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[54] **SAFETY MECHANISM FOR AUTOMATIC NOZZLE**
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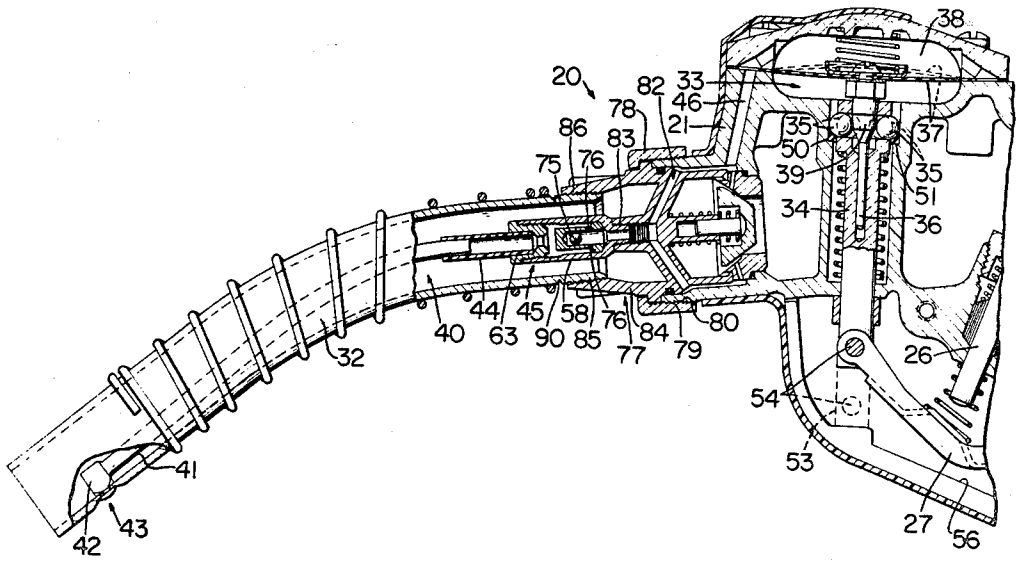
**ABSTRACT:** This disclosure relates to fluid dispensing nozzle means such as an automatic gasoline dispensing nozzle which has safety means incorporated therein to assure that if the dispensing nozzle is inadvertently moved or dropped from its normal dispensing position gasoline flow through such nozzle will be stopped.

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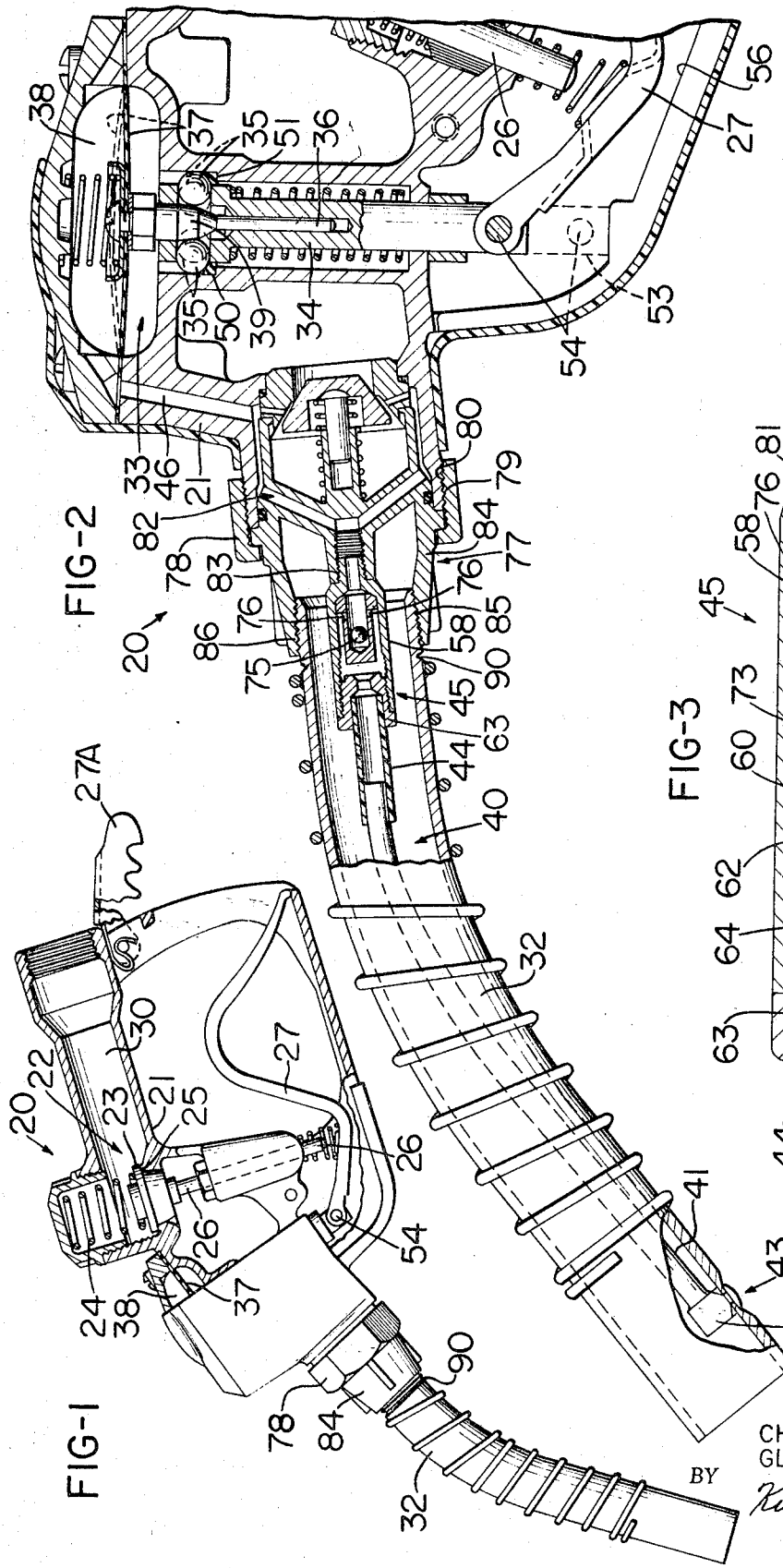


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# SAFETY MECHANISM FOR AUTOMATIC NOZZLE

## BACKGROUND OF THE INVENTION

Many fluid dispensing nozzle means are in current use today including gasoline dispensing nozzles of the type provided with automatic high level shut off and often used in self-service type gasoline stations where the automobile driver is encouraged to operate the gasoline nozzle and dispense gasoline within the tank of his own automobile. In such selfservice type gasoline stations it often occurs that the driver inadvertently drives away from the gasoline station with the gasoline dispensing nozzle still inserted within the gasoline tank of his automobile thereby creating considerable damage to the gasoline pumping equipment, causing considerable gasoline loss, and creating a fire hazard.

## SUMMARY

This invention provides improved safety means for fluid dispensing nozzle means, such as a gasoline dispensing nozzle, for example, which assures that gasoline flow through such nozzle is stopped in the event the nozzle is moved or dropped from its normal dispensing position. In addition, such safety means provides a controlled shearing away of a portion of the gasoline dispensing nozzle to minimize the damage which would otherwise be caused without such shearing and further this invention provides safety means for actuating automatic shutoff means normally provided in such a gasoline dispensing nozzle to stop gasoline flow after the discharge conduit is sheared away and as the gasoline dispensing nozzle strikes ground.

Other details, uses, and advantages of this invention will become apparent as the following description of the exemplary embodiment thereof presented in the accompanying drawing proceeds.

## BRIEF DESCRIPTION OF THE DRAWING

The accompanying drawing shows a present preferred embodiment of this invention, in which

FIG. 1 is a side elevation of an exemplary gasoline dispensing nozzle with parts thereof shown in section and which includes the safety means of this invention as an integral part thereof;

FIG. 2 is an enlarged view of the nozzle of FIG. 1 with parts in section and parts broken away to particularly illustrate integral safety means of this invention and comprised in part of a gravity operated valve and to also illustrate the arrangement of such gravity operated valve within the gasoline dispensing nozzle; and

FIG. 3 is a sectional view of such gravity operated valve.

In the exemplary embodiment of this invention illustrated in FIGS. 1—3 of the drawings, an improved fluid dispensing head means such as a gasoline dispensing head or nozzle 20 is illustrated. Dispensing nozzle 20 is comprised of a main housing means or body 21 having normally closed valve means indicated generally by the numeral 22 supported within body 21.

Valve means 22 comprises a poppet valve 23 which is normally urged closed by a spring 24 against a cooperating seat 25 provided in housing 21. Poppet valve 23 has a stem 26 fixed to the lower end thereof. The lower end of stem 26 is normally engaged by a suitably pivoted lever 27 to override spring 24 and thus open valve assembly 22.

A passage 30 is provided in housing 21 and such housing has means such as threads or the like at the entrance to passage 30 for connection of nozzle 20 to a flexible hose, or the like, which in turn is connected to a source of gasoline through a gasoline metering pump. Fluid discharge conduit means such as a discharge conduit 32 is also suitably connected to the discharge end of nozzle 20. Upon actuating lever 27, with nozzle 20 inserted in a gasoline tank, for example, stem 26 and hence poppet 23 is raised upwardly allowing gasoline to flow through passage 30 and out of nozzle 20 through its discharge conduit 32.



Gasoline dispensing nozzle 20 includes automatic shutoff means enabling leaving nozzle 20 unattended. The automatic shutoff means shuts off the flow of gasoline through nozzle 20 once an associated gasoline tank has been filled so that the discharge end portion of conduit 32 is submerged by gasoline.

The automatic high-level shutoff means used in nozzle 20 is of a known type and is designated within nozzle 20 generally by the numeral 33. shutoff means 33 comprises a generally tubular cylindrical plunger 34 mounted within housing 21 for axial movement within confined limits. Plunger 34 has radial openings in one end portion thereof, shown in the upper end portion in this example, and a plurality of balls 35 carried within such radial openings for radial movement toward and away from the elongated axis of plunger 34. The balls 35 operate to hold the plunger 34 in a raised position upon being urged radially outwardly by a cooperating stem 36 extending through the central portion of tubular plunger 34 as will be presently described.

Stem 36 is suitably centrally fastened to a diaphragm 37 which is carried within housing 21 to define a pressure chamber shown at 38. Stem 36 has a tapered portion illustrated at 39 which serves as cam surface means adapted to engage balls 35. A balance spring is provided on the top side of diaphragm 37 for controlling the extent of movement of such diaphragm and hence the movement of tapered portion 39 and balls 35.

Nozzle 20 also has a separate passage means designated generally by the numeral 40 and extending from a location adjacent the terminal discharge end of discharge conduit 32 so that it is in flow communication with pressure chamber 38. Passage means 40 is comprised of a plurality of portions extending through several members and as will be described in more detail later in this specification. The lower end portion of passage means 40 is comprised of separate tubing means defined by a rigid downstream section of tubing 41 which has one open end portion 42 extending through conduit 32 adjacent its discharge end as shown at 43.

The opposite end means of rigid tubing section 41 is comprised of a stretchable rubberlike sleeve 44 suitably radially stretched to increase its diameter and slipped over the upper end of rigid section 41 and fastened in flow communication with an attitude sensitive device comprising this invention and designated generally by the numeral 45, and to be described in detail later in this disclosure. Device 45 is then connected in flow communication with passage means in a detachable support assembly comprising nozzle 20 as will be described later. Such support assembly has its passage means in flow communication with an integral passage 46 in housing 21 and passage 46 communicates with chamber 38.

During a normal filling operation, with a tank not yet full, the pressure within chamber 38 is such that tapered portion 39 urges balls 35 outwardly so that they engage an O-ring or seat ring 50 supported on a shoulder 51 provided in housing 21, thus holding plunger 34 in its raised position. This is the solid line position shown in FIG. 2.

As the tank or container is filled during a normal filling operation, liquid submerges the terminal end portion of arcuate discharge conduit 32 also submerging open end portion 42 of tubing 41 to cause a reduction in pressure in the entire passage means 40 including integral passage 46. Because passage 46 of passage means 40 is in flow communication with chamber 38, the reduced pressure is also present in chamber 38 which allows diaphragm 37 to move upwardly to the dotted line position of FIG. 2 causing balls 35 to roll toward each other to the dotted line position shown and thereby releasing or unlocking plunger 34 from its raised position as held by balls 35 being seated against seat ring 50.

As plunger 34 is released it drops to a lower dotted line position shown at 53 in FIG. 2 and thereby drops a pivot pin 54 carried at its lower terminal end.

Pivot pin 54 supports one end of lever 27 for pivoting movement thereabout. With pivot pin 54 dropped to position 53, the upper portion of lever 27 strikes housing 21 at 56 upon

being actuated making it physically impossible for lever 27 to contact the terminal end of rod 26 and allow flow through poppet assembly 23. It will be appreciated that once the mechanical assembly associated with plunger 34 drops to position 53 spring 24 immediately urges poppet assembly 23 closed. Also if lever 27 was previously left actuated and unattended using latch 27A in a known manner once plunger 34 drops to position 53 all flow through nozzle 20 is stopped.

The previously mentioned safety means 45 of this example of the invention is in the form of a gravity operated valve means or valve assembly 45. The valve assembly or valve 45 has an outer main body 58 which has a necked down portion 59 comprising one end portion thereof. Passage means is provided axially through body 58 and is defined by a large diameter portion or bore 60 extending through the major portion of body 58 and a reduced diameter portion or bore 60A extending through necked down portion 59. End portion 59 has outside threads provided thereon as shown at 61. The opposite end of body 60 has internal threads 62 provided therein and defining the outer end portion of bore 60.

A tubing supporting member designated by the numeral 63 is provided as part of valve assembly 45 and has a threaded outer portion as indicated at 64 for threaded cooperation with threaded portion 62. Member 63 has a passage extending completely axially through such member and designated by the numeral 65. The outer end portion of passage 65 is defined by a cylindrical counterbore designated by the numeral 66 which is adapted to receive the previously mentioned sleeve 44 therewithin.

Thus, it is seen that the tubing supporting member 63 is adapted to be threaded in position within housing 58 with sleeve 44 suitably fastened thereto and in the manner illustrated in FIG. 3 to place sleeve 44 in flow communication with passage 60.

Valve assembly 45 also has a ball supporting member designated by the numeral 73 which is suitably supported within bore 60 of housing 58. The supporting member 73 has a smaller outside diameter than the passage or cavity 60 within housing 58 and is provided with an axial cylindrical passage 74 and a plurality of radially extending openings each designated by the numeral 76 extending between passage 74 and the outer surface of member 73. Passage 74 is aligned with the passage 60A of housing 58 with member 73 suitably installed in position in valve assembly 45.

Supporting member 73 supports a spherical ball 75 which is adapted to roll back and forth along cylindrical passage 74.

Thus, with the valve assembly 45 threaded in position in nozzle 20 and upon tilting nozzle 20 so that the valve assembly 45 is placed in an attitude above housing 21, ball 75 will roll along passage 74 and seat against a seat shown at 81 defining inner surface means of passage 60A. Thus, ball 75 is adapted to shut off flow and, in effect, produce a vacuum within chamber 38 upon arranging nozzle 20 so that the valve assembly 45 is arranged above the main body 21 and hence above the main portion of the nozzle 20. Also, it has been found that during the falling and striking of a nozzle to the ground the ball 75 generally moves against seat 81 for an instant sufficient to actuate the automatic shutoff of nozzle 20.

In this example of the invention the opposite end portion of tubing 41 is fastened to the valve assembly 45 through sleeve section 44 which is preferably made of a yieldable material such as gasoline resistant plastic, or the like. The plastic tubing section is preferably fastened in position within tubular counterbore 66 of member 63 in any suitable manner as by a tight press fit, adhesive, or the like. The opposite end portion of sleeve 44 preferably has an associated end of tubing 41 inserted in position therewithin to provide a snug fit. Adhesive means may also be used between tubing 41 and sleeve 44.

However, the fastening of sleeve 44 in position is not very firm and is only sufficient to provide an air tight seal; yet, is such that upon applying a force against tubing 41, sleeve 44 assures that no damaging forces are exerted against valve assembly 45.

The valve assembly 45 is supported solely by a support assembly 77 detachably fastened at the discharge end of housing 22 in a manner as will be subsequently described. Support assembly 77 comprises a fastening collar 78 which has internal threads 79 provided therein to enable quick attachment and removal of assembly 77 at the terminal discharge end portion of housing 21 by threading over cooperating male threads 80 provided on such housing. In addition, it will be noted that assembly 77 has passage means 82 comprising passage means 40 and in flow communication with passage portion 46 of passage means 40. The passage means 82 extends through the main portion 84 of assembly 77 and defines the central portion of passage means 40.

The valve assembly 45 is supported solely by support assembly 77 by threading threaded portion 61 in position within cooperating threads 83 provided in assembly 77 and is arranged in flow communication with passage means 82. Thus, the valve assembly 45 is supported solely by support assembly 77 and essentially in a cantilevered manner for reasons as will be apparent from the following discussion.

The fluid discharge conduit 32 comprising nozzle 20 is supported in position by threads provided in its upstream portion as shown at 85. The threads 85 are threaded into cooperating internal threads 86 provided on support assembly 77.

Fluid discharge conduit 32 also has means to enable shearing thereof in the event of excessive forces being applied thereagainst. In this example of the invention such means comprise annular groove means shown as a substantially V-shaped groove designated by the numeral 90 provided in the upstream end portion of conduit 32 adjacent its threaded end 85. The annular groove 90 substantially reduces the wall thickness of the conduit 32 and, in effect, provides a shear section which in the event an excessive force is applied against conduit 32 enables the conduit to shear circumferentially at the reduced thickness section beneath groove 90.

Thus, it will be appreciated that in using gasoline dispensing nozzle 20 in a gasoline service station where inadvertently the nozzle is left within the tank of the automobile as the driver drives away, the fluid discharge conduit 32 will be sheared adjacent the groove 90. As conduit 32 is sheared the tubular portion 41 will generally be carried therewith. The construction of and physical dimensional tolerances of plastic sleeve 44 are such that either tubing 41 will be pulled from within sleeve 44 or both the tubing 41 and sleeve 44 will be pulled from within valve assembly 45 without setting up undue forces in valve assembly 45.

With the conduit 32 being thus sheared the remaining portion of nozzle 20 will fall toward and against the ground causing ball 75 to travel toward its seat 81 and thereby actuate the automatic shutoff mechanism and stop fuel flow from out of the gasoline dispensing nozzle 20.

It will be appreciated that the safety provisions incorporated in nozzle 20 assure shearing of conduit 32 to minimize damage to the nozzle, fuel metering pump, etc. as well as shutting off of gasoline flow through nozzle 20 to reduce waste and reduce the likelihood of a serious fire due to the spilled gasoline.

In this example of the invention the conduit 41 is illustrated as being a rigid member which is fastened in position to the gravity operated valve 45 utilizing flexible sleeve 44. However, it will be appreciated that member 41 could be made of a rubberlike material and extend from end portion 43 the full length of conduit section 32 and into supporting member 63.

Terms such as "upwardly," "downwardly," "inwardly," "outwardly," and the like, have been used in this disclosure for ease of description and to correspond to the arrangement of the various component parts as illustrated in the drawing and such terms should not be considered as limiting the scope of this invention in any way.

Thus, it is seen that improved safety means has been provided by this invention which may be readily incorporated in an existing nozzle means in a simple and economical manner and essentially without requiring any rework of such existing nozzle means.

While present exemplary embodiments of this invention have been illustrated and described, it will be recognized that this invention may be otherwise variously embodied and practiced within the scope of the following claims.

I claim:

1. Fluid dispensing nozzle means for dispensing fluids into fluid container means comprising, a main housing means, valve means supported within said housing means and adapted to be opened to allow fluid flow through said nozzle means, a support assembly detachably fastened adjacent the discharge end of said main housing means, a fluid discharge conduit means for said nozzle means detachably fastened to said support assembly and adapted to have its terminal end portion submerged in fluid upon filling said container means, the discharge conduit means including a shear means adjacent the support assembly, automatic shutoff means including a second conduit means for automatically shutting off flow through said valve means as said end portion of said conduit means is submerged in said fluid, and readily detachable safety means within the second conduit means structually supported solely by said support assembly upstream of said end portion and within said discharge means, the second conduit means including readily detachable means adjacent the safety means, said support assembly enabling said fluid discharge conduit means and said safety means to be readily installed in an existing nozzle while keeping said main housing means intact, and said safety means operating to actuate said automatic shutoff means upon moving said nozzle means from its normal fluid dispensing position.

2. Fluid dispensing nozzle means as set forth in claim 1 in which said safety means comprises a gravity operated valve.

3. Fluid dispensing nozzle means as set forth in claim 1 in which said fluid discharge conduit means is of substantially circular tubular outline and said means to enable shearing thereof comprises an annular groove extending completely around said tubular conduit means immediately adjacent said support assembly to substantially reduce the thickness of said conduit means and facilitate shearing upon application of said excessive forces.

4. Fluid dispensing nozzle means as set forth in claim 1 in which said safety means comprises a gravity operated valve which has a substantially cylindrical fluid passage extending therethrough, a valve seat adjacent one end of said passage, and a member which is adapted to move toward and away from said valve seat under the influence of gravity and which seats against said valve seat upon placing said gravity operated valve above said housing means.

5. Fluid dispensing nozzle means as set forth in claim 1 in which said automatic shutoff means comprises, a diaphragm operatively connected to control said valve means, said diaphragm having one surface which cooperates with portions of said housing means to define a pressure chamber, air passage means extending from said pressure chamber and having an inlet therefor arranged adjacent said terminal end portion of said conduit means, and said safety means comprises a gravity operated valve threadedly fastened in position at the terminal outer end of said support assembly while being arranged in flow relation in said passage means between said pressure chamber and said inlet.

6. Fluid dispensing nozzle means for dispensing fluids into fluid container means comprising a main housing means, valve means supported within said housing means and adapted to be opened to allow fluid flow through said nozzle means, a support assembly detachably fastened adjacent the discharge end of said housing means, a fluid discharge conduit means for said nozzle means detachably fastened to said support assembly and adapted to have its terminal end portion submerged in fluid upon filling said container means, automatic shutoff means for automatically shutting off flow through said valve means as said end portion of said conduit means is submerged in said fluid comprising a diaphragm operatively connected to control said valve means, said diaphragm having one surface which cooperates with portions of said housing means to define a pressure chamber, air passage means extending from said pressure chamber and having an inlet therefor arranged adjacent said terminal end portion of said conduit means, readily detachable safety means comprising a gravity operated valve threadedly fastened in position at the terminal outer end of said support assembly and being arranged in flow relation in said passage means between said pressure chamber and said inlet, said support assembly enabling said fluid discharge conduit means and said safety means to be readily installed in an existing nozzle while keeping said main housing means intact, said conduit means including means to enable shearing thereof away from said support assembly in the event of excessive forces being applied against said conduit means, and said air passage means comprising separate tubing means having one end defining said inlet for said passage means and opposite end means detachably fastened to said gravity operated valve, so that in the event of excessive forces being applied against said conduit means it is sheared away and said opposite end means is detached from said gravity operated valve and with said gravity operated valve structually supported solely by said support assembly said automatic shutoff is still actuated by said gravity operated valve as it is placed in an attitude above said housing means.

7. Fluid dispensing nozzle means as set forth in claim 6 in which said opposite end means comprises tubing means made of a rubberlike material to effectively isolate said gravity operated valve from damaging forces during shearing of said discharge conduit means.

8. Fluid dispensing nozzle means as set forth in claim 6 in which said fluid discharge conduit means has thread means in it upstream end to enable easy attachment to said support assembly and easy removal of the portion remaining attached to said support means after said shearing.

9. Fluid dispensing nozzle means as set forth in claim 8 in which said separate tubing means comprises a rigid downstream tubing section defining said one end and an upstream tubing section made of a rubberlike material defining said opposite end means, said upstream section being fastened in flow communication with said gravity operated valve at its upstream end and fastened in flow communication with said downstream section at its downstream end by being stretched over the upper end of said rigid downstream section and frictionally held thereagainst by the tendency of said rubberlike material to return to its unstretched condition so that said tubing means is easily detached from said gravity operated valve to effectively isolate said gravity operated valve from damaging forces during shearing of said discharge conduit means.