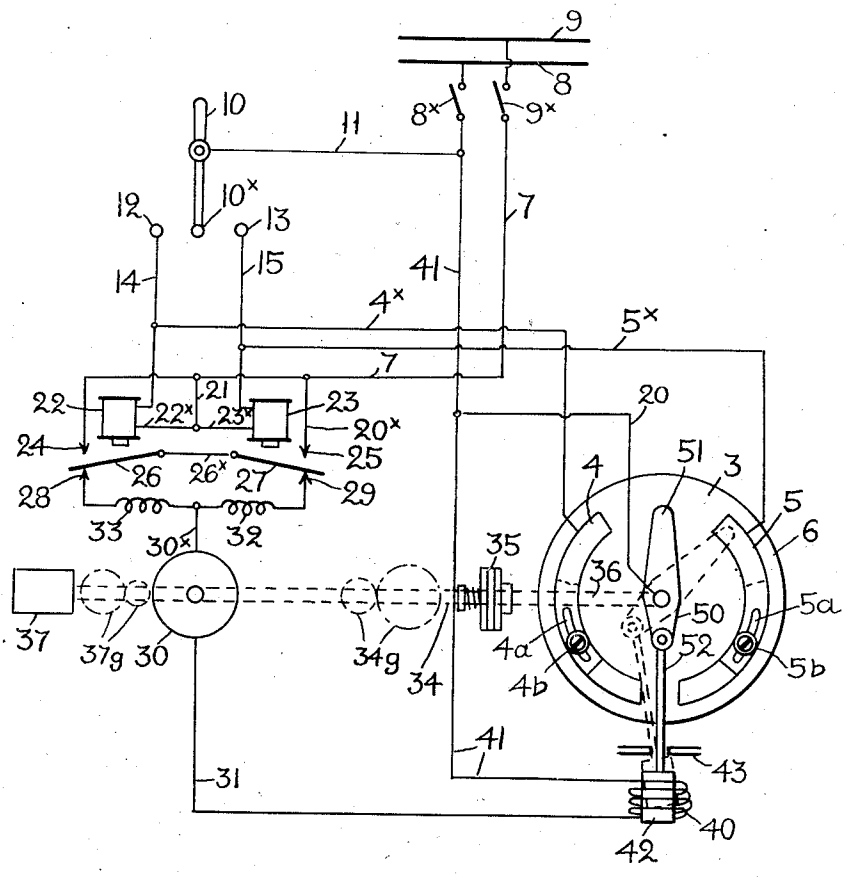
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AUXILIARY DEVICE FOR STOPPING MOTORS

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AUXILIARY DEVICE FOR STOPPING MOTORS

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1

This invention relates to a device for stopping an electric motor, and more particularly, to a device for instantly stopping the motor at any desired moment.

The prime object of this invention is to provide a device for stopping an electric motor with the load at or close to the desired position.

A further object is to provide a motor stopping means capable of stopping the motor within a small fraction of revolution after the motor is de-energized. Further object of this invention is to prevent hunting or oscillation, as will be apparent from the specification following.

For the attainment of these objects and such other objects as may appear or may be pointed out herein, we have shown an embodiment of our invention in the accompanying drawing, wherein the single figure of the drawing is a diagrammatic illustration of the improved motor stopping means of this invention.

Mainly for the purpose of describing the application of the improved motor stopping means of this invention, there is shown in the single figure an electric motor controlling means, which comprises, in its rudimentary form, a manually operable switch 10 having a distal contact 10× selectively engageable with one or the other of a pair of contacts 12, 13 for the purpose of rotating a reversible motor 30 in the desired direction, the reversing field windings of which 32, 33, are individually energized by the movement of the manual 10 to engage the said contacts 12, 13, as will be seen. Interposed between the said contacts 12, 13 and the said field windings 33, 32 are a pair of relays 22 and 23, the circuit to which may be traced from current supply lines 8, 9 and current supply switches 8×, 9×, as follows: From supply switch 8× a lead 11 connects to the selectively adjusted manual 10, the circuit continuing by engagement of distal contact 10× with one or the other of stationary contacts 12, 13, continuing by leads 14, 15 to one terminal of the respective relays 22, 23, the other terminals of which are connected by short leads 22×, 23× to a common lead 21. The common lead 21 connects to a wire 7 leading through switch 9× to current supply line 9 and extending leftwardly to relay contact 24 associated with relay 22. A lead 20× connects the said wire 7 to a contact 25 associated with the other relay 23. Armature 26 of the relay 22 is engageable upon energization of the relay, with the said contact 24, while in the normal deenergized condition of relay 22, armature 26 engages a contact 28 which is connected to the field winding 33; armature 27 of relay 23, upon the energization of the relay, engages the said contact 25 and, when de-energized, engages a contact 29 which is connected to the other field winding 32. The aforesaid relay armatures 26, 27 are connected together at their

2

inner ends by a common lead 26×. The common terminals of field windings 32, 33 are connected by a short lead 30× to the armature of motor 30 and to a lead 31, which connects to one terminal of an electro-magnet 40, the other terminal of which is connected by wire 41 to the aforesaid supply switch 8×.

For purposes of illustration, we assume energization of field winding 32 results in a clockwise rotation. If it is desired that the motor rotate in that direction, manual 10 is placed in engagement with the left-hand contact 12 to establish a circuit from supply switch 8×, through the manual contact 10× and lead 14 to relay 22, the circuit continuing through leads 22× and 21 to wire 7 to the other supply switch 9×. Energization of relay 22 attracts its armature 26 into engagement with contact 24 to complete a circuit to the clockwise winding 32 which may readily be traced from one supply terminal 9 and the said wire 7 to the relay contact 24, through the attracted armature 26, common lead 26×, through unattracted armature 27, relay contact 29, field winding 32, and through short lead 30× and the armature of motor 30 and via lead 31 and the coils of electro-magnet 40 to the other supply terminal 8. The circuit completed to energize the other field winding 33 for counter-clockwise rotation is quite similar, except that the manual 10 is placed in engagement with the right contact 13.

The improved motor-stopping means of this invention comprises a stationary mounting disc 6, made of insulating material and provided with a central opening for passage of a shaft 36, which is connected by means of a friction coupling 35 with shaft 34 which is geared (34g) to the motor 30; the motor is also geared (37g) to the load symbolically shown at 37. Mounted on the shaft 36 is a lever 50 provided at one end with a contact 51 engageable with one or the other of a pair of conducting segments 4, 5. Segments 4, 5 are mounted on the stationary disc 6, in a manner to separate their adjacent ends by a wide gap 3, and are adjustable to vary the size of the gap, for reasons subsequently explained. The other end of contact lever 51 is articulated by means of a rod 52 to the plunger 42 of the aforesaid electro-magnet 40. The segments 4, 5 are connected through leads 4× and 5× to the respective leads 14, 15 associated with the relays 22, 23. The lever 50 is connected at its pivotal point, by a lead 20, to the wire 41.

During the normal running of motor 30, lever 50 is maintained in a central position in the said gap 3 between the segments 4, 5 by the energization of electro-magnet 40 which is included in the motor armature circuit, as already traced. That is, the electro-magnet 40, energized during the running of the motor, is effective to maintain

lever 50 in a substantially vertical position as shown, in gap 3 midway between the segments 4, 5, against the frictional urgency of friction coupling 35, as already described.

Assuming that the motor rotates in a clockwise direction, as viewed in the figure, and that the manual 10 is moved into neutral position, as shown in the figure, to stop the motor by breaking engagement between 12 and 12×, this is effective to de-energize electro-magnet 40, releasing contact lever 50 so that the lever will be turned, through friction coupling 35, in the same clockwise direction to cause it to assume the dotted position in the drawing, with its contact 51 engaging segment 5. Engagement of contact lever 50 with conducting segment 5 completes a circuit to relay 23 which may be readily traced from one supply terminal 8, lead 41, lead 20, contact lever 50, conducting segment 5, and through lead 5× to relay 23, continuing through short leads 23× and 21 and wire 7 to the other terminal 9. Energization of relay 23 by attracting its armature 27 into engagement with relay contact 25, completes a circuit to the field winding 33 which, as already described, has been assumed to be assigned to cause counter-clockwise rotation of the motor, i. e., in a direction opposite to the direction assumed for motor rotation in the example being considered. Rotation of the motor in the reverse or counter-clockwise direction turns contact lever 50 counter-clockwise from the position shown in the figure in broken line engaged with the conducting segment 5, to the normal central position of the contact lever (shown in solid lines), which return movement of the contact lever disrupts the afore-traced circuit to relay 23 and stopping motor rotation in the reverse direction (counter-clockwise, in the example). At the same time, electro-magnet 40, which is energized concurrently with the rotation of the motor in the reverse direction, will cause lever 50, as it is turned counter-clockwise (in the example assumed) by the inertia of the motor and the other rotating parts, to come to a stop at the mid-point of gap 3, preventing it from over-running into engagement with the other segment 4, which would result in undesirable hunting.

The said conducting segments 4, 5 are made adjustable as by means of an elongated slot 4a, 5a and a cooperative set screw or the like, respectively, 4b, 5b, so as to provide facilities for adjusting the gap 3 separating the facing ends of the conducting segments for the purpose of controlling the time of engagement of the contact lever 50 with the conducting segments. The extent of turning of the contact lever, frictionally driven by the shaft as aforesaid, may be limited by means of a stop 43, which limits the extent of upward movement of plunger 42 of the solenoid 40.

We claim:

1. In a device for stopping a reversible electric motor, directional switch means comprising a pair of electrical conducting elements separated by a gap and electrically associated with the said motor, a lever adapted to be frictionally moved by the motor, an electro-magnetic means in the motor circuit having an armature articulated to the said lever and adapted, upon energization of the motor for rotation, to maintain the said lever in a mid-position in the said gap, the said lever being moved by the motor, upon de-energization thereof and the said solenoid, into engagement with one or the other of the said conducting elements depending upon the direction of motor rotation, said engagement causing the motor to rotate in the reverse direction to return the lever to mid-position and energizing the said solenoid to stop the lever at mid-position.

2. In a device for stopping a reversible electric motor, directional switch means comprising an insulated disc, a pair of electrical conducting elements separated by a gap adjustably secured on the said disc to vary the said gap, the said conducting elements being electrically associated with the said motor, a lever pivotally mounted at the center of the said disc and adapted to be frictionally turned by the motor, a solenoid in the motor circuit having its armature articulated to the said lever and adapted, upon energization of the motor for rotation, to maintain the said lever in a mid-position in the said gap against the urgency of the said frictional turning, the said lever being turned by the motor, upon de-energization thereof and the said solenoid, into engagement with one or the other of the said conducting elements depending upon the direction of motor rotation, said engagement causing the motor to rotate in the reverse direction to return the lever to mid-position and energizing the said solenoid to stop the lever at mid-position.

3. In a device for stopping a reversible electric motor, directional switch means comprising an insulated disc, a pair of electrical conducting elements secured thereon separated by a gap and electrically associated with the said motor, a lever pivotally mounted at the center of the said disc and adapted to be frictionally turned by the motor, a solenoid in the motor circuit having its armature articulated to the said lever and adapted, upon energization of the motor for rotation, to maintain the said lever in a mid-position in the said gap against the urgency of the said frictional turning, the said lever being turned by the motor, upon de-energization thereof and the said solenoid, into engagement with one or the other of the said conducting elements depending upon the direction of motor rotation, and means to limit the said turning of the lever in engagement with the conducting element.

4. In a device for stopping a reversible electric motor, directional switch means comprising electrical conducting elements having a neutral region and electrically associated with the said motor, a lever adapted to be moved by the motor, restraining means controlled by the motor articulated to the said lever and adapted, upon energization of the motor for rotation, to maintain the said lever in the said neutral region, the said lever being turned by the motor, upon de-energization thereof, into engagement with one of the said conducting elements depending upon the direction of motor rotation, said engagement causing the motor to rotate in the reverse direction to return the lever and energizing the said restraining means to stop the lever in said neutral region.

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