Sept. 23, 1952 C. E. TALLY 2,611,383

AUTOMATIC WATER CUTOFF AND DRAIN

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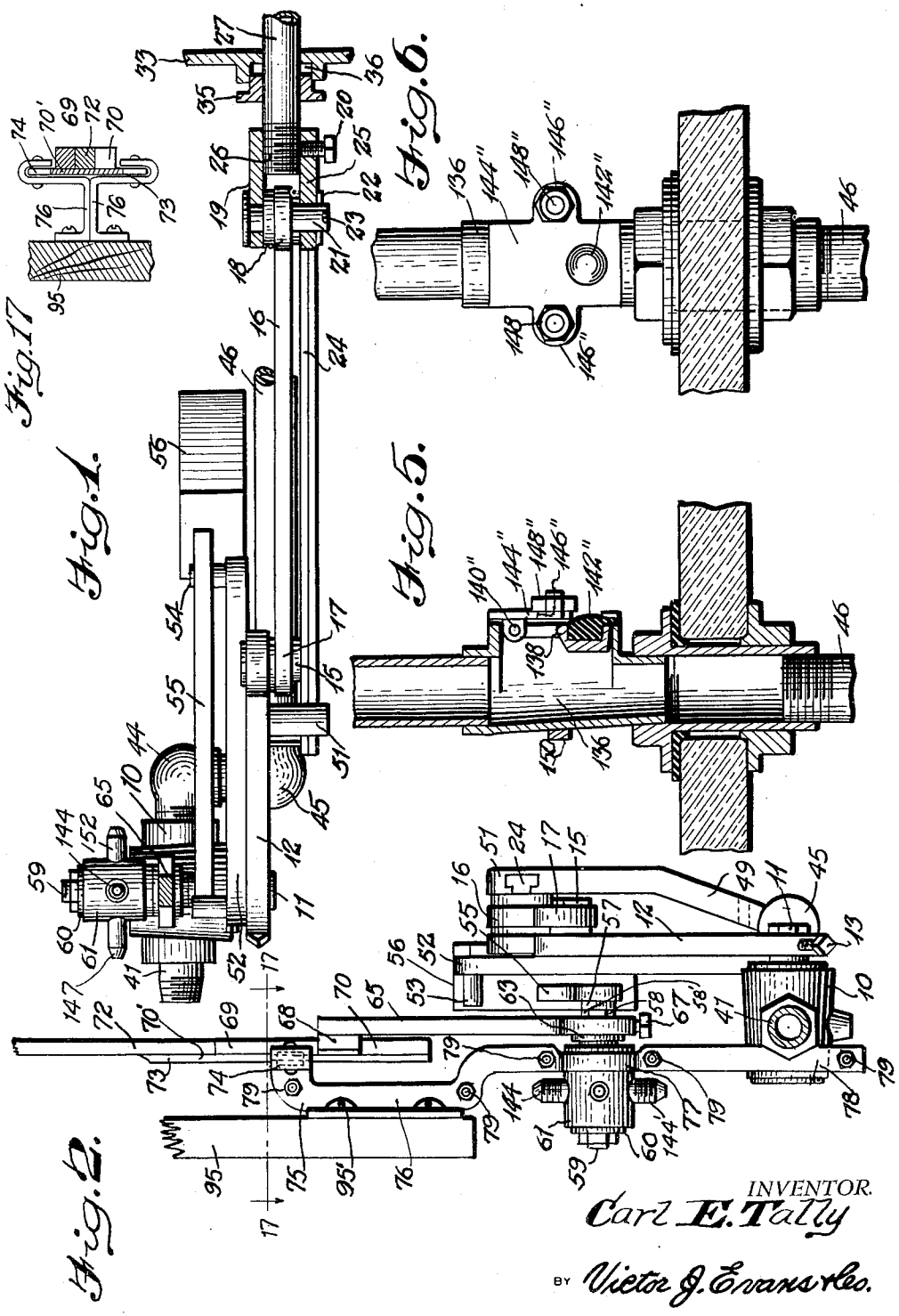


Fig. 1.

Fig. 2.

Fig. 5.

Fig. 6.

Fig. 17

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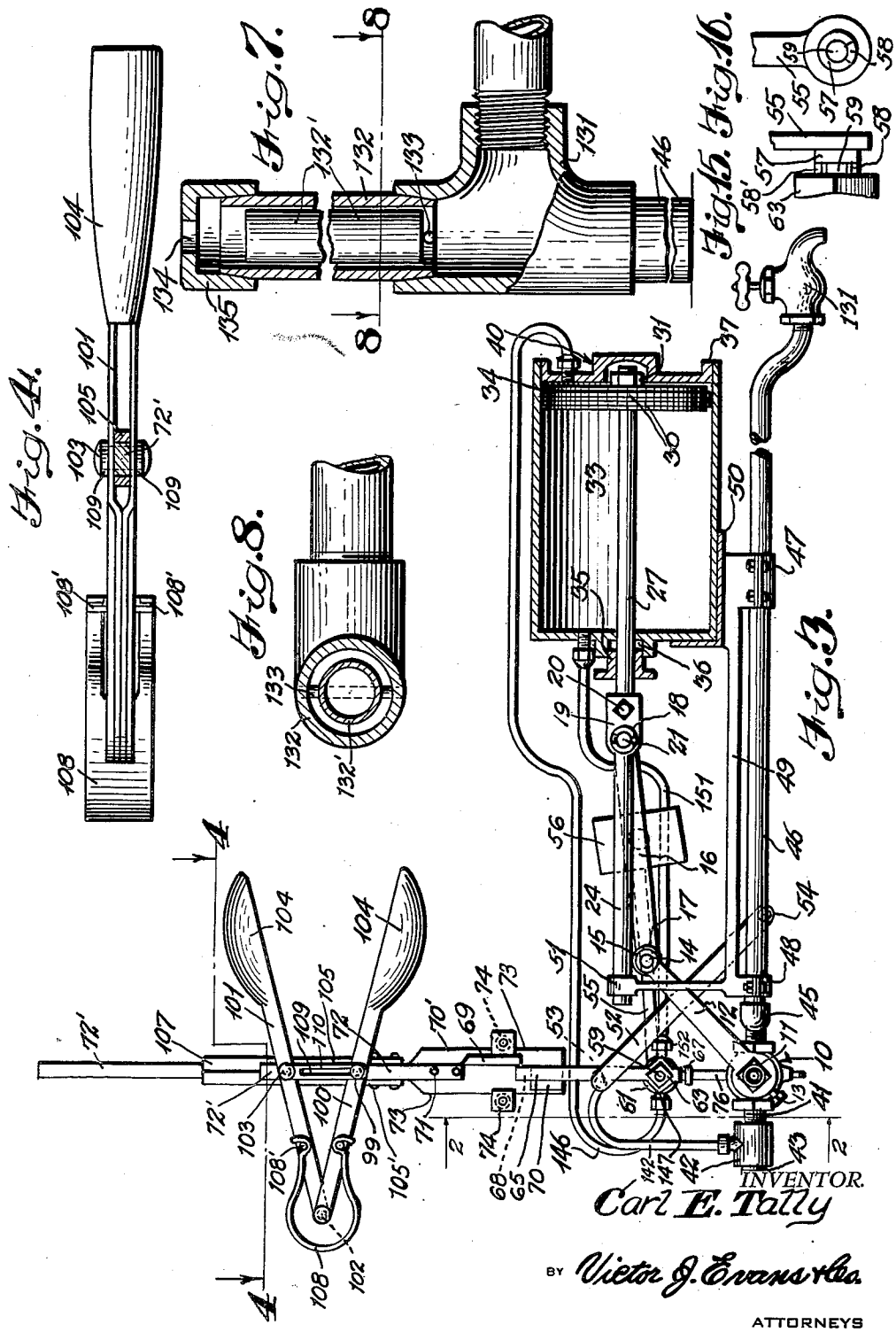
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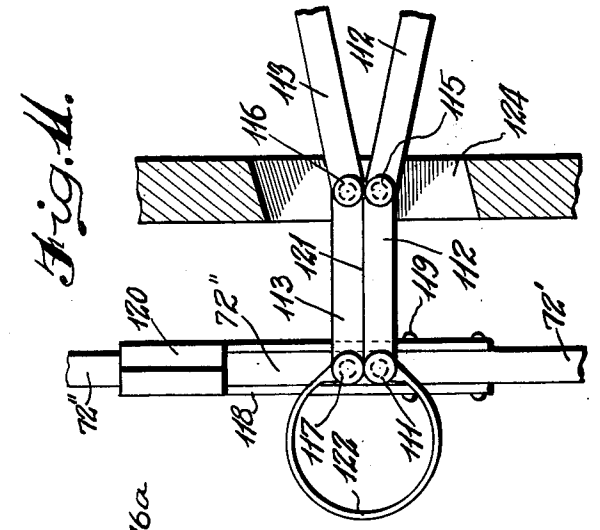


Fig. 11.

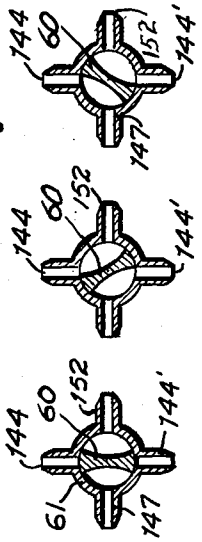


Fig. 12. Fig. 13. Fig. 14.

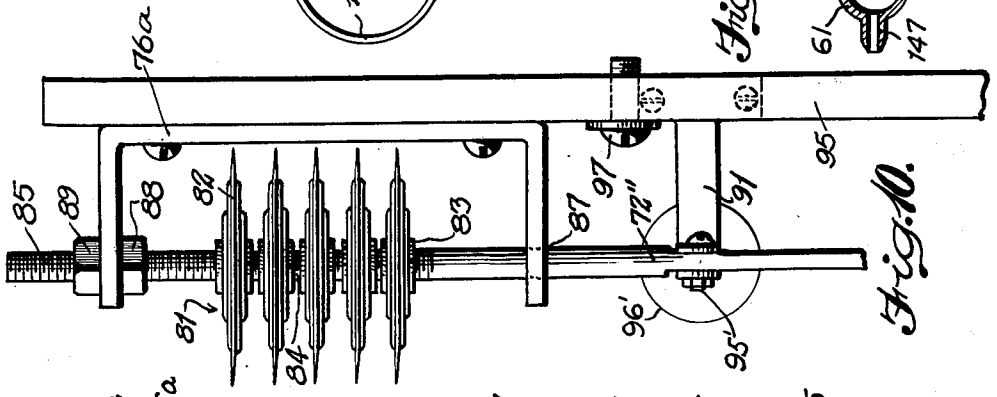


Fig. 10.

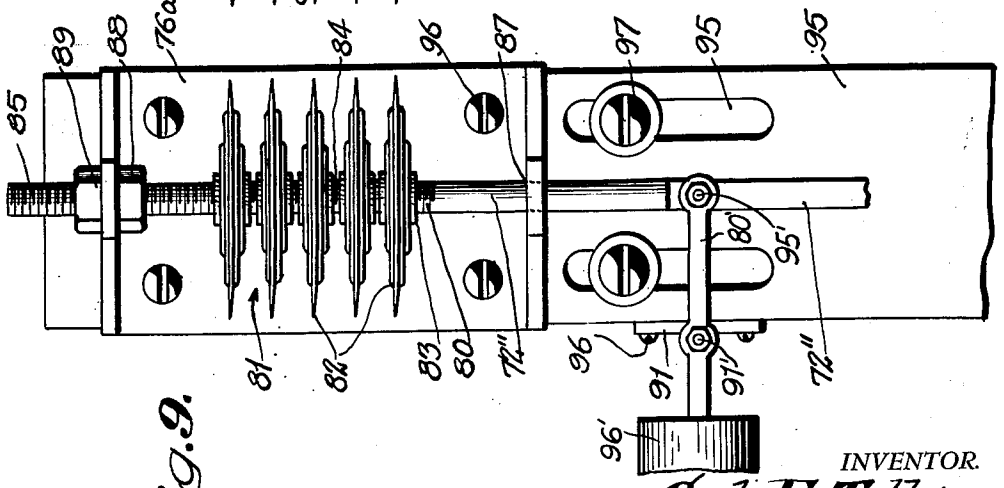


Fig. 9.

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UNITED STATES PATENT OFFICE

2,611,383

AUTOMATIC WATER CUTOFF AND DRAIN

Carl E. Tally, Cleburne, Tex.

Application August 7, 1946, Serial No. 688,812

1 Claim. (Cl. 137—61)

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The invention relates to an automatic water control valve, and more especially to an automatic cut-off and drain mechanism.

In almost all water supply systems, business, residential or otherwise, there is in common use, a water cut-off or a stop-and-waste valve, which is manually operated to cut off the water supply, and thereby open the waste vent in the valve. It is also the usual custom to manually open all hydrants connected to such system, to afford drainage in sub-freezing weather. The primary object of the present invention is the provision of a device or mechanism of this character, wherein the manual operations are eliminated, and such operations are automatically, positively and simply completed.

Another object of the invention is the provision of mechanism or a device of this character, which is simple in construction, thoroughly reliable and efficient in operation, strong, durable, novel in construction, unique in the assembly of its parts, which are few in number, and inexpensive to manufacture and install.

In the accompanying drawings:

Figure 1 is a top plan view, partly broken away, of a portion of the device constructed in accordance with the invention.

Figure 2 is an end elevational view thereof.

Figure 3 is a side view thereof, with certain parts added, some parts broken away and others in section.

Figure 4 is a sectional view taken on the line 4—4 of Figure 3 looking in the direction of the arrows.

Figure 5 is a fragmentary vertical sectional view showing a commode drain adapted to be used with the device.

Figure 6 is a side elevation thereof.

Figure 7 is a side view, partly broken away, of another type of drain adapted for use with the device.

Figure 8 is a sectional view taken on the line 8—8 of Figure 7, looking in the direction of the arrows.

Figure 9 is a front elevation of a thermostat for association with the device.

Figure 10 is a side view thereof.

Figure 11 is a side view of a manually operated scissorslike control for the device.

Figures 12, 13 and 14 respectively are detail cross-sectional views through a valve, forming part of the device, in different adjusted positions.

Figure 15 is a fragmentary side view of the hub portion of the weight operating lever.

Figure 16 is a front view of the same.

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Figure 17 is a sectional view taken on line 17—17 of Figure 2.

Similar reference characters indicate corresponding parts throughout the several views in the drawings.

Referring to the drawings in detail, 10 designates a cut-off valve (or standard stop-and-waste valve), having a squared head 11 to which is attached a lever 12 by a set screw 13. This lever 12 has at its opposite end an opening 14 through which is fitted a bolt 15 forming connection with a rod 16 through its apertured end 17. The other apertured end of the rod 16 has connection with the apertured bifurcated or forked cross-head 19 by a pin 21, as shown more clearly in Figure 1, with a washer 22 and a cotter pin 23 respectively. The cross-head 19 has a guide bar 24 and at its base a tapped aperture for receiving the threaded end 26 of a piston rod 27, locked by the set screw 20. The piston rod 27 has a threaded tapered end inserted in the piston 30 and secured to it by a nut 31 on the threaded end of the rod 27.

The piston 30 is slidable within a cylinder 33 and is fitted with the usual piston rings or piston packing 34. The cylinder 33 is fitted with a packing nut 35 and a packing 36 respectively. This cylinder 33 is closed by a cylinder head 37 which is provided with the central projecting formation 40 having a recess for receiving the nut 31, and the external formation of the projection 40 is nut shaped to facilitate the applying and removing of the head 37.

The cut-off valve 10 has a nipple 41 (Figure 3) connecting with a T 42 having connection at 43 with a city water-main or source of water supply not shown. Also, the opposite end of the valve 10 has fitted thereto, two elbows 44 and 45 respectively, to off-set a pipe 46 to avoid contact with a lever and its weight hereinafter described. The pipe 46 is representative of the piping system to be protected by the device.

The elbow 45 has fitted thereto the pipe 46 to the various outlets as desired, and this pipe 46 has clamped thereto, as at 47 and 48 respectively, a supporting bracket 49, having one end formed as at 50, to receive a portion of the end and bottom of the cylinder 33, while the other end extends upward and forms a guide 51 for the guiding bar 24 to keep the piston 30 from canting while in motion.

The lever 12 carries a rigid cross-arm 52 having at each end rigid protruding pins 53 and 54, respectively, for the purpose of elevating the weight lever 55 carrying a weight 56 having a

function to appear. The lever 55 at its end opposite the weight 56 is provided with a hub 57 of cylinder shape, having a laterally-projecting circumferentially-extending lug 58, as best shown in Figures 15 and 16 of the drawings. This hub 57 is pivoted on the round protruding end 59 on the valve core 60 which works within a four-way valve body 61, the core 60 being formed with a square head 63 (Figure 15) from which protrudes the round end 50. At the intersection of the said square head 63 and the round end 59 is a laterally-projecting circumferentially-extending lug 58' on the valve core adapted to contact with the lug 58 on the hub 57 to turn the four-way valve body 61 to the proper open or closed positions in a manner to appear, the lugs 58 and 58' being shown in Figures 2 and 15, respectively, of the drawings. A lever 65 is held rigidly on the square head 63 by a set screw 67.

The upper end of the lever 65 carries a lateral lug 68 (Figure 2) working in connection with stop lugs 69 and 70, respectively, carried on either side of the said lug 68 by a connecting plate 70' having connection thereto by rivets 71, a square bar 72 to which are attached as extensions thereof the bars 72' and 72'', to be hereinafter described. The side edges 73 on the plate 70' slide vertically within a guide 75 (Figure 2) having two opposing rollers 74. The guide 75 is a two-piece bracket formed from pieces 76, 76' (Figure 17) each of which carries rollers 74. The bracket pieces 76, 76' are formed around the larger end of the four-way valve body 61, as at 77 in Figure 2 of the drawings, and such bracket pieces extend further downward and have their lower portions formed around the smaller end of the cut-off valve 10, as at 78. The said bracket pieces 76 and 76', either forged or cast, are held together by the bolts 79, and also function to hold the valve body 10, the four-way valve body 61 and the plate 70' in alignment.

The square bar 72'' (Figures 7 and 10) forming a continuation of bar 72' (see Figure 11) extends upwardly and at 80 is in threaded connection with a thermostat 81 (Figures 9 and 10) formed of a multiple of discs 82 filled with fluid, such as mercury, alcohol or other suitable expanding and contracting fluid. Each disc 82 has tapped hubs 83. The bottom-most disc 82 is threaded on the end 80 of the bar 72''. Short connecting threaded studs 84 are threaded to the stud 85 which has its upper end held firmly to the bracket 76a by an adjusting nut 88 below and another adjusting nut 89 above the bracket, holding the thermostat at an adjusted position and with it the bars 72, 72' and 72'' which in turn support the plate 70' carrying the stop lugs 69 and 70 controlling the pivotal movement of the lever 65 in its swingig movements in a manner to appear. The bar 72, being thermostatically controlled by 81 will raise or lower plate 70' to release the lug 68 on lever 65 to operate the four-way valve 61 in a manner to be explained.

A bracket 91 and the bracket 76a are held in rigid vertical position by a member 95, preferably of wood, as the same is non-expansive, which is secured to an outer wall or other support by screws 97, loosely, through the vertical slots 95'' to allow for settling of the residence or other carrier, thereby not affecting the thermostat 81, relative to its position with the valve operating controls, and the lugs 69 and 70. The bracket 91 is secured to the member 95 by screws 96 and supports a pin 91' on which is pivoted a lever 80' having one end pivoted to the bar

72'' by a pivot pin 95' and its other end weighted by a counterbalance weight 96' for the purpose of counterbalancing the weight of the bars 72'', 72', 72, 70 and all parts carried thereby. The square bar 72 (Figure 3) extends upward from its lower end connection by the rivets 71 with the plate 70', and ends with a pivot 99 which pivotally carries the lower handle 100 being connected with another handle 101 by means of a pivot pin 102. The handle 101 carries a pivot pin 103 vertically opposite the pivot 99. The pivot pin 103 is fixed to the lower end of the square bar 72' (Figure 3). The opposing handles 100 and 101 carry suitable hand grips 104 for a purpose to appear. The square bar 72 carries an alignment member 105 (Figures 3 and 4) secured to the said bar by rivets 105', the upper end of the member 105 being formed as a sleeve 107 for telescopically fitting over the lower end of the bar 72' as shown in Figure 3. The two handles 100 and 101 are provided with pins 108' which carry an expanding spring 108, and the rivets 103 pivotally carry a pair of depending bars 109 which are provided with slots 110 within which are slidably received the pivots 99. This allows the handles 100 and 101 to be pivoted towards each other on pivot pins 102 by manually forcing the hand grips 104 together. Reverse movement or separation of the handles 100 and 101 is limited by the lower end of each slot 110 coming in contact with the rivet 99 by reason of the expanding force of the spring 108. The square bar 72' of Figure 3 extends upward terminating, as shown in Figure 11, in a pivot pin 111 upon which is pivoted the lower lever 112 having a handle 112', forming one element of a scissors-like element for moving bar 72'' relative to bar 72'. To the oposite end of the bar 72'' is secured by rivets 119 an alignment member 118 having a sleeve 120 through which slides the lower end of the square bar 72'', the end of which is provided with a pivot pin 117 on which is pivoted the complementary lever 113, having a hand grip 113', for the scissors-like element. The handles 112 and 113 are biased closed, as at 121, by the contractive flat spring 122, fixed to the pivot pins 111 and 117. The bar-lengthening element formed by the levers 112 and 113 enters the residence or other building immediately above the floor line through an adequate slot 124 and these levers are pivoted to the building by the pins 115, 116, respectively. The levers are manually operated, through an opening cut in the inner wall or base, not shown.

The bar 72'' of Figure 11 continues upwardly and terminates in the threaded end 80 (Figures 9 and 10) which connects with the thermostat previously described. The pipe 46 continues to a conventional faucet drain 131. In place of the manually-operated drain 131, the drain device of Figures 7 and 8 may be used. The pipe 46 is attached to a T connection 131' having a casing 132 within which a float 132' is caged by a cross wire 133 for controlling a port 134 in the upper end or cap portion 135 of the casing 132.

In Figures 5 and 6 of the drawings, there is shown a type of drain 136 for use with the device or mechanism, and is especially designed for commode tanks or the like, not shown, and includes a swing valve 138 pivoted at 140'' formed with a resilient button 142'' abutting an apertured plate 144''. The ears 146'' of the plate 144'' are secured by bolts 148'' of a yoke 150.

In the operation of the device or mechanism, the thermostat is acted upon by the atmospheric

temperatures. By adjustment of the nuts 88 and 89 (Figures 9 and 10) the structure composed of the bars 72, 72' and 72'', and the plate 70' carrying the stop lugs 69 and 70 is initially adjusted relative to the side lug 68 on the lever 65. As shown in Figure 3 of the drawings, the raising or lowering of this structure by the nuts 88, 89 determines the relative initial position between the stop lugs 69, 70 and the side lug 68. In Figure 3 the stop lug 69 is engaging the side lug 68. If for example the atmospheric temperature should drop to 32 degrees, the thermostat 81 will contract and raise the plate 70', lifting the stop lug 69 above the side lug 68 to release it, whereupon the lever 65 is free to be tilted, in a clockwise direction in Figure 3, by the lever 55, which is biased in a clockwise direction, shown in Figure 3, by the weight 56. The lever 55, as shown in Figures 15 and 16, has the hub lug 58 initially in contact with the lug 58' on the stem of the four-way valve core 60 and actuates the four-way valve as the weight moves clockwise from the position shown in Figure 3 downwardly until the lever 55 contacts the pin 54 on the cross-arm 52 carried by the lever 12. In so moving downwardly, the lever 55 moves the four-way valve core 60 from closed position, shown in Figure 12, to the left open position, shown in Figure 14 whereby water in the pipe 142, connected by the T 42 to pipe 43, enters the four-way valve through the top nipple 144 and leaves the valve through side nipple 147 to enter the pipe 146 for application to the right hand end of the cylinder 33 against the piston 30, actuating the piston rod 27 to move the lever 12 to the left in Figure 3 approximately 90 degrees, whereupon the cut-off valve 10 is moved from cut-on (shown in Figure 3) to a cut-off. As the valve 10 is turned counterclockwise in Figure 3 by the lever 12, the pin 54 is also raised since its arm 52 is carried by the lever 12. Raising of the pin 54 will then lift lever 55 and its weight 56 past top vertical center, whereupon it will flop further to the left in Figure 3 by gravity to a position approximately 36 degrees beyond top center. At this point the lugs 58 and 58' carried by the hub 57 on the lever 55 and the four-way valve core 60 will come into contact, while the weight continues its fall to this 36 degree position, and thus also moves the lever 65 back to its starting point of Figure 3 whereupon its lug 68 will strike the stop lug 70 which was raised when the thermostatic device 81 was contracted by the fall in temperature and lifted the plate 70' and its stop lugs 69 and 70. With stop lug 70 in the path of the side lug 68, it thus stops the four-way valve core 60 at its cut-off position of Figure 12. The drain 131 allows any water in the water system represented by pipe 46 to be drained off to prevent freezing of the water therein. The nipple 144' of valve casing 60 is open to the atmosphere to allow the water from cylinder 33 to drain.

When the temperature rises about 32 degrees, the thermostatic device 81 will expand, causing plate 70' and its stop lugs 69 and 70 to drop. In so doing, the lower stop lug 70 will free the lever 65 to complete its counterclockwise movement, in Figure 3, under the influence of lever 55, to turn the valve core 60 to the position of Figure 13 whereupon water, already in pipe 142 will pass into the valve body 61, as heretofore explained,

and not through nipple 152 into pipe 151 to force the piston 30 from the left hand end of cylinder 33 to its right hand end causing valve 10 to open to furnish water, for the piping system represented by pipes 46. When lever 65 is freed by lug 70 for counterclockwise movement, it falls to the left in Figure 3 until it strikes pin 53. When valve 10 is opened, the parts resume the position shown in Figure 3.

The manually operated handles 100 and 101 are for raising the plate 70' to release the side lug 69 from contact with the lug 68 for a valve test operation, prior to freezing weather. The other manually operated levers 112 and 113 (Figure 11) are for lowering the plate 70' to release the side lug 70 from contact with the lug 68 during sub-freezing weather to obtain a supply of water, then when these levers are manually released, the device or mechanism will again cut off the water and drain the pipes automatically, as before described.

I claim:

In combination, a cut-off valve, a lever having one end connected to said valve and provided with an opening in its other end, a rod having an apertured end arranged contiguous to said opening, a securing element connecting said apertured end to said lever, a crosshead mounted on said rod, a guide bar extending from said crosshead, there being a tapped aperture in said crosshead, a piston rod having a threaded end engaging said tapped aperture, a cylinder, a piston reciprocably arranged in said cylinder and mounted on said piston rod, a head closing an end of said cylinder, a nipple extending from one end of said cut-off valve, a T connected to said nipple for receiving water from a source of supply, a pipe leading from the opposite end of said cut-off valve, a bracket mounted on said pipe for supporting said cylinder, a portion of said bracket forming a guide for said guide bar, a crossarm carried by said lever, pins projecting from each of said cross-arm, a weight lever adapted to be elevated by said pins and having a counterweight mounted thereon, a hub on said weight lever, a four-way valve body including a core having an end engaged by said hub, conduits leading from said four-way valve to said cylinder and to said T, thermostatic control means coacting with said weight lever to operate said four-way valve core when freezing temperature exists, and manually operable means for actuating the four-way valve core independent of the thermostatic control means.

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