G. H. DORGELOH.

MOTOR CONTROLLING DEVICE.

APPLICATION FILED JUNE 24, 1908.

917,023. Patented Apr. 6, 1909.

Fig. 1.

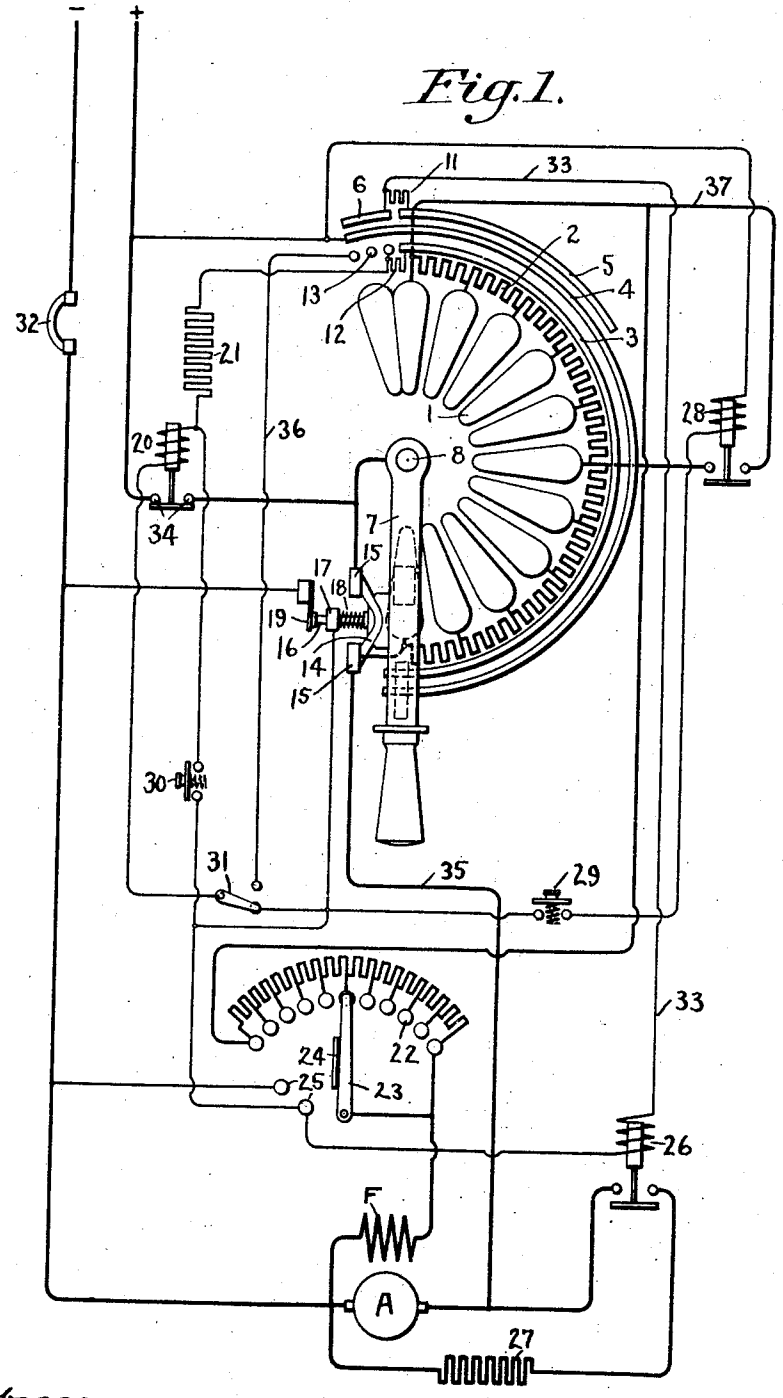
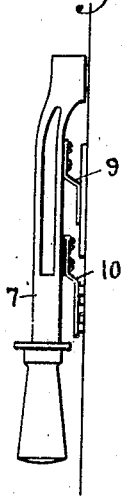


Fig. 2.



Witnesses:
Irving E. Steers.
J. Ellis Glen.

Inventor
George H. Dorgeloh,
by Allen A. Davis
Atty.

UNITED STATES PATENT OFFICE.

GEORGE H. DORGELOH, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

MOTOR-CONTROLLING DEVICE.

No. 917,023. Specification of Letters Patent. Patented April 6, 1909.

Application filed June 24, 1908. Serial No. 440,091.

To all whom it may concern:

Be it known that I, GEORGE H. DORGELOH, a subject of the Emperor of Germany, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Motor-Controlling Devices, of which the following is a specification.

This invention relates to devices for controlling electric circuits and has for its object the provision of means whereby an electric motor may be started, stopped and generally controlled in a reliable, safe and efficient manner.

My invention relates more specifically to means for controlling motors of the type adapted to run at a low speed in addition to the normal running speed, and which it is desired shall be started and stopped quickly when running at full speed. This type of control is commonly used in connection with printing presses in which it is desired that means be provided whereby the motor may be "jogged" along at a low speed. This "jogging" is preferably and usually accomplished by having switches arranged at different points around the press. In the patent to Yates, Serial No. 357,942, there is disclosed a controlling device of this type in which the motor may be jogged along at points around the press with the starting arm in the off position. It has been found, however, that the operator frequently will not take the trouble of going to one of the control switches or buttons in order to jog the machine but will use the controlling arm. The result is that the starting contact segments are frequently injured by arcing. It has been found that in setting the plates and threading the paper into the press an extremely low speed is frequently required. Furthermore in large rotary web presses the static friction is often so great that the motor will not start with the resistance all in circuit so that it is necessary to give the motor an impulse with part of the resistance only in circuit. It has also been found desirable to employ an independent speed controlling rheostat. This rheostat I have so arranged that the motor circuit cannot be closed by any of the electro-magnetic switches until the speed controlling rheostat is in its initial position.

In the accompanying drawing in which I have shown my invention embodied in concrete form, Figure 1 is a diagrammatic view of the device; and Fig. 2 is a detail of the controlling arm.

Referring to the drawing, 1 represents a series of segments arranged in an arc of a circle so as to form terminals of starting resistance 2. Arranged concentric with these segments are contact rings 3, 4, 5 and 6, all having different lengths and arranged for purposes hereinafter described. The controlling arm or member 7 is pivoted at 8 and is provided with a contact brush 9 electrically connected with the arm 7 and adapted to engage the segments 1. A similar brush 10 is mounted on the arm but insulated therefrom and adapted to bridge the contact rings as shown.

The contact rings 5 and 6 are connected by a resistance 11 and a similar resistance 12 is connected between the ring 3 and one of the series of studs 13. The controlling arm 7 is provided with a bridging contact or brush 14 adapted to bridge the contacts 15 to short-circuit the controlling arm when the latter is in the running position. A plunger contact 16 is mounted to move longitudinally in the post 17 adjacent to the contacts 15. This plunger will be engaged by the arm when the latter reaches running position and forced against the tension of spring 18 into engagement with the contact 19. An electromagnetic switch 20 is arranged in series with the controlling arm, as shown, and a resistance 21 is connected in series with the coil of this switch and also connected to the resistance 12 at stud 13. A speed regulating rheostat provided with a series of studs 22 arranged to be engaged by the controlling arm 23 is mounted adjacent the starting rheostat. A bridging contact 24 is mounted on the arm 23 so as to engage the contacts 25 when the arm 23 is in the initial position. These studs 25 complete the circuit of the coil of switch 20 as well as the coil of switch 26. This latter switch is adapted to connect the resistance 27 in parallel with the armature A as hereinafter described. A third electromagnetic switch 28 is adapted to short-circuit a portion of the resistance 2 when the push button 29 is operated. A similar push button 30 is arranged to control the switch 20. A switch 31 is arranged to be set in either one of two positions so that the motor may be run at normal speed or jogged along as desired. 32 represents in

a conventional manner a single pole circuit-breaker connected in the line. The arrangement of circuits and mode of operation are as follows: with the switch 31 in the position shown in the drawing, the parts are arranged for normal running. With the arm 7 in the starting position in contact with the ring segment 6 and stud 13, the electromagnetic switch 26 will be energized from the positive main through brush 10, contact 6, conductor 33 and back to the negative main across the studs 25, the arm 23 being in its initial position. The energizing of switch 26 connects the resistance 27 in parallel with the armature and a low speed will be obtained. When the arm is moved a little farther so that the brush 10 engages stud 13 adjacent to ring 3, switch 20 is energized as follows: from the positive main, brush 10, resistance 21, solenoid 20, switch 31, contacts 25 and back to the negative main. This closes the armature circuit at contacts 34 so that the armature circuit will be from the positive main through arm 7, resistance 2, conductor 35 thence through the resistance 27 and armature A in parallel and back to the negative main. The arm 7 is now moved so as to cut out the starting resistance, and when the running position is reached, the arm 7 is short-circuited across the contacts 15. It will be seen, however, that as brush 10 passes off of segment 5, the switch 26 is de-energized so that the resistance 27 is no longer in circuit. When brush 10 passes on to segment 3, the resistance 12 is cut in series with the solenoid switch 20 so as to reduce the current to an amount sufficient to hold the switch closed. If the switch, however, is opened, it will be necessary to bring the arm back to starting position and eliminate the resistance 12 before it can again be closed. The same is true of the resistance 11 which is connected in series with the solenoid of switch 26 when the brush 10 moves from contact 6 to contact 5. This necessitates the return of the arm to starting position before the switch 26 can be closed after it is once opened. When the controlling arm 7 reaches running position the circuit of the switch 20 is completed through the contacts 15 and 19 instead of through contacts 25, so that the arm 23 may be moved to the right to speed up the motor by weakening the field F.

When it is desired to jog the motor along the arm 7 is returned to starting position and the switch 23 to its initial position. When the switch 31 is moved on to the jogging button, push button 30 is pressed, and the circuit of solenoid 20 will be as follows: from the positive main to stud 13, conductor 36, switch 31, coil 20, push button 30, contacts 25 and back to line. This will close the armature circuit through all of the starting resistance with the resistance 27 in parallel with the motor armature. If the load on the motor is so great, due either to static friction or other causes, that the motor will not start, the button 29 may be pressed which will energize the switch 28 and short-circuit a section of resistance so that the current will pass through the conductor 37 and short-circuit the first five sections of resistance. This will give the motor sufficient impulse to start and the button 29 may then be released. When the motor is normally running it may be stopped by actuating the push button 30, which will short-circuit the coil of switch 20 and open the circuit at contacts 34. It will then be necessary to bring the arm back to the starting position in order to again close the switch 20 as above described.

While I have described my invention in connection with a specific structure and as operating in a definite manner, it should be understood that I do not limit my invention thereto except in so far as it is limited by the scope of the claims annexed hereto.

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

1. The combination with an electric motor, of a starting rheostat therefor, an auxiliary resistance, and an electromagnetic device arranged to be energized to connect said resistance in parallel with the motor armature during a portion of the movement of the rheostat and deënergized to exclude said auxiliary resistance during the remaining movement.

2. The combination with an electric motor, of a starting rheostat therefor, an auxiliary resistance, an electromagnetic device arranged to be energized to connect said resistance in parallel with the motor armature during a portion of the movement of the rheostat and deënergized to exclude said auxiliary resistance during the remaining movement, and an electromagnetic switch in series with the starting rheostat.

3. The combination with an electric motor, of a starting resistance for the armature circuit, a controlling member therefor, an auxiliary resistance, an electromagnetic device arranged to be energized to connect said resistance in parallel with the motor armature during a portion of the movement of the member and deënergized to exclude said auxiliary resistance during the remaining movement, and an electromagnetic switch arranged to short-circuit a portion of the resistance with the controlling member in starting position.

4. The combination with an electric motor, of a starting rheostat therefor, a speed regulating rheostat, an electromagnetic switch in series with the starting rheostat and controlled by the regulating rheostat, means whereby said switch is closed by the initial movement of the starting rheostat,

and means independent of either rheostat for controlling the switch.

5. The combination with an electric motor, of a starting resistance for the armature circuit, a controlling member therefor, an electromagnetic switch in series with said resistance, and an electromagnetic switch arranged to short-circuit a portion of the starting resistance when the controlling member is in the off position.

6. The combination with an electric motor, of a starting resistance for the armature circuit, a controlling member therefor, an electromagnetic switch in series with said resistance, means whereby said switch is closed when the member is moved toward running position, means for controlling said switch when the member is in the off position, and an electromagnetic device arranged to short-circuit a portion of the starting resistance when the controlling member is in the off position.

7. The combination with an electric motor, of a starting rheostat therefor, an auxiliary resistance, an electromagnetic device arranged to be energized to connect said resistance in parallel with the motor armature during a portion of the movement of the rheostat and deënergized to exclude said auxiliary resistance during the remaining movement, an electromagnetic switch arranged to short-circuit a portion of the starting resistance without moving the rheostat, a speed regulating rheostat, and means for preventing the energizing of either of said electromagnetic switches until the regulating rheostat is in a predetermined position.

8. The combination with an electric motor, of a starting rheostat therefor, an auxiliary resistance, an electromagnetic switch arranged to be energized to connect said resistance in parallel with the motor armature during a portion of the movement of the rheostat and deënergized to exclude said auxiliary resistance during the remaining movement, an electromagnetic switch in series with the starting rheostat, a speed regulating rheostat, and means for preventing the energizing of either of said electromagnetic switches until the regulating rheostat is in a predetermined position.

9. The combination with an electric motor, of a starting resistance for the armature circuit, a controlling member therefor, an auxiliary resistance, an electromagnetic switch arranged to be energized to connect said auxiliary resistance in parallel with the motor armature during a portion of the movement of the controlling member and deenergized to exclude said auxiliary resistance during the remaining movement, an electromagnetic switch in series with the starting resistance, and an electromagnetic switch arranged to short-circuit a portion of the starting resistance independently of the movement of the controlling member.

10. The combination with an electric motor, of a starting rheostat therefor, an auxiliary resistance, an electromagnetic device arranged to be energized to connect said resistance in parallel with the motor armature during a portion of the movement of the rheostat and deënergized to exclude said auxiliary resistance during the remaining movement, an electromagnetic switch arranged to short-circuit a portion of the starting resistance without moving the rheostat, an electromagnetic switch in series with the starting rheostat, a speed regulating rheostat, and means for preventing the energizing of any of said electromagnetic switches until the regulating rheostat is in a predetermined position.

In witness whereof, I have hereunto set my hand this 22 day of June, 1908.

GEORGE H. DORGELOH.

Witnesses:
BENJAMIN B. HULL,
HELEN ORFORD.