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LIQUID LEVEL CONTROLLED FILLING NOZZLE

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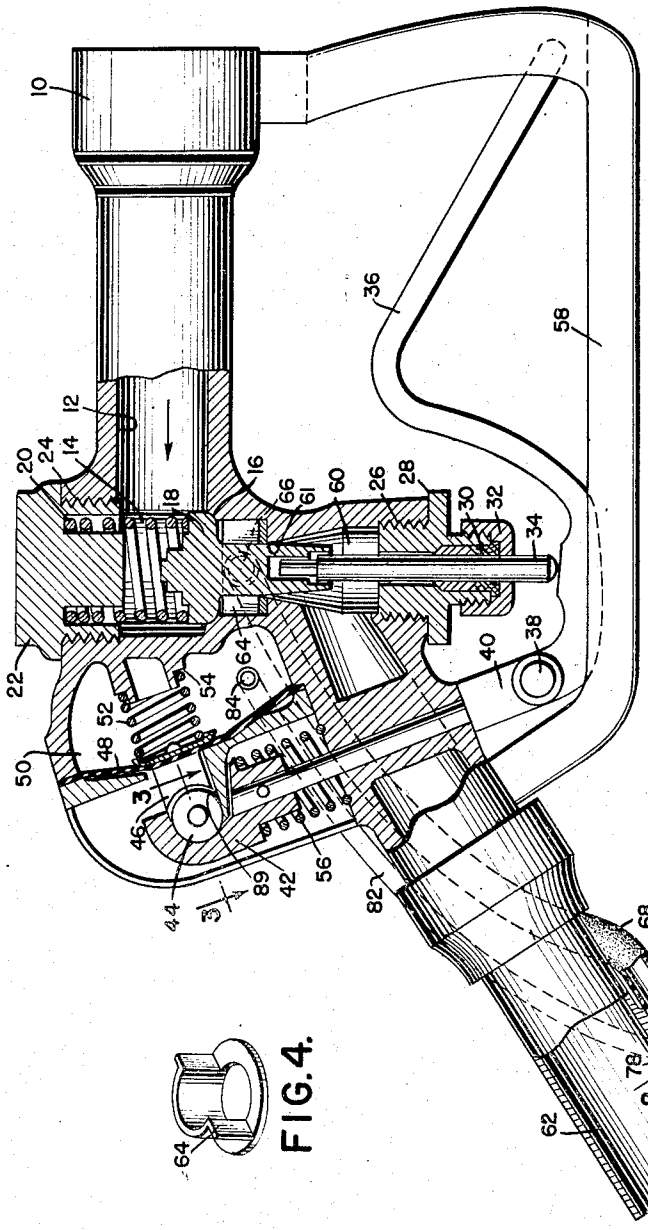


FIG. 1.

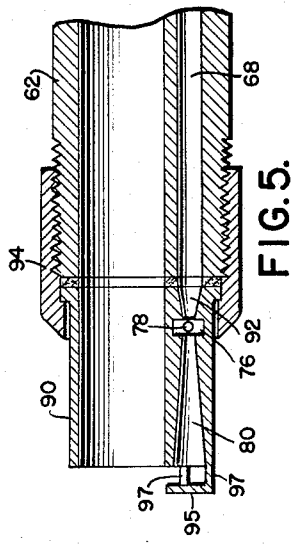


FIG. 5.

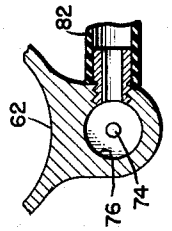


FIG. 2.

FIG. 4.

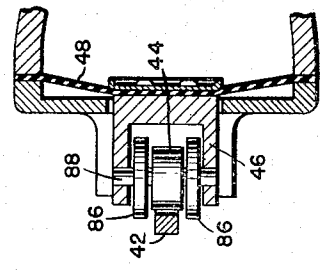


FIG. 3.

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LIQUID LEVEL CONTROLLED FILLING NOZZLE

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12 Claims. (Cl. 226—127)

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This invention relates to liquid level actuated automatic shut-off dispensing devices of the type commonly employed for dispensing fuels but readily applicable for dispensing liquids of other types.

Existing devices for such purposes have not been completely satisfactory for the reasons that they are unreliable in their operation where foam is encountered, they inherently tend to produce the very foam that renders them responsive to foam, they are unreliable whenever liquid being dispensed penetrates their expansible chambers and in most cases require a continuous circulation of air through their expansible chambers throughout a dispensing operation.

There have been efforts to produce such devices having a single discharge passage for the liquid being dispensed, but such arrangements have been unsatisfactory because if high pressures are employed in such devices, foaming will be inevitable and if low pressures are utilized, the differential pressures produced are so low that the size of the apparatus becomes impractical.

Typical of the prior art devices over which the present invention constitutes a marked improvement are the disclosures of the patents to Marone, 1,907,260, dated May 2, 1933, Piquerez, 2,326,251, dated August 10, 1943, and Davis, 2,320,033, dated May 25, 1943.

The present invention proposes in combination with a liquid level actuated automatic shut-off dispensing device containing a manually opened valve and an expansible chamber actuated tripping mechanism therefor, wherein the chamber has a pressure responsive movable wall and contains a port; a main liquid nozzle and an auxiliary tube of smaller flow capacity having spaced liquid ports providing multiple liquid paths downstream from the valve and having independent discharge ends, the tube containing a restriction and having an enlargement downstream from and of larger cross section than the restriction, and means defining a passage interconnecting the port and the enlargement providing the sole communication between the chamber and atmosphere.

The end of the nozzle is maintained in constant communication with the valve and in order to avoid the adverse effects of turbulence, a baffle is preferably interposed between the nozzle and tube ports. The tube preferably has a divergent wall whose minimum cross section exceeds that of the restriction, disposed downstream from the enlargement. The tube and nozzle ends may

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terminate in substantially the same plane and the nozzle and tube may be integral in part. The movable wall of the expansible chamber is preferably a flexible diaphragm. The liquid supply passage upstream from the valve is preferably of greater cross section than the smallest cross section of the nozzle downstream from the valve in order to maintain a pressure head that will assure proper operation of the device at all times.

The tripping mechanism preferably includes a bolt and a reciprocatory detent connected with the movable wall, the detent preferably being roller supported for movement on a surface provided by the casing and engageable with a hook portion carried by the bolt.

A more complete understanding of the invention will follow a detailed description of the accompanying drawings wherein:

Fig. 1 is an elevation, partially in section, depicting the invention;

Fig. 2 is an enlarged fragmentary section taken along line 2—2 of Fig. 1;

Fig. 3 is a section taken along line 3—3 of Fig. 1, also on an enlarged scale;

Fig. 4 is a perspective view of a baffle member shown in Fig. 1, also on an enlarged scale; and

Fig. 5 is a fragmentary sectional elevation depicting a modification.

The dispensing device as depicted in Fig. 1 has an inlet end 10 for connection to a suitable flexible hose for communication through a passage 12 with a valve chamber 14 containing a seat 16 for the reception of a valve body 18. The valve is biased towards its seat by means of a spring 20 which is interposed between the head of the valve and a plug 22 threaded into an opening 24. Axially aligned with the threaded opening 24, another threaded opening 26 is provided to receive a threaded bushing 28 which is provided with packing 30 and a packing nut 32 through which a valve stem 34 projects for engagement with an actuating lever 36. The actuating lever is articulated by means of a pivot 38 to a bolt 40 whose opposite end is provided with a hook portion 42 for engagement with a roller 44 carried by a reciprocatory detent arm 46 whose end is secured to a diaphragm 48 constituting a flexible wall of an expansible chamber 50.

The diaphragm 48 and the detent 46 to which it is riveted or otherwise suitably secured are biased towards the left as shown in Fig. 1 by means of a spring 52 interposed between the diaphragm and a shoulder 54 formed within the chamber 50. The bolt 40 is biased upwardly by means of a spring 56 interposed between the en-

larged hooked end 42 and a portion of the framework. So long as the detent 46 assumes the position depicted in Fig. 1, its roller 44 will engage under the hook portion 42 and the pivot or fulcrum 38 of the lever 36 will remain fixed with respect to the casing. Under those circumstances, when the lever 36 is grasped manually and moved away from its guard 58, the valve stem 34 will move upwardly to lift the valve 18 against the force of the spring 20 permitting passage of liquid from the valve chamber 14 downwardly beyond the valve body 18. The major portion of the liquid passing the valve will enter the main channel 60 through a port 61 and pass through the nozzle 62 to the container for which it is intended. Another portion of the liquid however, will pass between the baffle 64 and the wall of the casing into a port 66 which is suitably connected by means of a tube 68 with an eduction device 70 disposed near the discharge end 72 of the main nozzle. This tube defines an auxiliary passage restricted by a throat 74 which opens into an enlargement 76 intersected by an eduction port 78. Downstream from this enlargement, there is a divergent wall 80 which extends to a plane common to the end of the nozzle 72.

It is of great importance that the cross section of the throat 74 is smaller than the minimum cross section of the channel downstream therefrom so that when the divergent or conical wall 80 is unobstructed by liquid from the receptacle being filled, the jet discharged through the throat 74 will not entirely fill any portion of the passage downstream therefrom. Under these conditions, the enlargement 76 always communicates with atmosphere and there will be no eduction effect. Consequently, under these conditions, the tube 82 interconnecting the eduction port 78 with the expansible chamber 50 through its single port 84 will have no tendency to retract the diaphragm 48 and the chamber will remain at atmospheric pressure. However, as soon as liquid from the receptacle being filled has entered and closed the divergent passage 80, the jet projected through the throat 74 will constitute a liquid piston which will entirely fill at least a portion of the divergent passage, tending to produce a vacuum in the eduction tube 82 and the expansible chamber 50.

This effect quickly evacuates the relatively small expansible chamber 50 causing the diaphram 48 to move towards the right against the force of its spring 52 to retract the detent 46 and remove the roller 44 from under the end of the hooked portion 42 of the bolt, whereupon, the excessive force of the spring 20 over that of the relatively light spring 56, causes the bolt and its pivot 38 to move downwardly so that the valve stem 34 and its valve 18 will likewise move downwardly even though the operating lever 36 is still in its upper position. As soon as the nozzle is removed from the liquid, atmospheric pressure will be restored in the expansible chamber 50 and the springs 52 and 56 will become effective automatically to restore the latched condition depicted in Fig. 1 of the drawings, readying the device for another operation.

The roller 44, as shown in Fig. 3, is of slightly smaller diameter than the rollers 86 disposed at either side thereof and mounted with it on a common pin 88 which supports the rollers in the detent arm or yoke 46. The rollers 86 ride on a surface 89 provided by the casing.

It will be clear to those skilled in the art that for a given velocity of liquid in the main nozzle 62, there will be a relatively higher velocity in the throat 74 and therebeyond producing a much more rapid response with a given size of diaphragm than would occur with the relatively lower velocity liquid in the main nozzle. Moreover, it will be noted that there is no circulation of fluid, air or otherwise, through the expansible chamber 50 at any time. Hence, there is no entrainment of air in the flowing stream and to a great extent, this eliminates foam. But should there be a foamy condition for some other reason, the relatively high velocity of the pilot jet emanating from the throat 74 will break the foam and prevent a premature shut-off as has been so common with commercial devices previously proposed.

The modification depicted in Fig. 5 illustrates a greater portion of the tube 68 integral with the main nozzle 62 and contemplates a detachable end 90 containing a convergent throat 92, an enlargement 76 and a divergent wall or passage 80 and an eduction port 78 corresponding with that of Fig. 1. The detachable end may be suitably secured to the casing by means of a threaded thimble 94. There is also shown in this figure, a deflecting plate 95, spaced from the end of the passage 80 by legs 97 to disperse the high velocity stream from the passage 80 and thereby reduce its foaming tendencies.

The examples of the invention which have been illustrated and described should not be construed as limiting beyond the scope of the appended claims.

We claim:

1. In combination with a liquid level actuated automatic shut-off dispensing device containing a manually opened valve and an expansible chamber actuated tripping mechanism therefor, wherein said chamber has a pressure responsive movable wall and contains a port; a main liquid nozzle having an inlet port and a liquid conducting tube of smaller flow capacity than said nozzle having an inlet port, said nozzle and tube providing multiple liquid paths having independent discharge ends, said inlet ports communicating with relatively high liquid pressure areas of said device, said tube containing a restriction and having an enlargement downstream from and of larger cross section than said restriction, whereby a stream of liquid of smaller cross section than any portion of said tube downstream from said restriction will flow through said tube downstream from said restriction until the discharge end of said tube is immersed in a liquid, and means defining a passage interconnecting said chamber port and said enlargement providing the sole communication between said chamber and atmosphere.

2. The invention as set forth in claim 1 wherein said nozzle end is in constant communication with said valve.

3. The invention as set forth in claim 1 wherein a baffle is interposed between said nozzle and tube ports.

4. The invention as set forth in claim 1 wherein said tube has a divergent wall whose minimum cross section exceeds that of said restriction, disposed downstream from said enlargement.

5. The invention as set forth in claim 1 wherein said tube and nozzle ends terminate in substantially the same plane.

6. The invention as set forth in claim 1 wherein portions of said nozzle and tube are integral.

7. The invention as set forth in claim 1 wherein said movable wall is a flexible diaphragm.

8. The invention as set forth in claim 1 wherein said device contains a liquid supply passage upstream from said valve and a passage of relatively smaller cross section between said valve and nozzle end.

9. The invention as set forth in claim 1 wherein said tripping mechanism includes a bolt and a reciprocatory detent connected with said wall.

10. The invention as set forth in claim 1 wherein said tripping mechanism includes a bolt and a roller supported detent connected with said wall.

11. The invention as set forth in claim 1 wherein said tripping mechanism includes a bolt having a hook portion and retractable detent connected with said wall and engageable with said hook portion.

12. The invention as set forth in claim 1 wherein deflecting means is provided adjacent the discharge end of said tube.

References Cited in the file of this patent

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