

Dec. 14, 1937.

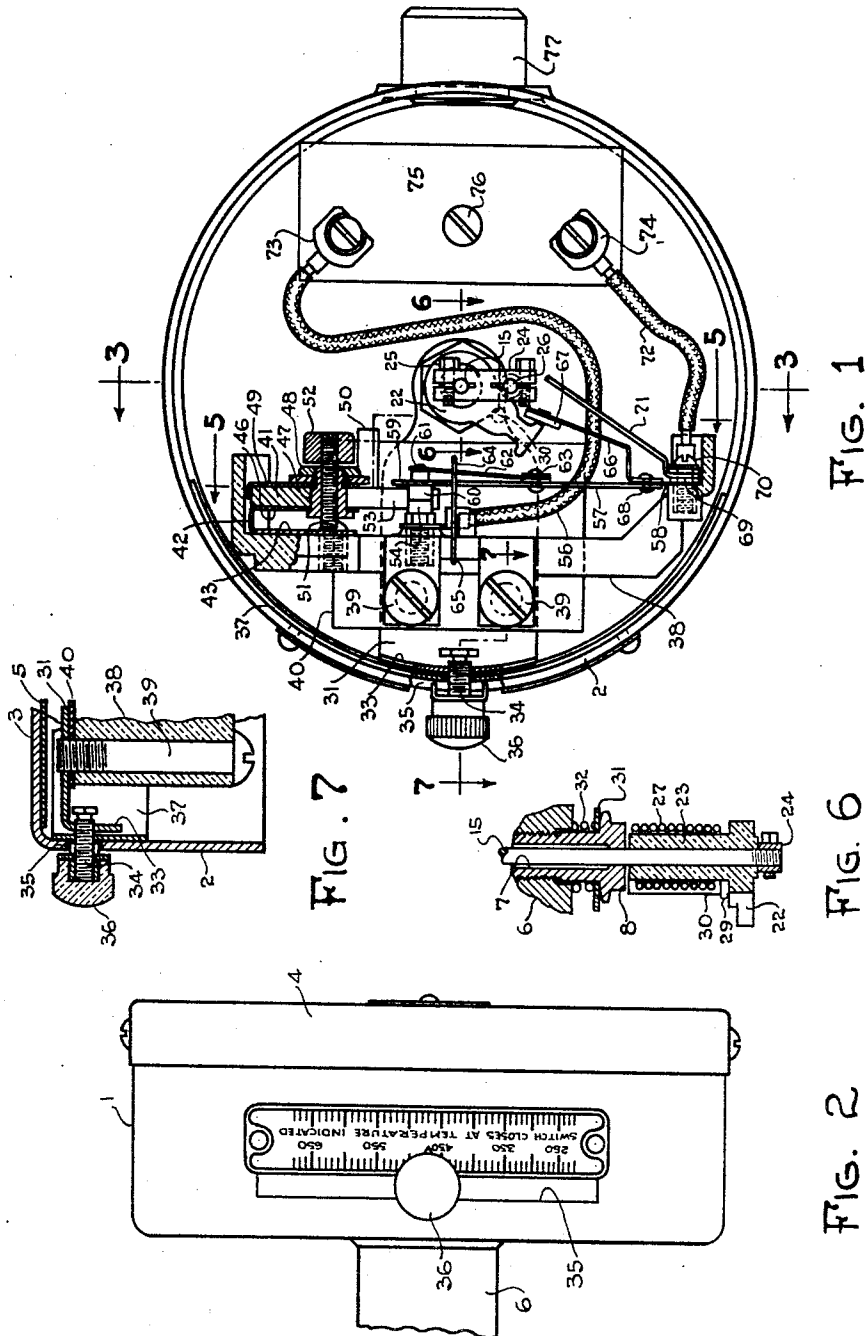
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2,102,176

CONTROL MEANS

Filed May 26, 1934

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

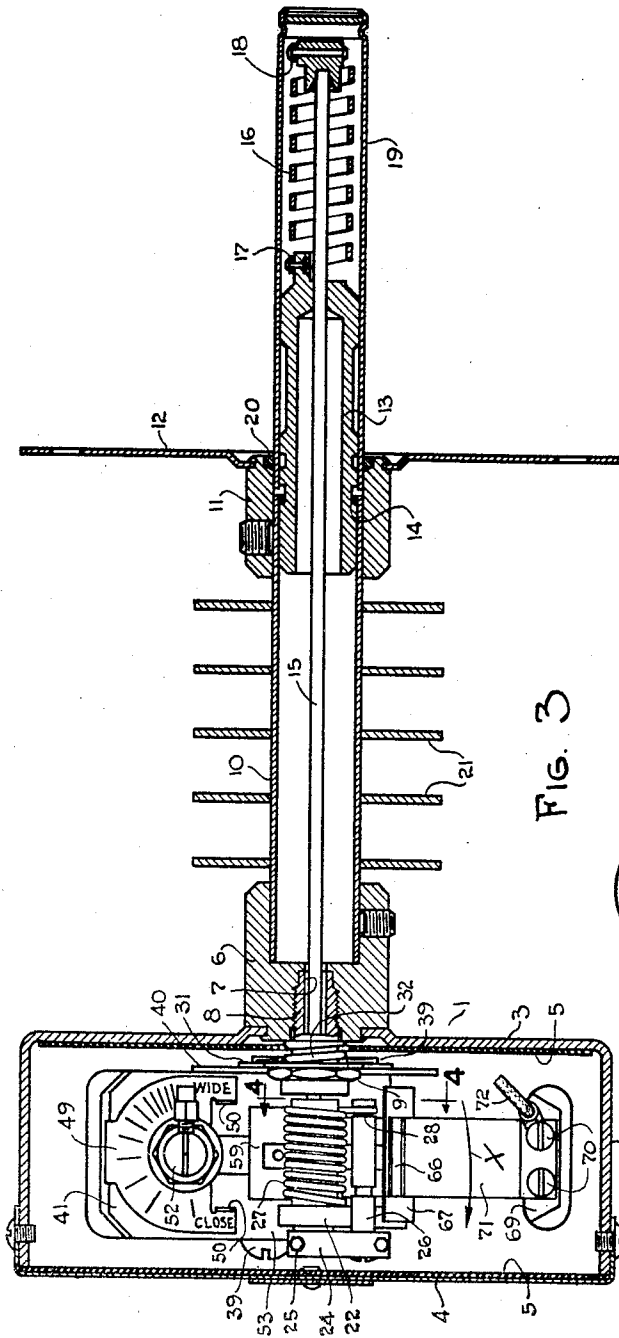


FIG. 3

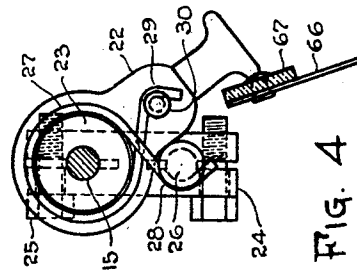


FIG. 4

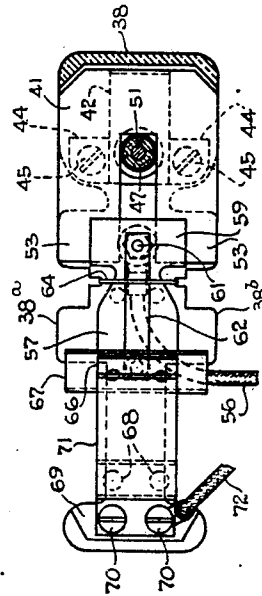


FIG. 5

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CONTROL MEANS

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3 Sheets-Sheet 3

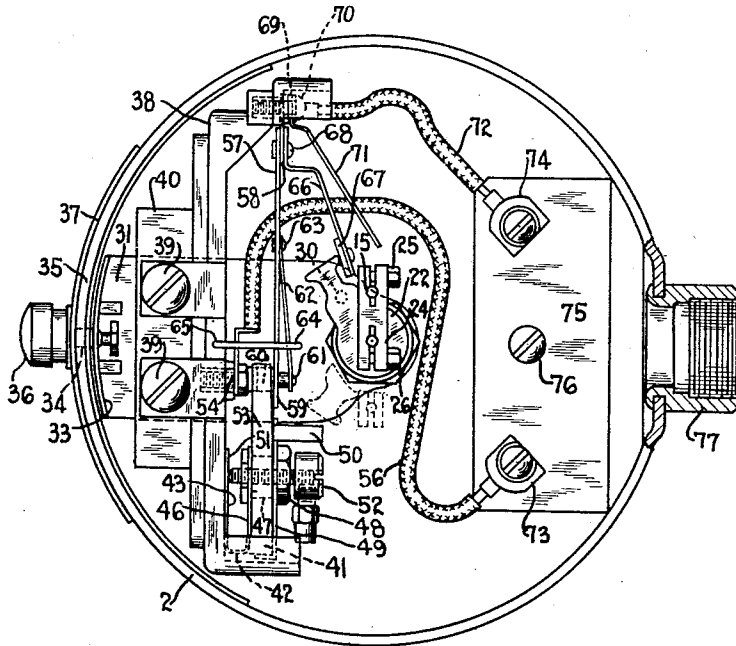


FIG. 8.

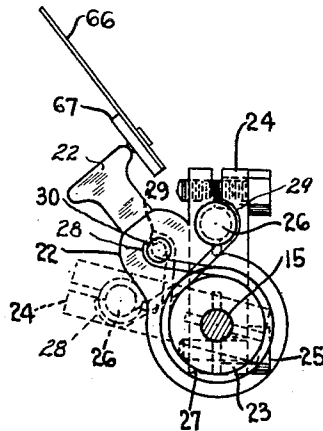


FIG. 9

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2,102,176

CONTROL MEANS

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Application May 26, 1934, Serial No. 727,779

21 Claims. (Cl. 200—138)

My invention relates to new and useful improvements in control means such as an electric switch having automatic actuating means.

An object of my invention is to provide a control means which is of simple and compact construction and which will be efficient in operation.

Another object is to provide a control means having means for adjusting or regulating the range of its operation by the automatic actuating means.

Another object is to provide means for regulating the differential operation of the control means.

Another object is to provide means which will prevent injury to the parts in the event of over-travel of the actuating means.

The invention consists in the improved construction and combination of parts, to be more fully described hereinafter and the novelty of which will be particularly pointed out and distinctly claimed.

In the accompanying drawings, to be taken as a part of this specification, I have fully and clearly illustrated a preferred embodiment of my invention, in which drawings—

Figure 1 is a view in front elevation of a control means embodying my invention, and having the cover member removed and certain parts shown in section for clarity;

Fig. 2 is a detail view of the casing for the control means, looking from the left toward the right of Fig. 1;

Fig. 3 is a view in section on the line 3—3 of Fig. 1;

Fig. 4 is a detail view taken on the section line 4—4 of Fig. 3;

Fig. 5 is a detail view taken on the line 5—5 of Fig. 1;

Fig. 6 is a detail view in section on the line 6—6 of Fig. 1;

Fig. 7 is a detail view in section on the line 7—7 of Fig. 1;

Fig. 8 is a view similar to Fig. 1 but showing a different arrangement of parts to provide a reversal of operation, and

Fig. 9 is a detail view showing a step in the reversal of parts illustrated in Fig. 8.

Referring to the drawings by characters of reference, 1 designates generally a supporting structure such as a casing of metal having a cylindrical side wall 2 closed by a rear or end wall 3 and having a front cover or closure member 4. The inside faces of the wall 3 and of the cover member 4 are preferably faced with circu-

lar sheets of electric insulating material 5. Centrally through the rear wall 3 there is an aperture in which is secured a cylindrical extension 6 through which there is a bore 7 opening into the interior of the casing. Screw-threaded into the bore 7 there is a bearing sleeve or member 8 which projects into the casing and which is provided with a polygonal flange 9 spaced from the rear wall 3, the flange serving as a nut by which the member 8 may be screwed into the extension 6. The outer end of the bore 7 is of enlarged internal diameter to receive one end of a supporting tube 10 which at its other end fits into the hub 11 of a supporting plate 12. Projecting from the tubular support 10 there is a bearing sleeve 13 which is fixed in the support 10 by solder or the like as at 14. Journaled in and extending through the bearing members 8 and 13 there is an operating shaft 15 which has its inner end extending into the casing and its other or outer end projecting from the bearing member 13. Surrounding the outer end of the shaft 15 there is an actuating means 16, preferably a thermostat in the form of a helical bimetal coil having one end secured, as at 17, to the bearing member 13 and having its other end secured, as at 18, to the outer end of the shaft 15. The thermostatic actuating means 16 is housed within a tubular casing 19 which extends into the hub 11 and is fixed therein by solder or the like, as at 20. The tubular support 10 may be provided with heat radiating fins 21 to prevent the conduction of heat therealong to the casing 1. Journaled on the shaft 15 within the casing there is an operating arm 22 which extends radially from the shaft and which is carried by a cylindrical sleeve member 23, the arm 22 and member 23 preferably being integrally formed of electric insulating material (see Fig. 6). Fixed on the end of the shaft within the casing there is a crank member 24 which is frictionally held in position by a clamping screw 25 so as to prevent removal of the arm 22 from the shaft. Projecting from the crank member 24 there is a pin 26 which is engaged by the side edge of the arm 22 and which extends in substantially parallel, laterally spaced relation to the sleeve member 23. Surrounding the sleeve member 23 there is a helical coil spring 27 which is under tension, having one end anchored, as at 28, to the pin 26 and having its other end anchored, as at 29, to a lug or projection 30 on the arm 22 so that the spring resiliently urges the arm and pin into engagement with each other. Journaled on the bearing member 8 there is a supporting plate 31 which lies against the rear

face of the flange 9, being frictionally held there-against by a coil spring 32 which surrounds the bearing member and is interposed between the extension 6 and the rear face of the plate 31.

5 The plate 31 extends radially from the shaft 15 and terminates substantially at the side wall 2 where it is provided with a forwardly extending flange 33 curved to conform to the inside face of the wall 2. Threaded through the

10 flange 33 there is a clamping screw 34 which projects through a circumferential slot 35 in the side wall 2. The screw 34 is provided with a knob 36 which bears against the outside face of the wall 2 to clamp the plate 31 in adjusted posi-

15 tion. The screw 34 extends through an aperture in a closure plate 37 which conforms to and has slidable engagement with the inside face of the wall 2 to close the slot 35, the plate 37 being interposed between the wall 2 and the flange 33. Extending transversely across the plate 31 between

20 flange 33 and shaft 15 there is a base member or supporting block 38 which is secured to the plate 31 by screws 39. The block 38 has oppositely positioned front and rear parallel supporting

25 faces 38^a, 38^b respectively through which the screws 39 extend and which are adapted to bear against the plate 31 so that the block 38 may be positioned either with face 38^b against plate 31 as shown or with face 38^a against plate 31 for a

30 purpose to be described. Clamped between the base member 38 and the plate 31 there is a substantially rectangular sheet 40 of electric insulating material which shields the plate from the electrical connections, to be described. At one

35 end of the base member and on the side face thereof toward shaft 15 there is a U-shaped permanent magnet 41 having its poles or arms in a plane parallel to shaft 15 and being adjustably supported or hinged by a U-shaped bracket 42

40 of resilient sheet metal. The bracket arm 43 which lies against the base member 38 is provided with lateral ears 44 to receive screws 45 by which the bracket is secured to the base member. The other arm 46 of the bracket which

45 carries the magnet is bent or stressed toward the base member so that its inherent resilience normally tends to urge the magnet theretoward. The magnet 41 is clamped to the bracket arm 46 by a hollow bolt 47 having a nut 48 which also

50 serves to clamp a dial plate 49 to the opposite face of the magnet. The dial plate is provided with oppositely positioned stop arms 50 which extend transversely to the plane of the magnet. Adjustably screw-threaded through the bore of

55 the bolt 47 there is a screw 51 which has its end bearing against the bracket arm 43 so that it is operable to move the magnet away from the base member against the resilient force of the bracket 42. The screw 51 is provided with an

60 adjustment knob 52 cooperable with the stop arms 50 to limit rotation of the screw 51 and the movement of the magnet toward and from the base member. The magnet extends longitudinally of the base member with its poles or arms 53 termi-

65 nating adjacent the radial center line of the plate member 31. Positioned between the magnet poles 53 there is a contact member 54 rigidly fixed to the base member and carried by a post preferably screw-threaded into the base member. The

70 contact member 54 is provided with a lead wire 56 which is clamped to the base member by a flange on the contact member. Extending longitudinally of the base member along the center line of its side face toward shaft 15 there is an oper-

75 ating lever or switch blade 57 which is pivotally

secured at one end to the opposite end of the base member from the magnet 41 by a hinge plate 58 of resilient sheet metal. The free end of the lever 57 comprises an armature portion 59 which terminates in overlying spaced relation to the magnet poles 53. The lever member 57 carries a contact member 60 which cooperates with the contact member 54 and is normally urged theretoward by the resilient hinge member 58. The contact member 60 is provided with a reduced portion which is reciprocable through an aperture in the lever 57, the reduced portion forming a shoulder engageable by the lever 57 to limit movement of the lever toward the magnet poles 53 when the contact member 60 engages the contact member 54. The reduced end portion of the contact member 60 is secured, as at 61, to a resilient arm or light leaf spring 62 which is fixed, as at 63, to the lever 57, the arm 62 being stressed to move into engagement at its free end with the lever 57 so that the lever 57 on movement away from the magnet poles 53 will not move the contact member 60 until the lost motion between the lever 57 and the arm 62 has been taken up. The lever 57 is provided with a stop means 64, preferably in the form of a U-shaped wire which straddles the lever 57 adjacent the contact members and which is secured at its free ends in the base member, as at 65. Fixed to the lever 57 adjacent its pivotal support by the hinge member 58 there is an arm 66 of resilient sheet metal which extends longitudinally of the lever in laterally spaced relation thereto and which diverges from the plane of the lever toward shaft 15. The free end of the arm 66 is provided with a transversely extending abutment plate 67 of electric insulating material which is positioned in the path of movement of the free end of the operating arm 22 for engagement by the end of the arm 22 to actuate the lever 57. The arm 66 and the lever 57 are secured together and to the hinge member 58 by rivets or the like 68. The hinge member 58 is secured to an elevated step portion 69 projecting from the side face of the base member at the opposite end thereof from the magnet 41, being clamped in position by screws 70. A stop member 71 in the form of an elongated plate is secured at one end to the base member by the screws 70 and extends longitudinally of the arm 66 for engagement thereby to limit the movement of the arm 66 by the operating arm 22. One of the screws 70 serves to clamp one end of a lead wire 72 to the base member 38 and to electrically connect the lead wire to the operating lever 57 and its contact member 60. The lead wires 56 and 72 are connected to binding posts 73, 74 respectively mounted on a block 75 of electric insulating material which is secured to the rear wall 3 by a screw 76. The side wall 2 of the casing is provided with a conduit outlet fitting 77 for the passage of suitable lead wires into the casing for connection to the terminals 73, 74.

The operation of my control means is as follows: When the temperature of the fluid heating medium decreases to which the thermostatic coil 16 is subjected, the shaft 15 will be rotated by the coil in a counterclockwise direction facing Fig. 1. The rotation of shaft 15 will carry with it the crank member 24 and the operating arm 22 which is resiliently held in engagement with the crank member pin 26 by the coil spring 27. Movement of the operating lever 57 to break contact between the contact members 54 and 54 of the control means will be opposed by the inherent

resilience of the hinge member 58 and the attractive force of the magnet poles 53 for the armature portion 59. As the shaft 15 continues to rotate under the actuating force of the coil 16, the arm 22 being in engagement with the abutment plate 67, then the spring 27 will be tensioned against the forces opposing movement of the operating lever and will flex the resilient arm 66 toward its stop member 71, storing up energy in the arm 66. When the tension in the spring 27 and the arm 66 is sufficient to overcome the resistance to movement of operating lever 57, then the lever will be moved with a quick substantially snap action as the opposing force of the magnet decreases upon initial movement of the armature portion 57 away from the poles 53. As above noted, the lever 57 will have some movement before the contact member 60 is moved thereby so that contact will be broken sharply. The movement of the operating lever by the resilient force built up in spring 27 and arm 66 will be limited by the stop means 64. If the temperature continues to decrease so that the coil 16 continues the counterclockwise rotation of shaft 15 after contact is broken, then the spring 27 will be tensioned against the resilient force of arm 66, permitting some lost-motion movement between the pin 26 and the operating arm 22, that is, will permit the shaft 15 to have some movement relative to the arm 22. If there is further rotation sufficient to flex the arm 66 against stop member 71, then arm 22 will be held against further movement and the shaft 15 will move the pin 26 away from arm 22 against the force of spring 27 thereby preventing injury to the parts of the control means. Assuming that the shaft 15 has been rotated by coil 16 to engage arm 66 with stop member 71 and to tension spring 27, then as the temperature to which the coil 16 is subjected increases, the spring 27 will unwind, moving the pin 26 toward the operating arm 22 and will finally bring the pin 26 into engagement with the arm 22 as the arm 66 leaves its stop member 71. As the shaft continues to rotate on heating of the coil 16, the resilient force of the hinge member 58 will hold the arm 66 in engagement with the operating arm 22 and will move the operating lever 57 and its contact member 60 toward magnet poles 53 and contact member 54. Continued clockwise rotation of shaft 15 will permit hinge member 58 to move contact member 60 into engagement with contact member 54 and to bring the armature portion 59 into the active field of the magnet poles 53, the attractive force of the magnet poles pulling the armature portion 59 against the shoulder on contact member 60 against the force of the resilient contact supporting arm 62. Should the temperature to which the coil 16 is subjected continue to increase after contact is made, then the operating arm 22 will move away from the abutment plate 67 so that the shaft will be free to rotate clockwise and prevent injury to the parts of the control means. The differential operation may be controlled or regulated by adjusting the position of the magnet poles 53 relative to the armature portion 59 when the contact members are in engagement. As shown, the switch is set to operate at substantially maximum differential, that is, there is a wide difference between the degree of temperature at which contact will be made and the degree of temperature at which contact will be broken due to the holding force exerted by the magnet poles 53 on the armature portion 59. If it is desired to decrease the differential of opera-

tion, the knob 52 will be rotated counterclockwise facing Fig. 3 to permit the resilient force of bracket 42 to move the magnet portion 53 toward the base member and away from the armature portion 59 thereby decreasing the attractive force of the magnet poles for the armature portion. The range of operation of the control means may be regulated by movement of the supporting plate 31. When the clamping means 34 is released and the supporting plate 31 is moved downward and counterclockwise about its bearing member 8, facing Figs. 1 and 2, the abutment plate 67 will be moved in a direction away from the operating arm 22 so that the temperature to which the coil 16 is subjected will be decreased at which the arm 22 will be moved clockwise of Fig. 1 to permit hinge member 58 to make contact. Should it be desired to increase the temperature at which contact will be made and increase the range of operation of the control means, then the supporting plate 31 will be rotated clockwise of Fig. 1 about its bearing member 8 by upward movement of the knob 36. This will require a higher temperature for movement of the arm 22 in a direction away from the abutment plate 67 to permit the resilient force of the hinge member 58 to move the contact member 60 into engagement with the contact member 54. If the change in the range of operation is increased substantially above the temperature to which the coil 16 is subjected, then the spring 27 serves as a lost-motion means to permit movement of the operating arm 22 with the supporting plate 31 after arm 66 engages its stop member 71 without injuring the coil 16.

The foregoing description sets forth the operation when contact is broken upon decrease of temperature. Without disturbing or changing the coil 16 or its counterclockwise rotation of shaft 15 on decrease of temperature, my control device may be made to break circuit on increase of temperature. This change in operation may be accomplished by inverting the base member 38 on the supporting plate 31, to the position shown in Fig. 8, that is by turning it through 180° in the direction of arrow X in a plane parallel to shaft 15 so that bearing face 38a abuts the plate 31. The change in the position of the base member merely requires the removal of screws 39 and interchange of lead wires 56 and 72. The arm 22 will now engage operating arm 66 upon clockwise rotation with the result that rising temperature to which coil 16 is subjected will break contact. If it is desired to retain the lost-motion connection between the shaft 15 and the switch lever 57, this may be done merely by positioning pin 26 on the other side of arm 22 facing Fig. 1 with spring end 29 engaging pin 26 and spring end 28 engaging projection 30 whereby spring 27 still urges pin 26 and arm 22 into engagement; the new position and the change of pin 26 and of spring 27 being indicated by full lines in Fig. 9. Obviously, if it is desired to have contact made on rising temperature in the arrangement shown in Fig. 8 at the same degree of temperature at which contact is broken on rising temperature in the arrangement shown in Fig. 1, the crank arm 24, reversed as described in connection with Fig. 9, must be moved relative to shaft 15 after loosening screw 25 and from the dotted line position, Fig. 8, to the full line position thereof wherein arm 22 engages arm 66. This ability to reverse the operation of the switch is very desirable in manufacture as it reduces cost and

eliminates the need of providing additional or different parts.

What I claim and desire to secure by Letters Patent of the United States is:

1. A device of the character described, comprising a supporting structure, an operating shaft journaled in said structure, means to rotate said shaft, control means carried by said structure and including an operating lever, an operating arm journaled about said shaft and intermediate its ends for transmitting movement to said lever, resilient means carrying said lever and opposing movement of said lever in one direction, and a spring operatively connecting said shaft and said arm.
2. A device of the character described, comprising a supporting structure, an operating shaft journaled in said structure, means to rotate said shaft, control means carried by said structure and including an operating lever fulcrumed eccentric of said shaft, a flexible arm fixed to and extending longitudinally of said lever in laterally spaced relation thereto, an operating arm journaled about said shaft and having its free end engageable with the free end of said arm to actuate said lever, said first-named arm flexing upon limitation of movement of said lever and continued movement of said operating arm, and a spring for transmitting movement from said shaft to said operating arm.
3. A device of the character described, comprising a supporting structure having a wall, an operating shaft extending through said wall, means to rotate said shaft, control means carried by said structure and including an operating lever fulcrumed eccentric of said shaft, an operating arm journaled on said shaft between said wall and one end of said shaft for transmitting movement to said lever, a crank member fixed on said shaft between said arm and said shaft end, a pin projecting from said crank member toward said wall in parallel laterally spaced relation to said shaft and engaged by said arm, and a spring holding said arm in engagement with said pin.
4. A device of the character described, comprising a supporting structure having a wall, an operating shaft extending through said wall, means to rotate said shaft, control means carried by said structure and including an operating lever fulcrumed eccentric of said shaft, an operating arm journaled on said shaft adjacent one end thereof for transmitting movement to said lever, a crank member adjustably mounted on said shaft between said end and said arm, a pin projecting from said crank member toward said wall in parallel laterally spaced relation to said shaft and engaged by said arm, and a coil spring under tension surrounding said shaft between said arm and said wall, said spring having one end anchored to said pin and its other end anchored to said operating arm whereby to hold said arm in engagement with said pin.
5. A device of the character described, comprising a supporting structure, an operating shaft journaled in said structure, an adjustable base member having a bearing aperture, a bearing member extending through said aperture and supporting said base member, said bearing member receiving and surrounding said shaft and being fixed in said structure, means to hold said base member in adjusted position, control means mounted on said base member and including an operating lever, an arm on said lever and having its free end in lateral spaced relation thereto,

and an operating arm carried by and movable with said shaft, said operating arm being engageable with said lever arm to actuate said lever.

6. A device of the character described, comprising a casing having a cylindrical side wall, an operating shaft projecting into said casing concentrically with said wall, a plate member apertured to receive and journaled about said shaft, means cooperable with said plate member and said cylindrical wall to hold said plate member in adjusted position, a contact member carried by said plate member, an operating lever having a contact member cooperable with said first-named contact member, and means carried by said shaft for actuating said lever, said plate member being disposed intermediate the ends of said shaft and between said operating lever and said actuating means.

7. A device of the character described, comprising a casing having a cylindrical side wall, an operating shaft projecting into said casing concentrically with said wall, a plate member journaled about said shaft, said wall having a circumferentially extending slot, clamping means projecting from said plate member through said slot and cooperable with said casing wall to hold said plate member in adjusted position, a contact member carried by said plate member, an operating lever having a contact member cooperable with said first-named contact member, and means carried by said shaft for actuating said lever, said plate member being disposed intermediate the ends of said shaft and between said operating lever and said actuating means.

8. A device of the character described, comprising a casing having a cylindrical side wall, an operating shaft projecting into said casing concentrically with said wall, a plate member journaled about said shaft, said wall having a circumferentially extending slot, clamping means projecting from said plate member through said slot and cooperable with said casing wall to hold said plate member in adjusted position, a slidable closure plate for said slot and movable with said plate member, a contact member carried by said plate member, an operating lever having a contact member cooperable with said first-named contact member, and means carried by said shaft for actuating said lever.

9. A device of the character described, comprising a base member, a contact member fixed on said base member, an operating lever having a contact member cooperable with said first-named contact member, a resilient hinge plate pivotally securing said lever to said base member, a flexible resilient arm projecting from said lever, an operating member engageable with said arm to move said lever, means to actuate said operating member, and a magnet cooperable with said lever and opposing operation of said lever by said actuating means, said arm being flexed against the force of said magnet by said actuating means and acting to move said lever quickly when released by said magnet.

10. A device of the character described, comprising a supporting structure, control means carried by said structure and including a lever, a magnet cooperable with and opposing movement of said lever, an operating shaft journaled in said structure, means to rotate said shaft, and resilient means for transmitting movement from said shaft to said lever, said resilient means being tensioned on operation of said shaft

against the force of said magnet whereby the force stored in said resilient means will move said lever quickly when said lever is released by said magnet.

11. A device of the character described, comprising a supporting structure, control means carried by said structure and including a lever, a resilient arm fixed to and extending from said lever, a magnet cooperable with said lever and opposing movement of said lever by said arm, and means to tension said arm whereby the force built up in said arm will move said lever quickly upon overcoming said magnet.

12. A device of the character described, comprising a supporting member, a base member having a supporting face seating on said supporting member, means clamping said face to said supporting member, control means carried by said base member and having an operating lever, a rotatable shaft, and means operatively connecting said shaft and said lever, said base member having a second supporting face positioned opposite said first face and adapted for engagement with said supporting member whereby said base member may be inverted to reverse the operation of said control means by said shaft.

13. A device of the character described, comprising a supporting member, a base member having oppositely directed faces adapted upon reversal of said base member to be positioned in opposing relation to said supporting member, means to secure said base member to said supporting member with either face directed toward said supporting member, movable control means carried by said base member, operating means for actuating said control means, said control means having its direction of movement reversed for a given direction of movement of said operating means upon reversal of said base member.

14. A device of the character described, comprising a supporting structure, an operating shaft journaled in said structure, a control means carried by said structure, a lever for actuating said means, lost-motion means operatively connecting said lever and said control means whereby movement of said control means occurs subsequent to initial movement of said lever, a magnet cooperable with said lever and opposing movement thereof, resilient means for moving said lever, and means to transmit movement from said shaft to said resilient means, said resilient means on movement storing energy in opposition to and determined by the force of said magnet opposing movement of said lever whereby when the potential force of said resilient means exceeds the attractive force of said magnet, said lever will be moved to move said control means by the released energy of said resilient means.

15. A device of the character described, comprising a supporting structure, an operating shaft journaled in said structure, means to rotate said shaft, a base member positioned laterally of said shaft, an operating lever fulcrumed on said base member and positioned between said base member and said shaft, an arm fixed to said lever and having its free end portion extending in spaced overlying relation longitudinally of said lever and toward said shaft, control means operable by said lever, and an operating arm extending from said shaft and engageable with the free end portion of said fixed arm to move said lever.

16. A device of the character described, comprising a supporting structure, an operating shaft

journaled in said structure, means to rotate said shaft, a base member positioned laterally of and extending parallel to and along said shaft, an operating lever fulcrumed on said base member and extending between said base member and said shaft, control means operable by said lever, an arm on and extending from said lever in spaced overlying relation thereto and toward said shaft, and an operating arm operable by said shaft and engageable with said lever arm, said operating arm extending between said lever and said lever arm.

17. A device of the character described, comprising a supporting structure, an operating shaft journaled in said structure, means to rotate said shaft, an adjustably mounted supporting member journaled about and intermediate the ends of said shaft, a base member fixed to said supporting member and positioned laterally of and extending parallel to and along said shaft, an operating lever fulcrumed on said base member and extending between said base member and said shaft, control means operable by said lever, means for transmitting movement from said shaft to said lever, and means for holding said supporting member in fixed position relative to said shaft.

18. A device of the character described, comprising a supporting structure, an operating shaft journaled in said structure, means to rotate said shaft, a supporting member having an aperture receiving said shaft, a lever carried by said supporting member, control means operable by said lever, a crank member fixed to and movable by said shaft, an operating arm journaled on said shaft and positioned between said supporting member and said crank member, an arm on said lever cooperable with said operating arm for movement of said lever by said shaft, and a spring interconnecting said operating arm and said crank member.

19. A device of the character described, comprising a supporting structure, an operating shaft journaled in said structure, means to rotate said shaft, an adjustable plate member extending radially to and having an aperture receiving said shaft, means to hold said plate member in adjusted position relative to said shaft, a base member secured to said plate member and positioned at one side of said shaft, a contact member fixed to said base member and extending toward said shaft, an operating lever fulcrumed at one end on said base member and extending transversely to said shaft between said shaft and said base member, a contact member on said lever cooperable with said first-named contact member, an arm fixed to and overlying said lever and extending toward said shaft, and an operating arm carried by and movable with said shaft, the end portion of said operating arm being engageable with the end portion of said lever arm to move said lever.

20. A device of the character described, comprising a supporting structure, a rotatable operating member carried by said structure, a base member positioned at one side of said operating member, a lever fulcrumed on said base member and extending transverse to the axis of said operating member and between said operating member and said base member, control means operable by said lever, a stop member fixed to said base member adjacent the lever fulcrum and extending in overlying diverging relation along said lever, an arm fixed to said lever and positioned between said lever and said stop mem-

ber, said arm being engageable with said stop member to limit movement of said arm, and an operating arm carried by and movable with said operating member, said operating arm being engageable with said lever arm to move said lever.

5 21. A device of the character described, comprising a casing, a rotatable operating member in said casing, said casing having a curved side wall concentric with said operating member, a
10 base member in said casing having a curved wall

portion conforming to and slidable along said side wall, means cooperable with said side wall and said wall portion to clamp said base member and said side wall against relative movement, a lever fulcrumed on said base member, control
5 means operable by said lever, and means operatively connecting said operating member and said lever for movement of said control means.

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