March 25, 1958 L. V. McCARTY 2,827,929

GAS NOZZLE

Filed Nov. 16, 1956 2 Sheets-Sheet 1

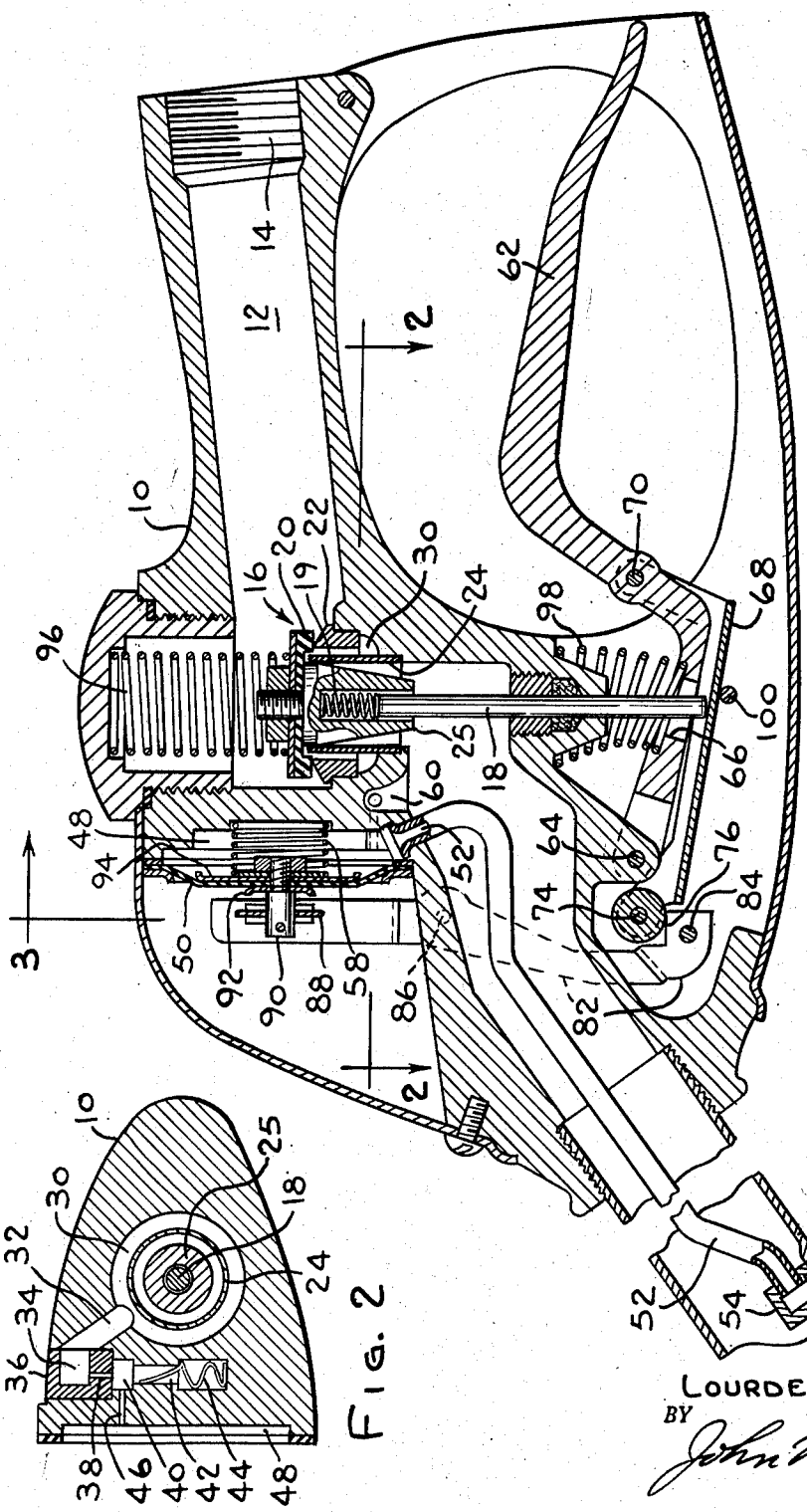


FIG. 1

FIG. 2

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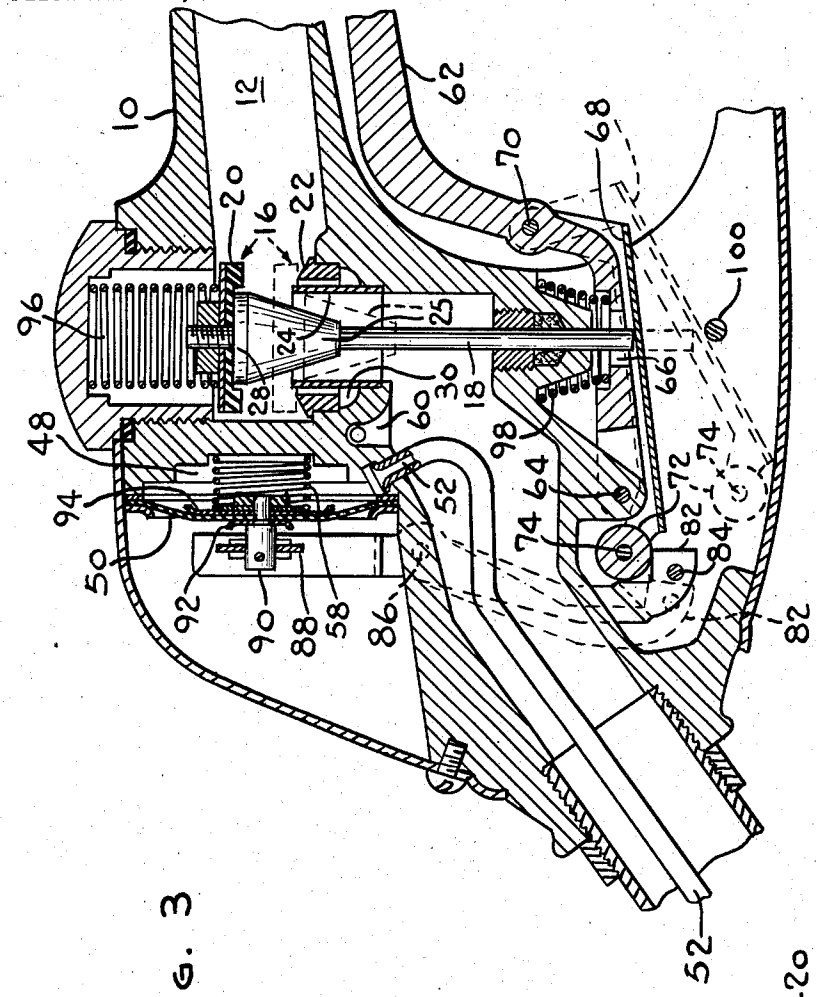


Fig. 4

Fig. 3

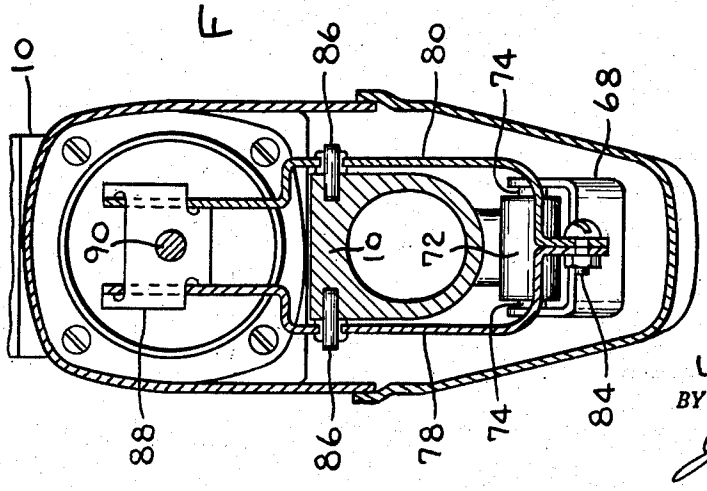
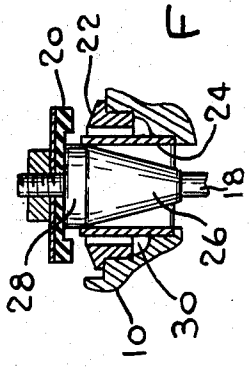


Fig. 5



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2,827,929

GAS NOZZLE

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Application November 16, 1956, Serial No. 622,633
11 Claims. (Cl. 141—209)

This invention relates to a fuel nozzle which shuts off automatically when the fuel level reaches the end of the nozzle and constitutes an improvement over the fueling nozzle shown in my application Serial Number 537,984.

The fuel nozzle shown in said application constitutes a marked improvement over the prior art in that it performs well over a much wider range of pressures and flow rates than the prior art structures. However, it is possible to open the valve to allow a moderate flow (one half gallon a minute or less) and still not have enough gasoline pass through the aspirator to operate the valve tripping latch mechanism. While this flow rate is quite small, it is desirable to improve upon the valve to make the aspirator latch mechanism operative at substantially all flow rates obtainable with the valve. In carrying out this objective the low flow rate is increased slightly (to, say, ⅔ of a gallon a minute at 15 p. s. i.) but this rate is low enough to permit filling in increments of less than one quarter cup.

The principal object of this invention, therefore, is to improve upon my prior structure to insure operation of the aspirator latch mechanism in substantially all flow conditions.

In order to achieve the purposes of this invention I have provided a resilient connection between the valve actuating handle and the valve so the valve will be popped open to a position insuring adequate flow to the aspirator to operate the latch mechanism.

Other objects and advantages will be pointed out in, or be apparent from, the specification and claims, as will obvious modifications of the single embodiment shown in the drawings in which:

Figure 1 is a vertical section through the nozzle showing the valve closed;

Figure 2 is a section taken on line 2—2 in Figure 1 to show the details of the venturi in the low flow path;

Figure 3 is a section taken on line 3—3 of Figure 1;

Figure 4 is a view similar to Figure 1, but shows the valve open in solid lines and in dotted lines shows the tripped position of the lever and the valve; and

Figure 5 is a detail of the valve in its low flow position.

Referring to the drawings in detail, the fuel nozzle has a body 10 provided with an inlet 12 threaded at 14 for connection to the hose leading from the fuel pump. Gasoline flowing through the inlet is regulated by valve assembly 16 which includes two valves serially arranged for actuation by stem 18 through the medium of stiff spring 19. Spring 19 is interposed between stem 18 and the valve assembly and is housed within hole 21 on the underside of the valve assembly. The rate of the spring is in the order of 400 pounds per inch and it is the presence of this spring which constitutes the improvement over my prior disclosure. The manner in which this spring improves the operation of my prior valve will be explained more fully hereinafter. The first of the two serially arranged valves comprises a neoprene disc valve 20 mounted on stem 18 and cooperating with seat 22 pressed in the valve body. This valve regulates the flow to the annular space between seat 20 and cylindrical sleeve 24. When the valve is raised only slightly, as in Figure 5, the cylindrical portion 28 of valve 26, also actuated by stem 18, acts to prevent flow centrally of sleeve 24. Of course,

when stem 18 is moved upwardly further, the conical portion of valve 26 comes into operation and permits a gradual increase in the rate of flow past valve 26.

Whenever valve 20 is raised from seat 22, there will be flow into annular space 30 between the sleeve 24 and seat 22. The gasoline flows from space 30 through conduit 32 into cross conduit 34 in plug 36 pressed into the body 10. The plug 36 is also provided with a small axial bore 38 through which the gasoline flows into the large bore chamber 40 and conduit 42. As the gasoline flows from the small bore 38 into the large areas 40 and 42, the gasoline tends to spray outwardly, and it is desired to have the liquid completely fill conduit 42 in order to insure a reduced pressure in the chamber 40 by venturi action. In order to insure this fanning out of the stream coming from the small bore 38 at all flow rates and at all pressures, the wire or spring 44 is bent as shown to provide an end projecting into conduit 42 to break up any solid stream coming from the small bore 38. This very effectively insures filling the bore 42 with liquid to prevent loss of the desired venturi effect. The reduced pressure in chamber 40 acts through the lateral bore 46 to communicate with aspirator chamber 48 on the right-hand side of diaphragm 50. The aspirator chamber 48 is vented through conduit 52 which runs down the center of the nozzle spout and terminates in fitting 54 mounted adjacent the end of the spout and including a vent 56. As soon as the liquid level in the container being filled rises to the level of vent 56, the breathing of the aspirator chamber 48 is blocked and the reduced pressure in chamber 40 becomes effective to act on diaphragm 50 to pull the diaphragm 50 to the right in opposition to the bias of spring 58.

The low rate liquid flow which is employed to obtain the venturi action at chamber 40 flows from conduit 42 into passage 60 which communicates with the interior of the spout on the downstream side of the valves. When the valve stem 18 is raised to open the conical valve 26, the flow through the venturi section and out passage 60 continues so the venturi effect is operative at all times.

The valves are operated by raising handle 62 about its pivot 64. It will be noted that stem 18 passes through aperture 66 in the handle to rest on lever 68, the right-hand end of which is pivotally connected to the handle at 70 and the left-hand end of which is provided with a roller 72 rotatably mounted on pin 74 and normally resting on ledge 76 formed by the lower ends of the two similar arms 78, 80 forming the rocker arm 82. Thus, the lower ends of arms 78, 80 are connected by the nut and bolt 84 and are pivotally connected to the body 10 by pins 86, 86. At the upper end of the lever 82 the arms 78, 80 are interconnected by a plate 88 which is connected to diaphragm pin 90. This pin is connected to the diaphragm 50 through the medium of the usual plates 92, 94.

As previously noted, spring 58 acts on diaphragm 50 to hold the diaphragm in the position shown in Fig. 1. Under this condition, rocker 82 is urged by the diaphragm spring 58 in a clockwise direction about its pivot 86. This holds ledge 76 under roller 72 so that when handle 62 is raised lever 68 will also be raised to lift valve stem 18 and open valve 20 alone or in combination with the conical valve 26. Now then, handle 62 can be held open manually or could be propped in the open position while the gasoline fills the container into which it is being dispensed. When the gasoline level reaches aspirator vent 56 in the tip of the nozzle, the vent becomes plugged and the low pressure in venturi chamber 40 becomes effective to reduce the pressure on the right-hand side of diaphragm 50 whereupon atmospheric pressure acting on the left-hand side of the diaphragm will move the diaphragm

to the right against the bias of spring **58**. When this happens, rocker **82** is rotated in a counter-clockwise direction about its pivot **86** and ledge **76** is withdrawn from its position under roller **72**, leaving the left-hand end of lever **68** without support. When this occurs, spring **96**, acting on the valves in the seating direction, will act to close the valves while lever **68** drops to the position shown in Fig. 4 in dotted lines. It will be noted that the valves close even though the handle is held in the full open position. It will be appreciated that the release of lever **68** is quite smooth and calls for very little effort since there is a rolling connection between lever **68** and rocker **82**.

After the valves have been closed as shown in dotted lines in Figure 4, the mechanism may be reset by releasing handle **62** for movement back to the position shown in Figure 1 under the influence of spring **98** compressed between the nozzle body and handle **62**. As the handle moves downwardly to the position shown in solid lines in Figure 1, the left-hand end of the released lever **68** will be forced to move upwardly by contact of the lever with pin **100**. Thus, as the right-hand end of lever **68** is lowered, the lever **68** must rock about pin **100**. Since the valve has closed, there is no pressure acting on the diaphragm and rocker **82** has returned to its normal position. Therefore, the elevation of the left-end of lever **68** permits the rocker to return to its normal position with ledge **76** under the roller. On the way up the roller cams the rocker out of its path.

Without spring **19** interposed between the stem and the valve assembly **16** the valve handle could be operated to open the valve only a very small amount (.001 inch to .005 inch) to allow such a moderate flow that there was insufficient action at the aspirator to operate the tripping mechanism. With spring **19** interposed between the handle and the valve, actuation or lifting of the valve handle will compress spring **19** until the force stored in the spring is great enough to lift the valve against the opposing forces of valve closing spring **96** and the pressure of the gasoline on the valve. With the spring rate of spring **19** in the order of 400 pounds per inch the amount the valve pops open is about .005 to .01 inch. This allows full flow through the aspirator, but does not permit any flow past valve **26**. As a result, the minimum flow is about ⅔ of a gallon per minute at 15 p. s. i. and this is slow enough to fill in increments of less than ¼ cup. It will be understood that when the valve assembly **16** is closed, the pressure is exerted across the area of the seat but when the valve is cracked open some of the pressure is on the underside of the valve. This has the effect of decreasing the resultant area of the valve and therefor the closing force on the valve. The net result is to cause the valve to pop open or snap open an amount determined by the rate of spring **19** and the decrease in effective area of the valve. Actually, with the spring **19** interposed between the stem and the valve assembly, there is still approximately .005 inch travel of the valve handle possible where the flow rate is insufficient to actuate the aspirator. It will be appreciated that this is an extremely small range of movement of the handle and that such a range of operation without the aspirator latch mechanism being operative is of little concern. When closing the present valve there is no range in which the flow through the aspirator can be so low as to not operate the latch mechanism. It will be seen, therefore, that the present fueling nozzle can, for all practical purposes, be considered fully automatic at all flow rates obtainable with the fuel nozzle.

Although but one embodiment of the present invention has been illustrated and described, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

I claim:

1. In a fuel nozzle of the type having a body provided with an inlet and an outlet with a valve regulating flow therebetween, and a passage including a venturi for developing reduced pressure for operating an aspirator-operated trip-latch mechanism, the passage originating upstream of said valve, the combination of a second valve for regulating flow to the passage, means for operating the second valve, and means operatively interposed between the operating means and the second valve for insuring adequate opening of the second valve to obtain sufficient flow through the venturi to operate the aspirator.

2. A fuel nozzle according to claim 1 in which the first means includes a manually operated lever and the second means is operatively interposed between the lever and the second valve.

3. A fuel nozzle according to claim 2 in which the second means comprises means for obtaining a snap action of the second valve between closed position and a position securing the flow rate necessary through the venturi to operate the aspirator.

4. A fuel nozzle according to claim 3 in which the second means comprises a spring interposed between the lever and the second valve.

5. A fuel nozzle according to claim 4 in which the valves are serially operated by said lever, the second valve opening first to establish the low flow rate.

6. A fuel nozzle comprising, a body having an inlet and an outlet having a main passage and an auxiliary passage therebetween, a valve for each passage and controlled by a common stem, manaully operable means for controlling the valve stem movement, the valves being mounted for sequential operation with the valve regulating flow through the auxiliary passage being opened first, venturi means in said auxiliary passage to develop a reduced pressure at the throat of the venturi means, aspirator means adapted to be actuated by the reduced pressure and including a vent to cancel the effect of the reduced pressure, means connecting said aspirator means to the manual means and operative to render the manual means ineffective when the vent is closed, and means operatively interposed between the manual means and the auxiliary valve to impart a snap opening action to the auxiliary valve so the minimum opening thereof passes enough fuel to insure obtaining the reduced pressure at the venturi necessary to operate the aspirator.

7. A fuel nozzle according to claim 6 in which the snap action means comprises a spring, said main valve being closed when the auxiliary valve is in its minimum flow position.

8. An automatic shut-off fuel nozzle having a body provided with an inlet and an outlet with a valve regulating flow therebetween, a venturi in the body having the flow therethrough regulated by the valve, said venturi being employed to develop a reduced pressure for operating an aspirator-operated trip-latch mechanism, means for operating the valve, and means operatively interposed between the operating means and the valve for insuring opening the valve sufficiently to obtain the minimum flow through the venturi required to develop the operating pressure reduction.

9. A nozzle according to claim 8 in which the first means is a lever and the second means is operatively interposed between the lever and the valve.

10. A nozzle according to claim 9 in which the second means is a snap operating mechanism for snapping the valve to the minimum flow position when the lever is actuated to open the valve.

11. A nozzle according to claim 10 in which the snap mechanism comprises a spring transmitting movement from the lever to the valve.

References Cited in the file of this patent

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,827,929 Lourdes V. McCarty March 25, 1958

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the grant, line 2, address of assignee, for "Chicago, Illinois" read -- Schiller Park, Illinois --; in the heading to the printed specification, line 4, address of assignee, for "Chicago, Ill." read -- Schiller Park, Ill. --.

Signed and sealed this 17th day of June 1958.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents