July 25, 1944. L. F. HAMMAND 2,354,209

GASOLINE DISPENSING NOZZLE

Filed Nov. 18, 1941 2 Sheets-Sheet 1

Fig. 1

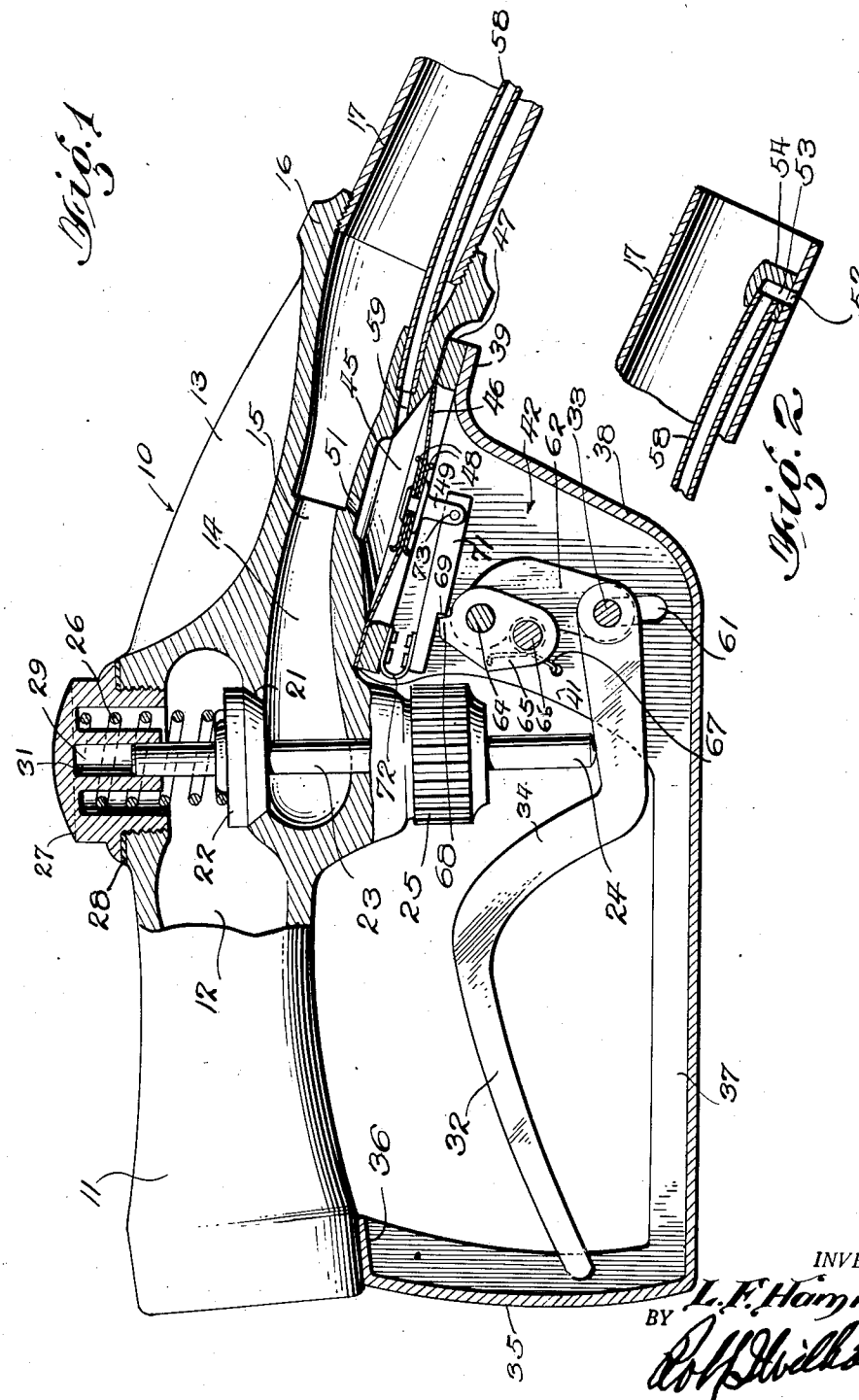


Fig. 2

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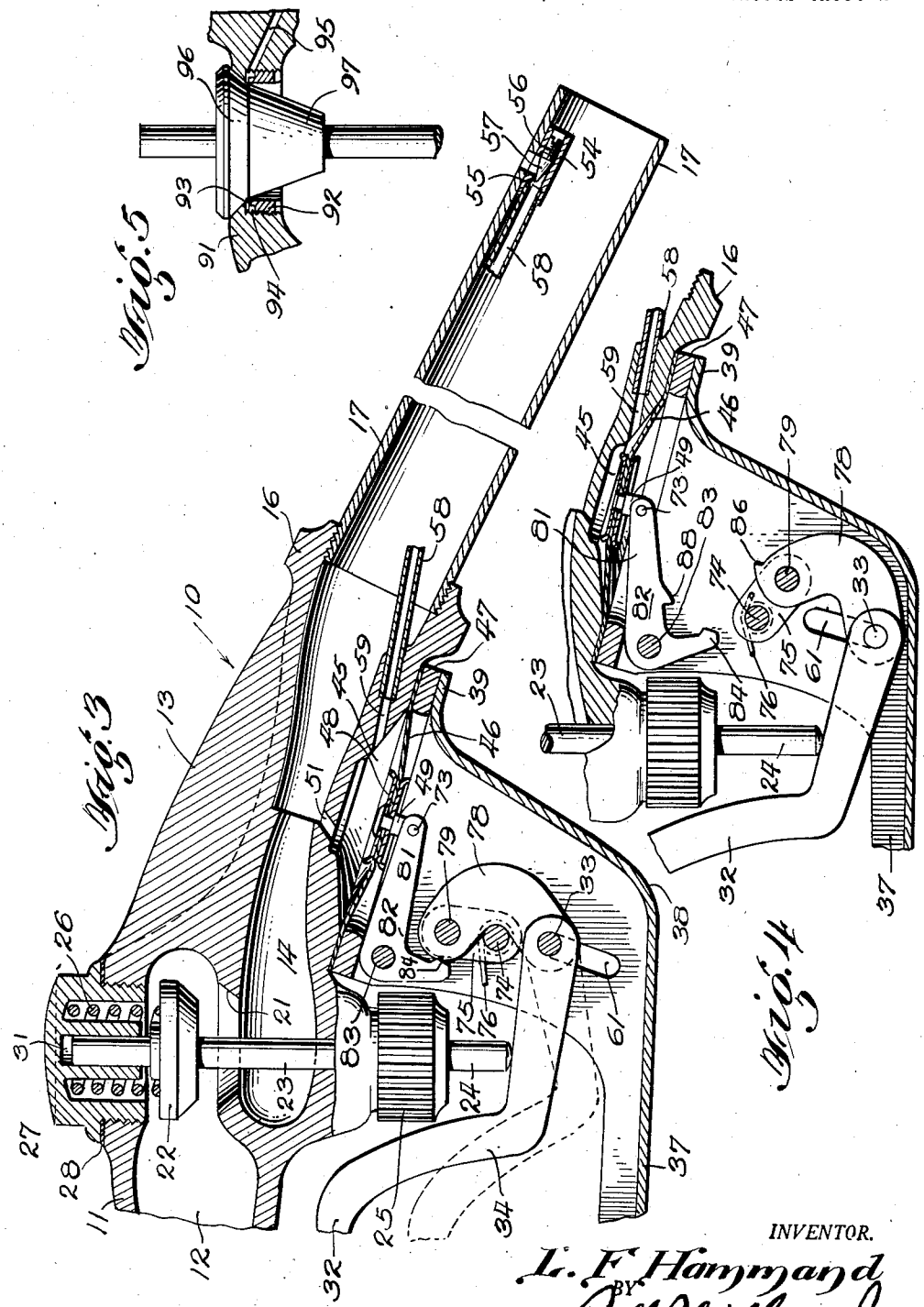


Fig. 5

Fig. 3

Fig. 4

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UNITED STATES PATENT OFFICE

2,354,209

GASOLINE DISPENSING NOZZLE

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Application November 18, 1941, Serial No. 419,524

10 Claims. (Cl. 226—127)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein, if patented, may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

The present invention relates to fluid dispensing nozzles and more particularly to a gasoline dispensing nozzle including an automatic shut-off mechanism whereby the flow of fuel will be shut off responsive to immersion of the nozzle tip in liquid.

Numerous attempts have been made in the prior art to provide an automatic shut-off nozzle whereby the flow of liquid would be automatically discontinued as the liquid level in a container being filled approached its upper limit, but insofar as these devices are known to the applicant they have been entirely unsatisfactory in practical use.

Most of the prior art devices have been objectionable in that they included unnecessarily complicated and expensive mechanisms, or because they failed to operate uniformly under differing conditions of pressure or rate of flow of the fluid. The prior art structures known to the present applicant have also been objectionable in that they have been extremely uncertain in operation even under normal conditions. Since devices of this character ordinarily utilize relatively small forces as, for example, the buoyancy of small floats or variations of atmospheric pressure operating on diaphragms or pistons, it is essential that the design and construction of the devices be such that the small forces permit positive operation of the mechanism.

It is, therefore, the principal object of this invention to provide a dispensing nozzle including a valve and pivoting valve operating lever, together with a diaphragm or other pressure responsive element so arranged that when the tip of the dispensing nozzle spout is submerged in fluid, the pivot of the valve operating lever will be released to close the valve.

Another prime object of the present invention is to provide an automatic shut-off dispensing nozzle whereby the relatively large forces controlling the shut-off valve may be positively operated and controlled by relatively small forces incident to the pressure variations within the nozzle.

A further object of the invention is to provide a novel and improved mechanical movement constituting a latching structure adapted to maintain itself against a relatively great force and to release said force responsive to forces of extremely small magnitude.

A further object of the invention is to provide an automatic shut-off liquid dispensing nozzle including a pressure reduction mechanism comprising a toggle joint arranged to assume a position close to but short of a dead center position whereby the force of the valve spring will bias the toggle toward its released position, and latch mechanism to maintain the toggle against release.

A further object of the invention is to provide an automatic shut-off nozzle including a valve and pressure operated diaphragm, together with a pressure reduction mechanism comprising a toggle joint adapted to reach a dead center position to maintain the valve in open position, and a toggle actuator adapted to shift the toggle from the dead center position responsive to the operation of the pressure diaphragm.

A further object of the invention is to provide a mechanical movement comprising a latching structure adapted to support a relatively great force and to be positively released by a force of minor magnitude, the structure including a toggle joint arranged to assume a critical position such that the toggle may be broken by a very minute force, together with the combination of a release latch to prevent accidental release and toggle actuator, and means whereby the toggle joint may be concurrently unlatched and actively urged toward released position.

A still further object of the invention is to provide an automatic shut-off nozzle including a relatively few parts of rugged construction and simple mechanical operation and adapted to economical methods of manufacture.

A further object of the invention is to provide an automatic shut-off nozzle including a rarified air chamber, a suction port, and a Venturi valve seat whereby the Venturi chamber is arranged on the valve seat, in order that the device will exert operating suction under widely different rates of flow, as when the valve is completely open or when it is almost entirely closed.

Referring now more particularly to the drawings,

Fig. 1 is a longitudinal sectional view of a gasoline dispensing nozzle constructed in accordance with the teachings of the present disclosure.

Fig. 2 is a fragmental sectional view of the air inlet passageway associated with the tip of the spout of the nozzle illustrated in Fig. 1.

Fig. 3 is a longitudinal sectional view of a modified form of gasoline dispensing nozzle.

Fig. 4 is a fragmental detail sectional view of a second modified form of the device.

Fig. 5 is a fragmental detail sectional view of a modified form of valve and valve seat for use with the above structure.

The nozzle structure illustrated in Figs. 1 and 2 includes a valve housing or body portion generally indicated at 10 consisting of a tubular handle portion 11 including an inlet passageway 12 having a neck portion 13. The neck portion 13 includes an outlet passageway 14 having a restricted venturi section 15 terminating in a threaded forward end constituting a mounting collar 16 for the dispensing spout 17. The valve body is provided with a valve seat 21 interconnecting the inlet passageway 12 with the outlet passageway 14 and arranged to be closed by a valve 22 having a valve stem 23 arranged to extend exteriorly of the valve body 10, so that the lower extremity 24 of the valve stem will be outside of the valve body and adapted for manual actuation. Preferably, a gland or other suitable sealing structure (not shown) is arranged to be tightened around the stem 23 by means of the sealing cap 25.

The valve 22 is normally forced into firm engagement with the valve seat 21 by a relatively heavy coiled compression spring 26 having its upper end supported by the threaded closure cap 27 and having its lower end bearing directly against the valve 22. The closure cap 27 is threaded into the valve body and is preferably provided with a sealing gasket 28 and drilled at 29 to provide a guide for the upper end 31 of the valve stem.

It is contemplated that the valve 22 is to be opened manually, and to this end a valve operating lever 32 is pivoted on a pivot pin 33 positioned somewhat forwardly of the lower extremity 24 of the valve stem. The valve operating lever 32 is offset at 34 so that the handle portion remote from the pivot 33 will lie substantially parallel with the handle portion 11 of the valve body, so that the operator may grasp the handle 11 and the valve handle 32 in one hand and open the valve by drawing the lever 32 toward the valve body. The actuating lever 32 is protected against accidental opening or damage by a lever guard 35 secured to the end of the handle portion 11 by any convenient means, as by the flange 36, and including a relatively straight portion 37 spaced apart from the valve body and extending forwardly in a position more or less parallel with the handle portion 11. The forward curved end 38 of the handle guard is arranged to be secured to the lower side of the valve neck 13 by a plurality of cap screws (not shown), which extend through the flange 39. The forward portion of the handle guard 35 is provided with a pair of relatively wide side walls 41 spaced apart from each other to define a cavity 42 in the forward portion of the valve guard in front of the valve stem and below the neck 13 and outlet passageway 14 for purposes to be hereinafter described.

The lower portion of the forwardly extending neck 13 of the valve body is widened to provide a rarified air chamber 45 over which a flexible fabric diaphragm 46 is clamped by a flange 47. The diaphragm 46 may be of any resilient material but is preferably formed of multiple thicknesses of thin cloth treated in such a manner as to make it impervious to air and commonly known in the trade as "airplane cloth." The diaphragm 46 is circular in shape so that it entirely closes the lower side of the aperture 45. It is provided with a pair of center plates 48 to reinforce the fabric diaphragm and to provide a mounting for a post 49 to which the latch release mechanism is attached.

The rarified air cavity 45 is interconnected with the venturi 15 by a suction port 51 so that the flow of liquid through the discharge passageway of the nozzle will withdraw some of the air from the air chamber 45 of the valve body. When the device is in use, the air sucked from the chamber 45 through the suction port 51 will be replaced by air entering the side port 52 of the nozzle spout 17. The air from the port 52 enters through the orifice 53 in the block 54 secured on the inner circumference of the spout, and passes thencethrough the vent tube 58, which extends upwardly through the spout 17 and communicates with the air chamber 45 through the air inlet port 59.

It will be noted that the block 54 is positioned entirely within the nozzle spout 17 and is therefore entirely protected against accidental damage.

It has been mentioned previously that one of the objects of the invention has been to provide a novel and improved release mechanism for the pivot pin on which the valve control handle is mounted in order that the relatively small atmospheric force actuating the shut-off diaphragm may be utilized to release the comparatively large force of the coiled compression spring 26 and force the valve 22 into closed position, and in firm engagement with the valve seat 21. To accomplish this result, the valve pivot pin 33 is mounted in a pair of slots 61 provided in each of the side walls 41 of the linkage cavity 42 so that when not maintained by mechanism hereinafter described the forward end of the valve operating lever 32 may snap outwardly responsive to the outward force of the valve stem, so that the valve 22 will be in closed position notwithstanding the fact that the rear end of the valve operating lever 32 is moved into engagement with the flange 36 of the guard 35.

The lever mounting pin 33 is maintained in position at the upper extremity of the slot 61 by a toggle joint comprising a pair of links 62 extending between the pin 33 and the center pivot pin 64 of the toggle. The center pivot pin 64 serves to join the pair of links 62 with a third link 65 pivoted on the stationary toggle pivot 66. A coil spring 67 is wound around the stationary pivot 66 and has its opposite ends anchored to the handle guard and the link 65, respectively, in order to urge the link 65 in a counter-clockwise direction around the pin 66 so that, unless forces of greater magnitude act on the toggle joint, the spring 67 will draw the links 65, center pin 64, links 62, and pivot pin 33 to the position shown in Fig. 1 of the drawings. In this connection, it will be pointed out that the links 62 are curved at a point intermediate the pivots 33 and 64 so that the three pivots 64, 66 and 33 may approach a dead center position, although they will be prevented from assuming a true dead center position by reason of the contact of the side of the links 62 against the stationary pin 66, for purposes to be hereinafter described. It will also be noted that the link 65 is provided with a dog 68 at its upper end which will be engaged by the latch surface 69 milled on the pressure reduction lever 71 which is secured to the flange 47 by a leaf spring 72 and has its opposite end pivoted on the diaphragm post 49 by means of the pin 73.

The operation of this form of the device is as follows:

The normal positions of all parts of the structure are as shown in Fig. 1 of the drawings and, to operate the device, the operator will grasp the nozzle by the handle portion 11 and draw the rear end of the valve operating lever 32 inwardly to bear against the lower portion 24 of the valve stem and raise the valve 22 from the seat. The liquid will then be free to flow through the passageway 12 into the passageway 14 through the Venturi tube 15 and outwardly through the nozzle spout 17 and into the container. During this time, the action of the Venturi tube 15 will withdraw air from the air chamber 45, but inasmuch as the air chamber 45 is vented through the air inlet 52, and vent tube 58, the pressure within the air chamber 45 will not be substantially reduced and the diaphragm 46 will not be caused to operate. When the level of the liquid in the container being filled rises to a point above the end of the spout 17, the liquid will close the orifice 52 or the restricted needle valve 57 and since the flow of liquid through the restricted orifice will be far less than the flow of air through the same orifice, the vent 58 will be, to all intents and purposes, closed by the rising level of the liquid. When this occurs, the continued action of the Venturi tube 15 will continue to withdraw air through the suction port 51 and cause a substantial reduction of pressure in the air chamber 45 so that the atmospheric pressure of the surrounding air (which is in communication with the lower surface of the diaphragm 46 through the linkage cavity 42) will force the diaphragm 46 upwardly against the comparatively light resistance of the leaf spring 72. The leaf spring 72 acts as a pivot for the anchored end of the pressure reduction lever 71 as well as acting as a spring, so that when the outer end of the lever 71 is drawn upwardly the latching notch 69 is disengaged from the latching dog 68 on the toggle joint.

It will be noted, in passing, that the latching dog 69 is positioned at a point less than half of the distance between the pivot spring 72 and the diaphragm post pivot 73 so that the movement of the diaphragm has a decided mechanical advantage over the latching surfaces and a very small effort on the diaphragm is sufficient to overcome the friction incident to the engagement of the latch 69 so that the release operation of the mechanism will be entirely positive, notwithstanding the fact that the pressure differential on the opposite sides of the diaphragm may be rather small.

When the latch 69 disengages the dog 68 of the toggle joint, the force of the coiled compression spring 26 of the main valve 22 will straighten the toggle to move the pivot 33 to the lower end of the slot 61 and close the valve. This action will be readily understood when it is recalled that while the three pivots of the toggle joint have approached their dead center position they are prevented from reaching a true dead center by the contact of the link 62 with the anchor pin 66. As illustrated, the centers of the pins 65 and 33 define an angle of about 20° with respect to the center of the pivot 64. Thus, when the lever 32 is operated, the force of the compression spring 26 will urge the pivot pin 33 downwardly in the slot 61 and will tend to bias the toggle joint toward its released position. It will be understood, of course, that since the toggle links are near their dead center locations, the force tending to bias the linkage to its released position will be extremely small as compared to the total force of the spring 26, but it will nevertheless be sufficient to overcome the tension of the return spring 67 and permit the mechanism to release. As this operation takes place, it is obvious that the spring 26 will instantly close the valve 22 and shut off the flow of liquid in time to prevent the container being filled from overflowing.

When the flow of liquid through the Venturi tube 15 is discontinued, the pressure on the opposite sides of the diaphragm 45 will equalize and the spring pivot 72 will draw the diaphragm 46 outwardly and downwardly to the position illustrated in Fig. 1.

When the operator releases the rear end of the valve actuating lever 32, the return spring 67 will swing the toggle joint in counter-clockwise direction with sufficient force to overcome the force of the spring 72 so that the dog 68 may snap past the latch surface 69 and assume its original position.

In the form of the device illustrated in Fig. 3, the structure of the pressure operated mechanism is identical with that heretofore described, with the exception that the block 54 on the spout is provided with an annular valve seat 55 and a screw-threaded adjusting screw 56 is arranged with a needle valve 57 adapted to be adjustably moved toward the valve seat 55 to provide an adjustment for the restriction of the vent passageway. Thus, while the block 54 is positioned entirely within the nozzle spout 17 and is therefore entirely protected against accidental damage, the screw 56 may be easily reached by inserting a screw driver in the open lower end of the spout. By this arrangement, the restriction of the air inlet to the cavity 45 may be adjusted so that the device will be readily responsive to specified changes in pressure.

The structure of the force-reduction linkage is also identical with that heretofore described, except that the toggle joint consists of a pair of short links 75 urged in counterclockwise direction by coiled spring 76 and pivoted to a single center link 78 by a center pivot 79. The link 78 is shaped to contact the anchor pivot 74 after the toggle joint has reached its dead center position, so that unless some external force is brought to bear on the toggle joint the force exerted by the valve spring 26 and transmitted to the valve pivot 33 will not cause any movement on the part of the pivot pin 33 or any of the toggle mechanism. In this form of the device the toggle is not latched, but the pivot 73 of the diaphragm post 49 is connected to the long end 81 of the bell crank 82. The crank 82 is mounted on a stationary mounting pivot 83, and its short end is provided with a contacting element or toggle-actuator portion 84 arranged to bear against the link 78 at a point adjacent the center pivot 79 of the toggle joint.

In the operation of the form of the device illustrated in Fig. 3, the operator will grasp the valve body 11 of the nozzle in the same manner as heretofore described, and will operate the valve lever 32 to open the valve 22 and permit the flow of liquid through the nozzle and outwardly through the spout. The only difference in function in this connection is in the fact that the toggle joint is not latched in operating position but has moved into or past the dead center position so that it is self-maintaining and will not release unless urged by an external force. In this form of the invention, however, the diaphragm 46 is arranged with a toggle-actuator to apply force to the cen-

ter pivot of the toggle joint to effect the release operation. Thus, whenever the restricted orifice at the nozzle tip is closed, the action of the air passing through the air chamber **45** is identical with the form heretofore described, but the operation of the external release linkage is somewhat different.

In this form of the invention, when the orifice at the tip of the spout is closed by the rising level of the liquid, the diaphragm will snap upwardly to exert an upward force on the long end of the bell crank **82**. The actuator portion **84** or short end of the bell crank will then move to the right to engage the toggle joint and force it off of its dead center position, whereupon the pressure of the valve spring **26** will act to snap it downwardly into fully released position.

When the toggle linkage is used without any latch, it is considered preferable to arrange the structures so that the toggle lies at exactly dead center position or slightly beyond the dead center, in order to prevent any possibility of accidental release. Similarly, with the form of the invention illustrated in Figs. 1 and 2, the pivots of the toggle joint are arranged to reach their limit of movement some distance short of the dead center position, so that the force acting to bias the toggle will be substantial, and the friction inherent in the toggle joint cannot under any circumstances prevent release of the toggle when the latch is released. In either case, the mechanical connection with the pressure responsive diaphragm is such that the diaphragm has a decided mechanical advantage, with respect to the latch or actuator that engages the toggle, so that small pressure differences on the opposite sides of the diaphragm will be sufficient for positive operation of the mechanism.

It has been previously mentioned that the toggle joint illustrated in Fig. 3 should preferably be set at the exact dead center position or slightly beyond, in order to prevent any possibility of accidental release. This should not be taken to mean that the device would be entirely inoperative if it should be positioned just short of dead center, since any mechanical device has a certain amount of inherent friction and if the toggle is sufficiently close to dead center the very small force of bias will normally be too small to overcome the friction of the linkage. It does mean, however, that if the toggle is in any position short of dead center it will be in what may be termed a "critical" condition where its successful operation would depend on the maintenance of a rather delicate balance of forces, so that the biasing force would be present but would be insufficient to overcome the inherent friction of the device. Thus, unless the parts are delicately balanced and accurately constructed and assembled, the critical position of the links is to be avoided. Similarly, the form of device shown in Figs. 1 and 2 may be successfully used with the toggle joint positioned at a greater or less angle than illustrated. Here, again, however, a "critical" position of the toggle joint is to be avoided, since the biasing force should unfailingly break the toggle whenever the latch is released.

A second modified form of the invention, illustrated in Fig. 4, includes force-reduction linkages having a peculiar combination and arrangements of structures whereby certain marked and unobvious advantages are gained over either of the linkage arrangements heretofore described.

In considering the advantages of the structure illustrated in Fig. 4, it should be kept in mind that in any mechanical structure the factor of cost is an extremely important consideration, and that the development of any type of device which aids in adapting the structure to high speed methods of production comprises a valuable contribution to the art. It follows, of course, that a structure mechanically designed to permit wide dimensional tolerances in the manufacture of the individual parts and in assembly possesses marked advantages over any type of device requiring close tolerances or accurate assembly methods.

It should also be appreciated that great advantages may be gained by the use of a structure so designed as to operate successfully irrespective of the exact position of the toggle and arranged so that variable factors of friction, wear, corrosion, etc., do not materially affect the functioning of the device.

In the structure shown in Fig. 4, the toggle joint is identical with the toggle shown in Fig. 3, except that the upper end of the link **78** is provided with a hook **86** arranged to engage a latch **88** on the bell crank **82**. The arrangement is such that the hook **86** and latch **88** will engage and positively maintain the toggle against release. When the diaphragm **46** is operated, however, the latch **88** will be released and the toggle actuator **84** will concurrently urge the toggle toward released position.

This structure is particularly advantageous in that it permits satisfactory operation of the device with the toggle in a critical position and, since the toggle is very sensitive in such a position, the force required for dependable actuation of the release is extremely small. That is, when the toggle is positioned short of dead center, it will be subject to a small biasing force which, while not sufficient to be depended upon to effect release in and of itself, renders it very sensitive to the releasing force applied thereto by the actuator **84**.

The construction and arrangement is such that the very slight bias of the toggle joint toward its broken position will be insufficient to cause any perceptible amount of friction between the latching surfaces which would tend to resist the releasing action of the latch and at the same time when the latch is released, if the bias is insufficient to cause actuation of the toggle, it will be obvious that only a very small force by the actuator will be sufficient to break the toggle and snap it into released position.

The utility of this form of the device is particularly useful when the toggle is set in critical position, since it permits the release of the toggle with a smaller actuating force than would otherwise be required. It is also advantageous in that it will accommodate itself to wide tolerances in manufacture and assembly and will function satisfactorily. Even in the event that the toggle joint is bent or improperly assembled to the point that it is beyond dead center, or not closely approaching the dead center position, the operation will be satisfactory, since in such cases the device will operate as described in connection with the forms of the device shown in Figs. 1, 2 and 3.

The modified form of valve construction illustrated in Fig. 5 of the drawings is arranged so that the sealing surfaces of the valve seat act as a part of the Venturi tube of the device. With this arrangement, the valve seat **91** is beveled at about 45° angle as is customary in devices of this kind, but the present structure differs sharply from the

conventional in that the lower portion of the valve seat is counterbored and threaded to receive a threaded ring 92. The ring 92 is spaced slightly below the lower edge of the valve seat to provide a thin circular air passage 93 entirely around the lower edge of the valve seat, and an annular notch or channel 94 provides for the free circulation of air. A suction duct 95 interconnects the annular channel 94 and circular air passage 93 with the air chamber 45 heretofore described.

The valve includes a sealing portion 96 beveled to fit against the seat 91 and a lower portion 97 tapering downwardly from the lower surface of the portion 96 at an angle of about 20°.

In operation, the valve structure acts as a Venturi tube to exert suction on the diaphragm 46, and the structure is advantageous in that it operates successfully either under full flow, with the valve 96 raised well above the seat 91, or at very small rates of flow, when the valve is only raised a small fraction of its full movement.

When the valve portion 96 is raised from the seat 91 the fluid passageway will be of uniform thickness across the width of the valve seat, but inasmuch as the seat is tapered at about a 45° angle and of diminishing diameter toward its lowermost edge the velocity of the liquid will be greatest at that point. The air inlet to venturi is immediately below the valve seat 91 and the fluid flowing beyond the lower edge of the valve seat is confined between the cylindrical inner wall of the ring 92 and the tapered surface of the lower portion 97 of the valve. These surfaces act in the same manner as the outwardly flared discharge passage of a conventional Venturi tube. The valve structure acts as a venturi and the lower edge of the valve seat acts as the vena contracta. Thus, even when the valve is opened to only a small fraction of its maximum rate of flow, the velocity of the liquid at the lower edge of the valve seat will be very high and will be effective to exert adequate suction to operate the diaphragm 46.

From the foregoing, it will be apparent that by following the teachings of the present invention a pressure operated automatic shut-off nozzle may be provided wherein the structure will be equally adapted to satisfactory operation under conditions of partial or restricted liquid flow, as well as full flow.

It will also be apparent that by following the teachings of the present invention, a novel and improved gasoline dispensing nozzle may be provided having automatic shut-off devices of improved design and construction whereby the operation of the relatively heavy shut-off valve spring may be eventually and positively controlled by a simple, rugged mechanism adapted to be operated by comparatively small forces, not apt to be subject to mechanical failures, and not including any unnecessarily complex structures.

It will also be seen that the mechanical movement here disclosed is well suited to the control of relatively large forces responsive to controlling forces of minute magnitude since the force acting on the pin 33 is primarily maintained by the toggle joint, but are controlled by the latch or the toggle actuator. Thus, the relatively small forces exerted by the diaphragm are entirely effective to release the forces of far greater magnitude exerted by the valve spring 26, with the result that the structure may be arranged to positively respond to the small differences in pressure incident to the submerging of the nozzle tip beneath the surface of the liquid.

Further, by following the teachings of this invention, it is possible to provide a novel mechanical movement, whereby great forces may be effectively maintained without danger of accidental release and yet may be positively and efficiently released in response to forces of minute magnitude as compared to the magnitude of the original force.

While I have shown and described the preferred embodiment of the present invention, I am aware that it is subject to numerous modifications and variations without departing from the invention spirit and I therefore wish to be limited only by the scope of the appended claims.

Having thus described my invention, what is claimed as new and desired to secure by Letters Patent is:

1. A dispensing nozzle having a normally closed valve, manually operated means to open the valve and release it for closing, and automatic means to release the valve when the tip of the nozzle is submerged, said means comprising a toggle for holding the manually operated means in operative position, a diaphragm exposed to suction from the material flowing through the nozzle and to the atmosphere through a vent in the tip of the nozzle, and a latch lever for the toggle pivoted at one end on the nozzle and at the other end on the diaphragm and having a latch projection between the ends for engaging the toggle to lock it in holding position.

2. A dispensing nozzle having a normally closed valve, manually operated means to open the valve and release it for closing, and automatic means to release the valve when the tip of the nozzle is submerged, said means comprising a toggle for holding the manually operated means in operative position, a diaphragm exposed to suction created by the material flowing through the nozzle and to the air within a container being filled by means of a vent near the tip of the nozzle, and a toggle latch connected to the diaphragm and having a projection, said toggle being composed of two hinged links having their ends pivoted to the nozzle and to the manually operated means respectively at points more closely spaced than the length of one of the links, the hinge of the toggle when in holding position being outside of and substantially in line with the end pivots and the latch projection engaging the hinge before it reaches dead center position.

3. A dispensing nozzle according to claim 2 in which the latch has an arm engaging the hinge on the opposite side from the latch projection to urge the toggle into unlocked position when the latch is released by the diaphragm if the toggle has passed beyond dead center position.

4. A dispensing nozzle having a valve normally biased to closed position, a handle to open the valve and release it for closing, and automatic means operable to release the valve in spite of continued pressure on the handle when the tip of the nozzle is submerged during dispensing, said means comprising a pivot for the handle shiftable from a position in which the handle is operative to open the valve and hold it open and one in which the valve is released in spite of manual pressure on the handle, a diaphragm, a toggle for holding the pivot in the operative handle position, and a diaphragm-operated member having a projection for holding the toggle in locking position short of dead center and an actuator for urging the toggle from a po-

sition at or beyond dead center to release the pivot, said diaphragm being responsive to differential pressures within the nozzle.

5. A dispensing nozzle having a normally closed valve, manually operated means to open the valve and release it for closing, and automatic means operable while the manual means is in opening position to release the valve when the tip of the nozzle is submerged, said automatic means comprising a toggle linkage to maintain the manually operated means in operative position, a diaphragm responsive to differential pressure within the nozzle, and a two-armed lever constituting an actuator for the toggle pivoted on the nozzle and on the diaphragm and engaging the hinge of the toggle to urge it from a position at or beyond dead center.

6. A nozzle as defined in claim 5 in which the two-armed lever has a latch projection engaging the hinge portion of the toggle to hold it locked when in a position short of dead center.

7. An automatic dispensing nozzle having a valve normally biased to closed position, a handle to open the valve or release it for closing, and means operable to release the valve independently of the handle, when the liquid level in the container being filled rises above the tip of the nozzle, a slotted frame carried by said nozzle and supporting and protecting said means and handle, said means comprising a pivot for said handle shiftably mounted in the slots of said frame, forming in one extreme position a fulcrum for manual operation of the handle but in the other extreme position rendering the handle inoperative, a diaphragm responsive to variations of pressure in the nozzle, a toggle for holding the pivot in operative position, said toggle having a link engaging the handle pivot and a link connected to the frame, the frame connection lying between the hinge of the toggle and the handle pivot when the toggle is locked, and a latch operated by the diaphragm and having means engaging behind the hinge when it is near dead center position.

8. A nozzle as defined in claim 7, the latch having means to engage the toggle hinge on the side opposite the latch to urge it to unlocked position if it has passed into or beyond dead center position.

9. A dispensing nozzle having a normally closed valve, manually operated means to open the valve and release it for closing, and automatic means operable while the manual means is in opening position to release the valve when the tip of the nozzle is submerged, said automatic means comprising a toggle linkage adapted to be folded to hold the manually operated means in position for operating the valve, a diaphragm mounted in a chamber which is subjected to suction from the material being dispensed and vented at a point adjacent the tip of the nozzle, and a latch lever for the toggle pivotally mounted on the diaphragm and secured to the nozzle by a U-shaped spring which both hinges and biases the lever, said latch engaging the toggle at its hinge, the toggle being biased to a folded holding position and straightened by the closing of the valve when the latch is disengaged by the movement of the diaphragm.

10. A Venturi valve structure comprising a casing having a cylindrical bore adapted to receive fluid at one end, said bore having an outwardly tapered seat adjacent said end, a reciprocating valve head having a tapered portion adapted to fit the tapered seat and a tapered projection extending through the cylindrical portion of the bore to form an expansion passage for the fluid flowing through the valve, the cylindrical bore being enlarged below the valve seat to form an annular shoulder, and a bushing in said bore terminating in line with and spaced from said shoulder, said bushing having a recess around its outer face at the end adjacent the shoulder, whereby an annular groove is provided having an annular mouth of less width than the body of the groove, there being a channel leading from said groove through the casing, said groove and channel being subjected to suction by the fluid entering the expansion passage of the valve.

LOWELL F. HAMMAND.

CERTIFICATE OF CORRECTION.

Patent No. 2,354,209. July 25, 1944.

LOWELL F. HAMMAND.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, lines 21 and 22, strike out the words "because they"; line 23, after "fluid" and before the period insert --or because their design and construction was such that the entire nozzle structure was bulky and awkward to handle--; line 34, after "mechanism." insert the following paragraphs -

--In automatic shut-off devices of the prior art known to the applicant, the dispensing nozzles have been characterized by unusually bulky and complicated constructions of design and proportion extremely divergent from the conventional types of apparatus in use in the gasoline dispensing field. This is regarded as a distinct disadvantage for any commercial adaptation, first, because it makes the operation of the dispensing nozzle inconvenient and difficult for operators accustomed to conventional nozzle devices; second, because the complicated nozzle structures do not present a neat and streamlined compact appearance and are objectionable as a matter of external design and, third, because nozzles cannot be used for replacement in gasoline pumps or other associated equipment having nozzle racks, nozzle hooks, or locking devices arranged and dimensioned to accommodate nozzle structures of the conventional types now known in the art.

To overcome these objections, the present invention contemplates an improved type of shut-off mechanism, and a novel structural arrangement for the entire nozzle shut-off mechanism including the pressure operated diaphragm, pressure reduction linkages, and latch mechanisms whereby the automatic mechanisms are so positioned and correlated as to present a nozzle of compact arrangement and streamlined appearance, not differing materially from the exterior appearance or external dimensions of conventional dispensing nozzles now in use.

Another object of the invention is to provide a pressure actuated diaphragm or equivalent pressure responsive element located between the outlet passageway of the nozzle and the pivotal mounting of the valve handle to provide a nozzle of neat appearance and compact mechanical arrangement.

Another object of the invention is to provide a gasoline dispensing nozzle including a handle portion and discharge spout, together with a shut-off valve arranged at an acute angle to the axis of the spout with the automatic shut-off mechanism positioned wholly within an acute angle between the spout and the valve to provide an automatic nozzle of compact mechanical structure and neat appearance.

the body portion, a spout extending forwardly and downwardly from the body portion, and valve operating means located below the body portion and within the acute angle formed by the valve stem and the spout, said means comprising a guard extending downwardly and rearwardly from the front of the body portion to a point rearwardly of the valve stem, a lever pivoted on the guard for operative engagement with the valve stem to open the valve and means to release the valve for closing when the tip of the spout is submerged, said last-mentioned means having a pressure-responsive diaphragm mounted on the bottom of the body portion within the guard and having restricted communication with said dispensing passage.

12. A valve and nozzle assembly for a dispensing line comprising a body portion having a dispensing passage therethrough, a normally closed valve in said passage having a movable valve stem projecting downwardly from the body portion, a spout extending forwardly and downwardly from the body portion, a pivoted handle extending longitudinally of the body and engaging the valve stem to open the valve and release it for closing, and automatic means positioned in the angle between the spout and the valve stem and operable to release the valve in spite of continued manual pressure on the handle when the tip of the spout is submerged during dispensing, said means having communication with the dispensing passage within said angle and being responsive to changing pressures within said body portion and spout. --;

in the heading to the printed specification, line 5, for "10 Claims" read --12 Claims--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 17th day of October, A. D. 1944.

Leslie Frazer

(Seal) Acting Commissioner of Patents.