July 1, 1941. R. E. NELLES 2,248,010

AUTOMATIC CIRCUIT CONTROLLER

Filed March 9, 1939

Fig. 1.

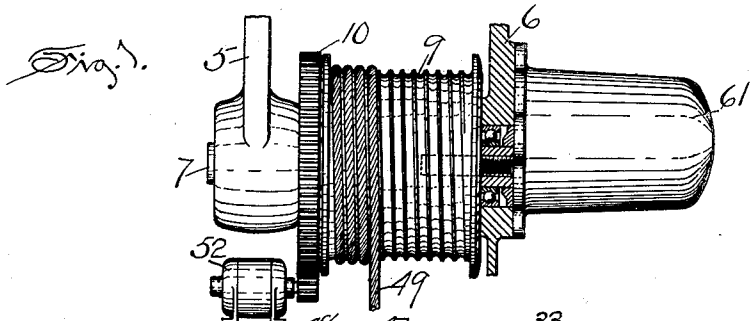


Fig. 2.

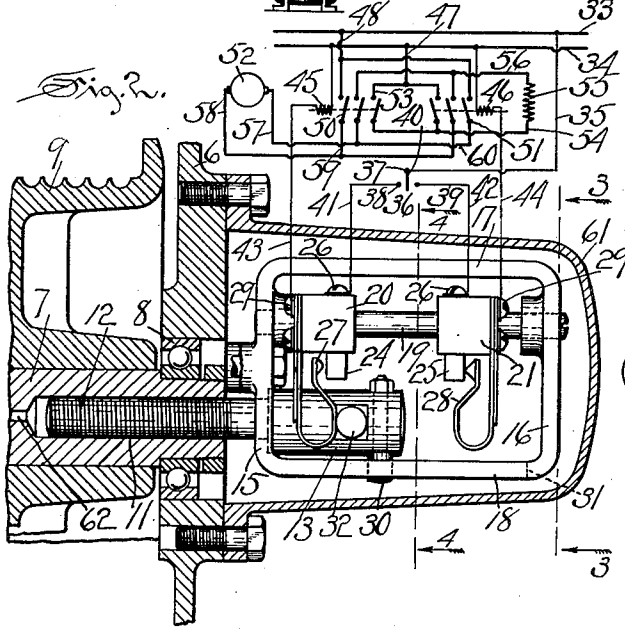


Fig. 3.

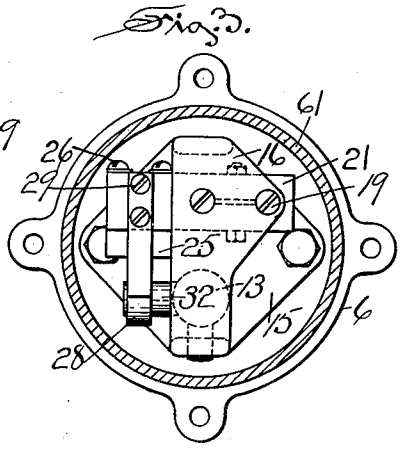


Fig. 5.

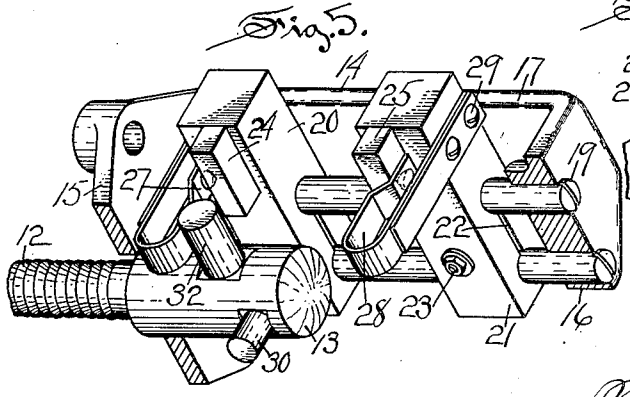
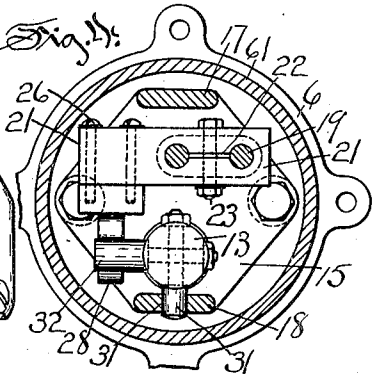


Fig. 4.



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AUTOMATIC CIRCUIT CONTROLLER

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2 Claims. (Cl. 200—47)

My invention relates to the class of devices that are employed for controlling the conditions of electric circuits and an object of my invention among others is to produce an apparatus for such purpose that is simple in construction and particularly effective in operation to secure the results for which it is designed.

One form of an apparatus embodying my invention and in the construction and use of which the objects herein set out, as well as others, may be attained, is illustrated in the accompanying drawing in which—

Figure 1 is a view in side elevation of my improved circuit controller.

Figure 2 is a view on enlarged scale in central vertical section of said controller.

Figure 3 is a view in cross section on a plane denoted by the dotted line 3—3 of Figure 2.

Figure 4 is a view in cross section on a plane denoted by the dotted line 4—4 of Fig. 2.

Figure 5 is an isometric perspective view of the controller supporting frame and parts mounted thereon.

In the drawing herein I have shown a portion only of a hoisting apparatus in connection with which my invention finds ready adaptation and have confined the illustration to so much only as is necessary for its full understanding, all of the parts comprising the invention, however, being shown. It will be understood, however, that the invention may be applied in various cases where the making and/or breaking of an electric circuit is required and its use is not therefore to be limited for any particular purpose. In the accompanying drawing the numerals 5 and 6 denote supports for a housing comprising part of a hoisting apparatus and which commonly encloses hoisting mechanism, which apparatus may be suspended underneath and carried by a trolley arrangement movable along a track depending from overhead, in a manner common to such structures and which will therefore be readily understood by those skilled in the art. A shaft 7 is rotatably mounted in the supports 5 and 6 and ball bearings 8 may be employed for this purpose if desired. A hoisting drum 9 is secured to the shaft 7 to be rotated thereby, and power may be applied to the shaft to rotate it by a motor of any desired form and common to structures of this type, this matter of driving being immaterial to my invention. However, for the purpose of the description, I have shown a gear 10 secured to the drum or shaft and affording a part of the driving connection between the motor and the shaft.

A hole 11 is bored into one end of the shaft and is threaded to receive the threaded shank 12 of a switch actuating head 13 mounted for reciprocating movement in a switch supporting frame 14 secured to the support 6 in any suitable manner, screw bolts being shown herein for this purpose, the switch actuating head 13 which is of insulating material extending into said frame, as shown in Fig. 5. This frame is open from side to side and comprises ends 15—16 with top and bottom bars 17 and 18 joined to and connecting said ends, as shown in Fig. 2. Contactor block guides in the form of guide rods 19 are each secured at one end to and project from the frame end 15, the opposite ends of said guides being supported in the end 16. Contactor blocks 20—21 are mounted for adjustable sliding movement on said guide rods, as shown in Fig. 5, these blocks being composed of any suitable insulating material. They are split as at 22 between the holes through which the guide rods extend, and clamp bolts 23 extend through each block and across said slots as a means for retaining the blocks in place after they have been adjusted in proper positions. These contactor blocks 20 and 21 have contacts 24 and 25, respectively, secured as by means of binding screws 26 each of which passes through the contactor block to which it is attached, the heads of these screws serving for the attachment of a conducting wire to be hereinafter described. The contacts 24 and 25 are fixed and coact with spring contacts 27 and 28 secured, respectively, to the conductor blocks 20 and 21. These spring contacts are preferably of U-shape with their free ends positioned to touch the contacts 24 and 25, the opposite ends of the spring contacts being secured to the contactor blocks by means of screws as shown in Fig. 5, these screws, as 29, serving as binding screws for a wire to be hereinafter described.

The switch actuating head 13 has a guide pin 30 which travels in a guide groove 31 in the bar 18, as shown in Fig. 2, this to prevent the head from turning. Said head 13 also has a switch actuating pin 32 projecting from one side of the head to press against the spring contacts 27—28 for the purpose of breaking the circuit between the contacts 24—25 and the spring contacts 27—28.

The electrical circuits for operating the device may be arranged in various ways to suit fancy or convenience or any particular condition, such arrangement not being material to my invention. One arrangement which will satisfactorily answer the purpose is diagrammatically illus-

trated in Fig. 2 of the drawing in which the light lines denote the controlling circuit and the heavy lines denote the power circuit all of which are connected with the main line wires 33—34. A wire 35 of the controlling circuit extends from the power line 33 to a switch 36. This switch may be of any desired type, as for instance, a push button switch which may be located in the end of the cable (not shown) depending from the carrier upon which this limit switch is mounted, the switch at the end of the cable being located in position for ready access by the operator in charge of the apparatus and in a manner well known to those skilled in the art. This switch 36 has a main contact 37 and two branch contacts, with a switch member 40 pivotally attached at the contact 37 and having swinging movement to engage either of the branch contacts 38 or 39. The switch member 40 may be operated in any well known manner as by either of the two push buttons, successive pressures upon each of which will cause said member to be engaged with and disengaged from one of the contacts 38 or 39.

Branch wires 41—42 extend from the branch contacts 38—39 to the binding screws 26 on the blocks 20 and 21, and return wires 43—44 extend from the binding screws 29 to electrically operated switch actuating devices 45—46, and from thence to the main line wire 34.

It will of course be understood that current passes from the wires 41 and 42, to the binding screws 26, to the contacts 24—25, and from thence to the spring contacts 27—28, and from thence to the binding screws 29, and from thence to the return wires 43—44.

The actuating devices 45—46 may be of any well known type whereby when electrified by current passing through them, they will operate to throw switches now to be described for controlling the power circuit for operating the drum 9. It is not thought necessary to describe in detail these switch operating devices as they may be constructed in different ways that will readily suggest themselves to electricians skilled in this art.

The power circuit for operating the drum 9 comprises two independent circuits each of which is connected with a power wire 47 or 48, the former extending from the main line wire 34 and the latter extending from the main line wire 33. For convenience of description the circuit on the left of Fig. 2 will be termed the "up" circuit as it will operate to rotate the motor 52 in a direction to turn the drum 9 to wind up the cable 49 on the drum and thereby raise the load suspended by said cable, and the circuit on the right will be termed the "down" circuit as it will effect rotation of the drum 9 in a direction to unwind said cable and therefore lower the load suspended therefrom.

Each of these circuits includes a three-pole switch, although other types of switches may be employed. These switches 50—51 when closed will effect rotation of the drum 9. For example, the push button, not shown but represented by the switch 36 and connected with the switch actuating device 45, being operated to excite said device, the "up" switch 50 will be closed and the electric current will be caused to pass through the armature of the motor 52 in one direction, thereby effecting rotation of the drum 9 in a certain direction. Upon second operation of the push button just mentioned the switch actuating device 45 will cease to receive current and the switch will thereupon be opened in a manner well known, as by means of springs. Operation of the other push button hereinbefore mentioned will effect operation of the "down" switch 46 in the same manner as just described except that the electric current will pass through the armature of the motor 52 in an opposite direction from that just described with the result that the motor will be rotated in the opposite direction to turn the drum to unwind the cable therefrom and lower the load suspended thereby.

While the wiring of the power circuit as shown is sufficient for a clear understanding a brief description of one will answer for both. The wire 47 which is general to both the "up" and "down" circuits transmits current to the wire 53 connected with a contact of the switch blade on the left of the set 50 of blades and from thence the current passes along wire 54, field of motor 55, wire 56 to the center blade of said set 50, of blades, along said blade and wire 57 to the armature of the motor 52, through said motor and along wires 58 and 59 to the blade on the left of said set 50 and by said blade and along wire 48 to the main line 33, thus completing the circuit.

The "down" circuit may be traced in substantially the same manner except that the current passes by wire 60 connected with the center blade of the set 51 of blades and also with wire 58 to the opposite side of the armature of the motor from that above described with reference to the "up" circuit, thereby operating said motor in a direction reverse to that before described and operating to rotate the drum to unwind the cable and lower its load.

As a means for protecting the switch or make and break mechanism a housing 61 is secured to one of the supports 6 as shown in Figs. 1 and 2 of the drawing. An important feature of the invention resides in a means for lubricating the threaded shank on the switch actuating head, this consisting of a duct or oil hole 62 extending axially within the shaft 7 of the drum and opening into the threaded hole 11, said duct extending from any oil opening conveniently located within the drum and shaft.

While the pin 32 is insulated by insertion in the insulated head 13 it is obvious that this result may be obtained by forming the head or pin, either or both, of insulating material.

In accordance with the provisions of the patent statutes I have described the principles of operation of my invention, together with the device which I now consider to represent the best embodiment thereof; but I desire to have it understood that the device shown is only illustrative and that the invention may be carried out by other means and applied to uses other than those above set out.

I claim:

1. In a limit switch construction of the character described, a non-rotatable supporting member, a rotatable member having a threaded socket therein journaled in said supporting member, a shaft threaded in said socket with a switch actuating head on the projecting end thereof, a member rigidly mounted in said supporting member and wherein said rigidly mounted member includes a substantially rectangular frame with the switch actuating head located within said frame and wherein there are cooperative means including a pin carried by the switch actuating head extending into a slotted opening formed in one side of said rectangular frame.

2. In a limit switch construction of the char-

acter described, a non-rotatable supporting member, a rotatable member having a threaded socket therein journaled in said supporting member, a shaft threaded in said socket with a switch actuating head on the projecting end thereof, a member rigidly mounted in said supporting member and wherein said rigidly mounted member includes a substantially rectangular frame with the switch actuating head located within said frame and wherein there are cooperative means including a pin carried by the switch actuating head extending into a slotted opening formed in one side of said rectangular frame, and means supported in opposite ends of said frame upon which said pairs of contacts are mounted.

RUSSELL E. NELLES.