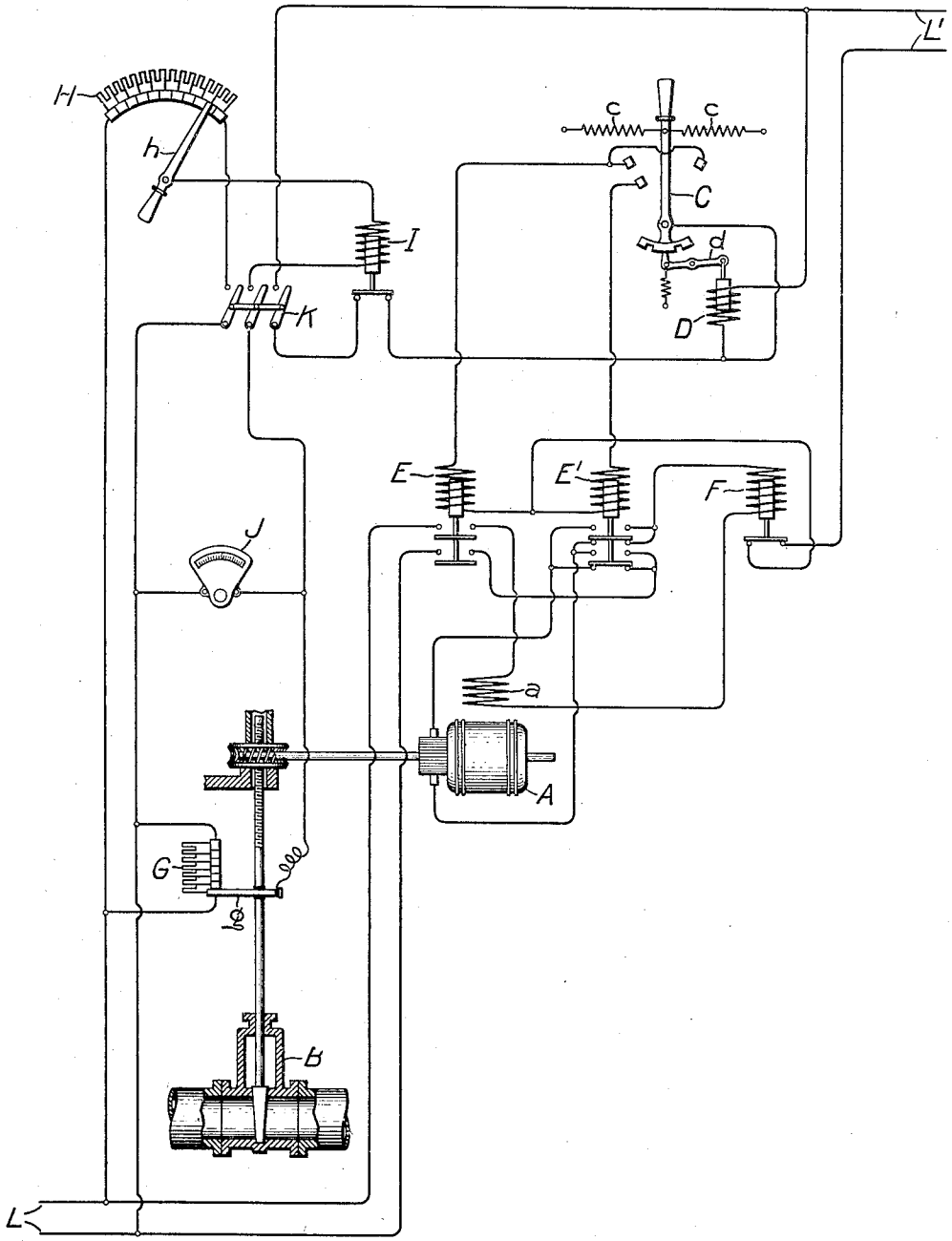
S. H. KANMACHER.

AUTOMATIC MOTOR CONTROL.

APPLICATION FILED OCT. 15, 1906.

923,186. Patented June 1, 1909.



Witnesses:

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UNITED STATES PATENT OFFICE.

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AUTOMATIC MOTOR CONTROL.

No. 923,186. Specification of Letters Patent. Patented June 1, 1909.

Application filed October 15, 1906. Serial No. 338,890.

To all whom it may concern:

Be it known that I, SAM H. KANMACHER, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Automatic Motor Controls, of which the following is a specification.

My invention relates to the automatic control of devices driven by electric motors, and is particularly applicable to the control of electrically-actuated valves and similar devices. With such devices it is ordinarily desired that means should be provided for automatically breaking the motor circuit when the driven member reaches either of its extreme positions, and it is also frequently desirable to provide means for automatically breaking the motor circuit when the driven member reaches a certain position predetermined by the operator. For this latter purpose means have been provided heretofore, comprising a controlling handle and means actuated by the movement of the driven member for breaking the motor circuit when the member reaches a position bearing a certain relation to the position of the controlling handle.

My invention consists in providing means for securing in a simple manner an automatic breaking of the motor circuit, both upon the driven member reaching either extreme in its range of movement, and also, when desired upon the driven member reaching an intermediate position determined by the operator. To accomplish this result, I provide a controlling switch for the motor arranged to return automatically to off-position when released, means for retaining the switch in an operative position, an overload-magnet in series with the motor arranged to release the switch from the retaining means when the driven member reaches either extreme in its range of movement, thereby stalling the motor and increasing the motor current above the normal limit, and means controlled by the position of the member also operatively related to the retaining means for the switch.

My invention will best be understood by reference to the accompanying drawing, in which—

A represents the armature and *a* the field of an electric motor which is connected through any suitable speed-reducing gearing to a valve or similar device B.

C represents the controlling switch for the motor, which is normally held in mid-position by the centering springs *c c*.

d represents a latch for locking the switch C in either of its operative positions, when the magnet D controlling the latch, is energized.

E E^1 represent magnetically-actuated switches or contactors, controlled by the switch C, and controlling the motor circuit.

F represents an overload magnet in the motor circuit, controlling contacts in the circuit of switch C.

G and H represent two resistances, which are connected across the source of current for the motor. These resistances are provided with contact members *g* and *h*, respectively, arranged to engage different points on the two resistances. The contact *g* is carried by the valve-spindle, while the contact member *h* is manually controlled by the operator.

I represents a magnet, which is connected between the contacts *h* and *g*, forming, with the resistances H and G, a Wheatstone-bridge connection. The contacts controlled by the magnet I are arranged to short-circuit the locking magnet D.

J represents an indicating device, such as a voltmeter, connected between one of the mains and contacts *g*, for indicating the position of the valve.

K represents a switch which, when open, renders the magnet I inoperative by breaking the circuits of its winding and of its contacts.

L represents leads to a source of current for the motor, and L^1 represents leads to a source of current for the control-circuit, which may or may not be the same source as that which supplies the motor.

The operation of the apparatus shown is as follows: When controlling switch C is moved to the right, a circuit is closed from the upper line-wire L^1 through magnet D, switch C, magnet E, and contacts of overload magnet F, to the lower line-wire L^1. Magnet D is consequently energized, so as to draw down its core and lock switch C in position, while magnet E raises its contacts, closing a circuit from line-wire L through the field and armature of motor A. The motor, consequently, starts to open the valve,

and, if switch K is open, as shown, continues operating until the valve reaches its other extreme position. At this point the motor is stalled, drawing an excess of current and actuating overload magnet F. This magnet then draws up its contacts, breaking the circuit of magnet D, so as to release switch C, which returns to its off-position, breaking the motor circuit. If switch C is moved to its other position both magnets E and E^1 are energized so that the motor is again connected to the line-wires L, but with its armatures reversed, so that it drives the valve in the opposite direction.

As long as switch K is open the apparatus acts simply to break the motor circuit on an overload, and consequently to stop the motor when the valve reaches each extreme of its movement. Since the motor circuit is opened only upon excessive current-flow, a high torque is produced for effectually seating the valve.

In order to stop the valve at any intermediate position, the contact member *h* is first set at the position desired and switch K is then closed. If the position of contact *h* does not correspond to the position of contact *g*, then current will flow between the two, energizing magnet I, and causing it to lift its contact so as to break the short-circuit, which would otherwise exist around the magnet D. Switch C may then be closed and locked in position by magnet D, thereby starting the motor; but when the valve-spindle reaches a position bearing a certain relation to the position of contact *h*, the contacts *g* and *h* will be at approximately the same potential, so that magnet I will be deënergized, allowing its contact to fall. This closes a short-circuit around magnet D, which releases switch C, so as to break the motor circuit. Since the voltmeter J is connected between one line-wire and the contact member *g*, the voltage at its terminals corresponds to the position of the valve-spindle, and the reading of the voltmeter serves as an indication of the position of the valve.

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

1. In combination with an electric motor and a member driven thereby, a controlling switch for the motor biased to "off" position, electromagnetically operated means for holding said switch in an "on" position, an overload relay for rendering inoperative said electromagnetically operated means upon an excess current flow through the motor, and another relay arranged when deënergized to render inoperative said electromagnetically operated means, an actuating coil for said last mentioned relay, and means for energizing said coil and automatically maintaining it energized until said member has moved to any desired position.

2. In combination an electric motor and a member driven thereby, a controlling switch for the motor biased to "off" position, a locking coil for holding said switch in an "on" position, an overload relay for interrupting the circuit through said locking coil upon an excess current flow through the motor, and another relay arranged when deenergized to short-circuit said locking coil, an actuating coil for said last mentioned relay, and means for energizing said actuating coil and automatically maintaining it energized until said member has moved to any desired position.

3. In combination with an electric motor and a member driven thereby, a controlling switch for the motor biased to "off" position, a locking coil for holding the said switch in an "on" position, an overload relay arranged to render said locking coil inoperative upon an excess current flow through said motor, two resistances connected in parallel across a source of current, one being adjacent said driven member and the other adjacent the controlling switch, contact means operated by said driven member in its movement for making electrical connection at different points in said first mentioned resistance, a manually movable contact member for making electrical connection at different points in the second mentioned resistance, a relay having its actuating coil connected between said contact means operated by the driven member and the manually movable contact member, and arranged in one position to render said locking coil inoperative.

4. In combination with an electric motor and a member driven thereby, a controlling switch for the motor biased to "off" position, a locking coil for holding the said switch in an "on" position, an overload relay arranged to interrupt the circuit through said locking coil upon an excess current flow through said motor, two resistances connected in parallel across a source of current, one being adjacent said driven member and the other adjacent the controlling switch, contact means operated by said driven member in its movement for making electrical connection at different points in said first mentioned resistance, a manually movable contact member for making electrical connection at different points in the second mentioned resistance, a relay having its actuating coil connected between said contact means and the manually movable contact member and arranged in one position to short-circuit said locking coil.

In witness whereof, I have hereunto set my hand this 13th day of October, 1906.

SAM H. KANMACHER.

Witnesses:
BENJAMIN B. HULL,
HELEN ORFORD.