G. H. WHITTINGHAM.

MOTOR CONTROLLER.

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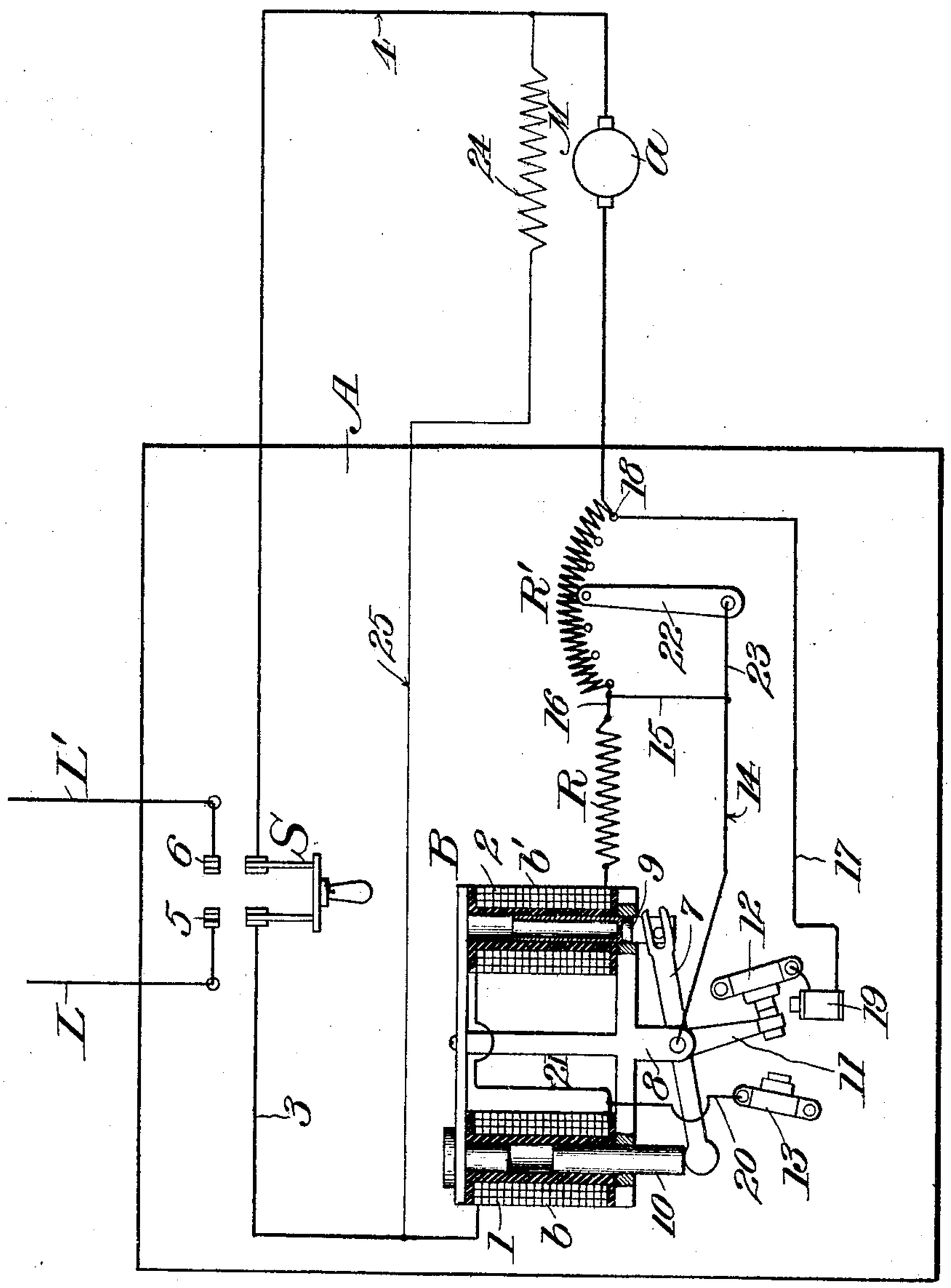
965,676.

Patented July 26, 1910.



Witnesses

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MOTOR-CONTROLLER.

965,676. Specification of Letters Patent. Patented July 26, 1910.

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To all whom it may concern:

Be it known that I, GEORGE H. WHITTINGHAM, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Motor-Controllers, of which the following is a specification.

This invention relates to improvements in the class of apparatus illustrated and described in Patent No. 891,720 granted to William C. O'Brien, June 23, 1908.

In operating machines, such as printing presses, by directly connected motors, it is desirable to provide means for operating the motor at different speeds for different classes of work, and to always operate the motor and press at a uniform speed while any given job or piece of work is being printed, regardless of the number of times the motor may be stopped or started while that particular job is running through the press, in order that the printed matter may be uniform in appearance. Where the motor must be operated at a speed considerably below the normal, by maintaining a resistance in the armature circuit, a manually controlled regulator arm is provided which is set at a point on the regulating resistance which will give the desired speed; but if a considerable quantity of this regulating resistance is left in circuit, it interferes with the starting operation, and, with job presses, which require considerable power to start, but which run easily after starting, it occurs that when the regulator arm is set for a low speed the press operator must frequently assist the motor in starting by pulling upon the fly wheel of the press. My present invention is designed to overcome this difficulty and it combines with a starting and a regulating resistance, an automatic device which serves to eliminate the regulating resistance from the armature circuit while the motor is starting its load and which then eliminates the starting resistance, leaving in circuit the desired quantity of regulating resistance.

In the accompanying drawing the invention is illustrated in connection with a starter controlled by the current flowing in the armature circuit, the starter being shown partly in section and partly in side view, and the circuits being shown diagrammatically.

Referring to the drawing, A indicates a suitable supporting panel and B indicates the starter or controlling device, upon the panel. The controlling device comprises a holding solenoid *b* and a regulating solenoid *b'*, having windings 1 and 2, respectively. In the drawing these coils are shown connected in series with one another and in series with a starting resistance R and a regulating resistance R' and the armature *a* of the motor M. The coil 1 of the solenoid B is connected by a wire 3 to one side of a supply switch S and one brush of the motor is connected by a wire 4 to the other side of said supply switch so that a complete circuit is formed from one side of said switch to the other through the starter, resistances, and motor armature. The switch S is arranged to make and break connection with the terminals 5 and 6 connected with the supply wires L, L'. A lever 7 pivoted to the frame 8 of the starter has a slot and pin connection with the core 9 of the regulating solenoid so that said core and lever will move together, while the core 10 of the holding solenoid normally rests upon the opposite arm of the lever and supports the core 9 of the regulating solenoid. A switch arm 11 connected to the lever 7 normally engages a switch terminal 12 and when moved from normal position, said switch arm engages a terminal 13. The switch arm is connected by conductors 14 and 15 to a point 16 in the armature circuit between the starting and regulating resistances and the switch member 12 is connected by a conductor 17 to a point 18 in the armature circuit between the regulating resistance and the armature. The conductor 17 includes the coils of a blow-out magnet 19 arranged adjacent to the contact point of the switch members 11 and 12. It will be seen that in the normal position of the switch arm the regulating resistance is entirely shunted through the conductors 15, 14 and 17. The contact member 13 is connected by a conductor 20 to the wire 21 which connects the coils of the holding and regulating solenoids, and when the switch arm 11 engages the contact 13, the shunt around the regulating resistance will be broken and a shunt circuit will be formed around the regulating solenoid and the starting resistance R, this latter shunt circuit extending from the wire 21, through wire 20 to contact 13, thence through switch arm 11 and conductors 14

and 15 to the right hand end of the starting resistance R. A manually controlled regulator arm 22 engages the contacts of the regulating resistance R′ and this arm is connected by wire 23 to the wires 14 and 15. The shunt field 24 of the motor is shown connected to the wires 3 and 4 by conductor 25.

The operation is as follows: The regulating resistance is normally short circuited, while the starting resistance is in series with the armature. When the supply switch is closed to start the motor, both solenoid coils of the starter are energized. The holding solenoid lifts its core, thus removing the mechanical support from the core of the regulating solenoid, but the core of the latter is sustained by the starting current so long as this current remains above a predetermined quantity. As long as the core of the regulating solenoid is sustained by the current, the regulating resistance remains shunted and the starting resistance remains in circuit; but as soon as the starting current falls to a safe predetermined limit, the regulating solenoid releases its core and the switch arm 11 is thereby moved into engagement with the contact 13 thereby closing the shunt circuit around the starting resistance and the coils of the regulating solenoid, and also, prior thereto, opening the shunt circuit around the regulating resistance. When the switch arm engages the contact 13 current then flows through the wires 14 and 23 to the regulator arm 22, and through so much of the regulating resistance as is included between said arm and the point 18. It will, therefore, be plain that if the arm 22 is set to run the motor at a certain speed, the arrangement of the starter and circuits is such that, for starting purposes, the entire regulating resistance will be eliminated from the armature circuit until the motor has gained sufficient speed to cause the release of the core of the regulating solenoid, and that after this occurrence the starting resistance will be cut out and the motor will run with the amount of regulating resistance in circuit which the arm 22 had been set to include.

What I claim is—

1. A controlling mechanism for electric motors, comprising starting and regulating resistances for the armature circuit, and means for automatically maintaining the starting resistance in circuit and the regulating resistance out of circuit while the motor is starting, and for cutting out the starting resistance and including the regulating resistance after the motor has started.

2. A controlling mechanism for electric motors, comprising starting and regulating resistances for the armature circuit, and means controlled by the armature current for automatically maintaining the starting resistance in circuit and the regulating resistance out of circuit while the motor is starting, and for cutting out the starting resistance and including the regulating resistance after the motor has started.

3. A controlling mechanism for electric motors, comprising starting and regulating resistances for the armature circuit, circuits for shunting said resistances, a switch member adapted to open and close said shunt circuits alternately, and means for automatically operating said member so as to maintain the shunt around the regulating resistance closed while the motor is starting and to open said latter shunt and close the shunt around the starting resistance after the motor has started.

4. A controlling mechanism for electric motors, comprising starting and regulating resistances in the armature circuit, circuits for shunting said resistances, and an automatically controlled device comprising a switch member normally closing the shunt around the regulating resistance and adapted, when moved from normal position, to open said latter shunt and close the shunt around the starting resistance.

5. A controlling mechanism for electric motors, comprising starting and regulating resistances in the armature circuit, circuits for shunting said resistances, an automatically controlled device comprising a solenoid having windings in series with the motor armature and a switch member controlled by said solenoid, said switch member normally closing the shunt around the regulating resistance and adapted, when moved from normal position, to open said latter shunt and close the shunt around the starting resistance.

In testimony whereof I affix my signature, in presence of two witnesses.

GEORGE H. WHITTINGHAM.

Witnesses:
ROBERT WATSON,
NEWTON P. WILLIS.