May 11, 1937. E. J. DILLMAN 2,080,169

CONTROL DEVICE

Filed May 17, 1934

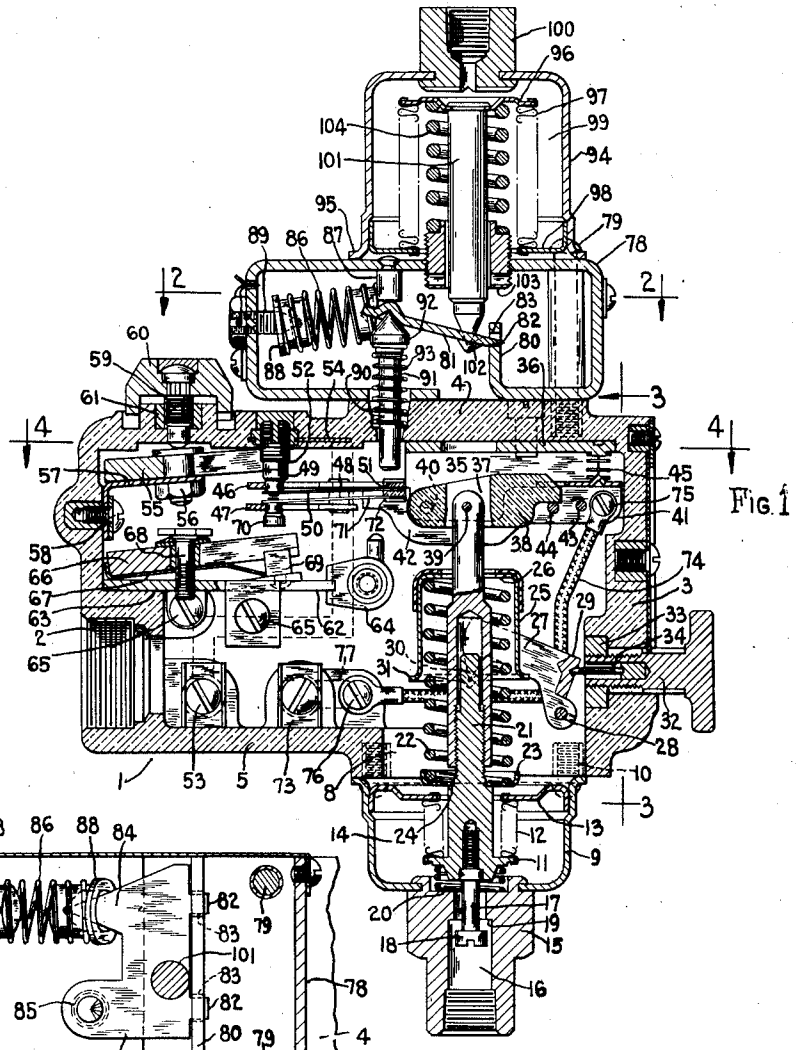

Fig. 1

Fig. 2

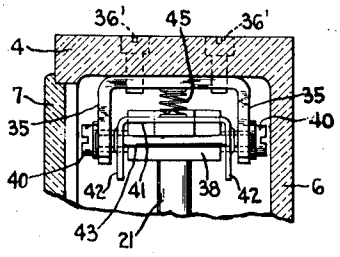

Fig. 3

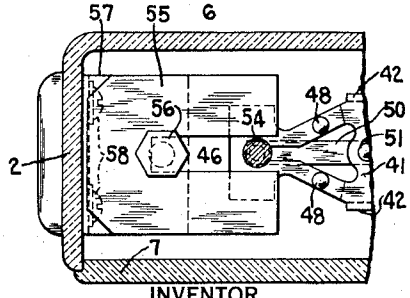

Fig. 4

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CONTROL DEVICE

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Application May 17, 1934, Serial No. 726,036

18 Claims. (Cl. 200—83)

My invention relates to new and useful improvements in control devices such as an electric switch having automatically operable means for actuating the same.

An object of my invention is to provide means for determining the force exerted by the automatic means which will operate the switch to make and break contact.

Another object is to provide means for determining the force exerted by the automatic means at which contact will be broken without affecting the force exerted by the automatic means at which contact will be made.

Another object is to provide means for determining the force exerted by the automatic means at which contact will be made without affecting the force exerted by the automatic means at which contact will be broken.

Another object is to provide means for actuating the switch irrespective of the operation of the switch by the automatic means.

Another object is to provide a snap acting safety means for actuating the switch.

Another object is to provide adjustable magnetic means for regulating the operation of the switch.

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

Figure 1 is a view in longitudinal vertical central section of the control device of my invention;

Fig. 2 is a view in section on the line 2—2 of Fig. 1;

Fig. 3 is a detail view in section taken on the line 3—3 of Fig. 1, and

Fig. 4 is a detail view in section taken on the line 4—4 of Fig. 1.

Referring to the drawing by characters of reference, 1 designates generally a supporting structure such as a rectangular housing of electric insulating material having opposite end walls 2, 3 joined by top and bottom walls 4, 5 respectively and closed by a rear wall 6. The housing is preferably closed at its front by a cover member or plate 7, also of electric insulating material. Through the bottom wall 5 of the housing adjacent the end wall 3, there is an opening 8 which is closed by a cup-shaped container 9 having a marginal rim or flange which engages the outer or under face of the wall 5 around opening 8 and by which the container is rigidly secured to the housing as by screws 10. The container 9 has a movable end wall 11 which forms the head of a metal bellows 12 positioned concentrically within the container 9. The upper end of the bellows 12 is sealed to an annular plate 13 which is secured and sealed at its outer periphery to the inside face of the side wall of container 9 adjacent its rim so as to provide within the container an expansible chamber 14. The bottom wall of the container 9 is provided with a fitting 15 having a bore 16 therethrough opening into the chamber 14 for the admission of fluid under pressure to actuate the wall 11. The head 11 is provided with a stop member 17 such as a post which extends into the bore 16 and is provided with a head 18 which cooperates with an annular shoulder 19 in the bore 16 to limit collapse of bellows 12 and expansion of the chamber 14. A coil spring 20 surrounds the post 17 and is held under compression between the head 11 and the fitting 15 and serves to oppose collapse of the chamber 14 and expansion of the bellows 12 upon reduction of pressure in the chamber 14. Extending upwardly from the wall 11 within the bellows 12 there is a thrust member or operating rod 21 which projects through the opening 8 into housing 1 and terminates adjacent the top housing wall 4. Surrounding the thrust member 21 there is a helical coil spring 22 which seats on an abutment member or cup plate 23 which rests on an annular upward facing shoulder 24 on the thrust member. The upper end of the spring 22 is housed within a cup member 25 and bears at its upper end against the end wall 26 of the cup member which is apertured for the free passage of the thrust member therethrough. Positioned between the thrust member 21 and the end housing wall 3 there is an adjustment lever 27 which is pivotally supported on a shaft 28 secured in the rear housing wall 6. The lever 27 is preferably U-shaped, having its arms of which but one is shown, and which are joined by a cross member 29, extending on opposite sides of the cup member 25 and bearing, as at 30, at diametrically opposite points on the top face of a circumferential flange 31 projecting from the lower end of the cup member 25. An adjustment screw 32 which is adjustably screw-threaded in a metal insert 33 in the end wall 3 is operatively connected to the lever 27 by a pin 34 which bears at its opposite ends in recesses in the screw 32 and the cross member 29. The upper end of the thrust member 21 terminates between the op-

posite depending side flanges 35, see Fig. 3, of a supporting bracket 36 secured by screws or the like 36' to the top housing wall 4, the flanges 35 extending substantially parallel to the rear wall 6. The upper end of the thrust member 21 is received in an aperture 37 in an operating lever 38 of electric insulating material to which it is pivotally secured by a cross pin 39. The lever 38 is fulcrumed between the flanges 35 on bearing pins or screws 40 which are supported in the flanges 35. Also positioned between the flanges 35 there is a switch arm 41 having parallel side members 42 which extend between the sides of the lever 38 and the flanges 35, the arm being fulcrumed adjacent one end and end wall 3 on a bearing shaft 43 supported in the flanges 35. The free end of the lever 38 seats on an abutment member 44 such as a rod extending between the side arm members 42. A helical coil spring 45 bears downward and seats on the switch arm 41 between its fulcrum and the end wall 3 and urges the abutment 44 upward against the lever 38. The spring seats at its upper end against the cross member of the U-shaped bracket 36. The free end of the arm 41 which extends toward the end wall 2 is provided with substantially parallel upper and lower armature portions 46, 47, the portion 47 being secured to the arm 41 by spacer sleeves and rivets 48 or the like. The arm 41 is provided with an upward projecting contact member 49 which extends through a slot in the armature portion 46 and is provided with a downward facing shoulder cooperable with the side edges of the slot to limit upward movement of the armature portion. The contact member 49 is carried by a spring blade 50 which is riveted to the under face of the arm 41, as at 51. The contact member 49 cooperates with a contact member 52 which is secured in the top housing wall 4 and projects downward therefrom. The contact member 52 is connected to a terminal post 53 by a lead member 54 extending through and embedded in the top and the rear walls of the housing. The armature portion 46 cooperates with the poles of a U-shaped permanent magnet 55 which extends longitudinally of the switch arm 41 in overlying relation to the armature portion 46, the poles of the magnet straddling the contact member 52. The magnet 55 is secured by a nut and bolt 56 to a resilient hinge member 57 such as a sheet metal angle plate rigidly secured to the end wall 2 by screws 58. An adjustment screw 59 having an operating knob 60 is adjustably screw-threaded in a metal insert 61 embedded in the top wall 4. The screw 59 projects through the top wall 4 and engages the head of bolt 56 which is held in engagement with the screw by the inherent resilience of the hinge member 57, the screw being operable to swing the magnet poles against the resilience of the hinge member and toward the armature portion 46 to regulate the attractive force of the magnet acting on the switch arm 41. Positioned beneath the magnet 55 there is a base member 62 in the form of a flat supporting shelf which rests at one end on a shoulder 63 projecting from the end wall 2 and which at its other end extends into a groove in a post or support 64 projecting from the rear wall 6. The base member 62 is rigidly held in position by screws 65 extending through depending flanges on the front and rear edges of the member 62 and threaded into the rear wall 6. Supported on the member 62 there is a U-shaped permanent magnet 66 which is fulcrumed at its base end on the top face of the member 62. The magnet 66 extends longitudinally of the switch arm 41 with the free ends of its pole extending beneath the armature portion 47 for cooperation therewith. The magnet 66 is supported in an upwardly inclined position with its poles spaced from the member 62 by a plate member 67 of resilient sheet metal which is bent or arched upwardly intermediate its ends and which has its opposite ends bearing on the top face of the member 62. A screw 68 extends through the magnet and is adjustably screw-threaded in the base member 62, the head of the screw 68 bearing on the top face of the magnet which is held in engagement with the screw head by the inherent resilience of the plate 67. Adjustment of the screw 68 will regulate the position of the magnet poles relative to the armature portion 47. On the base member 62 between the magnet poles, there is a stop member 69 of electric insulating material which cooperates with a stop member 70 carried by the switch arm 41 to limit movement of the armature portion 47 toward the magnet 66 and to prevent engagement between the magnet and the armature portion 47. The stop member 70 projects through a slot in the armature portion 47 and is provided with a circumferential shoulder engageable with the side edges of the slot, the stop member being carried by a spring blade 71 which is secured to but electrically insulated from the arm 41, as at 72. The switch arm 41 is connected to a terminal post 73 by a lead wire 74 which is secured at one end, as at 75, to the arm 41 and at its other end, as at 76, to a connector strip 77 embedded in the housing wall and joined to the post 73.

Supported on the top wall 4 there is a casing 78 which is rigidly secured to the housing 1 by bolts 79. The casing 78 is preferably formed from a blank of sheet metal which is bent into substantially rectangular form with one end portion 80 turned upward into the casing to provide a lever support. Within the casing there is a lever member 81 which extends transversely to the side face of the support 80 and has lugs 82 which extend into apertures 83 in the support 80 to prevent displacement of the lever member and to serve as bearing points therefor. The lever member 81 is substantially U-shaped, having parallel arms 84, 85 which extend away from the support 80. Positioned between the arm 84 and one end wall of the casing 78 there is a helical coil spring 86 which is under compression and which urges the lever member 81 into engagement with a stop member 87 depending from the top wall of the casing 78. The spring 86 is provided with end follower members 88 which are recessed, one receiving in its recess the pointed end of the arm 84, and the other receiving the pointed end of an abutment pin 89 adjustably screw-threaded in the end wall of the casing 78 to regulate the component of force of spring 86 acting on lever 81. Through the top housing wall 4 there is an aperture 90 which receives an actuating member or push rod 91, the aperture overlying the free end portion of the switch arm 41 intermediate its fulcrum and armature portion 46 so that the rod 91 is movable downward into engagement with the switch arm to actuate the same. The rod 91 is provided with a head 92 providing a downward facing annular shoulder. Surrounding the rod 91 there is a helical coil spring 93 which bears at its upper end against the head 92 and at its lower end seats on an annular shoulder in the aperture 90 so that the spring 93 normally urges the rod 91 upward and holds the same out of en-

gagement with arm 41 and in engagement with the lever arm 85. The lever arm 85 is provided with a conical downward facing recess which receives the conical upper end of the headed rod 91 to insure their operative engagement with each other. On the top wall of the casing 78 there is a container 94 which is of inverted cup-shaped form, having a circumferential flange 95 which seats on the top casing wall and by which the container is rigidly secured to the casing, preferably by the screws 79. The container 94 is provided with a movable wall 96 which forms the head of a metal bellows 97 having its other end secured and sealed to an annular plate 98 which is secured and sealed to the inside face of the side wall of container 94. The interior of the container 94 around the bellows 97 thus provides an expansible chamber 99 which is communicable with a source of fluid pressure through the bore of a fitting 100 secured and sealed in the top end wall of the container 94. A push rod or thrust member 101 is fixed at one end to the bellows head 96 and extends downward therefrom through the bellows and an aperture in the top wall of casing 78 and terminates in a conical or tapered end portion which seats in a conical recess 102 in the top face of the lever member 81 adjacent its fulcrum and between the fulcrum support 80 and the push rod 91. Surrounding the thrust member 101 there is an adjustable guide sleeve 103 which is adjustably screw-threaded in the top wall of the casing 78. Positioned between the sleeve member 103 and the bellows head 96 there is a helical coil spring 104 which surrounds the thrust member 101 and which opposes expansion of the chamber 99. The force exerted by the spring 104 and the spring 93 is preferably related to the component of force exerted by spring 86 so that the increase of resistance of spring 104 and spring 93 on movement of the bellows head 96 will be compensated by the decrease in resistance of the spring 86 to movement of the lever member 81 so that the force or pressure in chamber 99 which will initiate movement of lever member 81 will be sufficient to carry the lever completely through its range of travel. It will be noted that the resistance of spring 93 will be opposed by the component of force of spring 86 as the lever member 81 moves overcenter but the force of spring 93 is at all times sufficiently greater than the component of force exerted by spring 86 so that when the force on the bellows head 96 decreases, the spring 93 can move the lever member upward to the position shown.

This control device is particularly adapted for use in connection with refrigerating apparatus and its operation will be described as employed in connection therewith although it will be apparent that the device is adapted for other uses. The fitting 15 is connected by suitable piping to the refrigerant return line from the evaporator and the fitting 100 is connected by suitable piping to the high pressure side of the system, for example at the compressor outlet. The terminal posts 53 and 73 are connected by suitable lead wires to the compressor motor so that the control device will control the operation thereof. The control device is shown as having responded to the predetermined desired high pressure in the refrigerant return line which has closed the switch contacts to cause operation of the compressor. With the compressor in operation, the pressure in the refrigerant return line and therefore in chamber 14 will decrease. The switch contact 49 is held closed by the attractive force of the magnet 55 for its armature portion 46 and the force of spring 45 acting on the switch arm 41 together with the pressure in the chamber 14 which acts on the bellows head 11. When the pressure has decreased to the predetermined degree at which operation of the compressor is to be stopped, the spring 22 will push downward on the thrust member 21 and turn the lever 38 clockwise about its fulcrum 40 which will pull downward on the abutment 44 and turn the switch arm 41 counterclockwise about its fulcrum 43 to separate contact member 49 from its contact member 52 to break the circuit between terminal posts 53 and 73. Contact between members 49 and 52 will be broken with a quick substantially snap action due to the rapid decrease in the holding force of magnet 55 for its armature portion 46 as the lever arm 41 is moved. The lost motion between blade 50 and arm 41 also enhances the sharp breaking of contact as the arm 41 is in movement before the lost motion is taken up. The downward movement of the armature portion 47 under the force of lever 38 will move the stop member 70 into engagement with its fixed stop member 69 and bring the armature portion 47 into the field of its magnet 66, but the abutment member 44 will not leave the lever 38 as the spring 45 is sufficient to overcome the holding force of the magnet 66. With the compressor stopped, the pressure in chamber 14 will increase and when the pressure on the bellows head 11 plus the force of spring 45 becomes equal to the resisting force of spring 22 and the attractive force of magnet 66, then the thrust member 21 will be moved upward. The arm 41 is held with its abutment 44 in engagement with the lever 38 by the spring 45 so that as the lever 38 is rotated counterclockwise about its fulcrum 40, the switch arm 41 will move with it to engage contact member 49 with its contact member 52 to start operation of the compressor. The snap or quick action of arm 41 above described also occurs when the arm 41 is moved to make contact due to the attractive force of magnet 66 for portion 47. If it is desired to change the range of operation, that is, the mean pressure at which contact will be made and broken while maintaining a constant difference between the pressure at which contact is made and the pressure at which contact is broken, the force of the spring 22 is adjusted by the operating member 32. If the operating member 32 is rotated to compress the spring 22 so that it exerts a greater force on the thrust member 21, then the mean pressure in the chamber 14 at which contact will be made and broken will be increased thereby resulting in a higher average evaporator temperature. If it is desired to decrease the temperature at which the compressor will be stopped without varying or changing the temperature at which the compressor is to be started, that is, to regulate the differential at the switch cut-out point, then the magnet 55 is moved by its adjustment screw 59 toward the switch arm 41 which will increase the resistance to movement of the switch arm by the spring 22 so that the pressure in the chamber 14 must have a further decrease in pressure in order for the force of spring 22 to move the switch arm 41 as above described. This regulation of magnet 55 will not however affect the pressure in chamber 14 at which arm 41 will be moved upward to make contact. If it is desired to decrease the temperature at which the compressor is to be

started, that is, to regulate the differential at the switch cut-in point, then the magnet 66 is moved by its screw 68 toward the base member 62 against the force of resilient means 67 so that there will be a greater air gap between the armature portions 47 and the magnet poles when contact is broken and stop members 69 and 70 are in engagement thereby requiring a lower pressure in chamber 14 and a less upward force on bellows head 11 to overcome spring 22 and the attractive force of magnet 66. Should the pressure on the outlet side of the compressor increase so that the force acting on the bellows head 96 will overcome the resisting force of springs 86, 93, and 104, then due to the compensation effected by the reduction in the resisting component of spring 86, the plunger or thrust member 101 will be moved quickly downward to carry the lever 81 and its spring 86 overcenter. As the lever 81 moves downward, it will push downward on the actuating member or push rod 91 and bring it sharply into engagement with the switch arm 41 to separate the contact member 49 from contact member 52. The switch arm 41 is free to move downward under the force of push rod 91 due to the lost motion connection between the switch arm 41 and the lever 38 at abutment member 44, the attractive force of magnet 55 and the resistance of spring 45 only having to be overcome in order to break contact. If the pressure in the chamber 99 decreases due to stopping of the compressor when contact is broken by the safety mechanism, then when the pressure on the bellows head 96 has decreased sufficiently so that it will be overcome by the combined force of spring 93 and spring 104 less the resisting component of force of spring 86, the post 91 will be moved upward by the spring 93 which will hold lever member 81 in engagement with plunger 101 and permit the switch arm 41 to be moved to circuit making position under the force of spring 45. It will be noted that when contact is broken by downward movement of the push rod 91 increased pressure in the chamber 14 which will overcome spring 22 and move thrust member 21 upward will merely move the lever 38 away from abutment 44 and will not act in opposition to the pressure in the chamber 99.

From the foregoing, it will be apparent that I have provided a switch in which the range of operation may be adjusted by the control means 32 to regulate the pressures at which contact will be made and at which contact will be broken without affecting the differential of operation between these pressures. It will also be apparent that I have provided a switch in which the differential of operation may be increased or decreased either by changing the pressure at which contact will be made or by changing the pressure at which contact will be broken or by changing both the pressure at which contact is made and the pressure at which contact is broken independently of the range of operation of the device. Although the device is shown as adapted to respond directly to pressure, it is to be noted that the switch is equally operable by temperature responsive means requiring merely the connection of a volatile liquid containing bulb element to the fitting 15 or to the fitting 100 or to both of said fittings.

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, a control means, an arm pivotally supported by said structure and operable to move said means, power means for moving said arm in one direction, a magnet cooperable with said arm and opposing operation of said arm by said power means, a spring for moving said arm in the opposite direction and opposing operation of said arm by said power means, a magnet cooperable with said arm and opposing operation of said arm by said spring, one of said magnets being mounted for pivotal movement whereby it is adjustable relative to said arm, and means to move the free end of said movable magnet.

2. A device of the character described, comprising a supporting structure, a control means, an arm pivotally supported by said structure and operable to move said means, power means for moving said arm in one direction, a magnet cooperable with said arm and opposing operation of said arm by said power means, a spring for moving said arm in the opposite direction and opposing operation of said arm by said power means, a magnet cooperable with said arm and opposing operation of said arm by said spring, resilient means supporting one of said magnets, and means to adjust said one magnet against the force of said resilient means and relative to said switch arm.

3. A device of the character described, comprising a supporting structure, a control means, an arm pivotally supported by said structure and operable to move said means, power means for moving said arm in one direction, a magnet cooperable with said arm and opposing operation of said arm by said power means, a spring for moving said arm in the opposite direction and opposing operation of said arm by said power means, a magnet cooperable with said arm and opposing operation of said arm by said spring, a resilient plate member supporting one of said magnets, and a screw engaging said one magnet and operable to adjust said one magnet against the force of said plate member.

4. A device of the character described, comprising a supporting structure, a control means, an arm pivotally supported by said structure and operable to move said means, a lever separate from and engaging said arm, means holding said arm and said lever in engagement and operable to move said arm in one direction, a thrust member engaging said lever, means to move said thrust member to actuate said arm, and means directly engageable with said arm and operable to overcome said holding means, said last-named means acting through said arm to move said control means.

5. A device of the character described, comprising a supporting structure, a control means, an arm pivotally supported by said structure and operable to move said means, a lever separate from and engaging said arm, means holding said arm and said lever in engagement and operable to move said arm in one direction, a thrust member engaging said lever, means to move said thrust member to actuate said arm, an actuating member operable to overcome said holding means and to engage and move said arm relative to said lever, said actuating member acting through said arm to move said control means, overcenter means for moving said actuating member, and power means operable to move said last-named means overcenter.

6. A device of the character described, comprising a supporting structure, a control means, an

arm pivotally supported by said structure and operable to move said means, a lever separate from and engaging said arm, said lever being operable to move said arm, means holding said arm and said lever in engagement and operable to move said arm in one direction, a thrust member engaging said lever, means to move said thrust member to actuate said arm, a magnet cooperable with said arm and opposing operation of said arm by said last-named means, and means operable to overcome said holding means and the attractive force of said magnet and to move said arm relative to said lever, said last-named means being directly engageable with and acting through said arm to move said control means.

7. A device of the character described, comprising a switch arm having a fulcrum support, an expansible chamber having a movable wall, means for transmitting the movement of said wall to said arm, a range spring cooperable with said wall and determining the pressure in said chamber at which contact will be made and broken, a magnet cooperable with said arm and determining the pressure in said chamber at which contact will be made, a second magnet cooperable with said arm and determining the pressure in said chamber at which contact will be broken, one of said magnets being mounted for pivotal movement whereby it is adjustable relative to said arm, and means to move the free end of said movable magnet.

8. A device of the character described, comprising a switch arm having a fulcrum support, an expansible chamber having a movable wall, a lever separate from and engageable with said arm and operable to transmit the movement of said wall to said arm, means acting on said arm to hold said arm in engagement with said lever, means to move said arm relative to said lever, a range spring cooperable with said wall and determining the pressure in said chamber at which contact will be made and broken, a magnet cooperable with said arm and determining the pressure in said chamber at which contact will be made, said holding means exerting a greater turning moment on said arm than does said magnet whereby said holding means acts alone to overcome the attractive force of said magnet, and a second magnet cooperable with said arm and determining the pressure in said chamber at which contact will be broken.

9. A device of the character described, comprising a switch arm having a fulcrum support, an expansible chamber having a movable wall, means for transmitting the movement of said wall to said arm, a range spring cooperable with said wall and determining the pressure in said chamber at which contact will be made and broken, a magnet cooperable with said arm and determining the pressure in said chamber at which contact will be made, said magnet being mounted for pivotal movement and extending longitudinally of and overlying said arm, and a second magnet cooperable with said arm and determining the pressure in said chamber at which contact will be broken, said second-named magnet being mounted for pivotal movement and extending longitudinally of and underlying said arm and said first-named magnet.

10. A device of the character described, comprising a supporting structure including a base member, a switch arm fulcrumed on said structure, a magnet having one end fulcrumed on said base member and having its other end extending into cooperable spaced relation to said arm, resilient means positioned between said base member and said other magnet end and urging said magnet toward said arm, and adjustable means securing said magnet to said base member, said adjustable means being operable to regulate the position of said other magnet end relative to said arm.

11. A device of the character described, comprising a supporting structure including a base member, a switch arm fulcrumed on said structure, a magnet having one end fulcrumed on said base member and having its other end extending into cooperable spaced relation to said arm, resilient means positioned between said base member and said other magnet end and urging said magnet toward said arm, adjustable means securing said magnet to said base member, said adjustable means being operable to regulate the position of said other magnet end relative to said arm, and means on said base member to limit movement of said arm toward said magnet.

12. A device of the character described, comprising a housing, a switch arm fulcrumed in said housing, power means to actuate said arm, a push rod extending through the wall of said housing and engageable with said arm, a casing secured on said housing and receiving said rod, a lever fulcrumed in said casing and bearing on said rod, a spring in said casing and engaging said lever, said spring acting on said lever at an acute angle and being movable overcenter to exert its force through said lever to move said push rod to actuate said arm, and means to move said lever to move said spring overcenter.

13. A device of the character described, comprising a housing, a switch arm fulcrumed in said housing, power means to actuate said arm, lost-motion means operatively connecting said power means and said arm, a push rod extending through the wall of said housing and engageable with said arm, means normally acting to maintain said push rod out of contact with said arm whereby movement of said arm is unimpeded by said rod, a casing secured on said housing and receiving said rod, a lever fulcrumed in said casing and bearing on said rod, a spring in said casing and engaging said lever, said spring acting on said lever at an acute angle and being movable overcenter to exert its force through said lever to move said push rod to actuate said arm, and means to move said lever to move said spring overcenter.

14. A control device comprising a supporting structure, a movable member pivotally supported by said structure and movable for controlling an electric circuit, power means operable for moving said member in one direction, resilient means for moving said member in the opposite direction and opposing operation of said member by said power means, means cooperable with said member and yieldably opposing operation of said member by said resilient means, a magnet cooperable with said member and opposing operation of said member by said power means, said magnet being mounted for pivotal movement whereby it is adjustable relative to said member, and means operable to move the free end of said movable magnet.

15. In a control device having a movable switch member for controlling the circuit and operation of an electrically operated refrigerating apparatus and normally actuated by a power means responsive to changes in a fluid characteristic at

one point in said system, a snap acting device for moving said switch to open said circuit upon a predetermined change in the characteristic of said fluid at another point in said system comprising, a push rod normally positioned out of engagement with said switch member and movable to engage therewith to move said switch member to open position, yieldable means exerting a force and normally acting to hold said push rod in its normal position, a pivotal lever member in engagement with said push rod, a spring having one end fixed and its other end in engagement with the free end of said lever member with the point of engagement therebetween normally positioned overcenter in one direction, and a power means responsive to said predetermined change in the fluid characteristic at said second-named point in said system and having a thrust member for moving said lever to move its point of engagement with said spring overcenter in the opposite direction to move said push rod with a snap action into engagement with and move said switch member to open position, said resilient means exerting a greater force than the force exerted by said spring means and operable to return said spring means and said lever to their normal overcenter position upon a predetermined decrease in the force of said second-named power means.

16. In a control device for controlling flow in a fluid flow system and having a control means actuated through a pivotal lever by a power means responsive to changes in a characteristic of the fluid in one point of the system, a device for actuating said control means upon a predetermined change in the characteristic of the fluid in another point of said system comprising, a push rod normally positioned in spaced relation to said lever member and movable to engage and move said lever member to actuate said control means, a spring for holding said push rod in its normal position, a pivotal lever member engaging said push rod, a coil spring having one end engaging the free end of said second-named lever member with the point of engagement therewith normally being positioned overcenter in one direction, and a power means responsive to said predetermined change in the characteristic of the fluid at said second-named point in said system, said power means having a thrust member engaging said second-named lever member to move its point of engagement with said second-named spring overcenter in the opposite direction to move said push rod to engage and move said first-named lever member with a snap action, said first-named spring exerting a greater force than the component force exerted by said second-named spring acting thereagainst and operable to automatically return said second-named spring and said second-named lever member to their normal overcenter position upon a predetermined decrease in the force exerted by said second-named power means.

17. A device of the character described, comprising a pair of parallel longitudinally reciprocal thrust members, a control means, an arm operable to actuate said control means and extending transversely to said thrust members, one of said thrust members acting directly on and through said arm to actuate said control means, a lever pivotally supported and independent of said arm, said lever acting on and through said arm to actuate said control means, the other of said thrust members being operatively connected to and for moving said lever, and means urging said lever and said arm into cooperable engagement and opposing operation of said arm by said thrust members.

18. In a control device, a power element having a movable wall, a plunger operable by said wall, a control means, a thrust member longitudinally reciprocal and operable to actuate said control means, a lever for transmitting movement from said plunger to said thrust member, and a spring having one end engaging said thrust member, said spring acting to hold said thrust member out of engagement with said control means and in engagement with said lever and to hold said lever in engagement with said plunger.

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