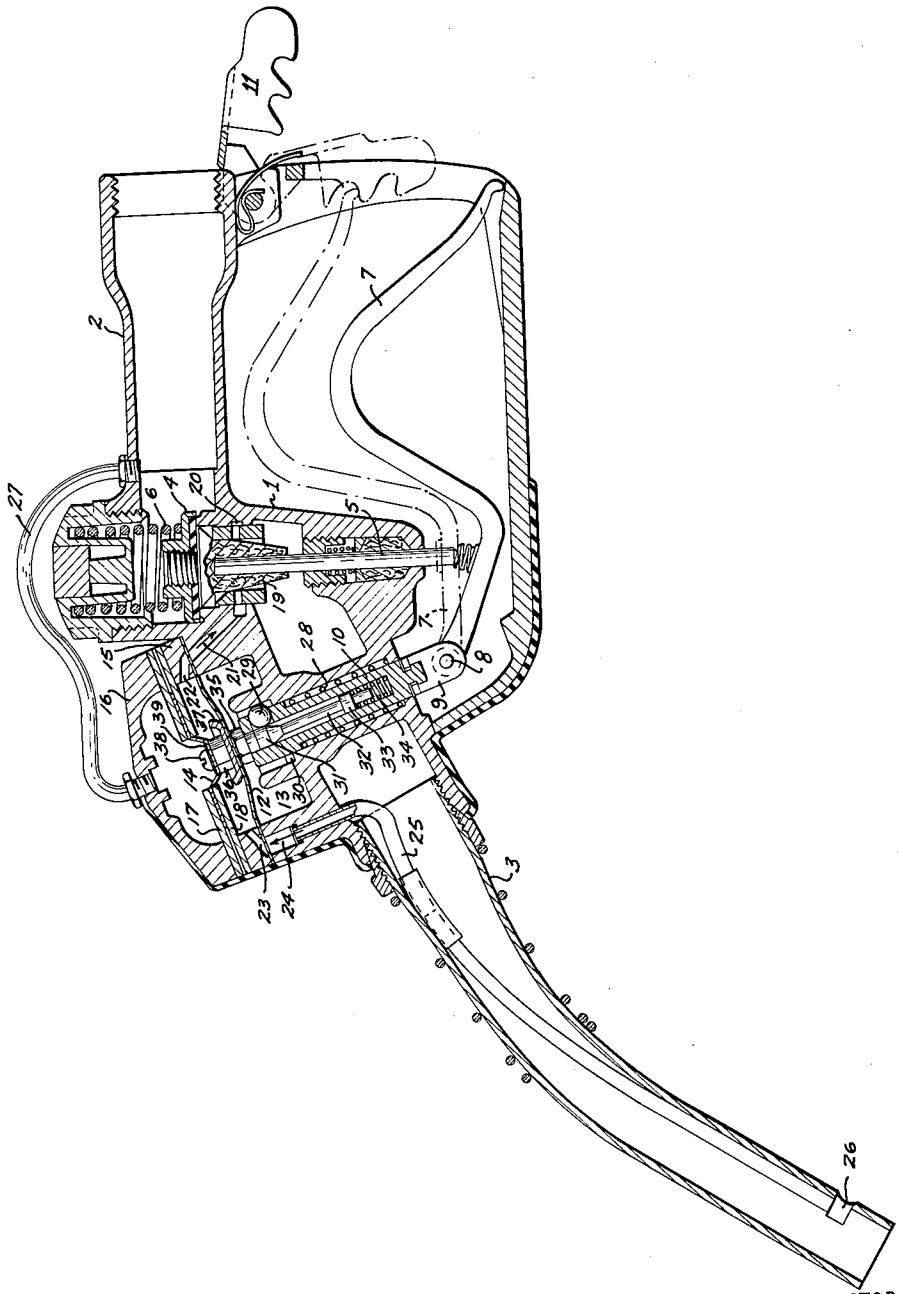
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AUTOMATIC SAFETY NOZZLE

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AUTOMATIC SAFETY NOZZLE

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The invention relates to nozzles such as are used with preset computer type gasoline dispensing pumps, the nozzles having automatic valve-closure means, responsive to a sensing means, for interrupting the flow of fuel through the nozzle when the tank into which the fuel is being introduced reaches a predetermined filling level.

A typical form of such nozzle is shown and described in the Duerr Patent 2,582,195. As is well known in such nozzles, there is a main valve which is operated by a lever having a latch means adapted to hold the lever in the open position. The lever, however, is pivoted to a supplementary plunger mechanism which, being actuated by a diaphragm made responsive to the sensing means, serves to move the lever to a valve-closing position, irrespective of the latch means, when the desired height of fill has been achieved in the tank. While the valves in such nozzles may be manually closed by the operator, they do not close automatically except in response to the sensing means. The operation of the diaphragm in response to the sensing means is dependent upon the continued flow of the fuel through the nozzle. It follows that, if for some reason the pressure of fuel ahead of the nozzle decreases or is interrupted, the nozzle valve will remain open until manually closed.

This is a disadvantage in the operation of automatic nozzles for several reasons. If the pressure ahead of the nozzle is eliminated, it is possible under some circumstances that reverse flow of the fuel will take place through the nozzle. A cessation of flow of the fuel through the nozzle into the tank by reason of a failure of pressure ahead of the nozzle may be mistaken by the operator for the automatic closure of the nozzle due to the filling of the tank. Thus the operator may withdraw the nozzle and hang it on the pump housing before the customer's tank has been filled, and with the nozzle valve still in the open condition. A restoration of the pressure ahead of the nozzle may then cause a flow of fuel through the nozzle with consequent loss of fuel.

It is a primary object of the invention to provide an automatic nozzle structure wherein the main nozzle valve will close if a substantial diminution or failure of fuel pressure occurs ahead of the nozzle.

This object and others which will be apparent to one skilled in the art upon reading these specifications, or which will be set forth hereinafter, is attained by that construction and arrangement of parts of which an exemplary embodiment will now be described. The exemplary embodiment has to do with an automatic dispensing nozzle of the type shown in the Duerr patent to which reference has been made; but it will be understood that the principles of the invention are applicable to other types of automatic shut-off nozzles.

Reference is made to the drawing which illustrates in longitudinal section the exemplary nozzle embodiment.

The automatic dispensing nozzle has a hollow body 1 with a fuel entrance portion 2 and a spout 3. It is provided with a main valve 4 having an operating stem 5, and a relatively strong spring 6 biasing the valve to the closed position. An operating handle 7 is positioned to engage the valve stem 5 and open the valve when the lever is drawn upwardly. The lever is pivoted as at 8 to a yoke 9 on the end of a plunger 10. The upper position of the lever is shown in dotted lines in the drawing; and this

position is maintained by a latch means 11, all as is well known in the art. The plunger 10 is part of a sensing means which, when the tank is full, permits the plunger 10 to descend. Thus the pivot point 8 of the operating lever is moved a sufficient distance to permit closure of the main valve 4 despite the fact that the outer end of the lever is still engaged by the latch 11. For the details of this apparatus reference may be had to the Duerr patent.

The present invention makes use of the conventional vacuum diaphragm 12 which extends across a chamber 13. The chamber, however, is provided with a second diaphragm 14 held in spaced relationship to the diaphragm 12 by a ring member 15. The chamber 13 is provided with a cap or top closure 16 which may be held in place by screws or in any other suitable fashion.

The effective area of the diaphragm 14 is made to be substantially less than the effective area of the diaphragm 12 through the use of washer shaped elements 17 and 18 located on either side of the diaphragm 14.

In the exemplary embodiment, the stem 5 of the main valve 4 is provided with a conical element 19 which, when the valve is open, produces a venturi effect in the flowing stream of fuel, so that a vacuum is drawn in an annular space 20 surrounding the valve. This space is connected by a passageway 21 through the wall of the chamber 13, and by a passageway 22 in the ring 15 to the space between the diaphragms 12 and 14. It will be understood that the diaphragm 12 has a perforation at the point of connection between the passageways 21 and 22. The vacuum drawn in the space between the diaphragms 12 and 14 is normally relieved by a connection to the outer air through a sensing means. This connection comprises a passageway 23 in the ring 15 and another passageway 24 in the wall of the chamber 13. These passageways are in communication with each other. The passageway 24 is connected to a suitable sensing means. In the particular embodiment this sensing means is a tube 25 extending interiorly of the spout member 3 and opening to the atmosphere exteriorly of the spout at 26. Other types of sensing means may, however, be used, such as a fitting built into the tank which is being filled, the fitting being connected to the passageway 24 by a flexible conduit.

The space between the cap or cover member 16 and the diaphragm 14 is connected back by means of a tube 27 to the entrance portion 2 of the nozzle structure at a point ahead of the main valve 4.

The plunger 10 is urged upwardly by the usual spring 28. The plunger may have the usual locking means comprising a plurality of balls, one of which is shown at 29. These balls engage in perforations in the plunger 10, and in their outermost positions will engage a shoulder 30 in the wall of the chamber 13. The plunger 10 is hollow, as shown, and a pin element slides within it. This pin element has a portion 31 of a diameter sufficient to keep the balls 29 in their outermost positions, and a smaller portion 32 which will permit the balls to ride inwardly, unlocking the plunger 10 and permitting its descent to change the pivot point of the operating lever as hereinabove explained. The pin also has an abutment means 33; and a spring 34 is engaged between this abutment means and the bottom of the hollow in the plunger 10.

The pin is fastened to the diaphragm 12 by nuts 35 and 36, there being a washer 37 positioned against the upper side of the diaphragm. The pin is also fastened to the diaphragm 14 by means of a screw 38 and a washer 39.

The operation of the apparatus is as follows: so long as fuel pressure is maintained in the entrance portion 2 of the dispensing nozzle, an equivalent fuel pressure will be maintained in the space between the cap or cover 16 and the upper diaphragm 14. This urges the central por-

tion of the diaphragm downwardly and takes the place of the usual diaphragm spring. It will serve to maintain the pin element in the position shown in the drawing, wherein the pin enlargement **32** keeps the balls **29** in their outward or locking positions.

The structure operates in the ordinary way as an automatic shut-off nozzle because, should an obstruction occur at the point **26** of the sensing means, as when the fuel reaches that point in the operation of filling the tank, the increased vacuum in the space between the diaphragm **12** and the diaphragm **14** will cause the diaphragm **12** to move upwardly, shifting the pin to a position at which the balls **29** can move to unlock the plunger **10**. It will be understood that there is atmospheric pressure on the underside of the diaphragm **12**, and the reason why the diaphragm **12** will move upwardly upon an increase in the vacuum in the space between the two diaphragms, is because the effective area of the diaphragm **12** is made to be so much larger than the effective area of the diaphragm **14** that the tendency of the diaphragm **12** to move upwardly under the influence of the increased vacuum will be greater than the tendency of the free portion of the diaphragm **14** to move downwardly under the pressure of the fuel.

If, however, the pressure of the fuel in the space between the cap **16** and the diaphragm **14** should fail or significantly diminish, the force of the spring **34** will raise the pin to a position in which the plunger **10** is unlocked.

In either event, once the plunger **10** is unlocked, it will move downwardly because the force of the spring **6** on the main valve is greater than the force of the spring **28** on the plunger. It will thus be apparent that the main valve of the dispensing nozzle will close either under the influence of the sensing means, or upon failure or significant diminution of the fuel pressure ahead of the nozzle, thus accomplishing the main object of the invention.

The main valve will remain shut off until the operator starts the pump and opens the valve again. This prevents the draining of the fluid behind the main valve. The arrangement of this invention works better than a check valve at the entrance side of the nozzle since with a check valve alone the fluid between the check valve the main valve could be drained by opening the main valve. With the mechanism described herein the main valve cannot be opened unless pressure is in the line to the nozzle entrance portion **2**.

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

1. An automatic dispensing nozzle comprising a hollow body having an inlet means, a valve, manual operating means for opening said valve, means for latching said operating means in the valve-open position, and release means acting on said operating means to permit closure of the said valve, a chamber on said body, a pair of diaphragms in spaced concentric relationship in said chamber, a common connection between both of said diaphragms and said release means, means for producing a vacuum between said diaphragms whereby, due to the action of a sensing means, one of said diaphragms having a side open to atmospheric pressure may be moved to actuate said release means against the resistance of the second diaphragm, and means in connection with the inlet means of said nozzle for imposing upon the second of said diaphragms the pressure of fluid ahead of said nozzle, whereby failure or substantial diminution of said pressure will actuate said second diaphragm to operate said release means.

2. The structure claimed in claim 1 wherein the effective area of the first mentioned diaphragm is larger than the effective area of the second mentioned diaphragm so

that a vacuum acting on said first mentioned diaphragm can overcome the effect of fuel pressure against said second mentioned diaphragm.

3. In an automatic dispensing nozzle, a hollow body comprising fluid entrance means, a spring actuated main valve with a stem, a manual operating lever positioned to actuate said valve stem whereby to open said valve, latch means for engaging one end of said lever to hold it in valve-opening position, the other end of said lever being pivoted to a slidable plunger, locking means to prevent sliding movement of said plunger, said plunger being adapted, when said locking means is released, to move the pivot point of said lever to a position at which said main valve will close, a chamber on said body, a first diaphragm in said chamber having a side open to atmospheric pressure, a second diaphragm in said chamber concentric with and spaced from the first diaphragm, a closure for the end of said chamber, means in connection with the flow of fluid through said nozzle for creating a vacuum in a space, means for connecting said space with the space between the two diaphragms, a sensing means in connection with the space between said two diaphragms and acting normally to relieve the vacuum therebetween, means for applying the pressure of fluid in the entrance means of said nozzle against the outer side of said second diaphragm, and a mechanical connection between said diaphragms and to the locking means for said plunger whereby movement of either diaphragm in a direction away from said plunger will release said locking means allowing movement of said plunger and consequent closure of said main valve.

4. The structure claimed in claim 3 wherein the effective area of the first diaphragm is larger than the effective area of said second diaphragm whereby vacuum in the space between said diaphragms will overcome the effect of fluid pressure against said second diaphragm.

5. The structure claimed in claim 4 wherein said plunger has a spring tending to return it to locked position and wherein said main valve has a stronger spring tending to urge it to the closed position.

6. The structure claimed in claim 5 wherein said locking means comprises a pin slidable internally of said plunger, said pin having portions of different effective diameters, and a series of balls operating through the wall of said plunger and engaging a shoulder on said body, an enlarged portion of said pin normally holding said balls in the locking position, said pin being movable in a direction longitudinally of said plunger to a position in which a reduced portion of said pin allows said balls to retract and release said plunger, and a spring acting on said pin to urge it to the releasing position, the effect of normal fluid pressure against said second diaphragm being sufficient to overcome the force of said spring.

7. The structure claimed in claim 6 wherein the means for creating a vacuum includes means at said main valve acting in connection with the flow of fluid therethrough to produce a venturi effect.

8. In an automatic dispensing nozzle, a valved hollow body through which a fluid is to be dispensed, a chamber in connection with said body, a first diaphragm spanning the walls of said chamber, a ring surmounting said first diaphragm, a second diaphragm scanning said ring, and a closure cap for said chamber, said elements respectively defining a space within said chamber below said first diaphragm which space is at atmospheric pressure, a second space within said chamber between said diaphragms which space may be subjected to a vacuum for automatic shut-off purposes, and a space above said second diaphragm, which space has a fluid connection to the entrance side of said nozzle, means for opening the valve, means for holding the valve in open position, release means for said last mentioned means, and a connection between said release means and both of said

diaphragms whereby movement of either diaphragm will be effective in operating said release means.

9. The structure claimed in claim 8 including rigid washer-shaped elements on either side of said second diaphragm whereby to reduce the effective area thereof to a value substantially below the effective area of said first diaphragm whereby the effect of vacuum in the space between said diaphragms will overcome the effect of fluid pressure against said second diaphragm.

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Notice of Adverse Decision in Interference

In Interference No. 92,586 involving Patent No. 3,005,476, R. M. Klaus, Automatic safety nozzle, final judgment adverse to the patentee was rendered May 25, 1962, as to claims 3 and 8.

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