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AUTOMATIC DISPENSING NOZZLES

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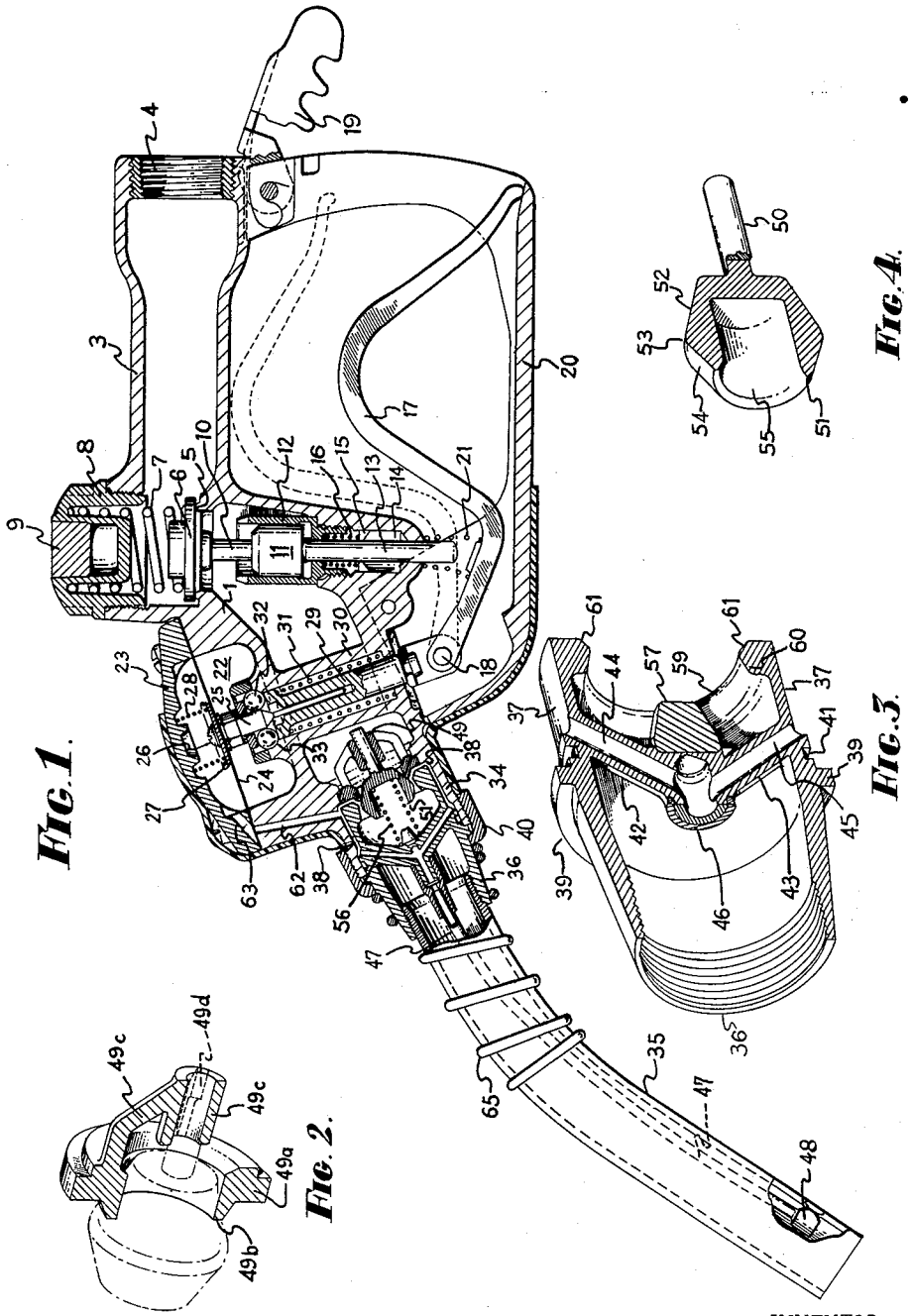

FIG. 1.

FIG. 2.

FIG. 4.

FIG. 3.

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AUTOMATIC DISPENSING NOZZLES

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The invention has to do with nozzles such as are widely used in the dispensing of gasoline into the tanks of motor vehicles, where the attainment of a predetermined filling level in the tank operates to close a valve in the nozzle. An exemplar of such nozzles is shown in United States Patent No. 2,582,195, issued January 8, 1952, in the name of L. H. Deurr. For purposes of clarity in this application, the term "nozzles" is used to include both the valve structure and the spout through which the fluid is delivered.

As is well known in such structures: there is a body containing a main valve seat and tappet, the valve being operated by a hand lever which can be latched in the valve-open position. The flow of the fluid through the valve body creates a suction by Venturi means, the suction being effective upon one side of a diaphragm in a supplementary chamber. The diaphragm is connected with a locking means for a plunger to which the lever is fulcrumed. The suction is normally relieved by an in-flow of air through a small tube having an outlet near the end of the spout. When fluid in the tank reaches the outlet of the tube, a resistance to in-flow through the tube is created, the diaphragm operates to unlock the plunger, and the main valve is permitted to close by movement of the plunger.

Hitherto in most such structures, the Venturi means is located at the main valve. This entails certain disadvantages. The Venturi means tends to restrict the flow of fluid at the main valve, and in many instances the suction which is created is undesirably low for the most positive action. Further, there is a considerable space inside the housing between the main valve and the spout. Upon the completion of a filling operation, this space may or may not drain, impairing the accuracy of the filling operation. Again, it may drain slowly or after the removal of the spout from the filling opening of the tank of the motor vehicle, resulting in spillage of gasoline.

It is an object of this invention to provide an automatic dispensing nozzle devoid of the above difficulties.

It is an object of this invention to provide an automatic dispensing nozzle in which the fluid will be held in the body of the structure and prevented from draining.

Thus, it is an object of the invention to provide a structure making for much more accurate dispensing operations than have hitherto been achieved. In particular, it is an object of the invention to provide an automatic dispensing nozzle which will be accurate enough for operation by customers as in dispensing devices in which an accurately measured flow of fluid can be obtained upon the deposit of a coin.

It is an object of the invention to provide an automatic dispensing nozzle adapted for rapid removal after the conclusion of a filling operation without danger of spillage and inadvertent discharge of fluid.

It is an object of the invention to provide an automatic dispensing nozzle in which the creation of the vacuum is more positive and in which the automatic cut-off is more surely responsive to the sensing means.

These and other objects of the invention, which will be set forth hereinafter or will be apparent to one skilled in the art upon reading these specifications, are accomplished by that structure and arrangement of parts of which an exemplary embodiment will now be described. Reference is made to the accompanying drawings wherein:

FIG. 1 is a longitudinal section of the discharging nozzle.

FIG. 2 is a view partly in perspective and partly in section of a fitting providing a seat for the tappet of a supplementary valve.

FIG. 3 is a sectional view of a fitting coacting with the tappet of the supplementary valve.

FIG. 4 is a perspective view, partly in section, of a means for controlling the flow of fluid to produce a Venturi effect, which means serves also as the tappet of a supplementary fluid cut-off valve.

The automatic dispensing nozzle comprises a valve housing 1 in the form of a hollow casting. A rearwardly extending portion of the housing, as shown at 3, serves as an entrance means for the fluid to be dispensed and also as a handle for the dispensing nozzle. Threads are indicated on this part at 4; and it will be understood that it will be connected to the coupling of a hose or flexible conduit leading to a dispensing stand. The conduit will have ultimate connection through a pump with a tank which is the source of the fluid to be dispensed.

The body is configured to provide a seat 5 for a main valve tappet 6. The tappet will normally be held against the seat by a compression spring 7 engaged between the tappet and a plug 8 threaded into the housing. In one modification the plug 8 may have a central hollow as shown in which a magnet 9 is fitted. When the filling cap is removed from the tank of a vehicle, it may be brought against this magnet so as to be held in a position of convenient access for replacement.

The valve tappet 6 has a downwardly extending plunger or rod 10 which is attached to the piston 11 of a dash pot cylinder 12 threaded into a portion of the housing. The purpose of the dash pot is to prevent a fluid knock arising from too rapid closing of the main valve. A rod 13 extends through the housing and the bottom of the dash pot cylinder so as to contact the piston 11. To prevent leakage around the rod 13, there will be a packing 14 surmounted by a gland 15, held in place by a spring 16. Other forms of packing or gland structure may be employed as desired.

The nozzle has an operating lever 17 which is pivoted as at 18 to a plunger hereinafter described. It will be evident from FIG. 1 that moving the lever 17 in a counterclockwise direction about the pivot 18 will cause it to engage the lower end of the rod 13 and move it upwardly, thus raising the valve tappet 6 against the compression of the spring 7. The outer end of the operating lever 17 is adapted to be held in valve-open position by a pivoted latch member 19 having suitable teeth for engaging the end of the lever. A spring (not shown) is normally provided for urging the latch member into the position shown in the drawing. A guard 20 partially encloses the operating lever as is usual in structures of this type. The operating lever may be urged to the valve-open position by a small spring 21.

The housing provides a supplementary chamber 22 which is closed by a cap 23 held in place by screws. The chamber is traversed by a diaphragm 24. A locking plunger 25 depends from the central portion of this diaphragm and is held in place by a screw 26 and washer 27. A spring 28 engages between the cap 23 and the washer 27. A plunger 29 is slidably mounted in a central tubular part 30 of the casting, which tubular part traverses the opening in the interior of the housing so that the fluid can flow on either side of it. A light spring 31 urges the plunger upwardly. Near the upper end of the plunger balls 32 are capable of moving transversely of the plunger in lateral openings therein. In the normal position of the locking plunger 25, these balls engage a shoulder 33 on the casting to retain the plunger 29 in the "up" position. However, when the locking plunger 25 is

drawn upwardly by the diaphragm 24, the reduced lower portion of the locking plunger will permit the balls to move radially inwardly, releasing the lock. Assuming that the operating lever 17 is in the valve-open position, and is being retained therein by the latch 19, an upward movement of the diaphragm 24 will release the plunger 29 permitting it to descend, since the strengh of the spring 7 is much greater than the strength of the spring 31. When the plugner 29 descends, as is well known in this art, the operating lever will permit the spring 7 to lower the tappet 6 against the valve seat 5. Under these circumstances, the latch 19 is usually released and pivots out of the way. The plunger 29 will tend to return to the position shown in FIG. 1 through the action of the spring 31; and if the diaphragm 24 has returned to its normal position, the plunger 29 will again be locked.

It will be noted that there is no Venturi means in connection with the main valve 5, 6. The Venturi means is located in the structure of this invention at the forward end of the body and comprises the structure next to be described. The forward end of the casting is configured to provide a threaded nipple 34. The spout member 35 is threaded into a cooperating member 36 having a part 37 extending into the nipple but spaced therefrom so as to provide a vacuum passageway 38. The parts are held together preferably in the fashion of a pipe union, member 36 having an annular ridge 39 for engaging the end of the nipple 34, and there being a threaded sleeve member 40 with a portion engaging the threads of the nipple and an annular inturned portion engaging the ridge 39. To seal the assembly against leakage, an O-ring of suitable material may be engaged in a recess 41 in the member 36. The member 36 is shown in enlarged detail in FIG. 3.

The member 36 is provided with an integral spider having two or more arms 42, 43. These arms are bored as at 44, 45 to provide passageways connecting at the center of the spider. The spider has a forwardly extending portion 46 also bored so as to connect with the passageways 44, 45; and to this portion there is connected a tube 47 which is the sensing tube of the apparatus. This tube, in the form shown, extends downwardly through the spout 35 to a position near the spout end where it is provided with a hollow head 48 having an opening through the spout wall.

The annular passageway 38 between the member 36 and the body of the valve casting extends across the end of the member 36, as shown in FIG. 1, and then forwardly slantwise, so as to open into the interior of the main housing. The adjacent portion of the main casting may be formed to provide a valve seat for a supplementary tappet hereinafter to be described; but it is preferable to provide a separate member, having a press fit with prepared surfaces inside the main or body casting. Such a separate member is shown generally at 49 in FIG. 1 and is illustrated on an enlarged scale in FIG. 2. It comprises an annular portion 49*a*, the outer surfaces of which are configured to accomplish the press fit aforesaid. A forward extension on the annulus provides a valve seat 49*b* for the supplementary valve tappet. At the rear of the annulus there is a spider, preferably of two or more legs 49*c*, 49*d*, supporting axially a sleeve member 49*e* in which the shaft of the supplementary tappet may be slidably journalled.

The supplementary valve tappet, indicated by dotted lines in FIG. 2, is shown by itself in FIG. 4 and has a shaft portion 50 terminating in a head 51. This head has exteriorly a first conical portion 52, a narrow cylindrical portion 53 and a second but oppositely directed conical portion 54. The head is hollow, as at 55, to form a seat for a compression spring 56 which engages between the head and the spider 42, 43 of the fitting 36. A boss 57 may be provided on the spider to hold the opposite end of the spring in place. The shaft portion of the supplementary shut-off member is slidably journalled in the sleeve 49*e*, as shown in both FIGS. 1 and 2.

The rearward end of the member 36 is shaped to provide a narrow cylindrical surface 59 only slightly larger in diameter than the cylindrical surface 53 on the supplementary valve tappet. The surface 59 is flanked by outwardly flaring conical surfaces 60 and 61, the purpose of which will be later set forth.

When the supplementary tappet 50, 51 occupies the position shown in FIG. 1 (which will be its position at all times when the main valve tappet is closed), its conical surface 52 engages the seat 49*b* on member 49, closing the interior of the main housing so that any portion of the fluid being dispensed lying in the hollow interior of that housing between the supplementary valve and the main valve will be positively retained. Any fluid lying ahead of the supplementary cut-off device will drain substantially instantaneously from the spout 35. Thus, the accuracy of the dispensing operation is very great.

When the main valve 5, 6 is opened, the pressure of the fluid within the housing will move the supplementary tappet forwardly against the compression of the spring 56. An annular passageway will be formed between the surfaces 52, 53, 54 of the supplementary tappet and the opposite surfaces 59, 60, 61 formed interiorly of the member 36 so as to produce a Venturi effect which is especially active and positive because the passageway 38 is a full annular passageway. The extent of movement of the supplementary tappet to the left in FIG. 1 will depend upon the pressure of the fluid behind it. As the device moves further to the left, the passageway between it and the housing becomes larger so that while a greater quantity of fluid will flow, the velocity of fluid movement is cut down. Thus, there is a correlation between volume and velocity in the structure of this invention such that vacuum surges are minimized or prevented. Premature or improper actuation of the diaphragm 24 does not occur.

The passageway 38 is connected by a passageway 62, a hole in the diaphragm, and a passageway 63 in the cap to that portion of the supplementary chamber 22 which lies above the diaphragm. The skilled worker in the art will understand that the entry of air through the tube 47 normally prevents actuation of the diaphragm. But if resistance is encountered at the opening 48, the vacuum produced at the Venturi mechanism will draw the diaphragm 24 upwardly.

The index numeral 64 illustrates a partial cover of rubber or plastic on the forward end of the device to prevent marring of automobile bodies, as is usual in this art. A buffer spring 65, also known, may be included in the structure.

It is an advantage of the structure of this invention that the spout assembly including the member 36 may readily be renewed or exchanged, since it is only necessary to unscrew the sleeve 40 to remove the spout assembly.

Modifications may be made in the invention without departing from the spirit of it. Having described the invention in an exemplary embodiment, what is claimed as new and is desired to be secured by Letters Patent is:

1. In an automatic dispensing nozzle construction, a hollow body having inlet means, a spout element attached to one end of said body, a main valve in said body for controlling the flow of fluid from said inlet means to said spout, means for operating said main valve, release means for said main valve responsive to a vacuum, sensing means controlling said vacuum, a supplementary, pressure actuated valve adjacent the juncture of said spout element and said body and acting in closed position to retain fluid in said body upon closure of said main valve, said pressure actuated valve having a tappet and a seat with opposing surfaces adapted to provide a Venturi means for creating a vacuum and a vacuum passageway in said body between said Venturi means and said release means.

2. The structure claimed in claim 1 including a fitting

detachably affixed to said hollow body and having a portion extending inwardly of said body but spaced from the walls thereof to provide a portion of said vacuum passageway, means in connection with said body having a portion providing a seat for said pressure actuated valve, said passageway opening into said body adjacent said seat.

3. The structure claimed in claim 2 wherein said fitting has an internal spider with hollow arms, the hollows in said arms communicating with said passageway and interconnecting at the center of said spider, a sensing tube having an end terminating at the center of said spider and in communication with the hollows in the arms thereof, said sensing tube extending to a position adjacent the other end of said spout element and having an opening to the atmosphere thereat.

4. The structure claimed in claim 3 wherein said spout element, said fitting, and said sensing tube are detachable as a unit from said body.

5. The structure claimed in claim 3 in which said tappet and the inner end portion of said fitting each have two substantially oppositely directed conical surfaces separated by a narrow cylindrical surface.

6. The structure claimed in claim 5 wherein the tappet for said pressure actuated valve has a hollow head and a shaft which is slidably journalled with respect to

said body, there being a compression spring engaged between said head and said spider.

7. The structure claimed in claim 6 wherein said means for operating said valve is a lever, said lever being pivoted at one end to a plunger movable in said body and connecting with a locking means on a diaphragm located in a chamber formed as part of said body, there being a passageway in said body connecting said first mentioned passageway to a space in said chamber adjacent one side of said diaphragm.

8. The structure claimed in claim 7 wherein said main valve is devoid of Venturi means and is provided with a dash pot acting to prevent sudden closure.

9. The structure claimed in claim 8 wherein said tappet has a guide shaft extending inwardly of said hollow body and wherein said shaft is slidably mounted in a spider in said body on the side of said tappet opposite said first mentioned spider.

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