Sept. 13, 1927. 1,642,141

J. O. CARREY

CONTROLLING DEVICE

Filed March 15, 1923

Fig. 1

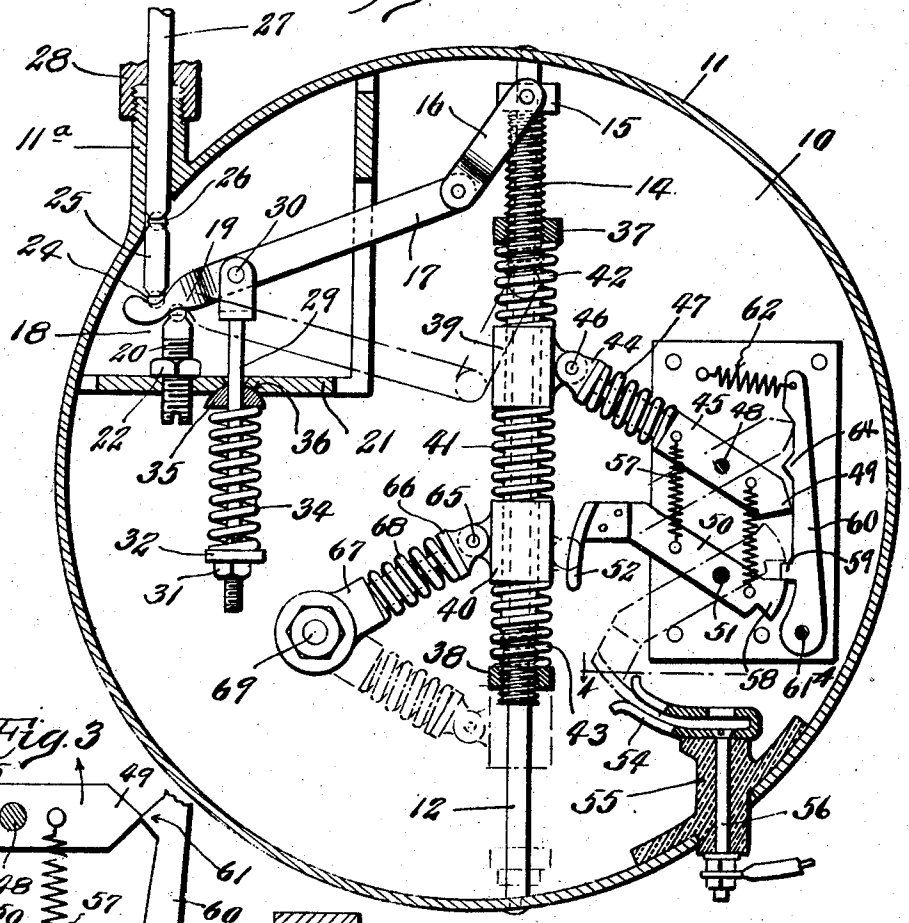


Fig. 3

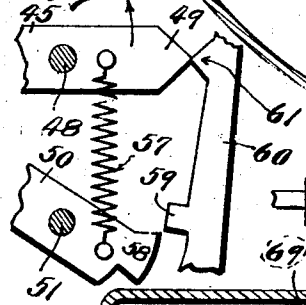


Fig. 2

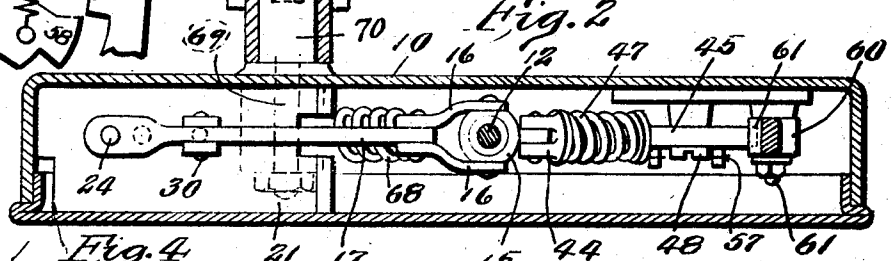
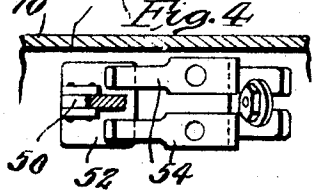


Fig. 4



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UNITED STATES PATENT OFFICE.

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CONTROLLING DEVICE.

Application filed March 15, 1923. Serial No. 625,427.

This invention relates generally to controlling devices and more particularly to devices for automatically controlling electric circuits and valves of circulating systems.

The objects of my invention are to provide a simple, highly efficient device of the class described which is automatically operated, is positive in its action and can be economically manufactured. Further objects of the invention are to provide a controlling device which may be used in conjunction with a fluid pressure system, a thermostat or in any other suitable manner and which is highly sensitive so as to readily respond to and act in accordance with the changes in the pressure or temperature, as the case may be, and which is positively operated and securely held against accidental movement.

Still further objects of the invention are to provide means in a device of the class described for imparting quick action to the operating parts thereof, thereby insuring an effective operation of the device.

With these and other objects in view, my invention consists in certain novel features of construction and arrangement of parts hereinafter more fully described and claimed and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the device with the housing shown in section.

Figure 2 is a horizontal cross section through the housing of the device.

Figure 3 is a detail view of the switch operating mechanism.

Figure 4 is a horizontal cross section taken on line 4—4 of Figure 1.

Referring by numerals to the accompanying drawings, 10 indicates a housing having a peripheral wall 11 in which are secured the ends of a vertically disposed rod 12. A sleeve 14 is slidably arranged on rod 12 and the upper threaded end of said sleeve carries a collar 15 to which are pivotally connected the outer ends of links 16. The opposite ends of said links are pivotally connected to the long arm of lever 17 which lever is fulcrumed at 18 by means of a ball bearing 19 which is seated in the upper end of a screw 20. This screw is adjustably mounted in a partition wall or bracket 21 and is provided with a nut 22 for locking said screw in its adjusted position. The short or power arm of lever 17 has an upwardly presented seat in which is arranged a ball 24 which is engaged by the lower end of a rod 25. The upper end of this rod which is comparatively short has a ball connection 26 with the lower end of rod 27 which extends into the casing 10 through a tubular bearing 11ª formed integral with wall 11. Rod 27 is a part of an automatic operating mechanism such as a pressure-operated valve or a thermostat and has a bearing in a tubular extension 28 which is adapted to be secured to the tubular portion 11ª. A rod 29 is pivotally connected at 30 to lever 17 and extends downwardly through an aperture formed in wall 21. The lower end of this rod is threaded for the reception of nut 31 which holds in position a washer 32. A coil spring 34 is arranged on rod 29 and the lower end of said spring presses against washer 32 while the upper end thereof bears against the underside of a semi-spherical member 35 which has a bearing in the concave seat 36 formed in the wall 21. A collar 37 is adjustably arranged on the upper end of sleeve 14 a suitable distance below collar 15 and a collar 38 is adjustably arranged on the threaded lower end of sleeve 14. Loosely arranged on sleeve 14 are a switch operating sleeve 39 and a valve operating sleeve 40 and interposed between the inner ends of said sleeves is a coil spring 41. A coil spring 42 is arranged on sleeve 14 between collar 37 and tubular member 39 and a coil spring 43 is arranged on sleeve 14 between collar 38 and valve operating tubular member 40. Springs 41, 42, and 43 are balanced with respect to each other and form yielding operative connections between the collars 37 and 38 of sliding sleeve 14 and tubular members 39 and 40 so that when sleeve 14 is moved on rod 12, said tubular members are caused at the appropriate time to move in the same direction in which sleeve 14 is moving. A member 44 having telescopic engagement with arm 45 is pivotally connected at 46 to tubular portion 39. A coil spring 47 maintains member 44 and arm 45 in their extended positions. Arm 45 is pivotally supported at 48 and the opposite or outer end of said arm is formed tapered, as shown at 49. An arm 50 is arranged below the arm 45 and is pivotally mounted at 51. The inner end of this arm carries a contact 52, which when said arm occupies its downward position is adapted

to engage a pair of stationary electric contact members 54 which are arranged in any suitable manner, such as a support 55 in housing 10. Each contact member 54 is adapted to be connected to the terminal of an electric circuit by means of a bolt and nut 56. Arms 45 and 50 are operatively interengaged by means of springs 57 which are arranged on the opposite sides of pivotal mountings of said arms and have their ends connected to pins projecting therefrom. Contact arm 50 is provided with a rearward segmental extension 58 which when said arm occupies its home position is adapted to engage a lug 59 of a retaining pawl 60 which is pivotally supported at 61 and has its upper end connected to a spring 62 which holds said retaining or locking pawl in engagement with the tapered end 49 of the arm 45. Pawl 60 has formed integral therewith a V-shaped portion 64 which projects toward arm 45 and the apex of which is in horizontal plane with pivot 48 of arm 45.

Tubular member 40 has pivotally connected to it at 65 a rod 66 which has telescopic engagement with an arm 67. A coil spring 68 is arranged between arm 67 and the enlarged head of rod 66 and yieldingly maintains them in extended position. Arm 67 is connected to a stem 69 of the valve 70 which stem projects into said casing through a suitable opening formed in the rear wall of housing 10.

In the operation of the device, assuming that pressure has been applied to rod 27 either by a thermostat or by a pressure valve, this pressure is transmitted to lever 17 causing the long arm thereof to move upwardly thereby disengaging contact 52 from contact 54 and actuating valve 70, as shown in full lines in Figure 1.

When the pressure on rod 27 is relaxed, spring 34 will cause the long arm of lever 17 to move downwardly; consequently, sleeve 14 will be moved downwardly and collar 37 which is secured to said sleeve will act on spring 42 and after compressing spring 42 to a predetermined degree, will cause tubular member 39 to move downwardly. The downward movement of member 39 will actuate arm 45 on its pivot 48 causing the tapered end thereof to move upwardly thereby stressing that spring which is connected to the rear ends of arm 45 and arm 50, the latter being held against movement by lug 59 which engages the rear portion 58 of arm 50.

Shortly after tubular member 39 has started to move, tubular member 40 is actuated by spring 41 causing arm 67 to operate valve stem 69. During the downward movement of members 39 and 40, springs 47 and 68 are placed under compression and when the pivotal connections 46 and 65 are moved past the center line of pivots 48 and 69, respectively, said springs 47 and 68 will be released from compression, thereby imparting quick action to arms 45 and 67.

When arm 45 reaches horizontal position, the tapered end 49 rides over the V-shaped portion 64 thereby rocking arms 60 on its pivot 61 so that lug 59 is moved out of the path of travel of the rearward extension 58 of contact arm 50. As soon as this lug moves out of engagement with said extension the stressed spring 57 causes arm 50 to operate quickly on its pivot 51 so that contact 52 is instantly brought into engagement with contacts 54. When the tapered end 49 of arm 45 passes over the apex of projection 64, arm 60 under the influence of spring 62 moves to its normal position thereby placing lug 59 in readiness for the next operation. The position of the contact 52 in engagement with contacts 54 closes the electric circuit so that where the device is used in conjunction with a refrigerating system, the motor operating the compressor is set in operation. The valve 70 is actuated in time relation with the closing of the motor circuit by arms 67 and the time relation of the valve relative to the electric contacts may be regulated by adjusting collar 38.

When the device is used for controlling a compressor, such as is disclosed in my co-pending application filed January 9, 1924, Serial Number 685,164, valve 70 is interposed in a by-pass pipe connecting the high pressure sides of the compressor and is operated to close the by-pass connection when the pressure in the system is low and to open the by-pass connection thereby permitting the pressure to be alternately transmitted from one side of the compressor to the other when the pressure in the system reaches a predetermined degree.

If desired, casing 10 may be filled with oil so that the operating parts of the device are lubricated and the electric contacts operate in oil, thereby eliminating sparking of the contacts and prolonging the life of the device.

While I have shown and described the approved form of my controlling device, it is obvious that various changes in the construction and arrangement of parts of my device can be made and substituted for those herein shown and described without departing from the spirit and scope of my invention.

I claim:

1. A controlling device comprising a lever, a stationary member, a sleeve movable longitudinally of said stationary member and provided with threaded ends, a collar screw-seated on each end, said lever being operatively connected to one of said collars, a pair of tubular members on said sleeve, valve mechanism operable by one of said tubular members, an electric switch mechanism oper-

able by the other of said tubular members, and coil springs interposed between said collars and said tubular members and between said tubular members for forming yielding operative connection between said collars and said tubular members.

2. A controlling device comprising an operating lever, a stationary member, a sliding member arranged thereon, a link connecting said lever with said sliding member, a pair of blocks yieldingly arranged on said sliding member and operable thereby, valve mechanism operable by one of said blocks, and an electric switch operatively connected to the other block and adapted to be actuated in time relation with said valve mechanism.

3. A controlling device comprising an operating lever, a stationary member, a sliding member arranged thereon and a link connecting said lever with said sliding member, a pair of blocks adjustably arranged on said sliding member and operable thereby, valve mechanism operable by one of said blocks, an electric switch adapted to be actuated by the other block in time relation with said valve mechanism, and means for imparting quick action to said switch.

4. A controlling device comprising an operating lever, a longitudinally movable member operatively connected thereto, an electric switch, a pivot member arranged on said movable member, yielding connections operatively connecting said switch and said pivot member, a rotatable valve, and yielding operative connections between said movable member and said valve for actuating the latter.

5. A controlling device comprising an operating lever, a slidable member operable thereby, valve operating means, yielding connections between said valve operating means and said slidable member, stationary contacts, a movable contact member for engaging said stationary contacts, yielding operative connection between said movable contact member and said slidable member, and means operable by said slidable member for imparting quick action to said movable contact member.

6. A controlling device comprising an operating member, a stationary support, a longitudinally movable member on said support, a link connecting said operating member with said movable member, a valve, a sleeve on said movable member, an operating connection for said valve and pivotally connected to said sleeve, and collars adjustably mounted on said movable member and in yielding engagement with said valve sleeve for actuating the latter.

7. A controlling device comprising a stationary support, a movable member slidably arranged on said support, operating connections for said movable member, a valve, a rocking member connected to and actuating said valve, a pivot member connected to said rocking member and operatively arranged on said movable member, an electric switch, a snap-action mechanism for said switch, a switch-rocking member for actuating said mechanism, and a pivot member operatively arranged on said movable member for actuating said switch-rocking member.

In testimony whereof I hereunto affix my signature this seventeenth day of February, 1923.

JOHN O. CARREY.