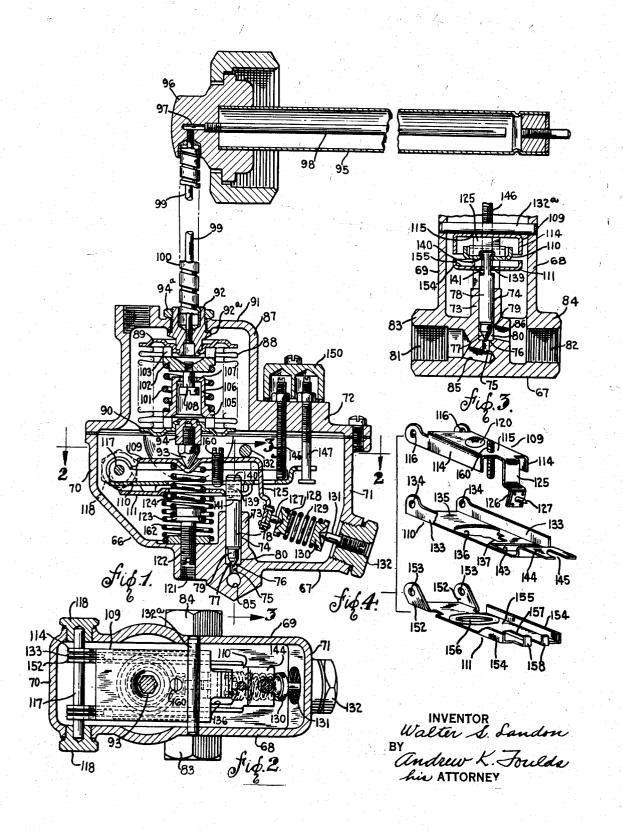
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W. S. LANDON CONTROL DEVICE

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CONTROL DEVICE

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My invention relates generally to fluid flow control devices and more particularly to thermostatic valves for controlling flow of fluid fuel to burners.

One of the objects of my invention is to provide a fuel supply control device having a new and improved arrangement of the operating parts thereof.

Another object of my invention is to provide a new and improved snap-acting thermostatic 10 control device for controlling the supplying of fuel to a burner and to provide a device of this character having a new and improved snap-acting, motion transmitting mechanism for transmitting motion from a thermostatic power ele- 15 ment to a flow controlling means.

Another object of my invention is to provide a snap-acting control device which is sensitive and efficient in operation and one in which frictional of the snap-acting mechanism are minimized without sacrificing the efficiency or effectiveness of the snap-acting mechanism.

The invention consists in the improved confully 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 my invention, in which drawing

- Fig. 1 is a view shown in vertical cross section of a control device embodying my invention;
- Fig. 2 is a view shown in cross section taken 35 along the line 2-2 of Fig. 1;

Fig. 3 is a view in cross section taken along the line 3-3 of Fig. 1, and

Fig. 4 is a view showing certain parts of the control device in perspective.

Referring to the drawing by characters of reference, the numeral 66 designates the casing of the device, the casing preferably being a hollow, substantially rectangular casting having a bottom wall 67, side walls 68 and 69, and end walls 4570 and 71. The upper end of the casing is closed by a cover 72 which may be secured to the casing by screws or other suitable attaching means. An extended portion 73, preferably integral with botextended portion 73 preferably being located substantially midway between the end and side walls of the casing. The extended portion 73 is provided with a relatively large, vertically ex-

end, the bore 74 leading into an axially aligned. relatively small bore 75 at its lower end. The bores 74 and 75 provide a seat 76 for cooperating with the conical face 77 of a controlling means which is shown as a valve member 78 and which 5 is disposed for reciprocal movement in bore 74. The valve member 78 has an upper end portion extending into the casing and has a lower end portion of reduced diameter, as at 79, which cooperates with the wall of bore 74 to provide an annular chamber 80. The casing 66 is provided with an inlet 81 and an outlet 82 for connection in a fluid fuel line (not shown) and preferably the inlet and outlet are oppositely disposed and located in side walls 68 and 69, respectively, and

also located adjacent bottom wall 67. The inlet 81 and the outlet 82 may be defined by hollow bosses 83 and 84, respectively, which may be integral with the casing and be internally threaded and other forces tending to oppose movement 20 for connection in a fluid fuel supply line. A bore 85 connects the inlet passage 81 and the

relatively small bore 75 of the valve chamber, the bore 85 preferably being inclined downwardly from passage 81 and being intersected by the struction and combination of parts to be more 25 relatively small bore 75. The outlet passage 82 is in communication with the annular chamber 80 by a bore 86 which is preferably inclined downwardly from chamber 80 and communicates with outlet passage 82 through the casing 66.

30 The valve member 78 is actuated by a thermostatic power means or element which includes a temperature responsive actuator which is carried by, and removable with the cover 72 as a unitary structure. The cover 72 is provided with an upwardly extending hollow portion 87 in which the thermostatic actuator is disposed, the actuator including an expansible-collapsible element 88 which may be a substantially cylindrical, circumferentially corrugated, resilient, metallic bel-40 lows. The bellows 88 is arranged for movement in a vertical direction and has its upper and lower ends hermetically sealed and secured to end wall or plate members 89 and 90, respectively. In the end or upper wall 91 of the hollow cover portion 87 there is provided a centrally

disposed aperture for receiving a tubular shaped supporting and connecting member 92 which has an external annular flange 92ª for abutment against the inner face of the end wall 91. An tom wall 67, extends upwardly therefrom, the 50 upper end portion of the tubular member 92 projects above the end wall 91, externally of the casing, and is threaded to receive a nut 94^a by means of which the supporting member 92 may be secured to the wall 91. Between the wall 91 tending bore 74 which opens through its upper 55 and flange 92ª there may be provided a washer

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or gasket, if desired. The upper end wall 89 of the bellows 88 is provided with a centrally disposed aperture for receiving a lower and reduced end portion of the supporting member 92, the lower end of the reduced portion being peened over to rigidly secure the end wall 89 to the supporting member 92. A thrust member 93 is screw threaded to a supporting member 94. The lower or movable end wall 90 is provided with a centrally disposed aperture for receiving the supporting member 94 whose inner end is peened over to secure the parts together.

The thermostatic power element includes a bulb 95 for heat transfer relation with the heated medium which, for example, may be water in a 15 boiler of a hot water supply system. A supporting member 96 has a bore for receiving an end portion of the bulb 95 which is sleeve fitted thereinto and the supporting member 96 also has a relatively small bore 97 in which is screw 20 threaded one end of an open ended tube 98 which extends longitudinally through the bulb 95. The tube 98 connects the interior of bulb 95 with the relatively small bore 97. Intersecting bore 97 externally of the bulb there is a bore 25 in which is threaded an end portion of a conduit 99. The other end of the conduit 99 is threaded into the bellows supporting member 92, the conduit 99 thus connecting the interior of bulb 95 and the interior of the bellows 88. A 30 flexible conduit or sheath 100 is preferably provided for enclosing conduit 99 to protect the same against injury. Opposite ends of the flexible conduit 100 may be inserted in apertures in the bulb and bellows supporting members and may be secured and sealed therein by solder, or other suitable sealing material. The bulb, bellows, and connecting conduit may be charged, preferably under a vacuum, with ethyl alcohol, or any other suitable expansible-contractible fluid.

Disposed within the bellows 88 there is a coil spring 101 which tends to expand bellows 88. The upper end of spring 101 preferably seats against a retainer member 102, the lower face of the retainer having an extended portion for receiving and preventing undue side movement of the upper end of spring 101. The upper face of the retainer 102 is provided with a plurality of upwardly extending, spaced lugs 103 and the lower face of fixed end wall 89 is formed with a 50 downwardly directed extended portion which receives and cooperates with lugs 103 to retain member 102 and therefore the upper end of spring 101 in axial alignment with bellows 88. The lower end of spring 101 rests against the 55 external flange of a retainer 105, the retainer 105 preferably having a tubular portion 106 which extends centrally through spring 101 and toward the upper retainer 102. The lower retainer 105 has a plurality of lugs extending 60 downwardly from its lower face and which surround an upwardly directed, extended portion formed on the movable end wall 90 of the bellows. The upwardly extending tubular portion of lower retainer 105 has an end wall 107 in $_{65}$ which there is provided a centrally disposed aperture through which the shank of a screw 108 extends. The screw 108 is carrried by the upper retainer 102 and has a head disposed within the tubular portion 106 of lower retainer 105. The 70 aperture in end wall 107 is made sufficiently large such that there will be no frictional engagement between the screw and retainer, but is smaller than the diameter of the head of screw 108 so that the latter cannot pass therethrough. The 75 recess, provided in a seating or retainer member

adjacent ends of the upper and lower retainers are adapted to engage to prevent undue collapsing movement of bellows 88, and the head of screw 108 is adapted to engage end wall 107 to prevent undue expansion of the bellows.

Disposed within the casing 66 there is a motion transmitting means for transmitting movement of the thrust member 93 to the valve member 78, and this transmitting means includes three levers or movable operating members 109, 110, and 111 which levers are shown in Fig. 4. The lever 109 may be termed the main lever and the levers **110** and **111** may be termed auxiliary levers. The main lever 109 extends horizontally and longitudinally of the rectangular shaped casing 66 and is disposed adjacent the upper end thereof. Preferably the main lever 109 is formed having substantially parallel, reenforcing side flanges 114 which, when the lever is in operative position, extend downwardly from the lever proper, or horizontally extending portion designated by the numeral 115. The side flanges 114 extend beyond the horizontal portion 115, at one end of the lever, and are provided with aligned apertures 116 for receiving a pivot pin or bearing shaft 117 whose opposite ends may be supported in the opposite side walls 68 and 69 of the casing **66** and preferably adjacent end wall 10. Opposite end portions of the shaft 117 are preferably inserted and supported in aligned removable closure plugs [18 which may be threaded into side walls 68 and 69. In the horizontally disposed lever portion 115 there is preferably provided a downwardly extending, conical shaped indentation 120 for receiving the pointed end of the thrust member 93 which seats therein. Preferably the point of engagement of the thrust member 93 and lever 109 is at a point between the pivot point of lever 109 and the valve mem-40 ber **78**.

In the bottom wall 67 of the casing there is provded a threaded bore 121 whose axis is substantially in alignment with the thrust member 93 and in which there is screw threaded the shank 122 of an adjustable supporting member 123 which supports the lower end of a forceexerting means or coil spring 124. The upper end of the spring 124 seats against the underside of the main lever 109 and surrounds the downwardly extending indented portion 120 which serves to prevent undue lateral movement of the upper end of the spring. The spring 124 is under compression and opposes movement of the thrust member and this spring may be termed the range spring for by changing the force exerted by this spring the temperature range of operation of the device can be changed accordingly.

The main lever 109 extends from its pivot point adjacent the end wall 70, toward opposite end wall 11 and overlies the upper end of valve member 78 in spaced relation thereto. The end of the lever 109 which is disposed toward end wall 71 has an arm or portion 125 which extends substantially perpendicularly and downwardly from horizontal portion 115 and whose lower end portion 126 is preferably bent or offset, and in a manner so that it extends downwardly at an angle to portion 125 and back toward valve member 78 or end wall 70. Carried by the lever 109 and fixed to the offset portion 126 there is a bearing or engaging pin 127 which extends downwardly and toward end wall 71 and which preferably has a pointed end for seating in a conical

128 against the opposite end of which one end of a force-exerting means or coil spring 129 seats. The spring 129 is disposed at an angle to lever portion 115 with its longitudinal axis extending from the seating member 128 downwardly and 5 toward end wall 11, and in the lower end of the spring there may be provided a seating member or retainer 130 similar to retainer member 128. The retainer 130 has a conical recess which is engaged by the pointed end of a screw 131, 10 face of the auxiliary lever 110. The other or threaded into a closure plug 132, which in turn minimum stop screw 147 extends through the is threaded into the end casing wall 11 adjacent bottom wall 67. By means of the screw 131 it will be seen that the compression force of spring 129 can be adjusted, and the force exerted by 15 movement. This screw can be set so as to perthis spring determines the temperature differential that will be obtained as well as acting to aid in actuating the valve member 78. The point of engagement between pin 127 and member 128 is adapted to move over center either side of a line 20 extending from the point of pin 131 through the pivot point of lever 109. When the pointed end of pin 127 is above the above mentioned centerline, the force exerted by spring 129 will tend to pivot lever 109 in a counterclockwise direction 25while when the point of pin 127 is moved below the center line the force of spring 129 will tend to pivot lever 109 in a clockwise direction. Located above the main lever 109 for engagement with its upper face there is a stop member 132* 30 which may be in the form of a pin or shaft and have its opposite ends supported in the opposite side walls of the casing. The stop member 132° thus limits pivotal movement of the main lever 109 in a counterclockwise direction. 35

The auxiliary lever 110, like the main lever 109, is preferably rectangular in shape and constructed of sheet metal. The lever 110 is disposed within casing 66 immediately below and adjacent to main lever 109 and extends horizontally and 40 forcing flanges 154 which extend upwardly when substantially parallel with lever 109. Preferably the auxiliary lever 110 is formed having longitudinal side reenforcing flanges 133 which, when the lever is in operative position, extend upwardly, and preferably the width of lever 110 is 45made such that its upturned side flanges 133 are positioned between the downwardly extending side flanges 114 of main lever 109. The side flanges 133 are provided with aligned apertures 134 adjacent one end of the auxiliary lever 110. 50 for receiving the pivot pin or shaft 117. In the lever proper, or horizontally disposed portion designated by the numeral 135, there is an aperture 136 through which spring 124 extends, and running into aperture 136 and extending toward 55 the free end of the lever there is provided a slot 137 for receiving the valve member 78. The valve member 78 has oppositely disposed flattened portions 139 adjacent its upper end which provide upper and lower shoulders 140 and 141, respec- 60 tively. The width of the slot 137 is made such that the lever will engage the upper shoulder 140 and also so that it is freely movable without frictional engagement with the oppositely disposed flattened portions 139. The lever 110 extends 65 beyond the valve member 78 toward end wall 71, and at a point between its free end and the slot 137 there is provided an opening 143 preferably of rectangular form through which extends the downwardly extending portion 125 of the main 70 lever 109. Preferably the lever 110 has an upwardly disposed offset portion 144 at its free end and in which there is provided a slot 145 which runs out of the end of the lever 110 to thus provide a bifurcated lever end. 75

The cover 12 is provided with two laterally positioned threaded bores for receiving parallelly extending threaded screws 146 and 147 which may be termed maximum and minimum stop members, respectively and which together with the stop member 132^a comprise an abutment means. Lower end portions of the screws project downwardly into the casing, the lower end of screw 146 being disposed for engagement with the upper slot 145 in the end of lever 110 and has a head on its lower end which is adapted to engage with the underside of the lever to limit its downward mit the valve to positively stop flow of fluid through the valve port, or can be set in a position so as to obtain a minimum desired fluid flow. Preferably locking nuts are provided and threaded on the upper ends of screws 146 and 147 externally of the casing, and preferably the upper or externally projecting portion of the screws are enclosed by a cap member 150. The stop members 132⁸, 146 and 147 thus provide parallel spaced stop surfaces.

Disposed within the casing 66 and immediately beneath the auxiliary lever 110 is the auxiliary lever 111. This lever, like the other two levers, is preferably rectangular in shape and constructed of sheet metal. The lever III is horizontally disposed and extends substantially parallel with levers 109 and 110 and is also pivotally supported on the pivot pin or shaft 117. The lever 111 may be formed having upturned, oppositely disposed side flanges or tabs 152 at one end thereof and which may be provided with aligned apertures 153 for receiving the shaft or pivot pin 117. The lever III is also preferably provided with longitudinally extending, substantially parallel reenthe lever [1] is in operative position. In the lever proper, or horizontally extending portion and which is designated by the numeral 155, there is provided an opening or aperture 156 through which the range spring 124 extends. The lever iii is provided with a slot 157 which runs out of its free end and which receives the flattened portion of the valve member 78. The slot 157, like the slot 145 in the upper auxiliary lever 110, is sufficiently wide such that the lever is freely movable without frictional engagement with the flattened portions 139 of the valve member, the width also being such that the lever is adapted to engage the lower shoulder 140 formed on the valve member. At its free end the lever III is preferably provided with upturned flanges or abutting portions 158 whose upper ends are adapted to engage the underside of the auxiliary lever 110.

Surrounding the spring supporting member 123 and the range spring 124 there is a coil spring 162 which has its lower end bearing against the bottom wall 67 of the casing and has its upper end bearing against the underside of the lower auxiliary lever 111. The spring 162 is operable to maintain the auxiliary levers 110 and 111 in engagement and opposes clockwise movement of the levers. Carried by the main lever 109 there is a vertically extending screw or engagement means 160 which is screw threaded into the horizontal portion 115 of the lever and which extends through aperture 136 in lever 110 and toward lower auxiliary lever 111. The lower end of the screw 160 is adapted to engage the upper face of lever []] and when the lever 109 is in engage-

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ment with stop member 132ª the screw 160 is set so that its lower end is spaced from lever iii. By this arrangement it will be seen that the main lever 109 will pivot in a clockwise direction a predetermined distance before it will engage and cause lever 111 to be pivoted, the lever 109 thus gaining momentum before it acts to pivot auxiliary lever 111 against the opposition of spring 162.

The operation of the herein described control 10 device is as follows: When the operating parts are in the position shown in Fig. 1, with main lever 109 against its stop 132° and with upper auxiliary lever 110 against the maximum stop screw 146, the valve member 78 is in open posi- 15 tion, and is being held in open position solely by the spring 162 acting through auxiliary levers 110 and 111. Also, when the valve member 78 is in open position the point of engagement between the supporting member 127 and the spring 20 end member 128 is above center so that the differential spring 129 is opposing the power element. Assume now that the device is set to have an operating range between 155° F. and 143° F. When the temperature of the bulb 95 becomes 25 155° F. the force exerted by the expanded fluid, plus the force exerted by spring 101, will exceed the opposing forces comprising the force of atmospheric pressure, the force exerted by range spring 124, and the force of differential spring 30129 and when this occurs the main lever 109 will begin to pivot in a clockwise direction. Because of the space between the end of adjustment screw 160 and the lever 111, the main lever 109 will move through a corresponding arc before it en- 35 gages and causes lever III to move and during which travel it gains momentum by the breakdown of spring forces. When the main lever 109 engages and causes lever 111 to pivot in a clockwise direction the upper auxiliary lever 110 fol- 40lows lever 111 by reason of its weight and the weight of the valve and thus valve member 78 moves toward closed position. When the main lever has moved to the point where the point of engagement between its bearing member 127 and 45the abutment member 128 moves below center, then the force of spring 129 acts with the power element and lever 109 is pivoted clockwise with a snap-action. Upon a predetermined movement of the lower auxiliary lever 111, it engages with 50 the lower shoulders on the valve member 78 and through such engagement the valve member is held in closed position, assuming that the minimum stop screw 147 is set to permit the valve to seat. When the temperature of the bulb 95 decreases to 143° F. the force exerted by the expansible-contractible fluid, plus the force exerted by spring 101 becomes less than the sum of the opposed forces and the main lever begins to pivot in a counterclockwise direction. During this 60movement spring 162 acts to maintain lever 111 in engagement with the adjustment screw 160 of the main lever and also engages and causes lever 110 to be pivoted in a counterclockwise di-65 rection. However, initial movement of levers 110 and 111 is not transmitted to the valve memher 78 because of the lost motion connection between the levers and the valve member. When the main lever 109 has moved such that the point 70 of engagement of its bearing member 127 and the abutment member 128 moves above center, then the differential spring 129 acts against the power element and the main lever is pivoted counterclockwise with a snap-action. The spring 75 sageway for fluid, a valve member for controlling

162 causes the auxiliary levers to follow the main lever and when the upper auxiliary lever engages the upper shoulders of the valve member the valve member is moved upwardly or to an open position determined by the position of maximum stop screw 146. When the minimum stop screw 147 is set to limit downward movement of the valve member 78 so as to obtain a minimum flow. the operation of the device is substantially as described above except that when the lever 110 engages the head of the stop screw 147 the lower auxiliary lever 111 continues to pivot through its lost motion so that the auxiliary lever 111 moves out of engagement. In this position the upper auxiliary lever 110 is in engagement with the upper shoulders of the valve member while the lower auxiliary lever is held against the lower shoulders of the valve member. When the main lever begins to pivot in a counterclockwise direction the valve member remains stationary until the lower auxiliary lever III engages the upper auxiliary lever and causes the same to pivot. By this time the main lever is moving with a snapaction and the auxiliary levers follow the main lever under the force of spring 162 until lever [10 engages the maximum stop screw 146.

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

1. In a control device having a power element for actuating a controlling means, a supporting means, a main lever fulcrumed on said supporting means and pivoted in one direction by said power element for actuating said controlling means, said lever having an inactive position, resilient means opposing pivotal movement of said main lever by said power element, and an auxiliary lever for engaging and moving said controlling means and movable by said power element through movement of said main lever and engagement of said levers, said auxiliary lever being in spaced relation to said main lever when said main lever is in its inactive position, said resilient means being so positioned relative to said main lever that the force exerted by said resilient means decreases upon movement of said main lever so that said main lever will gain momentum before engaging said auxiliary lever. 2. In a control device having a power element for actuating a control member, a supporting means, a main lever member pivotally mounted on said supporting means and pivotal in one direction by said power element, spring means engaging said main lever member, the point of engagement between said main lever member 55 and said spring means being movable overcenter. a second spring means acting on said lever member to pivot said lever member in the opposite direction, an auxiliary lever member pivotally mounted on said supporting means and carrying said control member, a stop means for limiting movement of said main lever member in one direction, a stop means for limiting movement of said auxiliary lever member in said main lever member one direction, and an engagement means carried by one of said lever members for engagement with the other of said lever members, said engagement means being out of engagement with the other of said lever members when the lever members are against their respective stop means so that the main lever member has a predetermined initial movement before it engages to move said auxiliary lever member.

3. In a control device, a casing having a pas-

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flow through said passageway, a lever member fulcrumed within said casing and having a lost motion connection with said valve member, said lever member being operable upon predetermined movement for engaging and moving said valve member in one direction, spring means operable to pivot said lever member, a second lever member fulcrumed in said casing and having a lost motion connection with said valve member, said second-named lever member being 10 engaging said first-named lever member to limit operable upon predetermined movement to engage and move said valve member in the opposite direction, and a power element for moving said second-named lever member.

4. In a control device, a casing having a pas- 15 sageway for fluid, a valve member for controlling flow through said passageway, a lever member fulcrumed within said casing and having a lost motion connection with said valve member, said lever member being operable upon predetermined 20 movement for engaging and moving said valve member in one direction, spring means operable to pivot said lever member, a second lever member fulcrumed in said casing and having a lost motion connection with said valve member, said 25 second-named lever member being operable upon predetermined movement to engage and move said valve member in the opposite direction, a power element for moving said second-named lever member, a stop member for engagement 33 with one of said lever members to limit movement of said valve member toward open position, and a second stop member for engagement with said one lever member for limiting movement of said valve member in a valve closing direction. 35

5. In a control device having a casing with a passageway for fluid controlled by a valve member, a lever member fulcrumed in said casing and carrying said valve member, said lever member having a lost motion connection with said valve member and operable to engage and move said valve member, a second lever member fulcrumed in said casing and engageable with said first-named lever member to hold the same in engagement with said valve member, said secondnamed lever member having a lost motion connection with said valve member and operable when pivoted in one direction to move said valve member toward closed position, resilient means operable to maintain said lever members in engagement and for moving said valve member toward open position, an overcenter means within said casing operable when moved overcenter in one direction to pivot said second-named lever member to move said valve member toward closed position, means operable to move said overcenter means in said one direction, and resilient means operable to move said overcenter means in the opposite direction.

6. In a control device having a casing with a passageway for fluid controlled by a valve member, a lever member fulcrumed in said casing and carrying said valve member, said lever member having a lost motion connection with said valve member and operable to engage and move said valve member, a second lever member fulcrumed in said casing and engageable with said first-named lever member to hold the same in engagement with said valve member, said secondnamed lever member having a lost motion connection with said valve member and operable when pivoted in one direction to move said valve member toward closed position, resilient means operable to maintain said lever members in en- 75

gagement and for moving said valve member toward open position, an overcenter means within said casing operable when moved overcenter in one direction to pivot said second-named lever member to move said valve member toward closed position, means operable to move said overcenter means in said one direction, resilient means operable to move said overcenter means in the opposite direction, a stop member for movement of said valve member in one direction, and a stop member for engagement with said first-named lever member to limit movement of said valve member in the opposite direction.

7. In a control device, a casing having a passageway for fluid, a reciprocal valve member for controlling flow through said passageway, a lever member fulcrumed in said casing and carrying said valve member, said lever member having a lost motion connection with said valve member and being pivotal for moving said valve member. a second lever member fulcrumed in said casing and having a lost motion connection with said valve member, said second-named lever member being pivotal in one direction for engaging said valve member to urge the same toward closed position, said second-named lever member being pivotal in the opposite direction to engage said first-named lever member, spring means acting on said second-named lever member and operable to hold said first-named lever member in engagement with said valve member to hold said valve member in an open position, a main lever member fulcrumed within said casing and pivotal for engaging and moving said second-named lever member in a valve closing direction, said main lever member having an active and an inactive position and being out of engagement with said second-named lever mem-40 ber when in its inactive position, a spring engaging said main lever member with the point of engagement being movable over center for quickly moving said main lever member to its active and inactive positions, spring means operable to move said main lever member to its inactive position, and a power element operable to move said main lever member to its active position.

8. In a control device, a casing having a pas-50 sageway for fluid, a reciprocal valve member controlling flow through said passageway, a lever member fulcrumed in said casing and carrying said valve member, said lever member having a lost motion connection with said valve member 55 and pivotal to move said valve member toward open position, a second lever member disposed immediately beneath said first-named lever member and having a lost motion connection with said valve member, said second-named lever 60 member being pivotal in one direction to engage said first-named lever member and being pivotal in the opposite direction to engage and urge said valve member toward closed position, spring means urging said second-named lever member 65into engagement with said first-named lever member and operable to move said valve member toward open position, a main lever member fulcrumed in said casing and overlying said firstnamed lever member, a spring acting on said 70 main lever member with the point of engagement being movable overcenter, said main lever member having an active and an inactive position and being pivotal from its inactive position to engage and pivot said second-named lever

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member to move said valve member toward closed position, spring means operable to move said main lever member to its inactive position, and an element operable to pivot said main lever member to its active position.

9. In a control device having a power element for actuating a control member, a supporting means, a main lever member pivotally mounted on said supporting means and movable by said power element for actuating said control mem- 10 ber, spring means acting on said lever member, the point of engagement between said spring means and said lever member being movable either side of a center, and an auxiliary lever member pivotally mounted on said supporting 15 means and operable to move said control member, said main lever member being spaced from motion transmitting engagement with said auxiliary lever member and being positioned for movement into engagement therewith so that said 20 main lever member will have lost motion prior to engagement therewith, said main lever member and said spring being moved overcenter by said power element prior to movement of said control member by said auxiliary lever member 25 so that said main lever member will be in motion upon its operation of said control member thereby to impart a quick movement to said control member.

10. In a control device having a power ele- 30ment, a controlling means, a supporting means. a main lever member pivotally mounted on said supporting means and movable by said power element in one direction, spring means engaging said main lever member with the point of engagement being movable overcenter, resilient means for moving said main lever member in a direction opposite to said one direction, an auxiliary lever member pivotally mounted on said supporting means, said auxiliary lever member having a lost motion connection with said controlling means and being operable for engaging and moving said controlling means toward one position, a second auxiliary lever member pivotally mounted on said supporting means and 45 having a lost motion connection with said controlling means, said second-named auxiliary lever member being arranged to engage said firstnamed auxiliary lever member, and spring means acting on said second-named auxiliary lever 50 member and operable to move said auxiliary lever members and said controlling means toward said one position, said second-named auxiliary lever

member being moved in the opposite direction through engagement therewith of said main lever member for movement of said controlling means toward a second position.

11. A control device comprising a supporting means, an auxiliary lever member journaled on said means, a control means movable upon movement of said lever member, a coil spring opposing movement of said lever member, a main lever member journaled concentrically with and extending parallel to said auxiliary lever member. means to transmit movement from said main lever member to said auxiliary lever member, a spring acting on said main lever member, said auxiliary lever member having an aperture therethrough for transmission of the force of said second-named spring to said main lever member, stop means cooperable with said auxiliary lever member to space said auxiliary lever member from said main lever member, and a power element alined with said aperture and acting on said main lever member to move said main lever member in opposition to said second-named spring.

12. A control device comprising a supporting means, a main lever member journaled on said supporting means, an auxiliary lever member journaled concentrically with and extending parallel to said main lever member, a coil spring under compression and acting on said main lever member, said auxiliary lever member having an aperture therethrough for transmission of the force of said spring to said main lever member. stop means to limit movement of said main lever 35 member by said spring, a coil spring under compression and acting directly on said auxiliary lever member to move said auxiliary lever member toward said main lever member, stop means to limit movement of said auxiliary lever member toward said main lever member, a power element operable to move said main lever member away from said first-named stop means and to move said auxiliary lever member away from said second-named stop means, a thrust member for said power element alined with said aperture and engaging said main lever member, means to transmit the movement of said main lever member to said auxiliary lever member, and control means operatively connected to one of said lever members and movable upon movement of said auxiliary lever member.

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