March 26, 1957 J. J. PACEY 2,786,493

HOSE NOZZLE OF THE AUTOMATIC SHUT-OFF TYPE

Filed Jan. 24, 1955 2 Sheets-Sheet 1

Fig. 1.

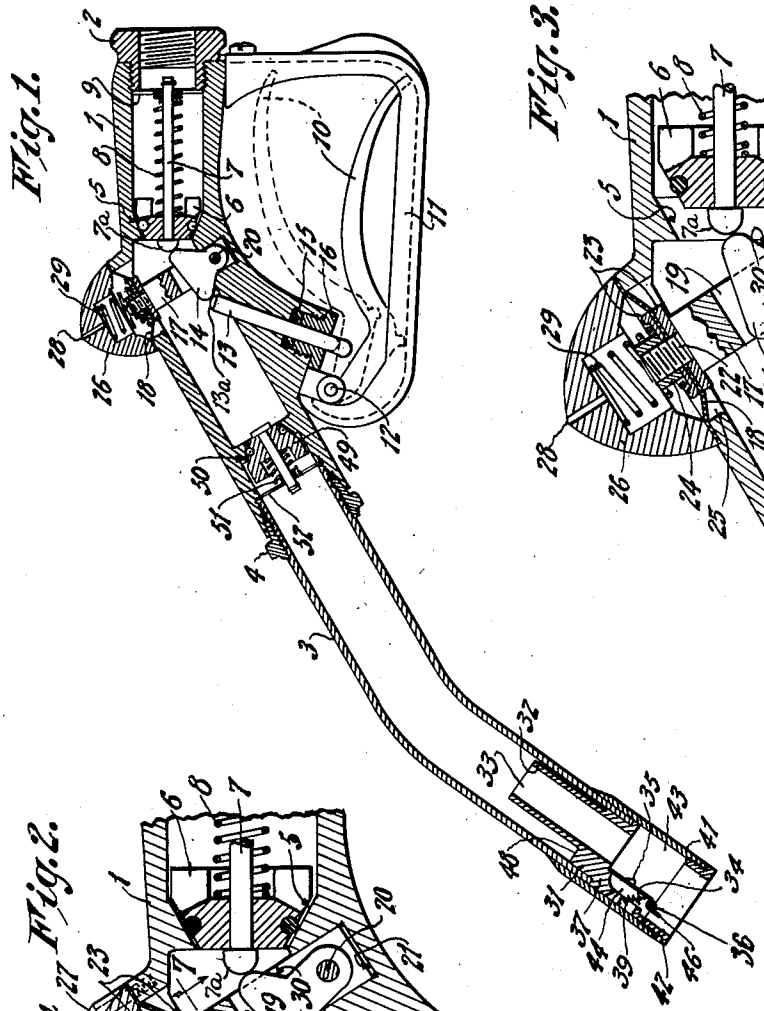
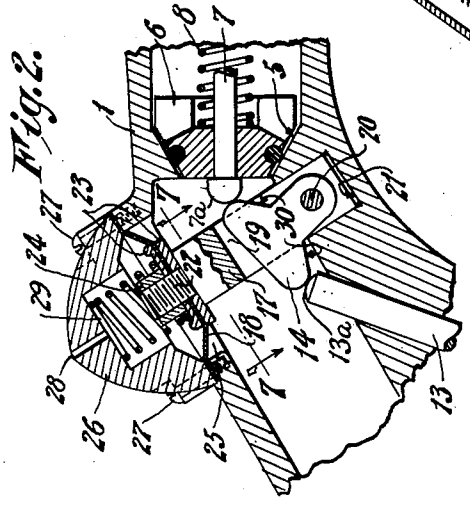


Fig. 3.



Fig. 2.



INVENTOR,
John J. Pacey,
BY
Chapin & Neal
Attorneys.

March 26, 1957 J. J. PACEY 2,786,493

HOSE NOZZLE OF THE AUTOMATIC SHUT-OFF TYPE

Filed Jan. 24, 1955 2 Sheets-Sheet 2

Fig. 8.

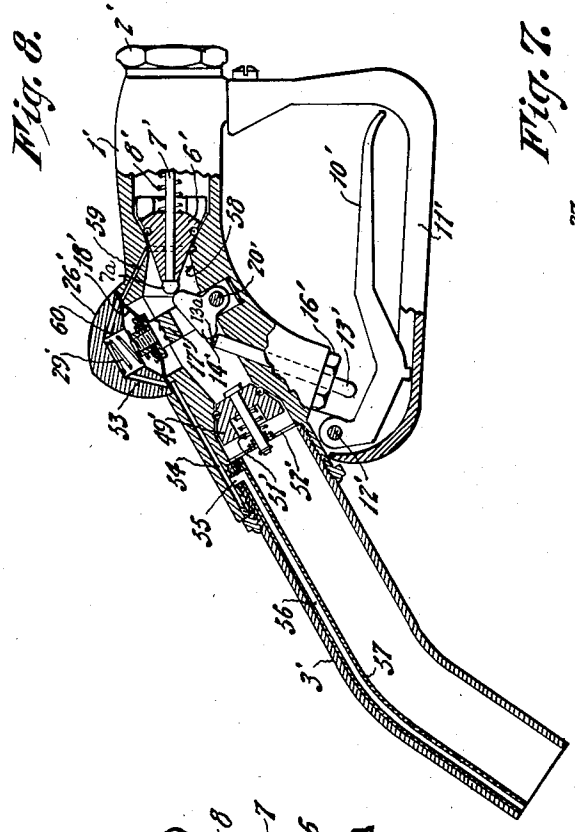


Fig. 7.

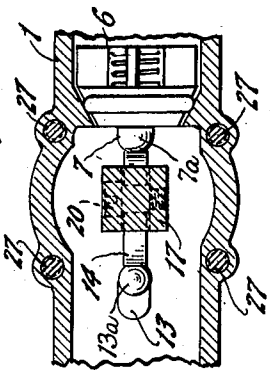


Fig. 6.

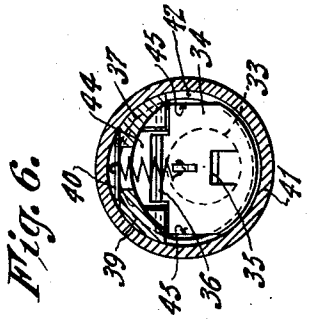


Fig. 4.

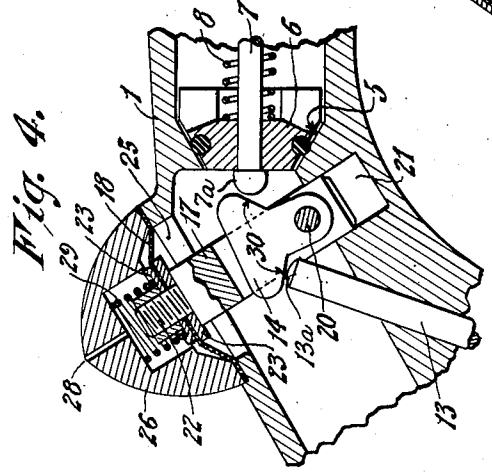
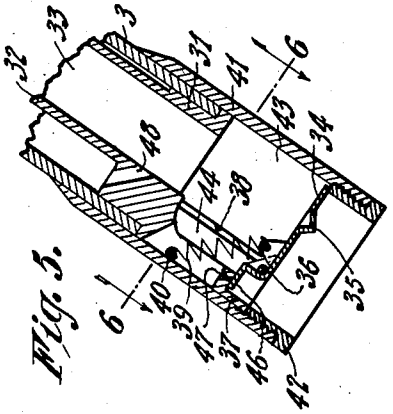


Fig. 5.



INVENTOR.
John J. Pacey,
BY Chapin & Neal
Attorneys.

United States Patent Office 2,786,493 Patented Mar. 26, 1957



2,786,493

# HOSE NOZZLE OF THE AUTOMATIC SHUT-OFF TYPE

John J. Pacey, Springfield, Mass., assignor to Gilbert & Barker Manufacturing Company, West Springfield, Mass., a corporation of Massachusetts

Application January 24, 1955, Serial No. 483,608

5 Claims. (Cl. 141—209)

This invention relates to improvements in nozzles of the automatic shut-off type for dispensing liquids.

One advantageous use for the invention is in connection with a hose nozzle such as is used in gasoline dispensing apparatus, where the dispensing flow is controlled by a valve, which is held open by a hand lever against the force of a spring that tends to close the valve. Here, it is desired that the valve shall automatically close when the gasoline rises to a certain level in the fill pipe of the tank being serviced, even though the operator holds the hand lever in a position which would normally cause opening of the valve.

The invention has for its object an improved means, controlled by the immersion of the outlet end of the nozzle in the liquid dispensed, for effecting the closing of the flow-control valve of a nozzle of the type, wherein such valve is adapted to be manually actuated by an exteriorly-located hand lever through a transmission, which includes two stems, one fixed at one end to the valve and the other adapted at one end for engagement by the hand lever, and a rocker interposed between the other and non-adjacent ends of such stems and adapted to transmit force from one to the other of the stems.

More particularly, the invention has for its object the provision of fluid-pressure-actuated means, rendered effective when the outlet end of the nozzle becomes immersed in the dispensed liquid, for bodily shifting the aforesaid rocker from a normal force-transmitting relation with the two stems to another position in which the valve stem is released to allow closure of the flow control valve by its spring.

Another object of the invention is to provide in a nozzle of the class described, cam surfaces on the rocker which enable the two stems to be spread apart to facilitate reinsertion of the rocker in operative position between the stems by means of a spring, after the fluid-pressure-actuated means has ceased to act.

Another object of the invention is to provide, as a part of the wall of the liquid passage in the nozzle, a movable wall, such as a diaphragm for example, to which is secured one end of a rod, the other end of which carries the pivoted rocker; a spring normally holding the movable wall and rod in a position such that the rocker is interposed between the stems in operative force-transmitting relation; and means, controlled by immersion of the outlet end of the nozzle in the dispensed liquid, for increasing the pressure of the liquid on the movable wall to overcome the force of the spring and cause the rocker arm to be removed from between the stems to allow the flow control valve to be closed.

The invention will be disclosed with reference to the illustrative embodiments of it in the accompanying drawings, in which:

Fig. 1 is a small-scale sectional-elevational view of an automatic shut-off hose nozzle embodying the invention;

Fig. 2 is a fragmentary sectional-elevational view, drawn to a larger scale, showing the valve-actuating rocker in position for actuation by the nozzle hand lever and the flow control valve closed;

Fig. 3 is a view, taken similarly to Fig. 2 but showing the rocker as it is positioned by movement of the hand lever to open the flow control valve;



Fig. 4 is a view, taken similarly to Fig. 3 but showing the rocker shifted to allow the flow control valve to close, even though the hand lever is held in the position that normally holds the valve open;

Fig. 5 is a fragmentary sectional-elevational view, drawn to a larger scale, and showing the pressure control valve at the outlet end of the nozzle;

Fig. 6 is a cross sectional view on the line 6—6 of Fig. 5;

Fig. 7 is a fragmentary sectional plan view taken on the line 7—7 of Fig. 2; and

Fig. 8 is a sectional-elevational view of a modified form of automatic shut-off hose nozzle.

Referring to these drawings and first to Fig. 1 thereof; the nozzle includes a hollow body 1, having screw-threaded into one end thereof a bushing 2, adapted for attachment to the delivery end of the flexible hose of a gasoline dispensing pump, and screw-threaded into its other end a tubular spout 3, adapted for insertion in the fill pipe of the gasoline tank to be serviced. The spout 3 is held to the body by a combined lock and seal nut 4. The bushing, body and spout afford within them one continuous passage for the flow of gasoline from the hose of dispensing apparatus to the tank to be serviced. In this passage, is a seat 5 adapted to be engaged by a flow control valve 6, which has fixed thereto a stem 7 and which is yieldably held to seat 5 by means of a spring 8. The latter encompasses stem 7 and acts between valve 6 and the central hub of a spider 9, the outer ends of the arms of which seat against the inner end face of bushing 2. The valve stem 7 extends through the valve and has a rounded end projecting beyond the downstream face of the valve. Valve 6 is adapted to be opened by means of a hand lever 10 which is located exteriorly of the body 1 and encompassed by the usual guard 11, suitably fixed at its ends to the body. The hand lever is pivoted to the body 1 at 12 and acts on valve 6 through the intermediary of a transmission which includes a stem 13, a rocker 14 and the downstream projecting portion 7a of stem 7. The stem 13 is slidably mounted in body 1 and suitably sealed, as by the packing 15 and gland nut 16. The outer end 13a of stem 13 is located in the path of lever 10 and its inner end projects into the nozzle passage, terminating with a rounded inner end located in spaced relation with the downstream projecting end of the valve stem 7. The rocker cam is interposed between the stems 13 and 7.

This invention provides a novel mounting for the rocker 14 and a means for bodily shifting it from between the two stems to allow the valve 6 to close while the hand lever 10 is manually held in the dotted line position, wherein the valve would normally be closed. The rocker is normally held yieldably interposed between the two stems in an operative relation therewith such as to function as a force-transmitting member of the transmission. The rocker is adapted to be shifted out of such relation in order to allow valve 6 to be closed under the force of its spring 8, by means which are controlled by the immersion of the outlet end of the nozzle spout 3 in gasoline. That is, when the gasoline in the fill pipe of the tank being serviced rises high enough so that the outlet end of the nozzle spout 3 is entirely immersed in gasoline, the rocker 14 will be automatically shifted to allow valve 6 to be closed.

To accomplish these results, the rocker is carried by a rod 17 (Fig. 2), actuated by the movable wall or diaphragm 18 of a fluid-pressure motor. As shown, the rod 17 has a longitudinal slot 19 in which the rocker 14 is received with its side faces in sliding engagement with the side walls of the slot. The rocker is fulcrumed on a stud 20 fixed in the rod 17, as indicated in Fig. 7. The lower end of the rod is slidably guided in a socket

21 formed in the body 1 and is suitably held from turning therein, as in the present example by making the rod and socket non-circular in cross section. The upper end of rod 17 has a threaded stud 22 which extends centrally through the diaphragm 18 and a pair of washers 23, one on each side thereof, and carries a nut 24, by means of which the diaphragm is clamped between the two washers and to the rod 17. This diaphragm covers an opening 25 in the upper wall of the nozzle body 1 and its margin is clamped against an external seat on the body by the rim of a hollow cap 26, which is secured by screws 27 (see also Fig. 7) to the body. The diaphragm forms a movable part of the wall of the nozzle passage. This cap has a passage 28, by means of which its interior is vented to the atmosphere. Interposed between the cap 26 and the adjacent washer 23 is a coil spring 29, which normally forces the diaphragm 18 attached rod 17 inwardly until the lower end of the rod abuts the bottom of the socket 21. This socket is connected at all times to the nozzle passage by the slot 19 so that liquid can surge back and forth into and out of the space in the socket beneath the rod. The spring 29 normally holds the stem 17 seated against the bottom of socket 21 and thus holds the fulcrum 20 of the rocker in a predetermined position, in which it is operative to transmit a force from stem 13 to stem 7 to move valve 6 from the position shown in Fig. 2 to that shown in Fig. 3 or vice versa, when the handle 10 is moved from the position shown by full lines in Fig. 1 to that shown by dotted lines or vice versa. When, however, sufficient fluid pressure is built up on the inner side of the diaphragm, the latter is moved outwardly to shift the fulcrum 20 and the rocker 14 from the position shown in Fig. 3 to the position, which is shown in Fig. 4 and in which the rocker 14 is no longer operative as a transmission element between the stems 7 and 13.

The rocker 14 can also function as a cam. It has cam surfaces 30, which function, when the pressure on the inner face of the diaphragm 18 decreases sufficiently for spring 29 to act, to spread apart the adjacent ends of stems 7 and 13 and enable the rocker to again be operatively interposed between the stems. Assuming that the valve 6 has been closed by the action of fluid pressure on diaphragm 18, as above described and as shown in Fig. 4, and that the handle 10 has been released and allowed to drop from the dotted line to the full line position shown in Fig. 1, then when the pressure on diaphragm 18 decreases sufficiently, the spring 29 will press rod 17 downwardly and the cam surfaces 30 will engage the adjacent rounded ends of the stems 7 and 13. The stem 7 will not be moved because the spring 8 is much stronger than spring 29, but the stem 13, movement of which is opposed only by the friction exerted on it by the packing 15, will be moved outwardly by downward movement of the rocker-cam and, as the latter is forced downwardly, it will also rock in a counterclockwise direction until the parts are moved back into the positions shown in Fig. 2.

Increase in the fluid pressure acting on the inner face of diaphragm 18 for the purpose of shifting it outwardly, may be produced in any suitable way that is controlled by immersion of the outlet end of the nozzle spout 3 in the liquid in the fill pipe of the tank being serviced. In Figs. 1, 5 and 6 has been shown a well-known expedient for substantially closing the outlet end of spout 3, when immersion of such end occurs. The substantial closing of the outlet end of spout 3 will cause a rise in pressure in the nozzle to force the diaphragm outwardly and shift the rocker 14. In gasoline dispensing pumps, a pressure of around 20 pounds per square inch could be built up in this manner. The expedient shown for this purpose is similar to that disclosed in Wildebour Patent No. 2,106,197, granted January 25, 1938. Fixed in the outlet end of spout 3 is a bushing 31 having a shoulder abutting the end face of spout 3 and a tubular portion 32 extending inwardly into the spout and affording a cylindrical passage 33 substantially smaller in cross sectional area than that of the nozzle spout and disposed eccentrically of the latter in order to make room for a flap valve 34, which is normally located for the most part to one side of the outlet of passage 33 although it has a small projection 35 located in the path of flow from this passage. This valve is pivoted at 36 to an outward extension 37 of the bushing 31. The extension 37 has a seat 38 for valve 34 and the latter is normally held thereto by a light spring 39. This spring is anchored to a pin 40 spanning a slot, through which the spring passes, and the ends of the pin (Fig. 6) are received in grooves in the outer periphery of the extension 37. A sleeve 41 is slipped over the extension 37 to cover the aforesaid slot and also over the outlet end of the spout 3, to which it is soldered or otherwise suitably secured. The outer end of sleeve 41 is interiorly threaded to receive a bushing 42, by means of which the extension 37 is pressed inwardly to clamp the shoulder of bushing 31 against the end face of spout 3. The sleeve 41 forms an extension of the nozzle spout. In front of the open valve 34 is a chamber 43 and in back of the open valve is a chamber 44, both these chambers being normally open at their lower ends. When valve 34 is moved to the position shown in Fig. 5 it abuts the inner end face of bushing 42 and substantially closes the outlet of chamber 43. However the valve 34 (Fig. 6) has two edges 45 which are cut back far enough to create small leak passages for a purpose to be later described. Also when valve 34 is moved to the Fig. 5 position, an extension 46 formed on the opposite side of its pivot 36 moves against a seat 47 on extension 37 and closes off the lower end of chamber 44 which then becomes open to the outlet chamber 43. There is also provided, in the bushing 31 a drain passage 48 for connecting the space outside tube 32 to the passage 33.

It is usual to provide in the nozzle on the downstream side of the main valve, an outwardly-opening check valve, such as is shown in Fig. 1 at 49. This check valve is yieldingly held to a seat 50 in the nozzle body 1 by means of a light spring 51, acting against the hub of a spider 52, the ends of which are clamped between the end of spout 3 and a shoulder on the nozzle body. This check valve opens at a very low pressure, about 1 pound per square inch, and remains open whenever the main valve 6 is open and liquid is flowing through the nozzle passage.

In operation, the liquid flowing past the open pressure control valve 34 acts on the latter in a direction tending to open it only through the very small area presented by the projection 35. At the same time, the rush of liquid past the valve 34 tends to create a partial vacuum behind it in the chamber 44. Thus, the pressure of the liquid in chamber 43 acts against the face of valve 34 and this pressure plus the force of spring 39 will hold valve 34 open against the relatively small force of liquid acting downwardly on projection 35. When, however, the outlet end of sleeve 41 becomes immersed in liquid, this vacuum disappears and the pressure on opposite faces of valve 34 becomes equalized. Then, the force of the liquid acting downwardly on projection 35 is enough to overcome that due to spring 39, whereby the valve will swing outwardly. As soon as the outer end of the valve 34 projects into the stream issuing from passage 33, the valve will be rapidly moved to closed position, substantially closing off the flow from the spout of the nozzle. Then, in a very short time a high pressure will be built up in the nozzle passage to actuate diaphragm 18 and shift the rocker-cam 14 out of operative position allowing the main valve 6 to be closed by its spring, even though the hand lever 10 is held by the operator in the dotted line position shown in Fig. 1. After the main valve 6 has thus been automatically closed, the operator will release the hand lever 10. After valve 6 closes the liquid flows out

of the nozzle spout through the leaks provided between the flap valve 34 and its seat on bushing 42 and the pressure within the nozzle passage on the downstream side of the valve rapidly decreases and, in a moment, the spring 29 will be enabled to restore rod 17 to its original position and again position the rocker-cam 14 in operative relation with the stems 7 and 13 so as to be effective subsequently as a transmission element. This will occur well before the check valve 49 can close. As the spring 29 forces the rod 17 downwardly, as viewed in Fig. 4, the cam surfaces 30 of the rocker cam 14 will engage the rounded ends of the stems 7 and 13. The stem 7 will not be moved because the force that holds valve 6 closed is much greater than that exerted by spring 29. Thus, the rocker-cam 14 will turn on its fulcrum 20 as it is pressed inwardly and force the stem 13 outwardly, the parts coming to rest in the relative positions shown in Fig. 2. The resetting of the rocker-cam takes but a moment. Soon, afterward the check valve 49 closes. The nozzle spout, between this check valve and its outlet end, will empty through the described leaks provided, into the fill tube of the tank being serviced and, as soon as the tube drains, the flap valve 34, will be opened by its spring 39. The nozzle spout 3 will then be withdrawn from the fill tube of the tank and is in condition for a subsequent operation.

In Fig. 8, a modification of the invention has been shown and this relates chiefly to another means, controlled by immersion of the outlet end of the nozzle spout 3 in the liquid, for increasing the pressure on the diaphragm to remove the rocker-cam from operative transmitting relation with the valve stem and hand lever actuated stem. Many of the parts are the same as in Fig. 1 and these have been given the same reference numerals used in Fig. 1 with the addition of a prime. These parts will need no further description. The chamber, that is formed between the cap 26' and diaphragm 18' is vented through a passage 53 in cap 26', a hole in the margin of the diaphragm, a longitudinal passage 54 in body 1', a radial hole 55 connecting passage 54 to one end of a passage 56 formed in a tube 57, which is suitably secured to the spout 3' inside the same and extends to the outlet end thereof. The inner end of tube 57 is open, the chamber above the diaphragm will be vented to the atmosphere. The nozzle body 1' is formed with a venturi 58 and the throat of the latter is connected to said chamber by a passage 59, a hole in diaphragm 18' and a passage 60 in cap 26'. Thus, when valve 6' is opened by manual actuation of hand lever 10', the rush of liquid through the venturi 58 will exhaust air from the chamber above diaphragm through the passages last described. As long as the outlet end of tube 57 is open, no substantial vacuum can be created in this diaphragm chamber. However, when the outlet end of tube 57 becomes closed by liquid rising in the fill pipe of the tank being serviced, a partial vacuum will be created in the diaphragm chamber, allowing the pressure of the liquid on diaphragm 18' to move the latter against spring 29' and thus lift rod 17' and draw the rocker-cam 14' out of operative force-transmitting relation with the stems 7' and 13'. Thus, valve 6' will be automatically closed by its spring 8' and this will be followed by closing of the check valve 49'. When valve 6 closes, the vacuum-producing means stops and atmospheric pressure will soon prevail on both sides of the diaphragm 18', allowing spring 29' to restore rod 17' and the rocker-cam 14' to their original positions.

The invention thus provides a relatively simple mechanism for effecting automatic closure of the flow control valve in a nozzle of that type wherein the transmission from the hand lever to the valve includes a pivoted rocker, interposed between two stems. All that is necessary is to add the diaphragm as movable portion of the wall of the nozzle passage, together with its spring and rod, and to fulcrum the rocker on the rod instead of the nozzle body, as formerly. No latch is necessary to hold the transmission parts in operative force-transmitting relation, the spring pressure on the rod holding it against a seat against the forces rtansmitted through the stems. These forces have very small components acting on the rocker in a direction tending to raise its fulcrum, the greater part of the forces being laterally of the fulcrum. The mechanism also allows the usual check valve to be located at the normal position in the nozzle. When the pressure on the diaphragm is controlled by closing off the outlet end of the nozzle, ample pressure is available to insure positive action in closing the flow control valve even when the flow is throttled down to a very small stream.

What is claimed is:

1. In a nozzle for dispensing liquid, a casing provided with a passage therethrough and a valve seat in said passage intermediate the ends thereof, a valve for controlling the flow through the passage, a spring for holding the valve to said seat, a hand lever outside said casing and pivoted thereto, and a transmission from the hand lever to said valve for opening the latter against the force of said spring and including two stems, one fixed at one end to and projecting from the downstream side of the valve and the other slidably mounted in said casing with an inner end projecting into said passage on the downstream side of said valve and an outer end projecting outside the casing and adapted to be engaged by the hand lever, and a rocker located in said passage and interposed between the adjacent ends of the stems; a fulcrum for said rocker, a member carrying said fulcrum and mounted in said casing for movement from one position in which said rocker is operable to transmit a force from one stem to the other to a second position in which said rocker is inoperable to transmit a force from one stem to the other, a spring for holding said member in its first position, and means operable by fluid pressure and controlled by immersion of the outlet end of the nozzle passage in the dispensed liquid for moving said member against the last-named spring into said second position.

2. The combination, as claimed in claim 1, in which the rocker has cam surfaces for engaging and spreading apart the adjacent ends of the stems, when the second-named spring moves said member back after cessation of operation of the fluid-pressure means, thereby enabling the rocker to be interposed between said stems in operable force-transmitting relation.

3. The combination, as claimed in claim 1, in which the fluid-pressure actuated means consists of a movable wall forming part of the wall of the nozzle passage, said movable wall being fixed to said shiftable member.

4. The combination, as claimed in claim 3, in which the fluid-pressure actuated means includes a control member operable by immersion of the outlet end of the nozzle passage in the dispensed liquid to substantially close such end and cause a rise in pressure of the liquid in the nozzle passage to move said movable wall against the second-named spring.

5. The combination, as claimed in claim 3, in which a chamber is provided on the other side of said movable wall, suction means operable by flow of liquid in the nozzle passage and connected to said chamber, and a vent passage leading from said chamber to the outlet end of said nozzle passage and adapted to be closed when such end becomes immersed in the dispensed liquid.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 2,008,299 | Etzel | July 16, 1935 |
| 2,106,197 | Wildebour | Jan. 25, 1938 |
| 2,326,251 | Piquerez | Aug. 10, 1943 |
| 2,504,450 | Rhodes | Apr. 18, 1950 |
| 2,528,697 | Logan et al. | Nov. 7, 1950 |
| 2,587,839 | Grise | Mar. 4, 1952 |
| 2,622,782 | Giger | Dec. 23, 1952 |
| 2,675,952 | Shaffer et al. | Apr. 20, 1954 |