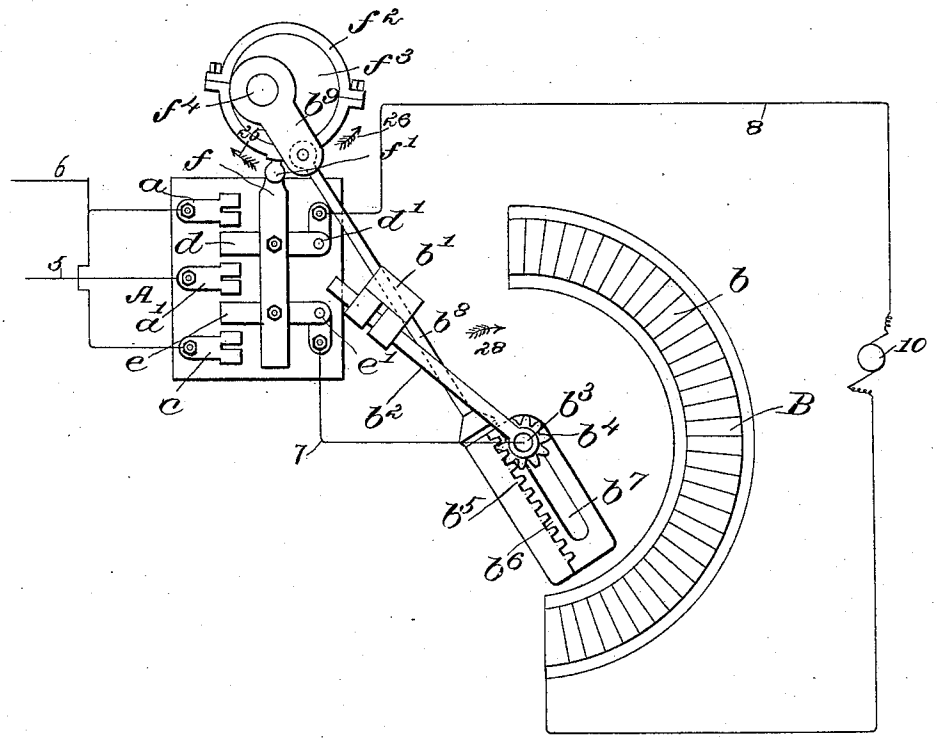
(No Model.)

J. H. CLARK.

CIRCUIT CONTROLLING DEVICE.

No. 563,743. Patented July 14, 1896.



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UNITED STATES PATENT OFFICE.

JOHN H. CLARK, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE WHITTIER MACHINE COMPANY, OF SAME PLACE.

CIRCUIT-CONTROLLING DEVICE.

SPECIFICATION forming part of Letters Patent No. 563,743, dated July 14, 1896.

Application filed January 29, 1892. Serial No. 419,625. (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 Circuit-Controlling Devices, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

Circuit-controlling devices of the class to which this invention particularly relates consist, essentially, of a circuit-reverser and current-regulator or rheostat, the circuit-reverser being constructed in such a manner that movement of the operating shaft or member in one direction will send a current of one polarity over the line, whereas, in order to reverse the current to that of an opposite polarity, it is necessary to move the operating shaft or member in an opposite direction, and therefore in combining a circuit-reverser and current-regulator in a single controlling device it has been necessary to provide two sets of resistance-contacts, one to be swept by the regulating-arm when the operating shaft or member of the circuit-reverser is moved in one direction to derive a current of one polarity, and a second set of resistance-contacts to be swept by the regulating-arm when the operating shaft or member of the circuit-reverser is moved in an opposite direction to derive a current of opposite polarity. This double set of resistances complicates the construction of the device and increases to a considerable degree its first cost and the cost of maintenance.

This invention has for its object to improve controlling devices of the class described by providing a single set of resistance-contacts only, and so connecting the regulating member therefor with the operating shaft or member of the circuit-reverser that the said regulating member will be moved in the same direction over a single set of resistance-contacts by movement of the operating shaft or member in opposite directions.

In carrying out this invention the operating shaft or member of the circuit-reverser is provided with a crank or equivalent device, which is connected with and actuates the regulating member of the current-regulator, the said crank lying normally on what is commonly known as a "dead-center," *i. e.*, in a direct line between its operating-shaft and the operating member, so that, whether the operating-shaft be moved in one or the other direction from its dead-center point, one movement only will be transmitted to the controlling device, as will be fully hereinafter set forth.

One part of this invention consists in a circuit-controlling device containing a circuit-reverser, and a current-regulator having a regulating member, combined with an operating-shaft for the circuit-reverser, and connecting mechanism between said operating-shaft and regulating member, whereby movement of the operating-shaft in opposite directions to effect a change of polarity of the current will produce a movement of the regulating member in the same direction, substantially as will be described.

Other features of this invention will be hereinafter described, and set forth in the claim.

The drawing represents in elevation a circuit-controlling device embodying this invention.

Referring to the drawing, A represents a circuit-reverser comprising, as herein shown, the fixed contacts a a' c, with which coöperate the movable members d and e, pivoted, respectively, at d' e', and connected with and moved by a connecting-bar f, jointed at f' to the strap f^2 of an eccentric f^3, fast on the operating-shaft f^4, as shown.

B represents a current-regulator herein represented in its most general form, it comprising a single series of resistance-contacts b, arranged in the arc of a circle, and adapted to be swept by a brush b' on the regulating-arm b^2, pivoted on the shaft b^3, which latter is fitted with a pinion b^4, engaged and driven by a rack b^5 on a plate b^6, said rack being maintained in mesh with the teeth of the pinion b^4 by a slot b^7 in the said plate and through which the shaft b^3 is extended, said slot acting to guide the plate in its movements and in whatever direction it may be moved, holding the same with the teeth of the rack in mesh with the teeth of the pinion.

In accordance with this invention the plate b^6 is connected by a rod b^8 with a crank b^9,

fast on the operating-shaft f^4 and normally lying in its dead-center position with relation to the shaft b^3 of the current-regulator, as represented in the drawing.

The arrangement of circuits may be indicated as follows: The line 6 from one pole of the generator is connected with both the contacts a and e of the reverser. The movable member e of the reverser is connected by line 7 with the pivotal-shaft b^3 of the regulating-arm b^2, while the movable member d of the reverser is connected by a line 8 with the last resistance-contact b of the series, as shown, any motor or other translating device 10 being included in the line 8.

Assuming the parts to be in the position as represented, the operation of the device is as follows: If the operating-shaft f^4 be rotated in direction of arrow 25, the eccentric f^3 thereon will move the bar f down and the movable members d and e into contact, respectively, with the fixed contacts a' and c, such movement of the operating-shaft causing the crank b^9 thereon to be moved also in the direction of the arrow 25, and, through the rod b^8, plate b^6, and rack b^5, move the regulating-arm b^2 in the direction of arrow 28 to cause its brush b' to sweep over the series of resistances b, one after another of the resistances being cut out as the arm is caused to pass along the series, the current for the generator entering through the line 5 being then traced as follows, viz: line 5, fixed contact a', movable member d, line 8, resistances b, brush b', regulating-arm b^2, shaft b^3, line 7, movable member e, fixed contact c, and line 6 back to the generator. A current of electricity of one polarity is thus sent over the line to operate the motor or other translating device 10 in the line.

Should the operating-shaft f^4, however, be rotated in the opposite direction, as indicated by arrow 26, the eccentric f^3 will act to lift the bar f and cause the movable members d and e to contact with the fixed contacts a and a', such movement of the operating-shaft f^4, however, being in the opposite direction from before, to lift the plate b^6 and rack b^5 as before, so that the regulating-arm b^2 and with its brush b' will sweep over the series of resistances d in precisely the same manner as though the operating-shaft f^4 were rotated in the opposite direction, the current from the generator by this last movement of the operating-shaft being traced as follows, viz: line 5, fixed contact a', movable member e, line 7, shaft b^3, regulating-arm b^2, brush b', resistances b, line 8, movable member d, fixed contact a, and line 6 back to the generator, thus sending a current of opposite polarity over the line from above.

From the above description it will be evident that by placing the crank b^9 normally on its dead-center with relation to the current-regulator that the operating-shaft f^4 of the controlling device may be moved in one direction to send a current of one polarity over the line, and in an opposite direction to send a current of opposite polarity over the line, but by movement in either direction the regulating-arm b^2 is caused to travel in the same direction, making it possible to employ one series of resistance-contacts, whereas, so far as I am aware, heretofore it has been customary to provide two series of resistance-contacts, one to be swept by the regulating-arm when the operating-shaft of the circuit-reverser was moved in one direction, and the second series of resistance-contacts to be swept by the contact-arm when the operating-shaft of the circuit-reverser was moved in an opposite direction.

A device constructed in this manner is much cheaper, both as regards first cost and maintenance, and will control the current equally as well as devices as heretofore constructed.

Of course a crank may be employed to move the bar f of the circuit-reverser instead of the eccentric shown, and an eccentric may be employed in place of the crank b^9; also a crank may be employed instead of the rack b^5 and pinion b^4, and I consider as within the scope of this invention any devices which are equivalents of said crank, eccentric, and rack and pinion, provided they will operate to move the regulating-arm always in one direction, whether the operating-shaft or circuit-reverser be moved in one or another direction, thus making it possible to employ a single series of resistances to regulate the currents of opposite polarity.

The novel mechanism herein illustrated and described whereby I am enabled to construct and operate a circuit-controlling device in the manner described may be employed for other uses if desired.

I claim—

In an electric controlling device, an operating-shaft, and eccentric thereon; and a circuit-reverser operated by said eccentric; combined with a crank on the said shaft; a current-regulator; a regulating member therefor; a shaft on which said member is pivoted; a pinion on said shaft; and a rack in mesh with said pinion; connected with and reciprocated by said crank, substantially as described.

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

JOHN H. CLARK.

Witnessess
FREDERICK L. EMERY,
FRANCES MAY NOBLE.