

[54] **AUTOMATIC TRIP FILL NOZZLE**

[75] Inventor: **Peter S. Riegel**, Columbus, Ohio

[73] Assignee: **Gilbert and Barker Manufacturing Company**, Greensboro, N.C.

[22] Filed: **June 16, 1971**

[21] Appl. No.: **153,825**

Related U.S. Application Data

[63] Continuation of Ser. No. 769,239, Oct. 21, 1968, abandoned.

[52] U.S. Cl.**141/207, 141/52, 141/208, 141/225**

[51] Int. Cl.**B67d 5/375**

[58] Field of Search.....222/64, 188, 402.14, 402.15, 222/402.25, 402.23, 473, 474, 510, 529; 141/192-229, 346-352, 46, 52

[56]

References Cited

UNITED STATES PATENTS

3,357,461	12/1967	Friendship.....	141/46
3,443,608	5/1969	Copping et al.	141/46
3,357,461	12/1967	Friendship.....	141/198 X

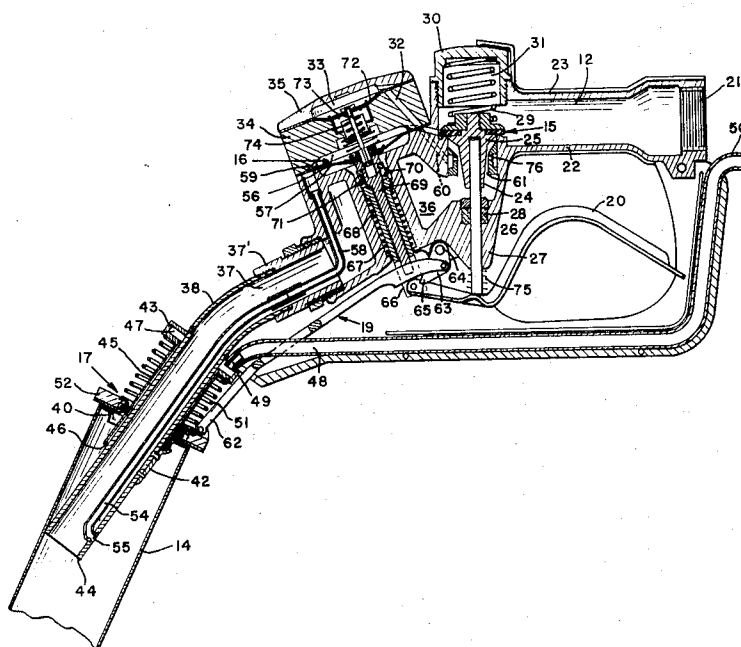
Primary Examiner—Houston S. Bell, Jr.
Attorney—David Rabin

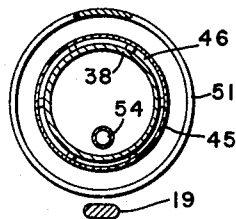
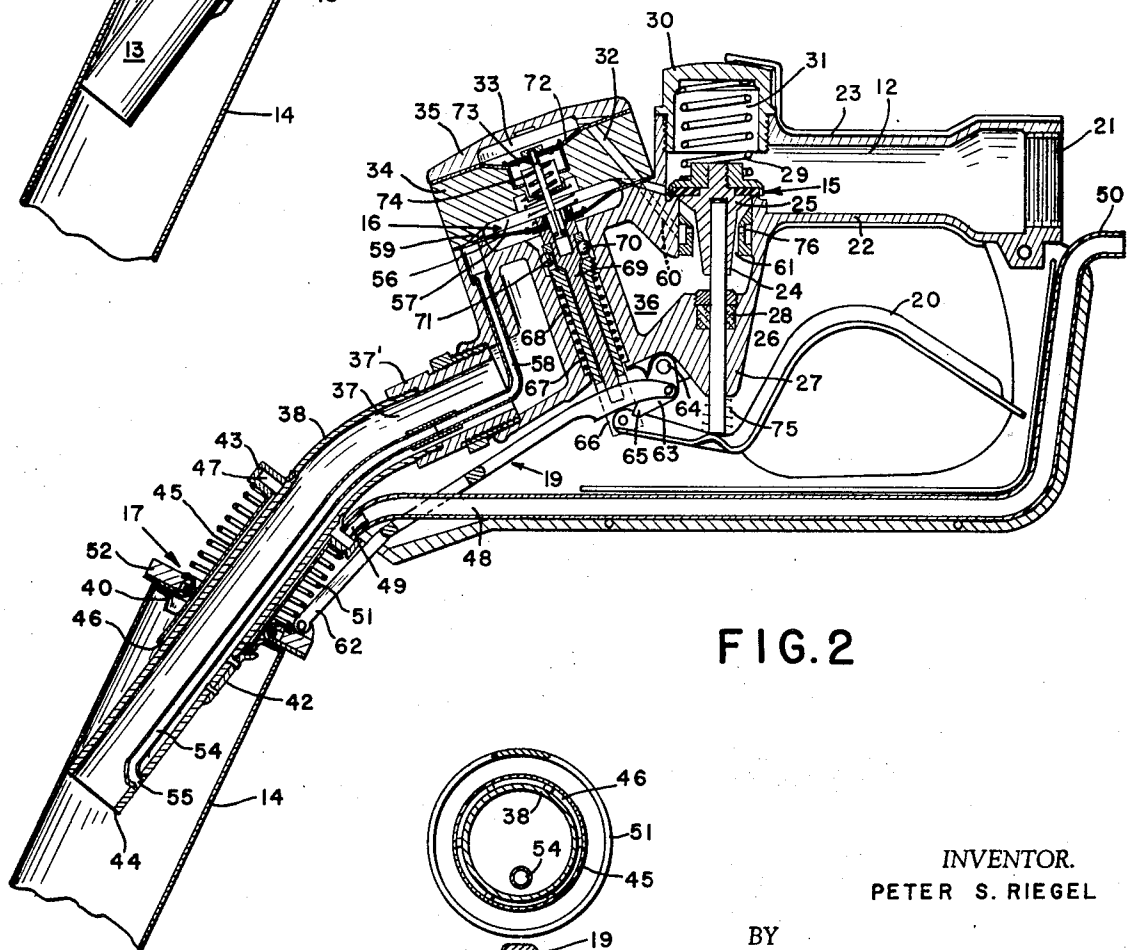
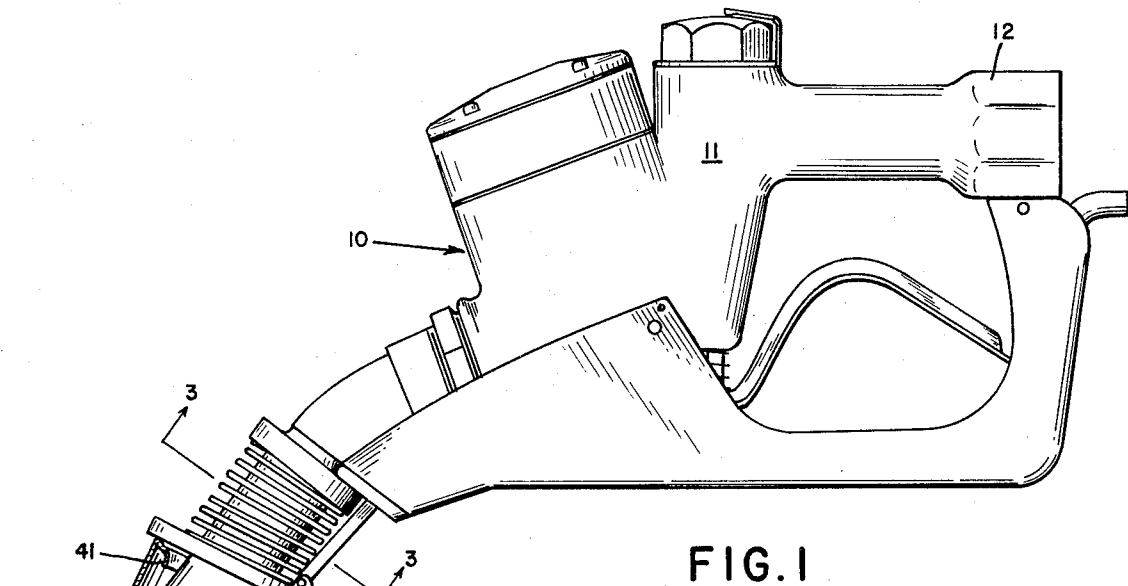
[57]

ABSTRACT

A safety automatic trip fluid dispensing nozzle for cooperatively sealing a tank fill pipe to prevent fluid splashage and vapor emission in which a valve mechanism with an operating linkage is preconditioned for valve mechanism operation upon fill pipe sealing and for valve mechanism de-actuation upon unseating intentionally or inadvertently.

10 Claims, 3 Drawing Figures





INVENTOR.
PETER S. RIEGEL

BY

attorney

AUTOMATIC TRIP FILL NOZZLE

This is a continuation of application Ser. No. 769,239, filed Oct. 21, 1968, now abandoned.

BACKGROUND OF INVENTION

Gasoline dispensing self-service stations have increased appreciably recently in various locations. Additionally, gasoline dispensing is now a commodity sold in retail outlets other than gasoline service stations including neighborhood grocery stores and supermarkets with the customer actually operating the gasoline pump. With the introduction of "preset" devices permitting a customer to pay a cashier at a location removed from the dispensing pump enabling the customer to fill his own tank for the predetermined volume and the increased use of bill, coin or credit card accepting gasoline dispensing pumps which dispense the selected and paid-for volume, it is increasingly important to provide increased safety measures to eliminate the hazards attendant in the dispensing of gasoline by untrained personnel. Continuous handling of the dispensing equipment by untrained, non-technical persons demands maximum protection against mishaps and malfunctioning particularly at busy or unattended service stations. Maximum protection against potential spillage, inadvertent overflow, abusive handling, gasoline vapor emission, among other hazards, is essential for acceptable commercial operations to comply with present and contemplated safety regulations.

An acceptable gasoline dispensing nozzle must be readily adaptable to be received by all or virtually all standard tank fill pipes for use by untrained and trained personnel. It is contemplated that ultimately governmental regulations and controls will require standardization of all gasoline tank fill pipes with controls of vapor emission during fuel supply of all volatile fuels as well as increased safety standards.

The connecting relationship between the supplying gasoline dispenser and the receiving vehicle tank fill pipe is the gasoline fill nozzle which usually is connected to the gasoline pump by means of a flexible hose line. It is most desirable to retain, where possible, at least many of the accepted conventional features or systems presently in use provided they may be integrated and interrelated with a tank fill pipe sealing member to provide safety features in which disengagement of the fill nozzle with the tank fill pipe will automatically terminate fluid flow. It is desirable that the nozzle geometry should be essentially the size and shape of those presently being used without any increased flow resistance. It is further desirable that the nozzle derive its power for operation either from the operator or from forces generated by the flowing fluid without dependence on any outside power source. Furthermore, there should be elimination of any possibility of sparking which may occur due to the generation of an electrical potential resulting from the flow of fluid. Preferably some thermal insulation may be desirable to reduce the discomfort experienced by an operator during cold weather operation.

It is also desirable to incorporate in a fill nozzle a fluid sensing system for a self-contained automatic shut-off. Several systems are available such as: static pressure in which cut-off is effected by small static pressure differentials when gasoline rises or covers the

nozzle tip which translates pressure differential to operate a trip mechanism, buoyancy in which a float rises in a nozzle tip to trip a mechanism, vapor pressure in which a nozzle sealed in a fill pipe will transmit vapor pressure to a trip mechanism, and a vacuum trip in which the flow of gasoline through an air ejector develops air flow through a passage in the nozzle and air flow interruption increases the vacuum developed thereby tripping a shutdown mechanism.

An additional feature desirable in a nozzle for dispensing gasoline is to prevent flow in the absence of positive fluid pressure to prevent the delivery hose from being emptied at the expense of another customer. Various types of check valves have been employed to eliminate hose emptying.

Accordingly, the present invention relates to a fluid dispensing nozzle in which a valve mechanism cooperates with a tank fill pipe seal with the seal preconditioning valve mechanism operation and termination of fluid flow either upon tank fill or disengagement of the seal intentionally or inadvertently from the tank fill pipe.

A further objective of this invention is to provide an automatic trip safety fill nozzle with a preconditioning and shut-off linkage to control a valve mechanism before fluid flow may be initiated and for terminating fluid flow in the event of (a) tank fill, (b) seal release, (c) loss of fluid pressure, among other occurrences.

Other features of the novel safety fill nozzle will become more readily apparent from the detailed description hereafter.

DESCRIPTION OF DRAWING

FIG. 1 is a side elevational view of a fluid dispensing nozzle embodying a preferred form of this invention with portions shown in partial sectional view;

FIG. 2 is a longitudinal sectional view of FIG. 1 illustrating the fluid dispensing nozzle in the closed position; and

FIG. 3 is a transverse sectional view taken substantially along the plane of section line 3—3 of FIG. 2.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

Referring to the drawing, there is illustrated a preferred embodiment of this invention for a safety fill gasoline dispensing nozzle 10 in which the nozzle body 11 is provided with an inlet passage 12 that is suitably connected to a flexible supply hose (not shown) leading from a gasoline dispenser pump, a discharge passage or nozzle tube 13 for insertion into a gasoline tank fill pipe 14. The nozzle body 11 houses a valve mechanism which includes a valve assembly 15, to permit fluid flow in the valve open position and terminate fluid flow in the closed position shown in FIG. 2, at the nozzle inlet passage 12, and a valve-actuating section 16. A gasoline tank fill pipe sealing assembly 17 is cooperatively supported on the nozzle tube 13 for cooperatively engaging and releasably clamping to the open end 18 of the fill pipe 14 with the sealing assembly lever-actuating assembly 19 extending for connection to the valve-actuating section 16 and in proximity to the valve mechanism actuating lever 20 which lever is shown in the valve closed position.

The inlet passage 12 is provided with a threaded opening 21 for receiving a flexible hose connection with the remote end of the hose being connected to a gasoline dispenser pump. The nozzle handle section 22 is preferably provided with a suitable plastic insulation 23 providing greater comfort to the operator during cold weather. The valve assembly 15 of the valve mechanism is shown in the seated position with the air of frusto-conical sections 24 and 25 of the valve being supported on the valve plunger 26 that is guidably supported in the body depending lobe 27 and movable through the packing gland 28. The valve assembly 15 is normally urged downwardly through the coil spring 29 that is retained within the cover cap 30 that is threadably secured to the nozzle body 11 with the spring 29 being retained in the spring chamber 31 that communicates with the inlet passage 12. Fluid entering inlet passage 12 will flow through the fluid pressure passage 32 into the fluid pressure chamber 33 formed in the valve actuating section housing 34 that is enclosed by the closure cap 35 suitably secured on the housing 34 with the cap 35 being suitably recessed to provide a cavity for cooperation to form the pressure chamber 33.

The inlet passage 12 beyond the valve assembly 15 communicates with the intermediate flow chamber 36 in the body which will discharge the fluid into the discharge passage nipple 37 which is threadably secured to the outlet of the body 11 for threadably receiving the nozzle tube 38 which will have a diameter readily receivable in a conventional gasoline tank fill opening 40 which is usually provided with an inturned lip 41. A fill pipe latching lug 42 is secured to the nozzle tube 38 for releasable engagement with the fill pipe lug or inturned flange 41.

A fill pipe sealing assembly 17 is cooperatively supported on the discharge tube 38 and is provided with a vent manifold 43 secured to the tube 38 in spaced relation to the discharge end 44 of the tube in a fixed position. An enveloping sleeve 45 surrounds the tube 38 forming an annular passage 46 through which vapor and air from the fill pipe may pass to the manifold chamber 47 to be removed to a remote location by the tube 48 that is connected at one end to the discharge opening 49 that communicates with chamber 47 and the other end 50 of tube 48 may extend to a remote location for collection of vapor and air to prevent air pollution as into the gasoline storage tank of the service station or into a suitable collection chamber (not shown).

Coil spring 51 encircles the sleeve 45 resiliently biasing the tank fill collar 52, which collar may be of any suitable material including polyethylene or other petroleum resistant substance, to form a seal with the open end of the fill pipe 14. Upon introduction of the tube 38 into a fill pipe 14, the tube 38 will be inserted until the latching lug 42 will engage with the inturned flange 41 compressing the coil spring 51 adequately thereby seating the seal 52 in position on the fill pipe opening.

A fluid detecting air line 54 extends through the tube 38 communicating with the opening 55 in the wall of tube 38 in spaced relation to the tube end 44 for sensing or detecting fluid that may rise in the fill pipe for actuation of the valve-actuating section 16. A

vacuum chamber 56 is formed in the nozzle body for cooperatively receiving a pressure responsive diaphragm therein with the line 54 communicating with the upper air line 58 which leads to the vacuum chamber inlet 59. Suction line 60 leading from the vacuum chamber 56 communicates with the restricted opening or orifice 61 in the valve assembly 15. During normal fluid flow and before fill in the fill pipe 14, air will flow through opening 55, line 54, upper line 58, vacuum chamber inlet 59, chamber 56, through suction line 60, which flow is generated by the Venturi action of the fluid flowing through the orifice or inlet 61. Upon fluid detection at opening 55, air flow will terminate and the suction increase causing diaphragm 57 to be flexed upwardly to trip automatically the valve mechanism thereby terminating fluid flow as will be described hereafter.

The lever actuating assembly 19 is provided with a seal connecting link 62 that is pivotally joined to the self-aligning seal 52 and extends upwardly for connection to the bell-crank 63 that is pivotally connected on the pin 64 secured to the nozzle body. The free end 65 of the bell-crank 63 is cooperatively received in a recess (not shown) in the lower trip rod or plunger 66 to which rod or plunger a manual actuating lever 20 is pivotally connected at one end thereof. The plunger or rod 66 is encircled by a ball cage return coil spring 67 retained in the body bore 68 with the plunger 66 being urged normally upward, as shown in FIG. 2. An inner diaphragm actuated plunger 69 is slidably retained in the outer plunger 66 and engages the balls 70 in the ball cage 71.

The fluid pressure diaphragm 72 positioned in the fluid pressure diaphragm chamber is provided with a downwardly extending plunger or rod that is connected to the diaphragm and a diaphragm return spring 74 encircles the plunger 73. The fluid pressure diaphragm plunger 73 is preferably in axial alignment with the inner plunger 69 for cooperation therewith.

At such time that the gasoline dispenser pump is placed in operation, fluid under pressure will enter the nozzle inlet passage 12 and fluid pressure will urge the fluid pressure diaphragm 72 downwardly against the action of spring 74. The inlet pressure will act on the valve assembly 15 together with spring 29 to retain the valve 25 in a seated position. Before the fluid dispensing nozzle may be placed in operation to dispense fluid, the nozzle tube 38 must be inserted into a fill pipe 14 to a sufficient depth to lock releasably the latch 42 in the fill pipe to form a seating seal thereby actuating link 62 to pivot bell crank 63 counterclockwise withdrawing the plunger-engaging tip 65 from engagement with the inner plunger 69 and plunger 66. In the event fluid is in the opening 55 or line 54, diaphragm 57 in vacuum chamber 56 will have an increased pressure differential causing the diaphragm 57 to move upwardly thereby displacing plunger 69 upwardly to prevent suitable pivot action upon manual actuation of lever 20 as the outer plunger rod 66 will be floating and act against spring 67. Failure of the sealing means to be seated on the fill pipe opening will prevent the bell crank from pivoting thereby retaining the nozzle in the locked condition. Failure of pressure in the inlet line will reduce the pressure in the pressure chamber 33 causing the diaphragm 72 to

move upwardly thereby displacing plunger 73 upwardly which in turn will permit the inner plunger or rod 69 to move upwardly by virtue of the differential in pressure which will be inadequate to form a solid link between plungers 73 and 69 thereby precluding a solid pivot position between the manual operating lever 60 and rod 66.

Therefore, as a precondition for operation of the automatic fluid dispensing safety nozzle, the sealing means 17 must be in seating engagement with the fill pipe to transmit this condition to the lever actuating assembly 19, and adequate inlet pressure must be exerted on the pressure diaphragm 72 as well as a proper suction pressure or pressure differential be exerted on the diaphragm 57 to maintain the related linkage between plungers 69 and 70. When the aforementioned conditions have been satisfied, valve mechanism actuating lever 20 may be raised against the operating lever return spring 75 to urge the valve plunger 26 upwardly permitting fluid to flow through the orifice 61 thereby generating a suction through the restricted opening which will pass through the suction port 76 in the restricted opening 61 into the suction passage 60 to chamber 56.

Upon closing of the opening 55 in the tube 38, there will be an increased pressure differential or suction in chamber 56 which in turn will cause diaphragm 57 to move upwardly causing the pivot in plunger 66 and the connection with actuating lever 20 to be lost, and the valve assembly 15 will be urged downwardly to terminate fluid flow through the nozzle. Loss of pressure in pressure chamber 33 which may occur at anytime during flow will cause the nozzle to be tripped to the closed position. Disengagement of the sealing member 52 with the fill pipe will cause the lever actuating assembly 19 to be disengaged resulting in a loss of the pivot between plungers 66 and 69 or rotation of the bell-crank 63 into an inoperative position.

It is contemplated that various types of fill pipe sealing members may be utilized including an inflatable bulb, a conical hood for capping the end of the fill pipe, among other geometrical variations. Additionally, various types of check valves may be utilized in place of the diaphragm in the pressure chamber. Various types of linkages may also be utilized without departing from the inventive concept since a single preferred embodiment only has been illustrated and described without any purpose for limiting the scope of this invention.

I claim:

1. A fluid dispensing nozzle comprising a body having inlet and discharge passages, a tank fill line sealing assembly on said body discharge passage preventing fluid splashage and vapor emission in a seated position on a tank fill line, a valve mechanism including a valve assembly and a valve actuating section, a manually actuated lever coupled with said valve actuating section and adapted to actuate said valve assembly upon proper preconditioning of said manually actuated lever, and a lever actuating assembly coupled with said sealing assembly, said valve actuating section and said manually actuated lever for preconditioning said manually actuated lever for valve assembly actuation upon proper engagement of said sealing assembly with said fill pipe and fluid pressure within said valve mechanism, and for deactuation of said manually

operated lever and said valve assembly upon the unseating of said sealing assembly.

2. A fluid dispensing nozzle as claimed in claim 1, and means in said discharge passage communicating with said valve mechanism for deactuation of said valve mechanism upon fluid fill or contact.

3. A fluid dispensing nozzle as claimed in claim 1, and means associated with said sealing means for removing vapors to a remote location emitted from a tank fill line.

4. A fluid dispensing nozzle as claimed in claim 1, said sealing assembly being yieldably retained on said discharge passage for seating engagement with the open end of a tank fill line.

5. A fluid dispensing nozzle as claimed in claim 1, said sealing assembly being yieldably biased on said discharge passage for seating and sealing the open end of a tank fill line, and means on said discharge passage for releasably locking the discharge passage on a tank fill line.

6. A fluid dispensing nozzle as claimed in claim 1, said valve mechanism including a spring-loaded plunger valve assembly at said inlet passage, a valve actuating section having a vacuum chamber in said body, said vacuum chamber having a pressure responsive means therein, said vacuum chamber communicating with said valve assembly to transmit a pressure differential therethrough, means in said discharge passage for transmitting a pressure differential to said vacuum chamber, means movable with said pressure responsive means connected to said lever actuating assembly whereupon seating engagement of said sealing assembly with a fill line said valve assembly may be actuated for operation and upon disengagement of said sealing means with a fill line or failure to maintain a predetermined pressure differential in said vacuum chamber, said valve assembly will be urged into a closed position.

7. A fluid dispensing nozzle as claimed in claim 6, said valve actuating section further including a fluid pressure chamber in said body having pressure responsive means therein, means associated with said pressure responsive means in said pressure chamber communicating with said inlet passage, means associated with said pressure chamber responsive means for preconditioning said lever and said lever actuating assembly for actuation and for deactuation of said valve assembly, and means for venting vapors from said discharge passage to a remote location.

8. A fluid dispensing nozzle as claimed in claim 7, said spring loaded plunger valve assembly having a restricted opening and a lever-engaging plunger extending from said valve, said pressure responsive means in said valve actuating section vacuum chamber having a diaphragm and a linkage-actuating plunger extending therefrom, said pressure-responsive means and said fluid pressure chamber having a diaphragm and a linkage-actuating plunger extending therefrom for cooperation with said linkage-actuating plunger of said vacuum chamber pressure-responsive means whereby reduction or lack of fluid pressure in said fluid pressure chamber or unseating of said sealing means or improper pressure differential in said vacuum chamber will terminate fluid flow or prevent full preconditioning for actuation of said linkage for said valve mechanism.

9. A fluid dispensing nozzle as claimed in claim 6, said sealing assembly having releasable clamping means for connection to a tank fill pipe.

10. A fluid dispensing nozzle as recited in claim 1, said valve mechanism body discharge passage having an elongated tube for insertion into a tank fill pipe, said valve actuating section including a return line therein for transmitting a pressure differential communicating with the interior of the fill pipe to detect fluid level therein, said tank fill line sealing assembly having a resiliently biased collar for cooperative sealing engagement with the open end of a fill pipe guidably supported on said tube, fill pipe latching means on said tube for releasably engaging a fill pipe in the seated position of said sealing means on a fill pipe, a venting sleeve on said tube for receiving vapors and air from said fill pipe during tank fill, means connected to said sleeve for transferring vapor and air from said sleeve to a remote location, said valve mechanism having a valve assembly in said inlet passage, said valve assembly having a spring-actuated plunger and a valve forming a restricted inlet orifice to restrict fluid flow in the valve open position, said valve actuating section further including an inlet pressure chamber communicating with

said inlet passage having a pressure responsive diaphragm and connected plunger, a vacuum chamber communicating with said return line in said tube and said restricted opening having a pressure responsive diaphragm and connected plunger, said plungers being adapted for cooperation with each other for transmitting a force when suitably preconditioned with fluid pressure in said inlet passage and the absence of a fluid in said tube, said lever actuated assembly connected to said sealing assembly and at least one of said plungers, said manually actuated lever adapted to cooperate with said lever actuated assembly and said one of said plungers in said valve assembly spring actuating plunger whereby sealing assembly seating on a fill pipe and inlet fluid pressure precondition said lever actuated assembly for operation of said manual lever, and upon fluid pressure drop detected in said inlet pressure chamber below a predetermined level or unseating or said sealing assembly from said fill pipe or fluid detection in said tube said linkage will be de-activated automatically positioning the valve mechanism in an in-operative position terminating fluid flow through the nozzle body.

* * * * *

25

30

35

40

45

50

55

60

65