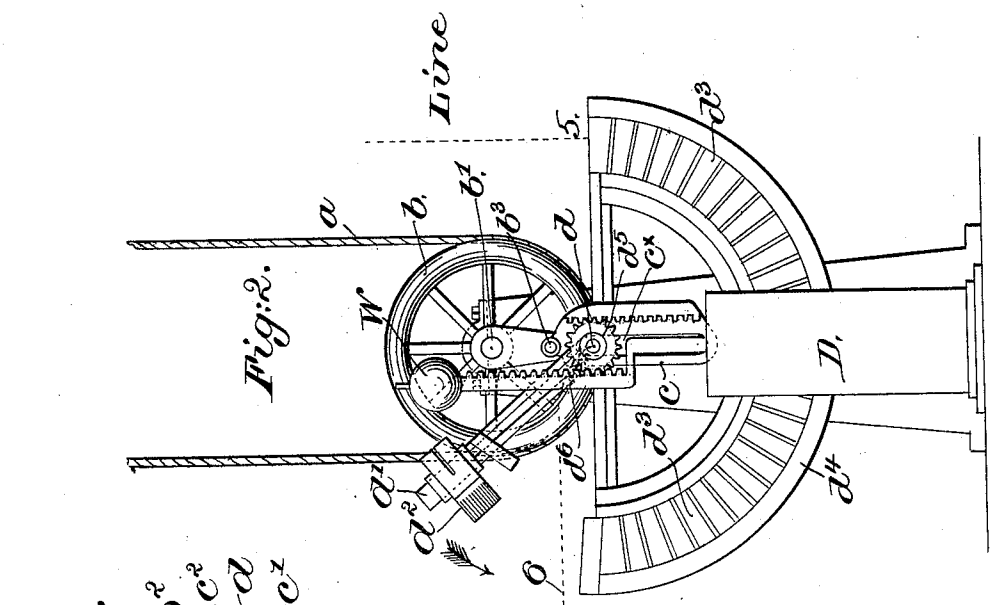
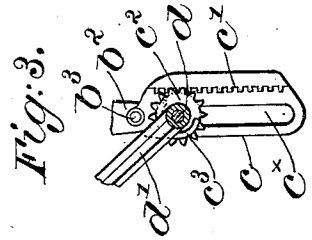
(No Model.)

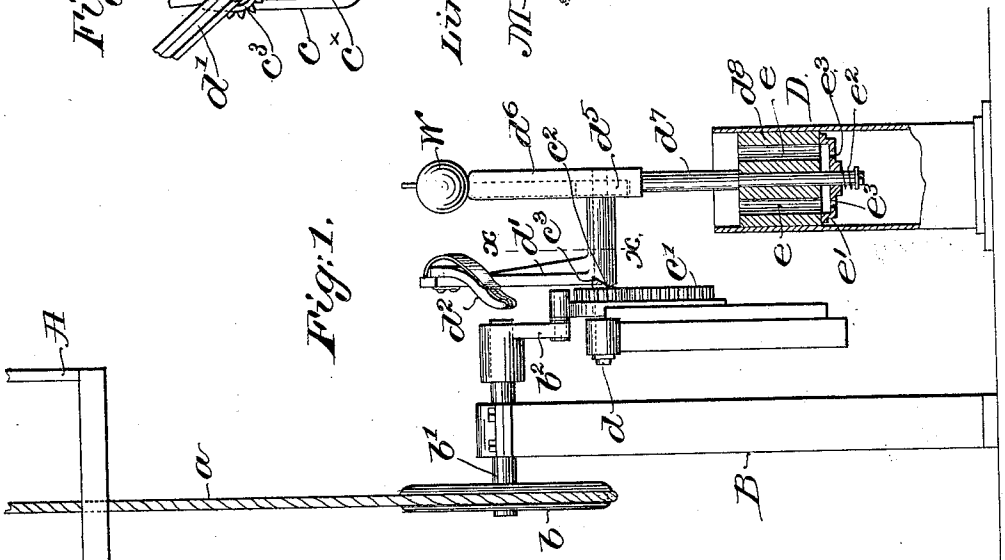
J. H. CLARK.

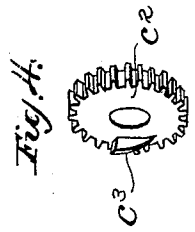
ELECTRIC CURRENT REGULATOR.

No. 509,363. Patented Nov. 28, 1893.









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ELECTRIC-CURRENT REGULATOR.

SPECIFICATION forming part of Letters Patent No. 509,363, dated November 28, 1893.

Application filed December 30, 1891. Serial No. 416,505. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. CLARK, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Electric-Current Regulators, of which the following description, in connection with the accompanying drawings, is a specification, like letters and numerals on the drawings representing like parts.

This invention relates to electric current regulators, and has for its object to improve the same, whereby the maximum current permitted to pass through the regulator may be quickly determined and the current thereafter gradually raised to such maximum by a retarded movement of the movable member of the regulator. This object I obtain by providing the regulator with a movable stop which is first moved into position to determine the maximum current, the movable member of the regulator being thereafter automatically moved to gradually raise the current to such maximum, as will be hereinafter described.

Figure 1 of the drawings represents in end elevation partial section, a current regulator embodying this invention; Fig. 2, a front elevation of the same, and Fig. 3, a sectional detail taken on the dotted line x—x, Fig. 1. Fig. 4 is a detached view in perspective of the movable stop, the normal position of the brush or movable member of the regulating device relative to the said stop being indicated in dotted lines.

The current regulator embodying this invention is not restricted to any particular use, although I have herein shown and shall describe the same as employed in connection with an electric elevator mechanism, and referring to the drawings, A represents a portion of an elevator car actuated in usual manner from an electric motor, not shown, all of which may be in accordance with the well known practice at the present time, and further reference thereto is therefore deemed unnecessary.

The shipper rope a in the present instance, is passed about a sheave b, fast on a shaft b', journaled in a suitable bearing in the support B, the said shaft at its end opposite the sheave b having a crank b^2, the crank pin b^3 of which is jointed to the frame c, which is guided in its movements by the shaft d extended through a slot $c^\times$ in said frame. The shaft d mounted in suitable bearings, has fixed to it the arm d', which I designate as the movable member of the controlling device, the said arm at its outer end carrying a series of brushes d^2 adapted to sweep over the resistance contacts d^3, arranged in the arc of a circle upon a suitable support d^4 as represented. A pinion d^5 fast on the shaft d, is in mesh with a rack d^6 on the upper end of the piston rod d^7 of the piston d^8 in the dash pot cylinder D, a weight w, placed upon the end of the rack, tending to depress the same and the piston d^8, to rotate the shaft d and cause the arm d' to sweep over the resistance contacts d^3 in the direction of the arrow Fig. 2.

The piston d^8 in the dash pot cylinder is provided with passages e, normally closed by the valve e' actuated by the spring e^2, said valve having as herein represented two small openings e^3, through which the fluid contained in the cylinder below the piston, must pass to the upper side of the piston as the latter descends within the cylinder, so that the downward movement of the rack d^6 and the consequent sweeping movement of the arm d' in the direction of the arrow must necessarily be retarded. But the upward movement of the piston and the movement of the arm d' in a direction opposite to the arrow, may be quick, for as the piston rises, the valve e' will be moved back to open the passages e, and permit the fluid above the piston to pass readily through to the cylinder beneath.

The vertically movable frame c in the present instance is provided with a rack c', which meshes with a pinion c^2 loose on the shaft d, and provided with a stop c^3, which acts as a movable abutment to prevent the arm d' from being moved by the weight W, except when the said stop is moved away from in front of it.

One manner of connecting the controller in circuit is illustrated by Fig. 2, wherein the line wire is connected with the controller at the point 5, while the shaft d is connected with one brush of a motor M by a wire 6, the other brush of said motor being again connected with the line as shown.

The operation of the device is as follows, viz:—If a maximum current is desired, the

shaft b' will be rotated to lift the frame c and through its rack c' and pinion c^2 move the stop c^3 into its dotted line position Fig. 3, permitting the weight W to descend and cause the arm d' to sweep over the resistance contacts d^3, the circuit being closed as the brushes d^2 strike the first contact of the series, in which case the current must pass from the line at 5 through the entire series of resistances to the brushes d^2 and arm d' to the motor, so that a weak current only is admitted to the motor. But as the weight W moves, it causes the arm d' to gradually sweep over the contacts d^3, one after another of the resistances being cut out, until the arm reaches the point 5 when the current is permitted to flow from the line wire directly to the arm d' and thence to the motor at its maximum strength, without passing through any resistance. On the other hand, should the stop c^3 be moved through one-half the distance indicated in Fig. 3, or an arc of ninety degrees, the arm d' would be arrested in its movement when it had cut out only one-half the resistances in the series, so that the maximum current received by the motor would be only one-half that received by the motor when the arm d' was permitted to cut out all of the resistances. In like manner by moving the stop c^3 into different positions, a current of any desired maximum strength may be permitted to pass to the motor; in every instance whether the maximum current be greater or less, the current is raised to the maximum gradually by the slow movement of the arm d'. When the shaft d' is so turned as to bring the parts into the position shown in Figs. 1 and 2, the wheel c^2 is turned bringing the movable stop into engagement with the arm d' of the brush which is thereby lifted and the parts brought into the normal position, that is the position shown in Fig. 1 by a positive movement, this being permitted by the construction of the dash pot hereinbefore described.

While I have herein represented the current regulator as utilized in connection with an electric motor, still this invention is not limited to such use, as it is equally adapted for regulating any current whatsoever, the prime feature of the invention being that the maximum current may be quickly determined by the location of the stop, and the controlling arm thereafter moved slowly up to the stop which limits further movement, to thus gradually raise the current from zero to its maximum strength.

In the construction herein shown the resistance contacts constitute the fixed member of the controlling device, the arm d' the movable member thereof, the shaft b the actuator for the stop c^3, and the rack d^6 the actuator for the movable member. Neither is this invention restricted to the particular device shown, as I consider any device wherein by a single movement of the actuating member, the maximum current may be determined, and the current thereafter raised to such maximum gradually, as within the scope of this invention.

I claim—

1. In a current regulator, a stop for limiting the extent to which the movable member thereof can move, means for setting the stop, and means for moving the said movable member into engagement with the stop after it has been set, substantially as set forth.

2. In a current regulator, a stop for limiting the extent to which the movable member thereof can be moved, means for imparting a retarded movement to the said member, after the stop has been set, substantially as set forth.

3. In a current regulator, a stop for limiting the extent to which the movable member thereof can be moved, an actuator for setting the stop, and means independent of the said actuator for moving the movable member of the regulator into engagement with the stop after it has been moved, substantially as set forth.

4. In a current regulator, a series of resistance contacts, a pivoted arm or brush adapted to sweep the same, a movable stop adapted to limit the extent to which the said arm can be moved, means for moving the arm into contact with the stop after it has been set or placed, and a retarding device which limits the speed of movement of the said arm, substantially as set forth.

5. In a current regulator, a series of contacts, and a brush adapted to sweep the same, a stop adapted to limit the extent to which the brush can sweep the said contacts, automatic means tending to sweep the brush over the said contacts, and means for setting the said stop to determine the extent to which the brush can be automatically moved, and for returning the stop and with it the brush to its normal position out of engagement with the contacts, substantially as set forth.

6. In a current regulator, a series of resistance contacts, a pivoted arm adapted to sweep the same, means for automatically moving the arm to cause it to sweep the contacts, a retarding device therefor, a movable stop which normally holds the said pivoted arm from movement, an actuator to move the stop away from the movable member to permit the latter to follow and to sweep one or more of the said contacts, the number of contacts swept by the arm being determined by the position of the stop, substantially as described.

7. A current regulator containing a series of resistance contacts, a shaft, an arm thereon adapted to sweep said contacts, a pinion fast on said shaft, a rack in mesh with said pinion, means to move the said rack, and a retarding device to retard the movement of the rack, combined with a stop loosely pivoted on said shaft, and means to move the same, to operate, substantially as described.

8. A current regulator containing a series of resistance contacts, a shaft, an arm thereon adapted to sweep said contacts, a pinion fast

on said shaft, a rack in mesh with said pinion, means to move the said rack, and a retarding device to retard the movement of the rack, combined with a pinion loose on said shaft, a stop on said pinion adapted to limit the movement of the said arm, a rack in mesh with said loose pinion, and means to move the said rack to operate, substantially as described.

9. A current regulator containing a series of resistance contacts, a shaft, an arm thereon adapted to sweep said contacts, a pinion fast on said shaft, a rack in mesh with said pinion, means to move the said rack, a dash-pot cylinder, a piston therein connected to and movable with the said rack, a valve on said piston adapted to open when the piston is moving in one direction, and close when the piston is moving in the opposite direction, combined with a pinion loose on said shaft, a stop on said pinion to limit the movement of said arm, a rack and means to move it to move the said stop, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN H. CLARK.

Witnesses:

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