Feb. 21, 1961 W. S. KUNZLER 2,972,262

CONTROL DEVICE OPERATOR

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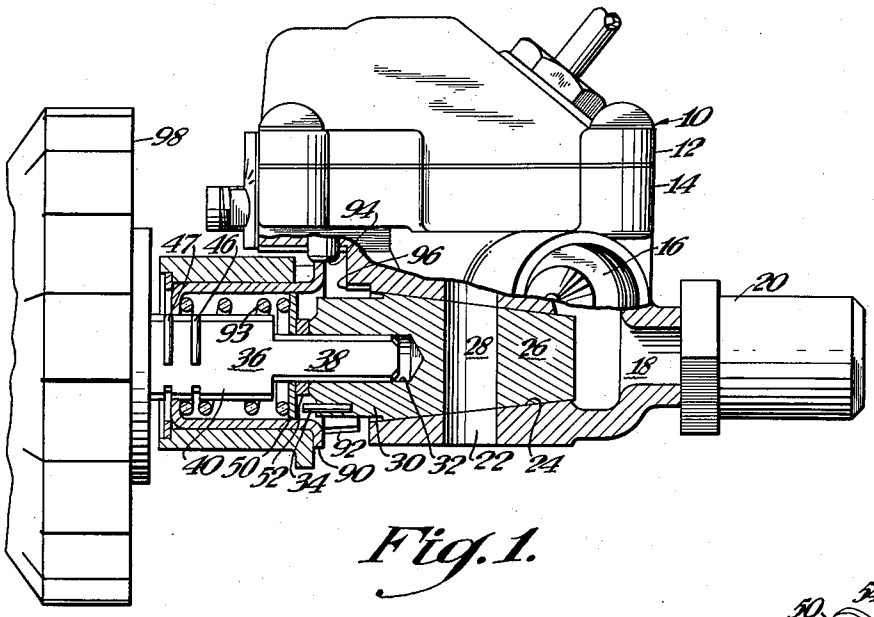


Fig. 1.

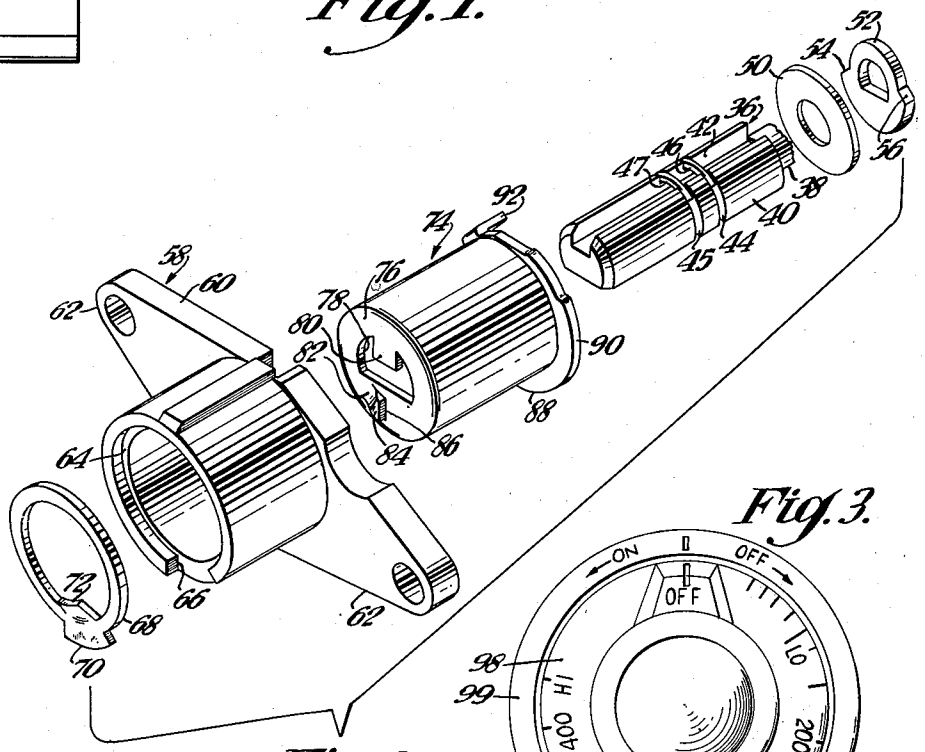


Fig. 2.

Fig. 3.

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CONTROL DEVICE OPERATOR

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This invention relates to control valve constructions for controlling a flow of fuel to a burner and in particular to a dial latch for preventing accidental opening of the valve.

An object of this invention is to separate the locking elements of the actuating mechanism of a control device during normal operation thereof.

Another object of this invention is to eliminate friction between the locking elements of the actuating mechanism of a control device during normal operation thereof.

Another object of this invention is to reciprocate one of the locking elements of a control device operating mechanism during the latching and releasing of the locking elements without reciprocating the dial during the latching operation.

This invention is particularly applicable, although not limited, to a combined gas cock and thermostatic regulating valve device to control the top surface burner of a cooking range appliance. In the preferred construction, an inwardly projecting lug is integrated with one end of a cylindrical cover for a control device housing. A control actuator is operably disposed within the cylindrical cover and is provided with an abutment means which engages the projecting lug to prevent accidental rotation of the control actuator when the same is in its off position. A dial shaft extends into the control actuator and is operatively associated therewith to move the same axially to disengage the locking elements and to rotate the control actuator to a controlling position.

Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings wherein:

Fig. 1 is an elevation view with parts broken away and parts in section of a control device embodying this invention;

Fig. 2 is an exploded perspective view of certain details of Fig. 1; and

Fig. 3 is a front view of the dial of the control device.

As is illustrated in Fig. 1, a housing 10 includes an upper casing 12 and a lower casing 14 secured together by suitable fasteners. The housing 10 is formed with a pilot outlet 16, a main outlet 18 with a hood 20 thereon, and an inlet bore 22. The upper casing 12 includes a thermostatically operated regulating valve means (not shown) to regulate a flow of fuel between the inlet bore 22 and the outlet 18 in accordance with variations from a desired temperature setting. Inasmuch as the regulating valve means may be of any suitable type, further description thereof is deemed unnecessary.

The lower casing 14 is open at its front end and provided with a frusto-conical bore forming a tapered valve seat 24 which bisects the inlet bore 22. A shut-off plug or valve member 26 has a correspondingly tapered surface for cooperation with the tapered seat 24. The valve member 26 is rotatably disposed in the tapered seat 24 and is provided with a through bore 28

which selectively registers with the inlet bore 22 to control the inlet flow of fuel.

Oppositely disposed to its tapered end, the valve member 26 is provided with a valve stem 30 which extends through the front opening in the casing 14. The end of the valve stem 30 has an axial recess 32 along its central axis and an outwardly projecting pin 34 radially offset from the central axis.

A dial shaft 36 has a generally D-shaped cross-section formed by an arcuate portion and a flattened chord portion. The dial shaft 36 has a reduced inner portion 38 which is slidably and rotatably received in the axial recess 32 of the valve stem 30, and an outer portion 40 which is provided with a longitudinal groove 42 on a side opposite the flattened portion. Intermediate its ends, the outer portion 40 is provided with a pair of spaced recesses 44 and 45 extending around the arcuate portion of the shaft 36 and forming mounting recesses for a pair of generally C-shaped spring clips 46 and 47, respectively. Each of the spring clips 46 and 47 has a straight portion which engages the flattened portion of the shaft 36 and an arcuate portion wrich protrudes slightly from its corresponding recess and extends across the longitudinal groove 42.

A ring washer 50 is mounted on the reduced inner portion 38 of the dial shaft 36 and is positioned adjacent, but slightly spaced from the shaft's outer portion 40. A sector plate 52 has a central D-shaped opening corresponding to the D-shaped shaft 36 and is mounted on the reduced inner portion 38 in abutting relation with the ring washer 50 and the end of the valve stem 30. The sector plate 52 is provided with a pair of spaced abutment surfaces 54 and 56 which are spaced approximately 210° apart and which alternately abut the projecting pin 34 to form a lost motion connection for operating the valve plug 26.

A generally cylindrical guide or cover member 58 is open at both ends and a mounting flange 60 on its inner end is provided with apertured ears 62 which receive suitable fastening means (not shown) for securing the cover 58 to the front end of the lower casing 14. Adjacent its outer end, the cover 58 is provided with a substantially annular recess 64 and a radially extending recess 66 projecting outwardly from the recess 64. A lock plate or a ring member 68 has a projection 70 on its outer periphery and a projection 72 on its inner periphery; the projection 70 is received in the recess 66 to align the ring 68 properly in the recess 64 and is secured to the cover 60 by any suitable means, such as staking.

A generally cup-shaped hub member 74 forms a control actuator and is rotatably and slidably disposed within the guide cover 58. The bottom wall 76 of the cup-shaped hub 74 has a D-shaped opening 78 conforming to the D-shaped configuration of the dial shaft 36. A generally square tongue 80 is an integral part of the bottom wall 76 and projects inwardly into the D-shaped opening 78 and is disposed between the two retaining clips 46 and 47, the clip 46 prevents removal of the dial shaft 36 from the completed assembly and the clip 47 engages the tongue 80. Directly below the opening 78, the bottom wall 76 is punched out to form an arcuate tang 82 having a slope or rise 84 and an end stop 86. A peripheral flange 88 extends radially outwardly from the mouth end of the cup-shaped hub 74; one part of the flange 88 has a varying thickness to outline a cam surface 90 and another part has an axially extending tab 92. A coil spring 93 surrounds a part of the dial shaft 36 and is mounted in compression between the ring washer 50 and the bottom wall 76 of the control actuator 74. The biasing force of the spring 93 urges the plug valve 26 in one direction against its tapered seat 24 and urges the control actuator 74 in another direction so that

the flange 88 engages the cover flange 60 which acts as a bearing surface.

The cam surface 90 engages a cam follower 94 which extends into the housing 10 for setting the thermostatic regulating valve at a desired temperature. The tab 92 alternately engages a pair of spaced abutments 96 (only one being shown) which are spaced approximately 80° apart to define the limit of rotation of the rotating mechanism; i.e., approximately 280°.

A control dial 98 is frictionally mounted on the outer portion 40 of the D-shaped dial shaft 36. A periphery of the control dial 98 is formed with suitable indicia corresponding to the various temperature settings of the control device. The temperature setting indicia cooperates with a fixed reference mark on a bezel ring 99.

In its "off" position, the dial 98 is locked against rotation because the end stop 86 of the arcuate tang 82 engages one edge on the projection 72 of the locking member 68. In order to place the control device in operation, the dial 98 is moved inwardly causing inward movement of the dial shaft 36 whereby the spring clip 47 acting on the tongue 80 depresses the control actuator 74 against the bias of coil spring 93. A slight inward movement of the control actuator displaces the arcuate tang 82 from the locking projection 72. While in the depressed condition, the dial 98 is rotated counterclockwise a small increment so that the tang 82 is completely clear of the projection 72. After the initial rotation of the dial 98, additional counterclockwise rotation may be accomplished without retaining the dial in a depressed condition. The dial 98 is rotated approximately 280° to its high position at which point the tab 92 will engage one of the stop abutments 96. Because of its D-shaped configuration, the sector plate 52 rotates with the dial shaft 36; after the initial rotation of approximately 210°, the abutting surface 56 of the sector plate 52 engages the pin 34 on the valve stem 30 so that the last 70° of rotation moves the valve 26 to a full "on" position with its bore 28 in registry with the inlet bore 22.

With the valve member 26 in an open position, gas flows through the housing 10 to a burner where it is ignited by any suitable means, such as a pilot burner (not shown). The dial 98 is then rotated clockwise to any particular temperature setting. During this temperature setting rotation, the sector plate 52 is rotated away from the projecting pin 34 so that the valve member 26 remains in an open position. The particular temperature setting is effected by the cam surface 90 on the control actuator 74 which positions the cam follower 94 to a position corresponding to the desired setting.

When it is desired to turn off the control device, the dial 98 is rotated clockwise to its "off" position. During the last 70° of such clockwise rotation, the abutting surface 54 of the segment 52 engages the projecting pin 34 of the valve stem 30 and thus rotates the valve member 26 to an "off" position. During the final increment of the clockwise rotation, the slope 84 of the tang 82 engages the projection 72 causing inward axial movement of the control actuator 74. As soon as the tang 82 completely clears the projection 72, the bias of the coil spring causes the control actuator 74 to move axially outwardly relative to the dial shaft 36 and the cover guide 58 and thus position the end stop 86 in abutment with the edge of projection 72. With the dial 98 in its "off" position, further clockwise rotation is prevented by the tab 92 engaging the other of two abutment stops.

During the initial movement from the "off" position, the dial 98, the dial shaft 36, and the control actuator 74 are axially moved as a unit and the spacing between the ring washer 50 from the outer portion 40 of the dial shaft 36 provides sufficient clearance for the axial movement thereof. During the final clockwise rotation of the dial 98 to the "off" position, the dial shaft 36 and the dial 98 do not reciprocate because the tongue 80 of the control actuator 74 reciprocates relative to the dial shaft

36 in the space provided between the two spring clips 46 and 47. With such an arrangement, there is no axial movement of the dial 98 to the hand of an operator so that the dial 98 may be manually turned with a smooth, unbroken rotary movement.

It is only during the final clockwise movement of the dial 98 to the "off" position that there is any frictional engagement between the tang 82 of the control actuator 74 and the locking projection 72. During all other times of rotation, the tang 82 is completely clear of the projection 72 so that friction therebetween during rotation has been eliminated. Although the tab 72 is shown as being slightly inclined outwardly in Fig. 2, it should be noted that this inclination is solely for the purposes of manufacturing tolerances and/or clearances and the locking means would function in a described manner with the projection 72 in the same plane as the locking ring 68.

Inasmuch as this disclosure is subject to various changes in structural details and in the reversal of parts, it is intended that the foregoing description and drawings be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a control device, the combination comprising a housing, control means in said housing movable between a plurality of controlling positions, a generally hollow cover member mounted on said housing, a control actuator slidably and rotatably disposed in said hollow member and being operatively associated with said control means, cam means carried by said control actuator, follower means for said cam means including control operating means operatively associated with said cam means to be selectively positioned thereby, a dial shaft having a portion extending into said hollow member and being operatively connected to said control actuator for unitary rotation therewith, resilient means engaging said control actuator and biasing the same into engagement with said hollow member, projection means carried by said hollow member, and abutment means on said control actuator for engaging said projection means and locking said control actuator against rotation, said abutment means and said projection means being disengageable by axial movement of said dial shaft and said control actuator.

2. In a control device, the combination comprising a housing having an opening at one end, control means in said housing movable between a plurality of positions, cover means including projection means and being mounted on said housing adjacent the opening therein, a control actuator slidably and rotatably disposed within said cover means and being operatively associated with said control means, cam means on said actuator, cam follower means including control operator means operativeliy associated with said cam means and being selectively positioned thereby, a dial shaft having a portion extending into said cover means and being slidably and non-rotatably connected to said control actuator, means carried by said dial shaft and cooperating with said control actuator whereby axial movement of said dial shaft causes axial movement of said control actuator, abutment means on said control actuator and engaging said projection means to lock the said control actuator and said dial shaft against rotation, and resilient means mounted in said control actuator and biasing the same into engagement with said cover means whereby axial movement of said dial shaft and said control actuator disengages said abutment means from said projection means to permit rotation of said dial shaft and said control actuator.

3. In a control device, the combination comprising a housing, control means in said housing movable between a plurality of controlling positions, a generally hollow member for said housing securely fastened thereto, a control actuator slidably and rotatably disposed in said hollow member and being operatively associated with said

control means, a cam surface on said control actuator and being rotatable thereby, cam follower means including a control operating element operatively engaging said cam surface and being moved thereby to a selected position, a dial shaft having a portion extending into said hollow member and being operatively connected to said control actuator for rotating the same from an initial position through a plurality of control positions, projection means carried by said hollow member, abutment means on said control actuator for engaging said projection means and locking said control actuator against rotation in the initial position, and resilient means engaging said control actuator and biasing the same into engagement with said hollow member, said abutment means and said projection means being disengaged by axial movement of said dial shaft and said control actuator and being separated during rotation of said control actuator to eliminate friction between said two last mentioned means during such rotation.

4. In a control device, the combination comprising a housing having an opening at one end, control means in said housing movable between a plurality of controlling positions, a cover member having a cylindrical portion and being mounted on said housing adjacent the opening therein, locking means carried by said cover member, a control actuator slidably and rotatably disposed within said cover member and being operatively associated with said control means, a cam surface integrally formed on said control actuator, cam follower means including a selectively positioned control operator engaging said cam surface and being movable thereby in response to rotation of said control actuator, abutment means carried by said control actuator and cooperating with said locking means to lock said control actuator against rotation, a dial shaft extending into said cover member, an operative connection between said dial shaft and said control actuator whereby said dial shaft and and said control actuator are slidably and non-rotatably connected, resilient means engaging said control actuator and biasing the same into engagement with said cover member, and means carried by said dial shaft and cooperating with said operative connection whereby said dial shaft and said control actuator move axially as a unit when said dial shaft is depressed axially and whereby said control actuator moves axially relative to said dial shaft when rotation of said dial shaft and said control actuator commences engagement of said abutment means with said locking means.

5. The combination as recited in claim 4 wherein said operative connection comprises a tongue and groove connection between said dial shaft and said control actuator.

6. In a control device, the combination comprising a housing having an opening at one end, control means in said housing movable between a plurality of controlling positions, a cover having a cylindrical portion and being secured to said housing adjacent the opening therein, a tab member carried by said cover and projecting radially inwardly, a generally cup-shaped control actuator slidably and rotatably disposed within said cylindrical portion and having a peripheral flange adjacent to its mouth in an opening in its bottom wall, a cam surface on said peripheral flange, a control operator follower extending into said housing and having one end engaging said cam surface whereby said control operator follower is selectively positioned by rotation of said control actuator, resilient means engaging said control actuator and biasing the flange thereon against said cover, a dial shaft extending through the opening in said control actuator and being operatively connected to said control actuator for unitary rotation therewith between on and off positions, a tang outwardly projecting from the bottom wall of said control actuator and engaging said tab member to lock said control actuator and said dial shaft against rotation when said dial shaft is in the off position, a tongue member formed in the bottom wall of said control actuator, a groove formed in said dial shaft and receiving said tongue member to form a slidable connection between said dial shaft and said control actuator, said tongue being slidable in said groove to permit axial movement of said control actuator relative to said dial shaft when rotation of said dial shaft to its off position effects engagement of said tang with said tab member, and retaining clip means carried by said dial shaft and engaging said tongue member whereby said dial shaft and said control actuator move axially as a unit when said dial shaft is depressed to disengage said tang from said tab member.

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