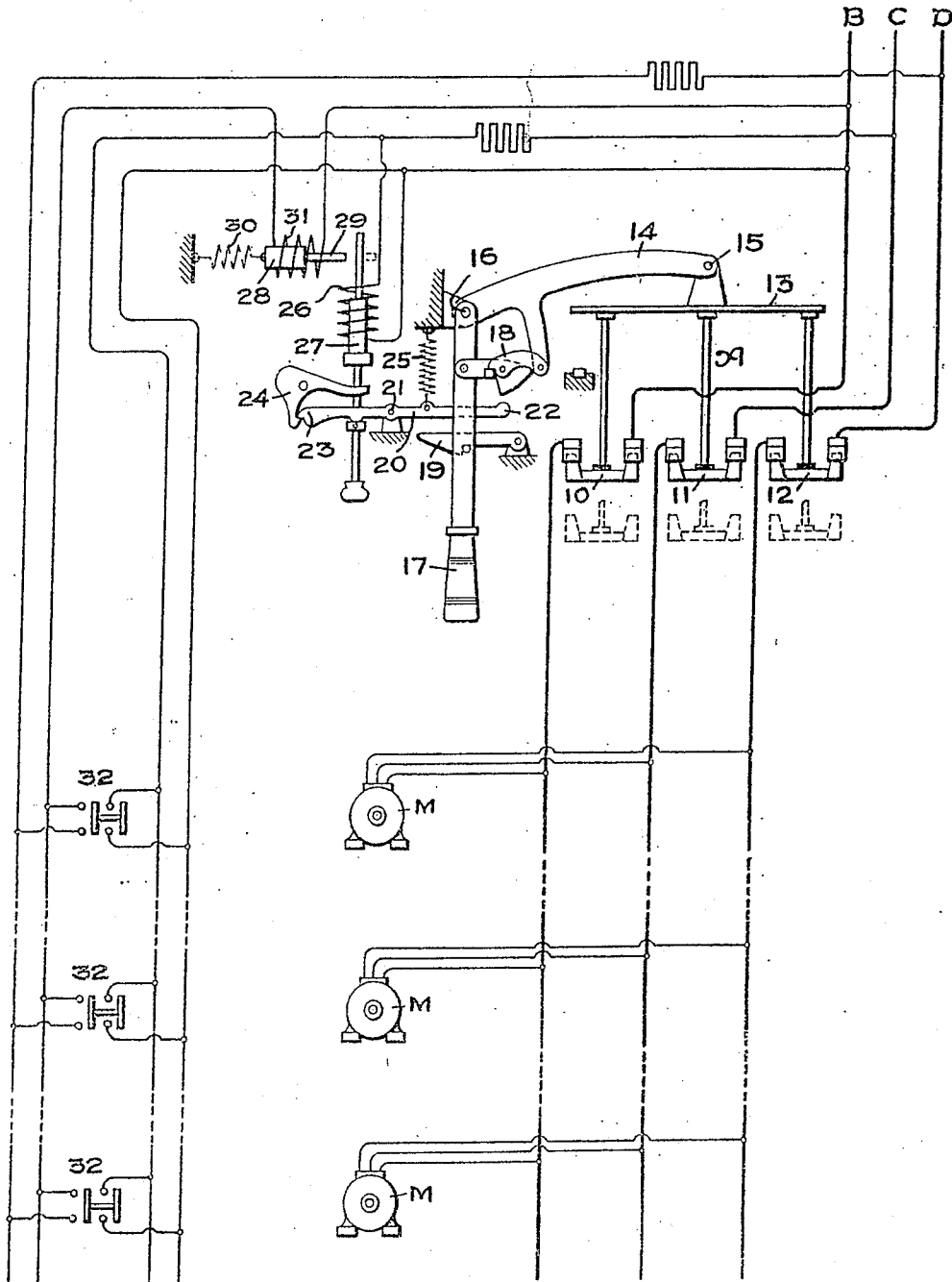


E. H. JACOBS.
SAFETY DEVICE FOR ELECTRIC CIRCUITS.
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1,045,981.

Patented Dec. 3, 1912.



Witnesses:

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UNITED STATES PATENT OFFICE.

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SAFETY DEVICE FOR ELECTRIC CIRCUITS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ERNEST H. JACOBS, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Safety Devices for Electric Circuits, of which the following is a specification.

This invention relates to the control of electric circuits and has for its object the provision of means whereby a circuit can be opened, closed, and generally controlled in a reliable, simple and efficient manner.

My invention relates more specifically to means for controlling the circuit by means of a circuit controller or switch which may in turn be controlled from a point somewhat remote from the switch itself. In the operation of one or more electric motors in industrial plants, such as mills, machine shops, and the like, it is frequently desirable to have all the motors controlled from a main switch located at the switchboard. This main switch is then controlled by a number of control switches located at the various motors, so that the operator may, by means of a control switch, open the main switch and stop all the motors.

One of the objects of my invention is to provide means whereby the main switch, after it has once been opened by the operator, cannot be again closed except by the same operator or with his consent.

In carrying out my invention I provide a main switch for controlling one or more motors and a control switch for each motor, the arrangement being such that if any one of the control switches is actuated the main switch will be opened. I also provide means whereby the main switch is locked against closing when the operator opens it, and cannot be closed until the operator again actuates the control switch. The main switch is preferably manually closed, so that after the operator has opened the main switch from a remote point he must go to the switch to close it. The arrangement for preventing the closure of the switch is preferably an electromagnetic device which locks some part of the switch, as, for instance, the no-voltage mechanism, against closure and can only be released by the control switch which locked it. The control switches may be key switches which can only be operated by a particular key in the hands of the operator, so that the

main switch cannot be closed except by the use of the key that opened it. In this way the operator is protected against the accidental starting of the motor when he may be in a position to be injured thereby.

Other objects of my invention will appear in the course of the following specification, in which I have shown my invention embodied in concrete form for purposes of illustration.

Referring to the drawing, in which I have shown my invention in a somewhat diagrammatic way, A represents the main circuit controller or switch for opening and closing the three phases B, C, and D of the supply circuit. I have shown my invention in connection with a three phase system merely for purposes of illustration but it is obvious that it is equally applicable to any other system.

For purposes of illustration I have shown in a somewhat conventional way a manually closed oil switch having a toggle arrangement for latching it in closed position. Any suitable type of switch provided will, however, serve my purpose. The switch which I have employed consists of three bridging contacts 10, 11, and 12, one for each phase, carried by the frame 13 which is raised and lowered by means of the arm 14 pivoted to the frame at 15 and to a stationary support at 16. The operating handle 17 is likewise pivoted at 16 and is connected with the arm 14 by toggle mechanism 18. A pivoted latch 19 holds the operating handle 17 in closed position. A trip lever 20 pivoted at 21 is mounted on a fixed support so that the end 22 will engage and knock out the toggle mechanism, while the opposite end 23 is engaged by pivoted latch 24 to hold it away from the toggle mechanism against the tension of the spring 25. The no-voltage coil 26 provided with a core 27 is arranged to drop upon the failure of voltage and trip the latch in a well-known manner.

In order to prevent the core 27 from being raised, after it has once been dropped, I provide a locking device consisting of a core 28 having a projection 29 which moves into the path of the projection on the core 27 and acts as a barrier. The locking projection 29 is normally held out of locking position by means of a spring 30 and is moved into locking position by the energizing of the coil 31, which moves the projection against

the tension of the spring into the position shown in dotted lines. This, of course, happens when the core 27 is in the down position. In order to control the main switch from a remote point or points, I provide the control switches 32. One of these switches is preferably provided at each motor M controlled by the main switch A, which motors may be located at various points around the plant or mill. The switches are connected in multiple and are preferably of the locking type which can only be actuated to either open or close the circuit by means of a particular key which is in the hands of the operator.

The arrangement of circuits and the mode of operation are as follows: Assuming the parts to be in the position shown in full lines in the drawing, the main circuit will be closed and the motors running. If now, an operator at any of the motors desires, for any reason, to stop the motor, he inserts his key in the switch 32 and turns it so as to close the control circuit at his switch. This has the effect of short-circuiting the no-voltage coil 26, which is normally connected across the line, and also energizing the coil 31. This causes the core 27 to drop and trip the main switch and at the same time moves the core 28 into locking position. When the core 27 trips the toggle mechanism the switch contacts are moved into position shown in dotted lines, thereby opening the main circuit. In order to close the switch it is first necessary that the operator again actuate his switch 32 to de-energize the coil 31. He may then close the switch by means of the operating handle 17. To close the switch latch 19 is raised and the handle 17 moved to the left to straighten the toggle. The handle is then moved to the right, lifting the arm 14 through the straightened toggle and thereby raising the frame 13 and closing the switch. This cannot be done, however, unless the no-voltage core 27 is raised, since otherwise the end 22 of the trip lever will be in engagement with the toggle and while the handle 17 may be moved to the left to straighten the toggle, as soon as it is moved to the right to close the switch the toggle will be knocked out by the trip lever. Furthermore, while the switch 32 is closed, the core 27 cannot be raised because of the projection 29. The result is that the main switch cannot be closed except by the key in the hands of the operator that operated it. This prevents the operator from being injured by the accidental starting of his motor while he is unprepared for it. While I have shown it as embodied in concrete form for purposes of illustration, it should be understood that I do not limit my invention thereto, since various modifications thereof will suggest themselves to those skilled in the art with-

out departing from the spirit of my invention, the scope of which is set forth in the annexed claims.

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

1. The combination with a main switch, of electrically controlled means for locking said switch against closure, a magnet for controlling the opening of said main switch, and a control switch for controlling said magnet and the locking means.

2. The combination with a main switch, of a plurality of electromagnets, means controlled by said magnets for opening said switch and locking the same against closure, and a control switch for controlling said magnets.

3. The combination with a main switch, of means for locking said switch against closure, a magnet for actuating said locking means to permit the switch to be closed, a magnet for controlling the opening of said main switch, and a control switch for both of said magnets.

4. The combination with a main switch and a no-voltage magnet for controlling the same, of electrically controlled means for locking said switch against closure, and a control switch for deenergizing the no-voltage magnet and actuating the locking means.

5. The combination with a main switch and a no-voltage magnet for controlling the same, of electrically controlled means for locking said switch against closure, and a control switch for deenergizing the no-voltage magnet and simultaneously actuating the locking means.

6. The combination with a main switch and a no-voltage device for controlling the same, of electrically controlled locking means for the no-voltage device, and an auxiliary switch for controlling the no-voltage device and the locking means.

7. The combination with a main switch and a no-voltage device for controlling the same, of electrically controlled locking means for the no-voltage device, and an auxiliary switch for simultaneously controlling the no-voltage magnet and the locking means.

8. The combination with a main switch and a no-voltage device for controlling the same, of electromagnetic locking means for the no-voltage device, and a control switch for deenergizing the no-voltage device and simultaneously actuating the locking means.

9. The combination with a main switch and a no-voltage device for controlling the same, of electromagnetic locking means for the no-voltage device biased to inoperative position, and a control switch for deenergizing the no-voltage device and simultaneously energizing the locking means.

10. The combination with a main switch

provided with operating mechanism arranged to be latched in closed position and a no-voltage device for tripping the mechanism to open the switch, of electromagnetic means for locking the no-voltage device in tripped position, and a control switch for deenergizing the no-voltage device and simultaneously actuating the locking means.

11. The combination with a main switch provided with operating mechanism arranged to be latched in closed position and a no-voltage magnet for automatically tripping said mechanism to open the switch upon the failure of voltage, of electromagnetic locking means for said switch, and a control switch for deenergizing the no-voltage magnet and simultaneously actuating said locking means to lock the main switch against closure.

12. The combination with a main switch provided with means for latching the same in closed position, of a no-voltage solenoid having a core arranged to drop and open the

switch, an electrically controlled member movable into the path of said core to lock it against upward movement and a control switch for deenergizing the solenoid and simultaneously actuating the locking member.

13. The combination with a main switch provided with means for latching the same in closed position, of a no-voltage solenoid having a core arranged to drop and open the switch, a locking member for said core biased to inoperative position, electromagnetic means for moving said member into the path of said core to lock it against movement, and a control switch for deenergizing the solenoid and simultaneously moving the said member to locking position.

In witness whereof, I have hereunto set my hand this 20th day of August, 1910.

ERNEST H. JACOBS.

Witnesses:

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HELEN ORFORD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."