Sept. 5, 1944. J. A. JENSEN 2,357,657

REFUELING NOZZLE

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FIG. 1.

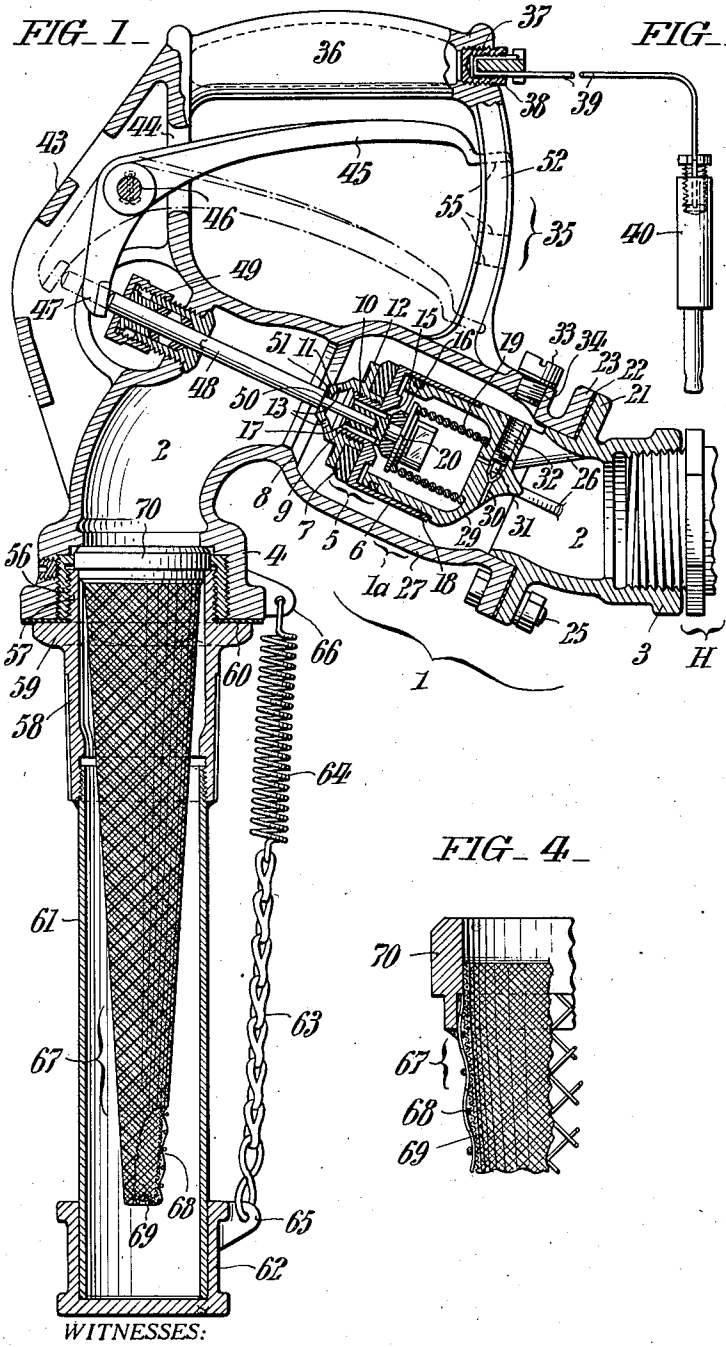


FIG. 2.

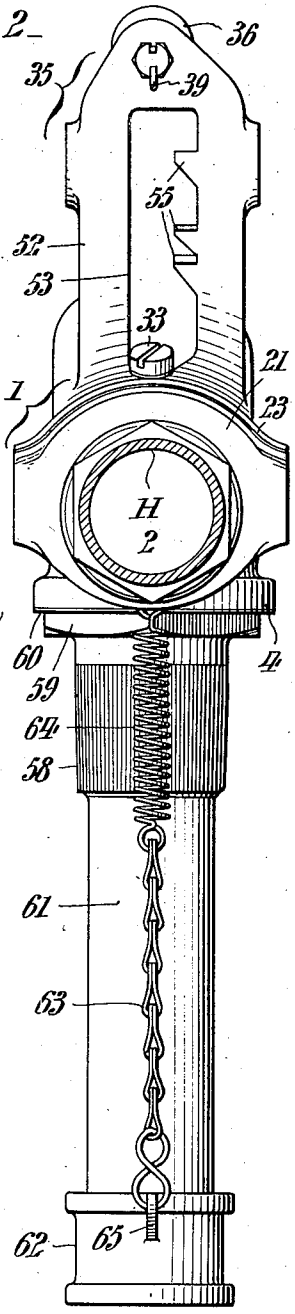


FIG. 4.

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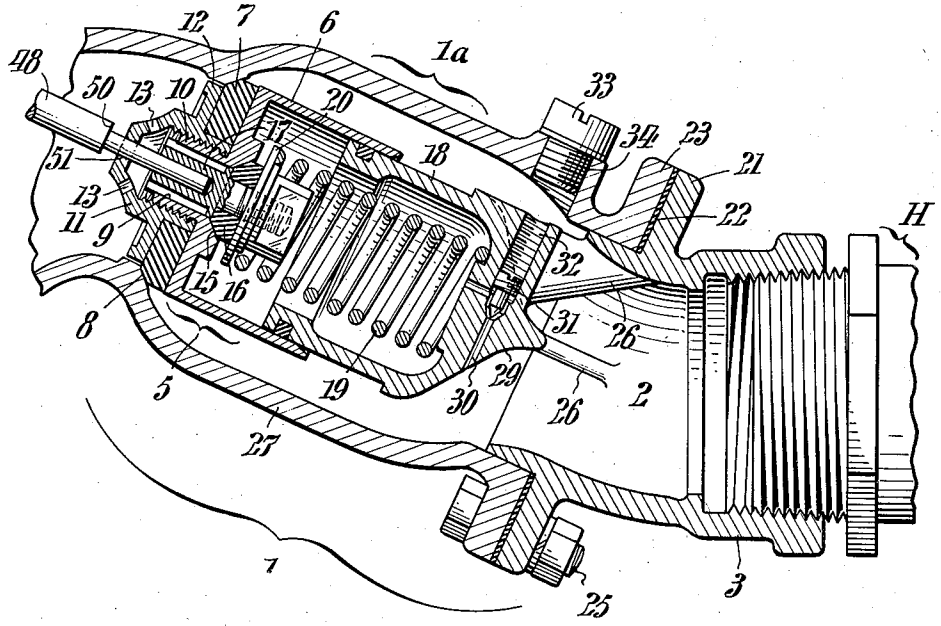
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FIG. 3.



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Patented Sept. 5, 1944 2,357,657

UNITED STATES PATENT OFFICE

2,357,657

REFUELING NOZZLE

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Application March 25, 1942, Serial No. 436,089

6 Claims. (Cl. 137—139)

This invention relates to valved nozzles of a type especially useful in connection with the refueling of airplanes, automobiles and the like, with gasoline, oil or other fluids delivered under pressure from a storage supply source.

In the ordinary types of nozzles heretofore designed for the above purpose, the control valves are disposed crosswise of the direction of flow of the liquids in the nozzle bodies. Accordingly, abrupt angles had to be traversed by the liquids, which greatly impeded their flow and correspondingly detracted from the operative efficiency of the nozzles. Moreover, closing of the valves in the prior art nozzles was attended by jars and shocks due to sudden checking of the fluid flow.

The chief aim of my invention is to overcome the above drawbacks, which desideratum I attain as hereinafter more fully disclosed, by forming the body of the nozzle with a continuously smooth internal flow passage of ogee or S-shaped configuration, by providing dash-pot means for retarding the closing movement of the valve under the influence of a yielding means which normally tends to hold said valve closed in the direction of fluid flow through the nozzle body; and by providing a smaller auxiliary relief valve and means whereby it is opened ahead of the first mentioned or main valve to relieve the dash-pot means and thereby allow quick opening of said main valve.

Other objects and attendant advantages will appear from the following description of the attached drawings, wherein

Fig. 1 is a view partly in side elevation and partly in axial section, of a refueling nozzle conveniently embodying the present improvements, with its main flow control valve in full open position.

Fig. 2 shows the rear end elevation of the nozzle, or as said nozzle appears when viewed from the right of Fig. 1.

Fig. 3 is a fragmentary view corresponding to Fig. 1, with the main and auxiliary valves of the nozzle both in closed position; and

Fig. 4 is a fragmentary sectional view showing important structural details of a filtering element associated with the nozzle.

As herein illustrated, my improved refueling nozzle has a body 1 with a continuously smooth flow passage 2 of ogee configuration extending through it from its inlet 3 to its outlet 4. Arranged for movement axially of the medial portion 1a of the body 1 is a main valve which is comprehensively designated by the numeral 5. In its construction this main valve 5 includes a cup-like component 6 having attached to its base end a washer 7 of a suitable elastic composition which closes against an annular seat 8 within the body 1 in the direction of fluid flow through the passage 2. The cup member 6 of the valve 5 has a central aperture 9, and a projecting threaded neck 10, the latter being engaged by a cap piece 11 with a circumferential disk flange 12 which bears upon the outer face of the washer 7 to secure it. From Fig. 3 it will be noted that the diameter of the disk flange 12 is such as to enter the neck of the body immediately ahead of the seat 8 with a rather close fit when the valve is in closed position. The purpose of this arrangement will be later explained. As shown, the dome portion of the cap piece 11 is provided for a purpose later on explained, with an annular series of apertures 13. Arranged to cooperate with a beveled seat 15 around the inner end of the opening 9 is a smaller auxiliary valve 16 with a fluted shank 17 snugly fitting slidingly into said opening. The cup 6 engages fluid tightly over a fixed reversely-positioned cup 18 interiorly of the nozzle body 1; and axially disposed within the cup 18 is a yielding member in the form of a helical compression spring 19, whereof one end bears against the bottom of said cup, and whereof the other end bears against a flange disk 20 attached to the auxiliary valve 16. It will be seen from Fig. 3 that under the influence of the spring 19, the main valve 5 and the auxiliary valve 16 are both yieldingly held in closed position normally.

The inlet 3 is internally threaded for attachment of a hose H leading from a pressure source of fluid supply (not shown) and for convenience of manufacture separately formed, being provided with a circumferential flange 21, which, with interposition of a sealing gasket 22, abuts against a smaller flange 23 on the main section of said body 1, and is secured by a plurality of screw bolts whereof one is shown at 25. In the illustrated instance the cup 18 is integrally formed with the end section 3 of the nozzle body 1 and connected thereto by a few thin short radial ribs 26. It is to be especially noted that in the region of the valve 5, the diameter of the nozzle body 1 is enlarged as at 27 so that ample circumferential space is provided for free flow of the liquid around said valve, the inner surface of the enlargement merging through smooth liberal curves with the other portions of the passage 2. Fluid flow through the nozzle is further eased through tapering of the rear end

of the cylinder 18 as at 29, and by reason of the fact that the connecting ribs 26 are rounded and of small cross section so as to be substantially negligible as obstructions.

Leading through the base of the cylinder 18 is an angular bleed-duct 30 which is regulatable by a small screw pin valve 31 threaded into a lateral aperture 32 in the base in said cylinder, said pin valve being accessible for adjustment upon removal of a plug 33 which normally closes an axially aligned opening 34 in the wall of the nozzle body 1. The arrangement just described is advantageous in that adjustments of the pin valve 31 may be made without necessitating dismantling any of the parts of the nozzle.

An integral loop 35 on the nozzle body affords a grasp handle 36 which is internally threaded as at 37 to receive a screw tip 38 at one end of a flexible grounding wire or cable 39. To the other end of the cable 39 is suitably attached a plug 40.

As shown in Fig. 1, the side portion 43 of the loop 35 is hollow and its inner wall provided with an opening 44 through which a valve actuating lever 45 extends into parallel relation with the handle portion 36 of said loop. The lever 45 is fulcrumed at 46 and provided with a finger projection 47 which is normally contacted by the outer end of a valve actuating stem 48 protruding through a stuffing box 49 in the wall of the nozzle body 1. At its inner end, to which the auxiliary valve 16 is connected, the stem 48 is reduced in diameter with resultant formation of a shoulder at 50, and said reduced portion guided in an axial aperture 51 in the cap 11. The opposite side portion 52 of the loop 35 is slotted as at 53, as clearly shown in Fig. 2, for projection thereinto of the outer end of the valve actuating lever 45, said slot being formed at intervals along one edge with stops 55 for engagement by the lever to hold the valve 5 in different positions of adjustment.

The outlet 4 of the nozzle body is internally threaded for retainment of a bushing 56 which is itself internally threaded to receive the neck end 57 at the top of a coupling sleeve 58. As shown the sleeve 58 is formed with a polygonal head 59 which provides an annular shoulder face to clamp a gasket 60 against the mouth edge of the outlet 4. Threaded into the sleeve 58 is a tubular spout 61; and normally closing said spout at the bottom is a cap 62 which is held in place by a flexible connection comprising a chain 63 and a helical spring 64 whereto the chain is joined at one end, the remote ends of said chain and spring being connected to lugs 65 and 66, respectively, on said cap and the nozzle body 1. Disposed within the spout is a downwardly tapering filter element 67 having an outer foundation component 68 of coarse wire mesh (Fig. 4) and a lining 69 of relatively fine wire mesh, said foundation component and lining being welded or otherwise secured to a circumferentially flanged ring 70 which is clamped between the bottom of the bore in the outlet 4 of the nozzle body 1 and the top end of the sleeve 59 to hold the filter element in place. By virtue of the described construction it will be seen that the spout and the filter element can be removed from the nozzle whenever cleaning of the screening becomes necessary. The bushing 56 I employ only in cases where the valve body is of a relatively soft metal such as aluminum which would be liable to rapid wear from frequent unscrewing of the spout. In other cases the nozzle may be directly engaged with the outlet 4. The tapering of the filter element as shown is advantageous in that liberal space is provided thereabout within the spout with consequent minimization of the resistance to free fluid flow through the latter.

As previously stated, the main valve 5 and the auxiliary valve 16 are normally held in closed position under the influence of a spring 19 as shown in Fig. 3. To operate the nozzle, the actuating lever 45 is drawn upward from the normal position in which it is shown in dot-and-dash lines in Fig. 1, such movement of said lever being attended by inward axial shifting of the valve stem 48. At the initiation of this shift of the stem 48, the auxiliary valve 16 is first opened so that liquid may by-pass through the dash-pot jointly formed by the two cylinders 6 and 18 via the bleed-duct 30, the port 9 and the openings 13 in the cap 11 so as to make quick opening of the main valve 5 possible. As the inward movement of the stem 48 continues, the shoulder 50 on the latter contacts the outer end of the cap 11, with the result that the main valve 5 is bodily displaced from the seat 8 and is fully opened when the actuating lever 45 reaches the position in which it is shown in full lines in Fig. 1. By selective engagement of the end of the actuating lever 45 with the stops 55, the valve 5 may be locked in correspondingly different positions of opening. To interrupt the flow from the nozzle, the actuating lever 45 is moved to the dot-and-dash position in Fig. 1 with attendant release of the valve stem 48 from manual control, and instant closing of the auxiliary valve 16 by the spring 19. The main valve 5 does not, however, immediately follow suit due to the retarding effect of the dash-pot, and to the entry of the disk flange 12 into the neck of the nozzle body in advance of the final contact of the washer 7 with the seat 8, so that the flow through the nozzle is gradually interrupted with avoidance of sudden shocks or jars, the time required for closing being predeterminable by adjustment of the pin valve 31 in the bleed-duct 30.

Having thus described my invention, I claim:

1. A dispensing nozzle having a straight hollow body portion between smoothly-mergent communicating tubular inlet and outlet portions of smaller diameter; a valve in the form of a cup whereof the base closes against an annular seat at one end of the body; a fixed reversely-positioned cup-like guide axially within the body with which the cup valve has a sliding fit; yielding means in compression between the valve and its guide for normally holding the valve closed; actuating means externally of the body permitting independent movement of the valve in closing; and a bleed duct providing restricted communication between the flow passage of the body and the interior of the dash pot jointly formed by the valve and its guide for retardation of the closing movement of the valve.

2. A dispensing nozzle according to claim 1, further including adjustable means accessible exteriorly of the body for regulating flow through the bleed duct.

3. A dispensing nozzle according to claim 1, wherein the base of the cup valve has an axial port; wherein an auxiliary valve normally engages a seat around the axial port of the main valve interiorly of the latter; wherein the auxiliary valve has a stem extending through a fluid-tight opening in the wall of the body for engagement by the actuating means; wherein the inner end of the stem passes through a guide on the main valve with allowance for a limited amount

of lost motion between the outer end of said guide and a shoulder on said stem so that the auxiliary valve will be opened before the main valve; and wherein the yielding means is in compression between the auxiliary valve and the bottom of the cup-like guide for the main valve.

4. A dispensing nozzle according to claim 1, further including means for regulating flow through the bleed duct; and an opening in the side of the body normally closed by a removable plug, through which access may be had to the regulating means for the purposes of adjustment.

5. A dispensing nozzle according to claim 1, wherein the base of the cup valve has an axial port; wherein an auxiliary valve normally engages a seat around the axial port of the main valve interiorly of the latter; wherein the auxiliary valve has a stem extending through a fluid-tight opening in the wall of the body for engagment by the actuating means; wherein the main valve is connected to the stem with capacity for a limited amount of lost motion so that the auxiliary valve will be opened before the main valve; and wherein the yielding means is in compression between the auxiliary valve and the bottom of the cup-like guide for the main valve.

6. A dispensing nozzle according to claim 1, wherein the axes of the inlet and outlet portions of the nozzle are oppositely disposed at acute and obtuse angles respectively to the axis of the body.

JAMES A. JENSEN.