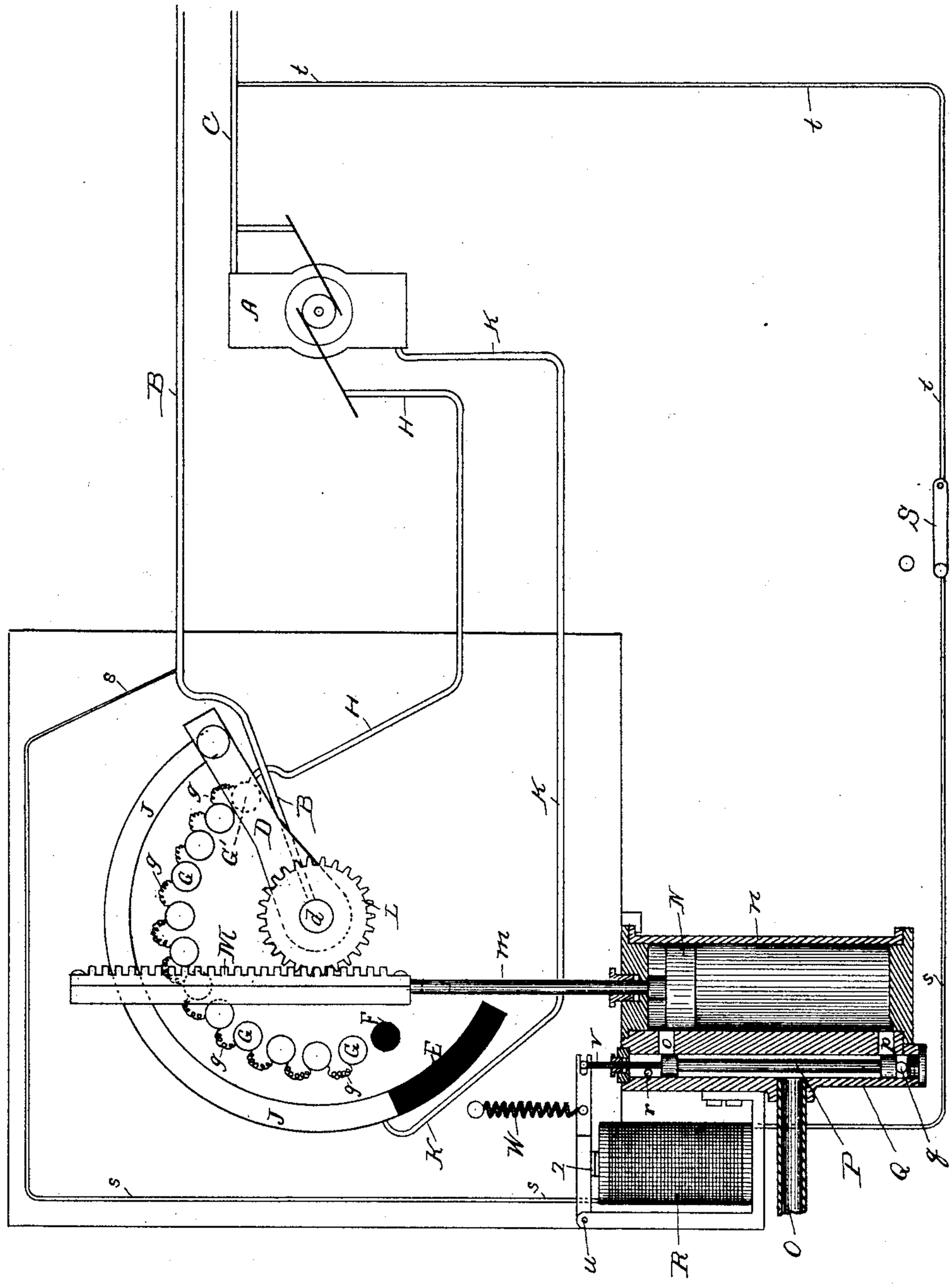
(No Model.)

C. G. ARMSTRONG.

SWITCH ACTUATING MECHANISM FOR ELECTRIC MOTORS.

No. 465,404. Patented Dec. 15, 1891.



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UNITED STATES PATENT OFFICE.

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SWITCH-ACTUATING MECHANISM FOR ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 465,404, dated December 15, 1891.

Application filed May 11, 1891. Serial No. 392,265. (No model.)

To all whom it may concern:

Be it known that I, CHARLES G. ARMSTRONG, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Switch-Actuating Mechanism for Electric Motors, of which the following is a specification.

This invention relates to the construction of devices for stopping and starting electric motors.

In the operation of an electric motor rheostats or resistance-boxes are generally used to control the supply of electricity to the motor when starting and stopping and to keep back any excess of electric current which would pass through the motor when standing idle or running at slow speed. These rheostats are placed near the electric motor and are generally worked by hand; but it is often desirable to be able to start an electric motor from a point at a distance, and also to provide means whereby the motor may be automatically stopped and started. It is also important that the means employed for actuating the brush of the rheostat should impart to the brush a slow movement to avoid injury to the apparatus. I accomplish these objects by closing the circuit through the motor by means of a rheostat or resistance-box and a fluid-motor operating the rheostat, the latter motor being itself capable of being controlled from a distant point.

In order to better explain the object of the invention one of the devices of a preferred construction is described in its entirety.

In the drawing I have shown a diagram of the electrical circuits connecting the resistance-box with what is known as a "shunt-motor," the resistance-box being in section.

In the drawing, A may represent the motor which is to be started by means of the resistance-box.

B is the wire supplying the positive current to the box, and C is the negative wire. The former is joined to the hub of the brush D of the resistance-box. The normal or idle position of the brush is exactly opposite that given in the drawing, the brush then being in contact with an insulated piece E and a dead-post F. Arranged in a circular row around the axis *d* of the brush is a series of contact-posts G, joined by the resistance-coils *g*. The last one of the series of posts G is indicated by the broken lines at G′, and the series is connected to the armature of the motor by a wire H, leading from this final post G′. Outside of the posts G is a segmental contact-piece J, with which the brush comes in contact as soon as it is moved off from the insulated piece E. This segmental contact-piece is connected to the field-circuit of the motor by the wire K. Both circuits of the motor are connected to the negative wire C, as indicated. The brush is operated by any suitable automatically-operating motor; but I prefer some such means as those now to be described. Rigid upon the axis of the brush is a gear-pinion L, which should be preferably made of rawhide or other insulating material. This pinion meshes with a rack M upon the stem *m* of the piston N, moving in the hydraulic cylinder *n*. This hydraulic cylinder has both upper and lower ports (lettered *o* and *p*, respectively) and is supplied with water under pressure through the pipe O, the admission of the water to cylinder *n* being controlled by a double-headed valve P, moving in a casing Q, connected with the cylinder *n* by the ports *o p*. By moving this valve P the water can be admitted to the under or upper side of the piston N, as required, and when admitted to one side exit is given to the water which may be upon the other side thereof through the ports *o* or *p* and the discharge-ports *q* or *r*, as will be readily understood.

It will be seen from what has already been described that if the brush be in its idle position and the valve P be moved to the position shown in the drawing and so as to admit the water through the port *p* to the under side of the piston and give exit through the port *o* to the water which is in the cylinder above the piston the piston will be forced upward to the position given in the drawing; also, that in thus moving upward the rack will actuate the pinion L and carry the brush around over the series of posts G until it has reached the position illustrated and in which the current is unobstructed and the motor energized to the utmost. Any appropriate means may be used for operating the valve of the motor, and the movement necessary is but a slight one, and as it is often

convenient, especially in the case of elevators operated by electric motors, to control the brush from a distance suitable means whereby this may be done are provided. A desirable construction of such means is as follows: A magnet R is placed in an electric circuit controlled by a switch S, located at any point in the circuit where the operator may be and upon the car of the elevator, if that is desired. The circuit which I prefer to employ is a shunt-circuit connecting with wires B and C by the wires *s* and *t*.

T is the armature of the magnet, pivoted at *u* and joined to the stem *v* of the valve at its other end.

W is a spring acting upon the moving end of the armature and exerting its tension to draw the armature away from the magnet. It will now be seen that if the circuit *s* and *t* is completed by the switch S the magnet will be energized and its armature drawn down, thus bringing the valve to the position indicated and causing an upward movement of the piston N and an actuation of the brush, with the resultant energizing of the motor. If it is desired to throw the motor out of operation, the magnet-circuit is broken by the switch, and the armature then rises in obedience to the spring W and moves the valve P into such position as will admit the water to the upper side of the piston and discharge it from below the same. The piston now moves downward and brings the brush around to its idle or normal position and the motor comes to a stop. These movements of the brush avoid any sudden starting or stopping of the motor. The device is extremely simple and not liable to become disarranged or to wear out. Of course suitable insulation should be used between the brush and the hydraulic piston, and this may be done by simply employing a rawhide pinion, as already stated.

While I have shown the invention as applied to what is known as a "shunt-motor," it will be understood that it can be equally well employed with a series motor by dispensing with the connections which carry the current to the motor-field—such, for instance, as the segmental contact J, the wire K, &c.

I claim—

1. The combination of an electric motor, a rheostat adapted to control the passage of the electric current thereto, a means for actuating and regulating the movement of the rheostat-brush, an electro-mechanical device in a shunt to the main circuit for throwing said actuating means into operation, and a second device constant and independent of the first device, such as a spring, for reversing said actuating means upon the cessation of action of said electro-mechanical device, substantially as set forth.

2. The combination of an electric motor, a rheostat adapted to control the passage of the electric current thereto, a hydraulic cylinder and piston connected with the rheostat-brush for actuating and regulating the movement thereof, a valve for said cylinder, and a motor for operating said valve, substantially as set forth.

3. The combination of an electric motor, a rheostat adapted to control the passage of the electric current thereto, a hydraulic cylinder and piston connected with the rheostat-brush for actuating and regulating the movement thereof, a valve for said cylinder, a motor for operating said valve, and a device constant and independent of the latter motor and adapted to act upon the cessation of operation thereof to move said valve, substantially as set forth.

4. The combination of an electric motor, a rheostat adapted to control the passage of the electric current thereto, a hydraulic cylinder and piston connected with the rheostat-brush for actuating and regulating the movement thereof, a valve for said cylinder, a magnet in a circuit connected with the main circuit for operating said valve, and a constantly-acting device, such as a spring, for moving said valve upon the cessation of the current in the main circuit or upon the de-energization of the magnet, substantially as set forth.

5. The combination, with a rheostat, of a hydraulic cylinder and piston connected with the brush of the rheostat for actuating and regulating the movement thereof, a valve for said cylinder, and means for operating the valve, substantially as set forth.

6. The combination of an electric motor, a rheostat, a hydraulic cylinder and piston connected with the rheostat, a valve for said cylinder, a magnet in a shunt of the main circuit and adapted to operate said valve, and an independent means for reversing the valve, substantially as set forth.

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