Nov. 28, 1961 M. J. KITTLER 3,010,475

FUEL LEVEL ADJUSTMENT MEANS

Filed April 14, 1958 2 Sheets-Sheet 1

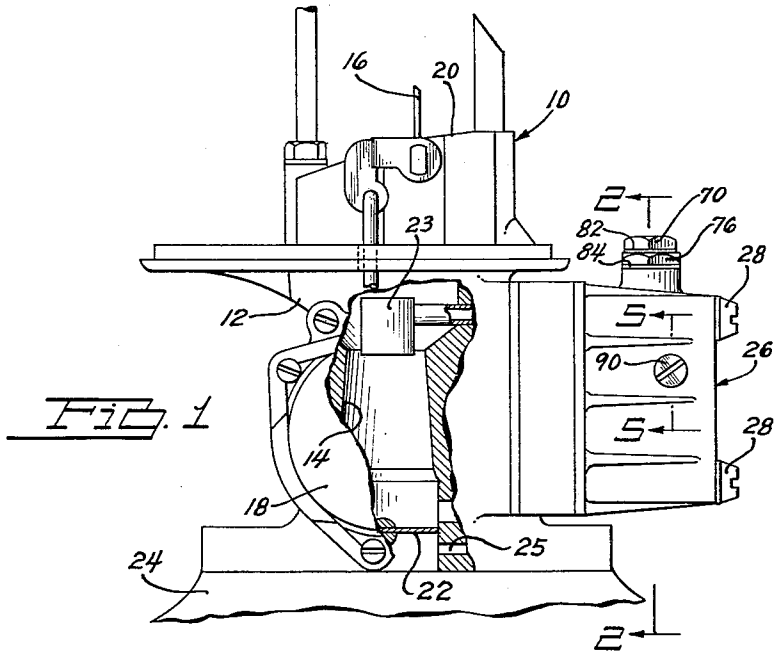


Fig. 1

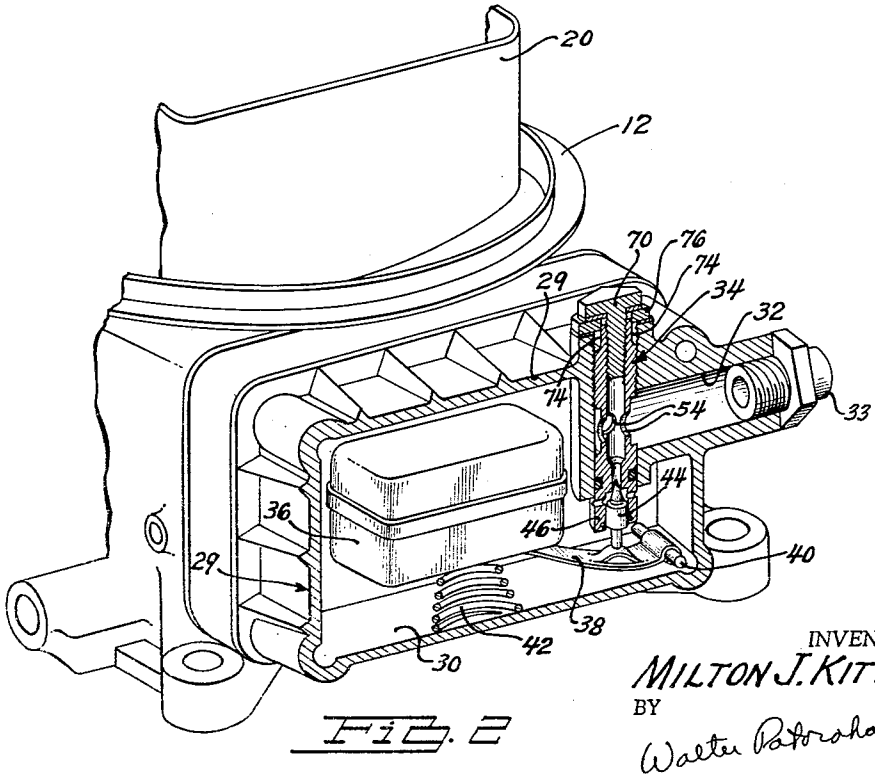


Fig. 2

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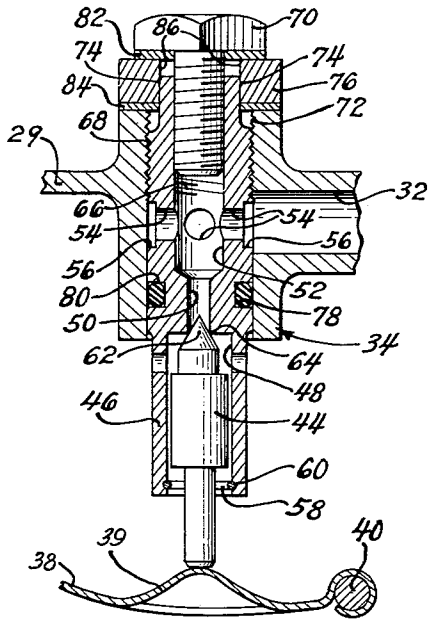


Fig. 3

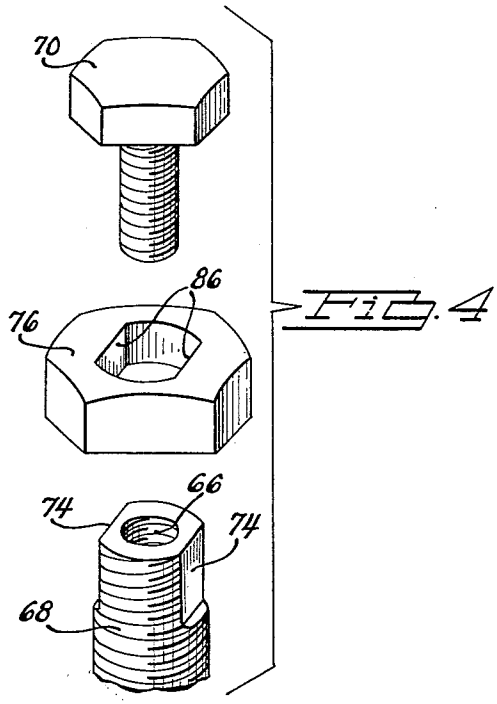


Fig. 4

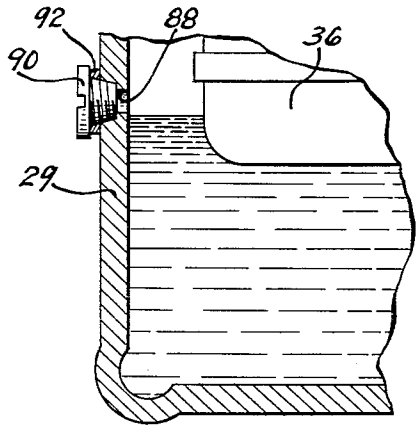


Fig. 5

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FUEL LEVEL ADJUSTMENT MEANS

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This invention relates generally to mechanisms for maintaining a desired liquid level, and more particularly to float operated mechanisms such as those employed in carburetors.

One of the most important factors in carburetor performance is the maintenance of a proper predetermined fuel level in the carburetor fuel bowl. Since this fuel level is controlled by a float operated needle valve, one of the most frequent items of carburetor maintenance is the adjustment of the fuel level and/or replacement of the needle valve and the valve seat.

With present carburetor constructions, it is necessary, in order to adjust the fuel level in the fuel bowl, to disassemble at least the fuel bowl portion of the carburetor and to adjust the float itself by the use of various gauges and special tools supplied by the carburetor manufacturer. In most cases, this adjustment involves the bending of a tab which must be provided on the float arm so as to be able to vary engagement of the arm with the base of the needle valve. Where no tab is provided the float arm must itself be bent in some manner. Such disassembly and adjustment, often done by inexperienced personnel, is expensive and time consuming and is done at the risk of creating other problems unless great care is exercised. Furthermore, adjustments made by this method are crude and inaccurate.

Constructions have been proposed in the past which would enable either adjustment of the level or replacement of the needle and seat, but not both, with some lesser degree of disassembly; however, these designs are not readily applicable to present carburetor design and do not provide maximum ease of manufacture and maintenance.

It is now proposed to provide a float chamber construction having an integral needle valve and seat assembly such that the assembly may be easily and quickly removed for replacement purposes without disturbing any other portion of the carburetor. Furthermore, the fuel level in the float chamber may be accurately and very easily and quickly adjusted from the outside of the carburetor, even while the carburetor is in place and the engine is running, and without the use of any special gauges or special tools.

These and other objects and advantages of the invention will become more apparent by reference to the following specification and the attached drawings, wherein:

FIGURE 1 is a side elevational view, with portions thereof cut away and in cross-section, of a carburetor embodying the invention; the carburetor is shown mounted on the engine;

FIGURE 2 is a cross-sectional view, taken on the plane of line 2—2 of FIGURE 1 and looking in the direction of the arrows, illustrating generally the relative relationship of the elements comprising the invention;

FIGURE 3 is an enlarged cross-sectional view illustrating in greater detail a portion of FIGURE 2;

FIGURE 4 is an enlarged exploded perspective view of some of the elements of the assembly shown by FIGURE 3;

FIGURE 5 is a fragmentary enlarged cross-sectional veiw taken on the plane of line 5—5 of FIGURE 1.

Referring now in greater detail to the drawings, FIGURE 1 illustrates generally a carburetor 10 having a body 12 through which an induction passage 14 extends. The

usual choke valve 16 adapted to be automatically controlled by a thermo-sensitive unit 18 controls the entrance of the air intake 20, and the usual throttle valve 22 controls the flow of combustible mixtures to the engine intake manifold 24. A fuel bowl assembly 26, from which fuel is supplied in the usual manner to the main nozzle 23 and the idle passage 25, is suitably secured to the body 12, as by screws 28.

FIGURE 2 illustrates generally the internal construciton of a fuel bowl assembly 26 embodying the invention. The assembly 26 is substantially comprised of an outer housing 29 formed to provide a chamber 30 and a fuel inlet passage 32 communicating with chamber 30 and adapted to be controlled by the valve assembly 34. The external fuel supply conduit 33 connected to inlet passage 32 supplies fuel under pressure from the main tank and the fuel pump, which are not shown. A float 36 is provided with an arm 38 adapted to actuate the valve, the arm being pivoted at 40. A spring 42 may be mounted within the fuel bowl directly below the float 36 so as to increase its buoyancy. Needle valve 44 is positioned within the body portion 46 of assembly 34 by the arm 38, which moves in accordance with the float position as determined by fuel level in the chamber 30.

FIGURE 3 better illustrates the valve assembly 34. The cylindrical body 46 may be formed to provide an axially extending cylindrical cavity 48 at one end thereof, which communicates by means of a conduit 50 with an axial cylindrical chamber 52 adapted to receive fuel through any desired number of radially formed passages 54. A circumferentially formed groove 56 delivers fuel from intake 32 to all of the passages 54. A needle valve 44 is received within cavity 48 and retained therein by any suitable means such as the generally circular spring-like retainer 58 which is seated within a groove 60 formed in the cavity wall. The valve portion 62 of needle valve 44 coacts with a seat 64 to either open or close conduit 50 in accordance with the requirements indicated by the float position.

The float position at any given time is, of course, determined by the instantaneous fuel level in the fuel bowl 29, and the needle valve 44 is urged in the seat engaging direction by some portion of the float arm 38. The present practice is to provide a tab extending from the float arm so that the tab can be bent into various positions to provide adjustment of the valve operation; in lieu of a tab, the arm itself is bent for the same purpose. In bending of the tab or arm, however, the original arm and valve geometry is disturbed so that forces resulting in lateral displacement of the valve and consequent failure of the valve to properly engage the seat are produced. Also, the float arm pivot may be disturbed so as to cause binding, etc. With the use of the invention, a solid valve engaging portion such as the dimple 39 may be provided, and the float itself need never be adjusted.

The other end of body 46 has both internally and externally threaded portions 66 and 68. A screw 70 is adapted to be received by threaded portion 66, while the portion 68 is received by a cooperating internally threaded portion 72 within bowl 29. The extreme end of body 46 has substantially flat and parallel surfaces 74 formed thereon which are adapted to be engaged by the adjusting nut 76.

An O ring 78 is placed within a circumferential groove 80 about body 46 to provide a seal between the body and bowl 29, and resilient washer sealing members 82 and 84 are placed on either side of adjusting nut 76 and forcibly held in position by the head of locking screw 70.

FIGURE 4 illustrates in perspective the locking screw 70, the adjusting nut 76 and the upper end of body 46 with which it coacts. Internally flatted surfaces 86 are

adapted to coact with surfaces 74 on body 46 and thereby provide a means for rotatably driving the body 46.

FIGURE 5 illustrates a gauge hole 88 and a threaded plug 90 which may or may not have a seal 92. The hole 88 is formed in the wall of the bowl 29 at a height which is based on the predetermined proper fuel level in the bowl. That is, the fuel level in the bowl should, when the adjustment is proper, be at the same height as the lower extremity of the hole 88 when the float 36 shuts off the fuel flow into the bowl.

Operation

For purposes of illustration, let it be assumed that the plug 90 has been removed to expose the gauge hole 88 and it has been discovered that the fuel level within the chamber 30 is at some distance below the lower extremity of sight gauge hole 88. This condition of inadequate fuel level could then be very easily and quickly corrected while the carburetor is in place and the engine is running by first loosening the locking screw 70 and turning the adjusting nut 76 counter-clockwise.

As the nut 76 is turned in the above manner, the body 46 of the valve assemby 34 would also be turned counter-clockwise, causing the entire assembly 34 to be raised. Since seat 64 is an integral part of body 46 (that is, it may be either formed therein or securely attached thereto) the seat 64 moves upwardly also. Because the seat moves upwardly or away from the arm 38, the float 36 will have to move upwards a greater amount before the flow through conduit 50 is restricted by the engagement of needle valve 44 with seat 64. This, in turn, requires that the fuel level within the bowl be raised before the float can attain this required height.

It becomes apparent then that by adjusting the external nut 76, the thickness or height of which should be such as to permit any desired position of body 46, the proper fuel level can be selected, as determined by the sight gauge hole 88. It is of course evident that the converse of the above procedure is also true; that is, as the seat 64 is lowered by nut 76, the fuel level also becomes lower.

In other words, the actual fuel level can be determined without disturbing any other portion of the carburetor, merely by removing the plug 90. Since the lower edge of the hole 88 is formed to indicate the precise desired fuel level for any given carburetor, the above adjustment may be readily made to either lower or raise the fuel level to the precise desired level. This can all be done very quickly and easily while the engine is operating. No adjustment or tampering with the float member and no special tools or gauges are required. Furthermore, with a fine thread on the portion 68, adjustments approaching micrometer precision are possible.

It is desirable, although not absolutely essential, that the pitch of thread 68 be the same as the pitch of thread of screw 70. This permits adjusting nut 76 to be rotated after slightly loosening and then holding locking screw 70, without either tightening or loosening the locking action. This permits adjustments to be made with the engine running, without leakage.

It is evident, of course, that the threads 68 can be of any desired pitch. However, since the valve assembly 34 is closer to pivot 40 than is float 36, a small change in position of valve assembly 34 will create a correspondingly greater change in the ultimate position of float 36. Therefore, generally it would be advantageous to make the pitch of threads 68 as small as is practical in order that a more sensitive adjustment of the float 36 can be made.

If it is desired to replace the needle valve and/or the seat, the screw 70 is loosened and the assembly 46 removed by turning adjusting nut 76 counter-clockwise. The adjusting nut is not itself removed during this operation; it merely serves as the handle or means for removing the body 46. This, too, can be done while the carburetor is in place on the engine. Either a new assembly 34 can be substituted or the individual parts, such as the needle valve 44 or the body 46, of the old assembly can be replaced, or the parts may be simply inspected and cleaned.

While but one embodiment of the invention has been described, it is apparent that other modifications are possible without exceeding the scope of the appended claims.

What I claim is:

1. A liquid supply device, comprising a body having walls formed to provide a liquid reservoir chamber, a liquid inlet conduit leading into said chamber, a discharge passage to which fuel from said reservoir is supplied, a second conduit open at both ends and connecting with the end of said inlet conduit inside of said chamber, one end of said second conduit extending through one wall of said chamber and having internal threads, a float member having an arm connected thereto, said arm being pivotally secured in said chamber so that a portion of said arm reciprocates below the other open end of said second conduit when the position of said float member changes due to changing liquid level in said chamber, and a valve and seal assembly disposed in said second conduit, said assembly including a hollow cylindrical valve seat member being externally and internally threaded at its upper end to coact with said internal threads of said second conduit and having openings therein communicating with said liquid inlet conduit, a valve retained in said hollow valve seat member, said valve being adapted to be moved into seat engagement by said float arm, said externally threaded portion of said seat member extending through the wall of said chamber and being formed with non-circular sides, a drive member cooperating with said non-circular sides to rotate said externally threaded seat member and to thus adjust its position in said chamber, means to prevent by-passing of fuel around said seat member, when in an adjusted position, a threaded member cooperating with said internally threaded portion of said valve seat member to lock said drive member against said one wall of said chamber in any desired position, and a liquid level opening in a side wall of said chamber to determine when proper float position has been reached.

2. A carburetor, comprising a body having walls formed to provide a fuel reservoir chamber, a substantially horizontal main fuel inlet conduit leading into said chamber, a discharge passage to which fuel from said reservoir is supplied, a second substantially vertical conduit open at both ends and connecting with the end of said inlet conduit inside of said chamber, one end of said second conduit extending through the upper wall of said chamber and being internally threaded, a float member having an arm extending laterally therefrom, the free end of said arm being pivotally connected to the wall of said chamber so that a portion of said arm reciprocates below the other open end of said second conduit when the position of said float member changes due to changing fuel level in said chamber, and an integral needle valve and seat assembly disposed in said second conduit, said assembly including a hollow cylindrical valve seat member being externally and internally threaded at its upper end to coact with said internally threaded portion of said second conduit and having openings in the wall thereof communicating with said fuel inlet conduit and fluid seal members positioned to insure that inlet fuel will enter said chamber only by way of said valve seat member, a needle valve retained in said hollow valve seat member, said needle valve being adapted by gravity to drop away from said seat unless forced upwardly against the flow of said inlet fuel and into seat engagement by said float arm, said externally threaded portion of said seat member extending through the upper wall of said chamber and being formed at the free end thereof with non-circular sides, a drive member coacting with said non-cir-

cular sides to rotate said seat member and thus to adjust its vertical position, said drive member being free of threaded engagement with seat member, so as to be slidable axially thereof, a threaded member cooperating with said internally threaded portion of said valve seat member to lock said drive member against said upper wall of said chamber in any desired position, fluid seal members disposed between said upper wall and said drive member and between said drive member and said locking member, visual means to determine when proper float position has been reached.

3. A carburetor for an internal combustion engine, comprising a body having walls arranged to provide a fuel reservoir chamber, a discharge passage to which fuel from said reservoir is supplied, a first passage extending through one wall of said chamber and being internally threaded along a portion thereof, a second fuel inlet passage extending through a wall of said chamber and communicating with said first passage, a fuel supply conduit connected to and communicating with said fuel inlet passage, said inlet passage receiving the total fuel supplied to said chamber, a hollow cylindrical valve seat member positioned in said first passage, fluid seal means to prevent by-passing of fuel around said seat member, said valve seat member having an internal valve seat and externally and internally threaded portions, radial ports providing communication through said hollow seat member between said fuel inlet passage and said chamber, and a non-circular portion at one end of said valve seat member protruding beyond the outer wall surface of said chamber, said externally threaded portion cooperating with said internally threaded portion of said first passage so that the axial position of said valve seat member in said first passage may be adjusted by rotation of said valve seat member, a float member having a fixed fulcrum pivoted in said chamber so that the position of a portion thereof with respect to the chamber end of the valve seat member varies in accordance with chamber fuel level, a valve member positioned between said float member and said valve seat in said valve seat member and movable by said float member to seated and unseated relation with said valve seat, means for retaining said valve member in said valve seat member as an assembly, the flow of fuel past said valve seat being prevented by said valve member when a predetermined fuel level in said chamber is reached, a drive member having a non-circular inner portion cooperating with said non-circular protruding end of said valve seat member so that said valve seat member may be rotated by said drive member, a locking member having external threads cooperating with said internally threaded portion of said valve seat member to lock said valve seat member against said wall of said chamber, and seal members between said drive member and said outer wall surface of said chamber and between said drive member and said locking member, said parts being arranged so that said valve and valve seat assembly is externally removable through said first passage and so that said valve seat is externally in said first passage and with respect to said float member without disconnecting said fuel supply conduit to gain access into said inlet conduit.

4. In combination with a wall having a threaded opening therein, an adjustable and removable valve and seat assembly comprising a cylindrical valve seat member having an axial bore extending through the entire length thereof, said axial bore being reduced intermediate the ends thereof to provide a valve seat, a valve movable axially in said bore, means for retaining said valve member in said bore, said cylindrical valve seat member being both internally and externally threaded adjacent one end thereof, the terminal end of said valve seat member adjacent said threaded end thereof being formed to provide a non-circular outer surface, a drive member having a mating non-circular opening formed therein and positioned over said non-circular end of said valve seat member, said drive member being formed to rotate said cylindrical valve seat member and at the same time permit axial movement of said drive member along said valve seat member, and a threaded member for engagement with said internal threads in said cylindrical valve seat member, said threaded member being engageable with said drive member to force the drive member into locking relation with said wall.

5. A valve and valve seat assembly for admitting fluid to a reservoir, the assembly being both externally removable and adjustable with respect to said reservoir through a threaded opening in a wall of said reservoir, said assembly comprising a generally cylindrical valve seat member having an axial bore extending therethrough, said valve seat member having a passage providing communication between the exterior of said valve seat member and said bore, a portion of said bore axially spaced from said passage being internally threaded, locking means cooperating with the internally threaded portion of said bore and the wall of the reservoir for locking said body in adjusted position, said valve seat member being externally threaded at that end of said member adjacent said axially spaced portion, a portion of said bore spaced from said passage in an oppositely axial direction being formed to provide a valve seat, an inlet valve member axially movable in said bore for cooperation with said valve seat, and means for retaining said valve member in said bore against accidental removal thereof from said body.

6. An adjustable and removable valve and seat assembly for cooperation with a threaded opening in a wall, comprising a generally cylindrical valve seat member having an axial bore extending therethrough, a portion of said axial bore being formed to provide a valve seat, a valve member positioned in said bore, and means for retaining said valve member in said bore for axial movement of said valve member in said bore, said valve member being engageable with said seat, said cylindrical valve seat member being externally threaded adjacent one end thereof, said body also being internally threaded adjacent said one end, locking means cooperating with the internally threaded end of said body and the wall for locking said body in adjusted position, said valve seat member having means at said externally threaded end thereof to provide for rotation of said valve seat member about its axis.

7. In combination with a wall having a threaded opening therein, an adjustable and removable fuel inlet valve comprising a generally tubular body, said body having a passage extending axially therethrough and open at each end of said body, said body having an opening intermediate the ends thereof providing communication between said axial passage and the exterior of said body, said passage having a valve seat intermediate the ends of the body, said body being externally threaded adjacent one end thereof for cooperating wth said threaded opening and for providing for adjustment of said body axially with respect to said opening, means on said body adjacent said one end for rotating said body about its axis, said passage being internally threaded adjacent said one end, manually positioned locking means cooperating with said internally threaded passage and said wall for locking said body in an adjusted position, an inlet valve movable in said axial passage engageable with said valve seat, and means at the other end of said body for retaining said valve in said passage, whereby said body and valve are removable through said opening as a unit.

8. In a fuel supply device for supplying fuel from a conduit extending from a main storage tank, a fuel reservoir having a fuel inlet passage, a discharge passage to which fuel from said reservoir is discharged, said inlet passage being the only fuel inlet to said reservoir from said conduit and being opened and closed by a float-engaged assembly comprising valve and valve seat members, said inlet passage also being disposed above said

discharge passage and above the fuel level in said chamber required to cause said float-engaged assembly to close said inlet passage, means on a wall of said reservoir cooperating with said valve seat member to provide for axial adjustment and removal of said valve seat member from said reservoir, means exterior of said reservoir cooperating with said valve seat member to effect said adjustment and removal, said assembly having means to prevent the by-passing of fuel around said valve seat member during and after the adjustment thereof, and means for locking said exterior adjusting means in abutting relation to said wall.

9. A valve and valve seat assembly for admitting fluid to a reservoir, the assembly being both externally removable and externally adjustable with respect to said reservoir through a threaded opening in a wall of said reservoir, said assembly comprising a generally cylindrical body having an axial bore open at one end of said body, said body having a passage providing communication between the exterior surface thereof and said axial bore, a valve seat in said bore, said valve seat being disposed between said passage and said one end of said body, an inlet valve member movable axially in said bore adjacent said one end for cooperation with said valve seat, means for retaining said valve member in said bore against accidental removal thereof from said body, means adjacent the other end of said body for rotating said body about its axis, said body being externally threaded adjacent said other end to provide for axial adjustment of said body upon rotation thereof, said other end of said body having an internally threaded axial bore adapted to receive a bolt cooperable with means on a wall of the reservoir to lock said body in the adjusted position thereof.

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