Feb. 17, 1942. F. A. KOMMER ET AL 2,273,205

FUEL CONTROL DEVICE

Filed Jan. 26, 1940 3 Sheets-Sheet 1

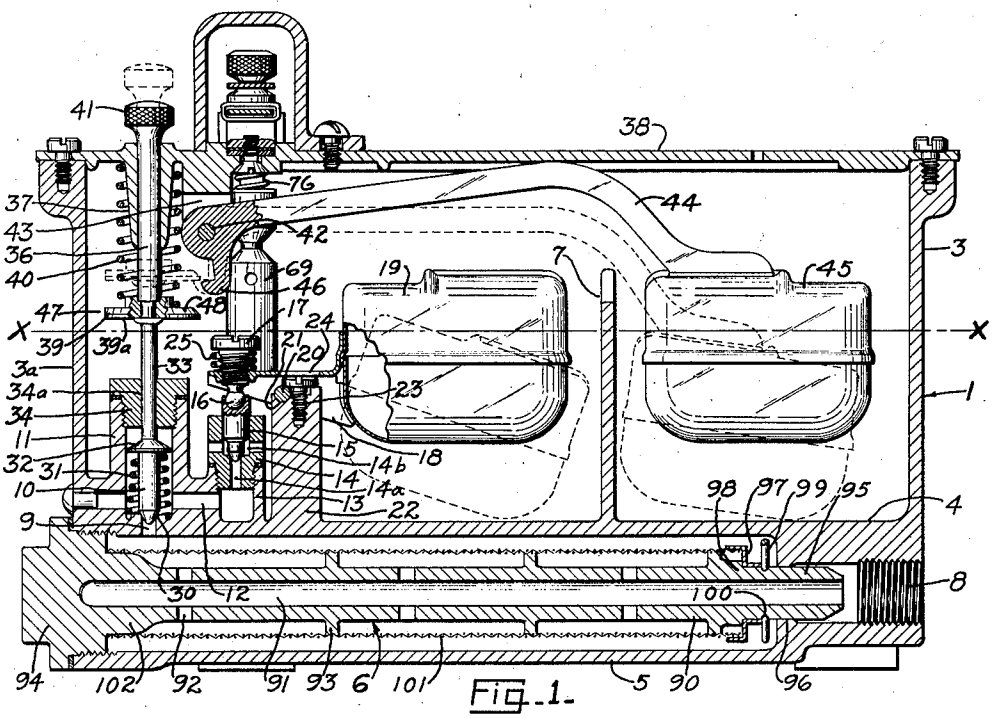


Fig. 1.

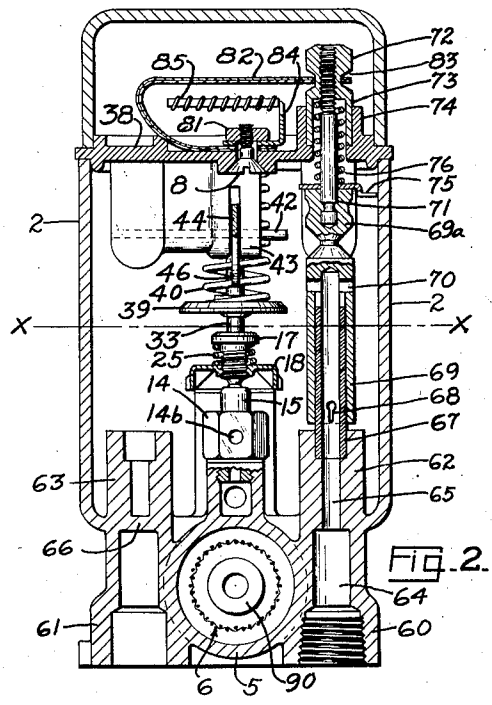


Fig. 2.

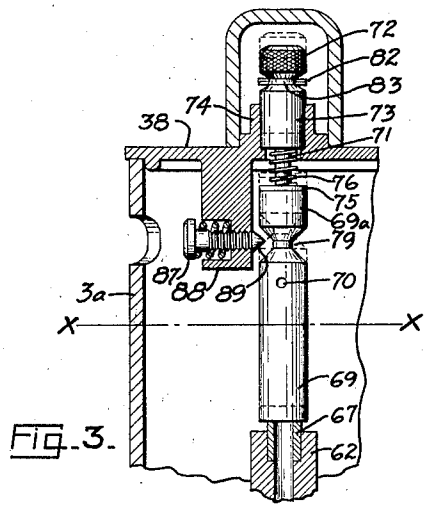


Fig. 3.

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Filed Jan. 26, 1940 3 Sheets-Sheet 2

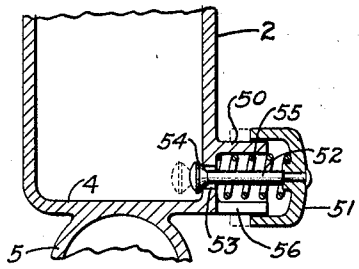


Fig. 4.

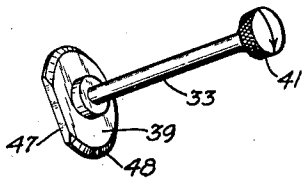


Fig. 5.

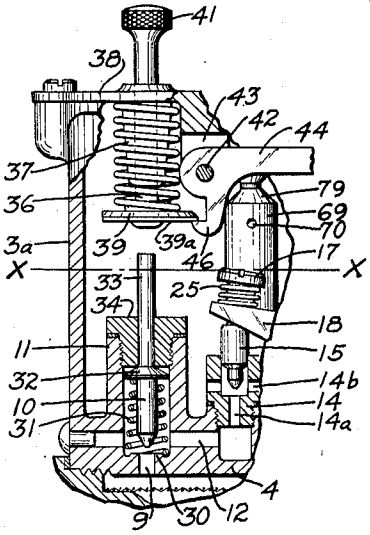


Fig. 6.

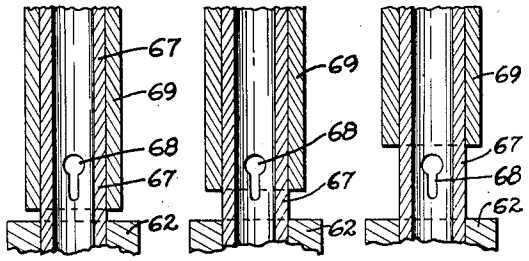


Fig. 7. Fig. 8. Fig. 9.

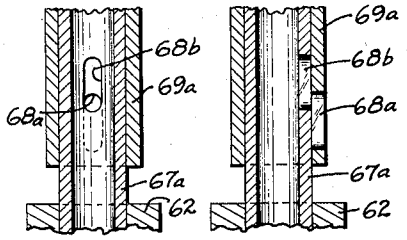


Fig. 13. Fig. 14.

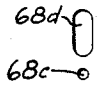


Fig. 15.

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Filed Jan. 26, 1940 3 Sheets-Sheet 3

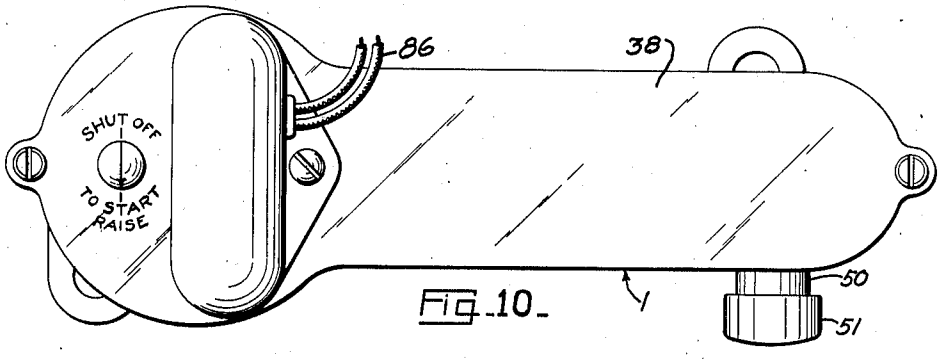


Fig. 10.

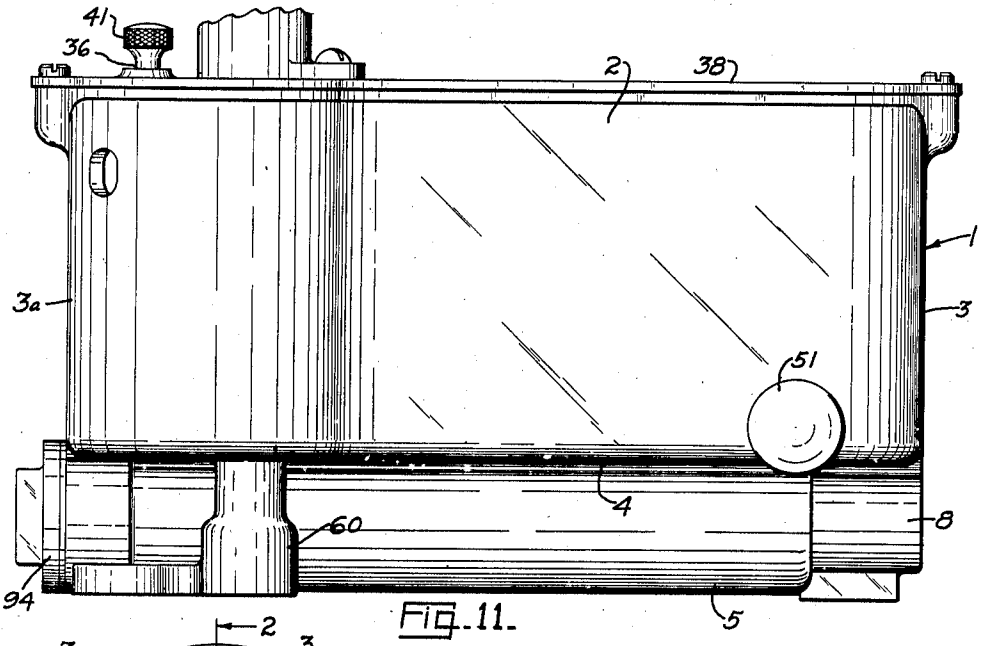


Fig. 11.

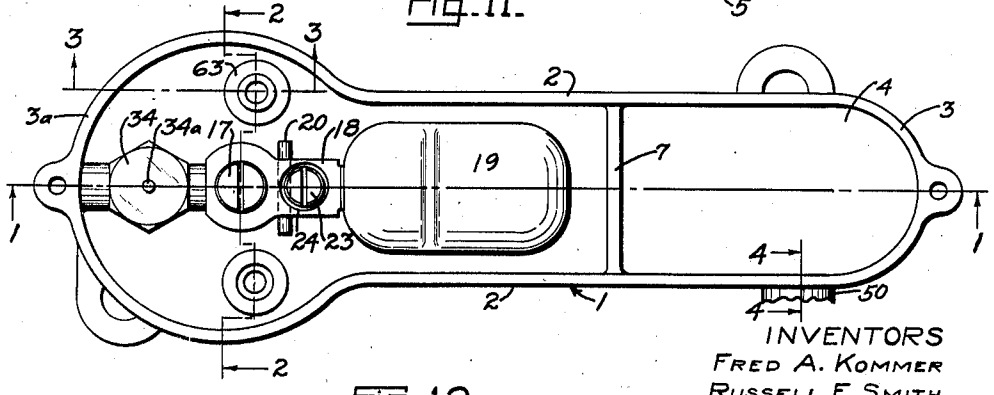


Fig. 12.

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UNITED STATES PATENT OFFICE

2,273,205

FUEL CONTROL DEVICE

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Application January 26, 1940, Serial No. 315,724

5 Claims. (Cl. 137—68)

This invention relates to fuel supply devices for oil burners and the like and more particularly to the provision of a combination constant level chamber, fuel metering control, and safety device.

In oil burner installations of the gravity feed type, there is customarily provided an elevated fuel storage tank and a vented constant level chamber in which the fuel is maintained normally at a level slightly above the high fire level in the burner. The oil is fed by gravity to the burner through a suitable metering orifice, manually or automatically controlled. A safety device is also desirable to shut off the fuel supply to the constant level chamber in the event of faulty functioning of the float valve mechanism, whether due to failure of the needle valve to seat properly or damage to the float.

Combination constant level chamber and safety devices as heretofore devised have been complicated and expensive so that their use, particularly with small, domestic heating plants, has been limited.

An object of the present invention is to provide a device of the above character that is simple, compact, positive in operation and economical to manufacture.

Another object is to provide safety cut-off mechanism for a fuel supply device having easily accessible means for manually tripping the cut-off valve.

Another object is to provide a novel, adjustable float valve mechanism for controlling the constant fuel level.

Another object is to provide a simple, effective drain valve for the over-flow chamber.

Another object is to provide a novel filtering screen arrangement which may be removed as a unit without affecting other parts of the device and which is self-cleaning during disassembly thereof.

The invention resides in the improved construction and combination of parts hereafter described and illustrated in the accompanying drawings in which:

Fig. 1 is a vertical longitudinal section through the device and taken substantially on line 1—1 of Fig. 12.

Fig. 2 is a vertical transverse section taken substantially on line 2—2 of Fig. 12.

Fig. 3 is a partial vertical transverse section taken substantially on line 3—3 of Fig. 12.

Fig. 4 is a detail section taken on line 4—4 of Fig. 12.

Fig. 5 is a perspective view of the safety plunger.

Fig. 6 is a partial section illustrating the trip mechanism in the cocked or open position.

Figs. 7, 8 and 9 are enlarged detail sections illustrating, respectively, the closed, low fire or pilot, and high fire positions of the fuel metering valve.

Fig. 10 is a plan view of the device.

Fig. 11 is a side view thereof.

Fig. 12 is a plan view of the device, the cover and parts carried thereby being removed for clearer illustration.

Figs. 13 and 14 are detailed sections corresponding to Fig. 8, but showing a modification.

Fig. 15 is a diagrammatic showing of another form of metering port.

The operating parts of the device are housed in a casing 1, conveniently formed integrally, including upstanding side walls 2 and curved end walls 3 and 3a, and a bottom wall or floor 4 having a hollow, cylindrical structure 5 extending longitudinally on the lower surface thereof and receiving the elongated strainer unit indicated generally at 6. A transverse partition 7 divides the casing into a main fuel reservoir and an over-flow chamber. A tapped inlet opening 8 is provided at one end of cylindrical structure 5 for attachment of a fuel line connecting the device to a remote fuel tank (not shown). An orifice 9 in the upper wall of cylindrical structure 5 opposite inlet 8 forms a communication between the fuel inlet and the interior of the casing and also forms a seat for safety needle valve 10, reciprocable in an apertured boss 11 projecting upwardly from the casing floor. A lateral passage 12 connects the interior of boss 11 with a second apertured boss 13 threadedly mounting a valve seat member 14, having axial and radial passages 14a and 14b controlled by a needle valve 15. Valve 15 has a universal ball attachment, as at 16, to a screw 17 threaded in an inverted U-shaped arm 18 projecting from main float 19.

A pin 20, extending between the depending legs of float arm 18, is seated in a groove 21 in the upper surface of a stanchion 22 projecting from the casing floor adjacent boss 13 and is secured in position by the overlapping head of a screw 23 threaded into the stanchion. By means of this arrangement, the main float and needle valve assembly may be readily removed for inspection or repair after screw 23 is withdrawn through an opening 24 in the float arm. The position of main needle valve 15 relative to float arm 18 may be adjusted by means of screw 17,

a coiled spring 25 being interposed between the screw head and float arm for stability. The universal or swinging mounting of needle valve 15 facilitates proper seating and movement of the valve in its guides irrespective of the positions of float 19 and screw 17 and even though the valve, seat, and guides may be worn.

Safety valve 10 is constantly urged upwardly and away from its seat 30 in orifice 9 by means of a coiled spring 31 interposed between the lower interior wall of apertured boss 11 and a collar 32 rigid with the valve and slidably fitting the inner wall of the boss. An actuator stem 33 projects upwardly from valve 10 through a closely fitting hole 34a in threaded plug 34 closing the top of boss 11. Collar 32 seats against plug 34 when valve 10 is open and insures sealing of the stem opening therein. A plunger 36 is slidably received in a depending boss 37 on the cover member 38 of the casing and, at its lower extremity, has a disc 39 formed rigidly therewith and presenting a lower, axially facing surface or shoulder 39a. Plunger 36 is constantly urged downwardly by means of a coiled spring 40 interposed between the disc and cover 38 and substantially stronger than spring 31. A knurled handle 41 is provided at the upper extremity of plunger 36 and easily accessible from outside the reservoir.

A pin 42 carried by a pair of lugs 43 depending from cover 38 pivotally supports a long arm 44 extending over partition 7 and carrying safety float 45 at its outer extremity. A detent or latch 46 is formed on the pivoted end of arm 44 and disposed to latchingly underlie and engage disc 39 to maintain the same in its elevated position, shown in dotted lines in Fig. 1 and also shown in Fig. 6. Disc 39 has a chamfered upper edge 48 and a cut-away segment 37 forming an eccentric recess in its periphery to provide for releasing the safety trip mechanism by manually rotating plunger 36 about its longitudinal axis.

The operation of the safety trip mechanism is as follows:

To open the safety valve 10 and cock the trip mechanism, plunger 36 is manually lifted to the position shown in Fig. 6 which comprises spring 40 and causes detent 46 to ride past the chamfered edge 48 of disc 39 and latch against the lower surface thereof. Assuming that the device is properly attached to an elevated fuel tank, fuel will be admitted to the portion of the casing on the left side of partition 7, forming the main fuel reservoir, to a predetermined level x—x, whereupon main float 19 will close inlet valve 15. The position of the float with the valve closed, and consequently the level x—x may be adjusted by means of screw 17 which may be readily reached with a screw driver when the reservoir cover is removed. Thereafter, if for any reason, such as improper seating of needle valve 15 or puncturing of float 19, an excessive quantity of fuel should be admitted to the casing, which has the effect of excessively increasing the delivery pressure at the outlet port, the fuel will be spilled over partition 7 into the safety chamber at the right side thereof, raising safety float 45 and ultimately releasing disc 39 from detent 46 so as to permit plunger 36 to be snapped downwardly by spring 40, striking valve actuator 33 and closing valve 10 against its seat 30 with considerable force. Thus, leakage from the casing is prevented and extinguishment of the burner flame, due to failure of the fuel supply, will indicate the faulty condition of the apparatus.

The safety float and actuating plunger may be readily removed as a unit with the bowl cover to permit inspection and repair and, after reassembly, the safety valve may be re-latched in its open position as above described. In some cases it may be desirable to manually close the safety valve, as when the apparatus is to remain out of operation for a substantial time, and this may be accomplished by merely rotating plunger 36 so as to bring cut-away segment 47 on disc 39 into registry with safety float arm detent 46.

The Fig. 4 shows a simple valve arrangement for draining the safety float chamber. This includes an apertured boss or cup member 50 projecting outwardly from casing side wall 2 at the lower edge thereof and telescopingly receiving a second cup member 51. A stem 52 projects axially from the member 51 through boss 50 and orifice 53 in the casing wall and, at its inner extremity, is provided with a conical valve head 54 shaped to seat against the edge of the orifice. Valve 54 is normally held in its closed position by means of a coiled spring 55 compressed between cap 51 and the casing wall around orifice 53. To open the valve, it is merely necessary to press inwardly on member 51, permitting egress of accumulated fuel through port 53 and slot 56 in the lower wall boss 50.

The fuel metering arrangement, as shown in Figs. 2 and 3, will now be described. Depending from the bottom wall of the casing on each side of cylindrical structure 5 are the apertured bosses 60 and 61 and aligned therewith are a pair of apertured bosses 62 and 63 extending upwardly into the casing. The bosses 60 and 62 are provided with connecting orifices 64 and 65 for conducting liquid fuel from the constant level chamber to the burner by means of a suitable pipe (not shown). In the present instance, the device is intended for use with a single burner only and, accordingly, the other outlet is closed, as at 66, the casting being formed with the extra bosses 61 and 63 so that the device may be easily modified so as to control the fuel supply to a pair of burners, if desired.

Tightly seated in the upper portion of orifice 65 is the lower extremity of a vertical tube 67 having a key-shaped port 68 located slightly above the surrounding shoulder formed by boss 62. Slidable on tube 67 is a sleeve valve 69 having lateral venting ports 70 above the fuel level and connected at its upper extremity by means of a pin 71 to a knurled nut member 72 having a cup-shaped portion 73 slidable in an apertured boss 74 projecting upwardly from the casing cover 38. A small sheet strip 75 fits tightly on pin 71 and has a squared, downwardly offset lip extending between adjacent flat surfaces of the casing wall and port 69a at the upper end of sleeve 69 to prevent rotation of the sleeve and pin 71 rigid therewith when cap nut 72 is rotated for manually adjusting the setting of the sleeve valve. A coiled spring 76 is seated between strip 75 and cup 73.

This form of metering valve is particularly advantageous for separately formed accurate, inexpensive production in that the outer surface of tube 67, after hole 68 is punched, may be centerless ground to eliminate burrs caused by punching and to provide a smooth bearing surface perfectly fitting the inner surface of sliding sleeve 69. Sleeve 69 may be accurately formed by automatic screw machine operations. Thus, no hand operations are necessary as would be required, for instance, if the metering port or ports were placed in the movable sleeve arranged

to telescope into a stationary boss or tube communicating with the outlet passage.

Secured to cover 38 by means of a screw 80 and nut 81 is a bi-metal thermostatic strip 82 (Fig. 2) with its free outer extremity recessed to embrace the circumferentially indented portion 83 of nut 72. A metal bracket 84 extends between the bends of thermostat 82 and mounts an electrical resistance coil 85 which may be energized thermostatically from a remote point, by means of wiring 86 (Fig. 10) to heat bi-metal strip 82 causing upward bowing of the free end thereof and raising of nut 72 and sleeve valve 69.

In order to limit the extreme positions of the slide valve, a kerfed screw 87, threaded in a depending post 88 on the casing cover (Fig. 3), has a tapered extremity 89 inserted into an annular recess 79 formed in the outer wall of the sleeve. The sides of the groove are beveled at the same angle as the tapered extremity of the screw. The high position of the slide valve, and consequently the maximum fuel supply (Fig. 9), is limited by engagement of screw 87 with the lower edge of recess 79 in the valve Where the lowering of the valve is to be limited to pilot or low fire requirements (see Fig. 8) this may be accomplished by engagement of the screw with the upper edge of recess 79. It is frequently desirable to completely close the outlet valve, this may be provided for by properly regulating the sizes of screw tip 89 and recess 79, or by permitting the sleeve valve to engage boss 62 at the lower extremity of its movement.

Vents 70 communicating with the interior of tube 67 provide for the escape of gases which may form in the fuel line posterior to the metering orifice 68.

Figs. 10, 11 and 12 show the sleeve valve arrangement of Figs. 2 and 3, respectively, in the fully closed, low fire or pilot, and high fire positions. The shape of port 68 is such that in the low fire position, Fig. 11, wherein the port meters the fuel at a very slow rate, the effective port opening approaches circular shape. This is particularly advantageous in that there is no relatively narrow portion of the port, such as is the case where the fuel is metered through a triangular port or through the annulus around a needle valve inserted into or through the port. Thus the possibility of dirt and gaseous bubbles blocking the port is reduced to a minimum.

Obviously the metering port may be shaped as desired to obtain the proper metering of fuel under various burner conditions.

In the modification in Figs. 13 and 14, both the tube 67*a* and sleeve valve 69*a* provided with metering ports 68*a* and 68*b* which varingly register so as to provide for different sizes of effective metering orifice according to the position of the sleeve valve. Fig. 15 shows vertically spaced ports 68*c* and 68*d*, the former serving to supply fuel for the low fire or pilot flame while both ports supply fuel for high fire requirements.

The strainer unit, (Fig. 1) previously referred to by the reference character 6, comprises an elongated tube 90 having a central, longitudinal bore 91, a series of outlet ports 92, and radial ribs or shoulders 93. The left hand end of the tube is closed and provided with a threaded head 94 for screwing the unit into the open end of cylindrical structure 5 on the bottom of the casing. The opposite end of the tube is open and provided with a nipple 95 which snugly fits into a collar 96 in the wall of inlet port 8. A cup 97 is snugly seated on the inner portion of nipple 95 and held in position against a shoulder 98 on tube 90 by a spring key or wire 99, conveniently of hair-pin shape and detachably applied to annular groove 100 in the outer wall of the nipple. A cylindrical screen 101 of suitable fine mesh material, is secured at one end to cup 97 and at the other end snugly fits the shoulder portion 102 adjacent threaded head 94 of the tube member.

The described strainer structure may be readily assembled with and dis-assembled from the remainder of the constant level and safety device without affecting any other part thereof. The relatively large area of screen is firmly supported throughout its length by cup 96, ribs 93, and shoulder 102 and the entire unit is also firmly supported at each end in cylindrical structure 5 so as to prevent leakage. The close fit between nipple 95 and shoulder 96 is such that foreign, solid particles are prevented from passing through these parts. All such foreign material will be retained inside screen 101 and, when the unit is withdrawn from its mounting, the screen may be disassembled for cleaning by removing key 99. Cup 96 is then slid off nipple 97 drawing the screen across ribs 93 thus scraping off or loosening foreign material adhering to the inner surface of the screen.

The device described functions effectively to meter fuel supplied to the burner and also to prevent over-flow from the constant level chamber with consequent fire hazard in case of faulty operation of the needle valve mechanism. The device is simpler than other somewhat similar devices with which I am familiar and embodies features facilitating production as well as the inspection and repair thereof after a service installation. The invention is not limited to the structure shown but may be modified in various respects as will occur to those skilled in the art. The exclusive use of all modifications as come within the scope of the appended claims is contemplated.

We claim:

1. In a liquid supply system, a liquid passage having a valve seat, a valve controlling said seat, means normally urging said valve toward its open position, a valve actuating plunger for said valve and having an axially facing shoulder, means yieldingly urging said plunger toward said valve, latch means constructed and arranged to engage said shoulder and hold said plunger in a cocked position, and a device responsive to predetermined liquid pressure conditions in said system to release said latch and permit said plunger to close said valve, said plunger being manually rotatable about its longitudinal axis to disengage said latch means from said shoulder and trip said actuating plunger.

2. In a liquid supply system, a liquid passage, a valve controlling said passage, and valve actuating mechanism therefor including means normally maintaining said valve in its open position, a valve actuating plunger device having an axially facing shoulder, a latch engageable with said shoulder to hold said plunger device in an inactive position, and means responsive to predetermined liquid level conditions in said system to trip said latch and permit said plunger to move said valve to its closed position, said plunger device being manually rotatable about its longitudinal axis to release said shoulder from said latch and trip said device.

3. In a liquid fuel control device, a liquid fuel

reservoir having inlet and outlet openings, means for maintaining the fuel supply to said outlet opening at a substantially constant pressure, a normally open, longitudinally movable safety cut-off valve in said inlet passage, a valve actuating plunger having a radially projecting shoulder, a latch engageable with said shoulder to hold said actuator in an inactive position, and means responsive to abnormal fuel pressure conditions in said reservoir and outlet opening to trip said actuator and close said valve, said actuator being manually rotatable about its longitudinal axis to disengage said shoulder from said latch and release said plunger to close said valve.

4. A liquid fuel control device as described in claim 3 in which said radial shoulder is formed by a disc projecting from said plunger and having an eccentric recess permitting manual tripping of said cut off valve by rotation of said plunger.

5. In a liquid fuel control device, a constant level reservoir, inlet and outlet passages communicating with said reservoir, a chamber for receiving overflow from said reservoir, a safety cut-off valve in said inlet passage, an actuating plunger for said valve and having an axially facing, non-circular surface, a latch engageable with said surface for holding said plunger in a cocked position, and means responsive to a predetermined level of fuel in said overflow chamber to trip said plunger and close said valve, said plunger having a readily accessible handle and being rotatable thereby about its longitudinal axis to release said latch from said surface and trip said plunger.

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