United States Patent

Boudot et al.

[15] **3,653,415**

[45] **Apr. 4, 1972**

[54] AUTOMATIC SHUT-OFF DISPENSING NOZZLE

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[21] Appl. No.: **882,028**

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

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

[58] **Field of Search** 222/566, 568; 251/214; 141/192–229

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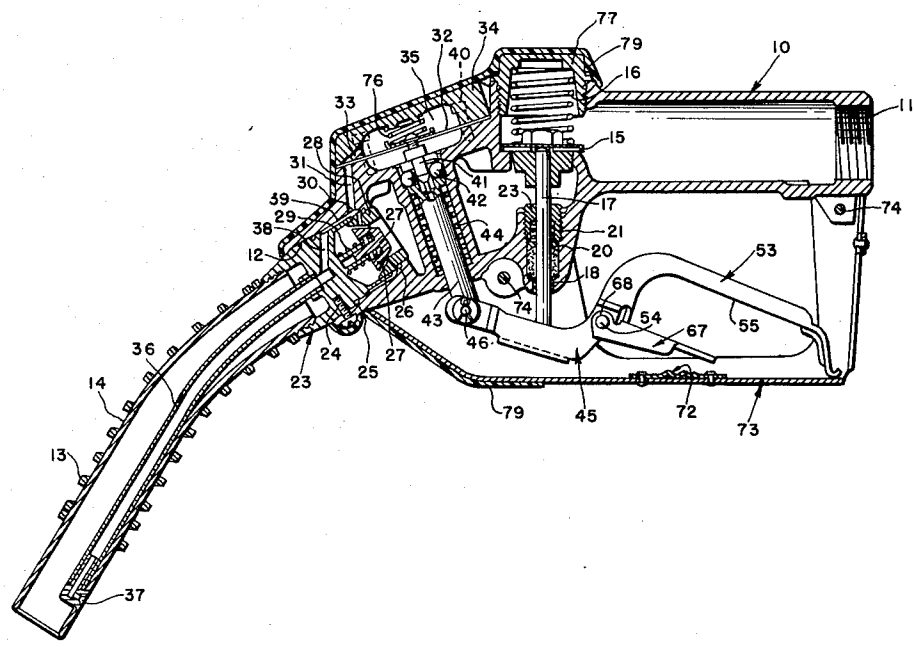
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Primary Examiner—Houston S. Bell, Jr.
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[57] **ABSTRACT**

Fluid flow through a nozzle body is controlled by a valve having a stem slidably mounted in the body. When a lever, which has one end pivotally and slidably connected to a plunger that is slidably mounted in the body and its other end pivotally connected to a handle, is moved by the handle, the lever engages the bottom of the stem to open the valve. When a container, which is being filled by the nozzle, becomes filled, the plunger, which has been latched, is released so that a spring acting on the valve causes the stem, which has its lower end engaging the lever, to move the lever about its pivotal connection to the handle so that the valve moves to its closed position. The handle may be held in a valve open position by a trigger, which is pivotally connected to the handle at its pivotal connection to the lever.

25 Claims, 20 Drawing Figures



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7 Sheets-Sheet 1

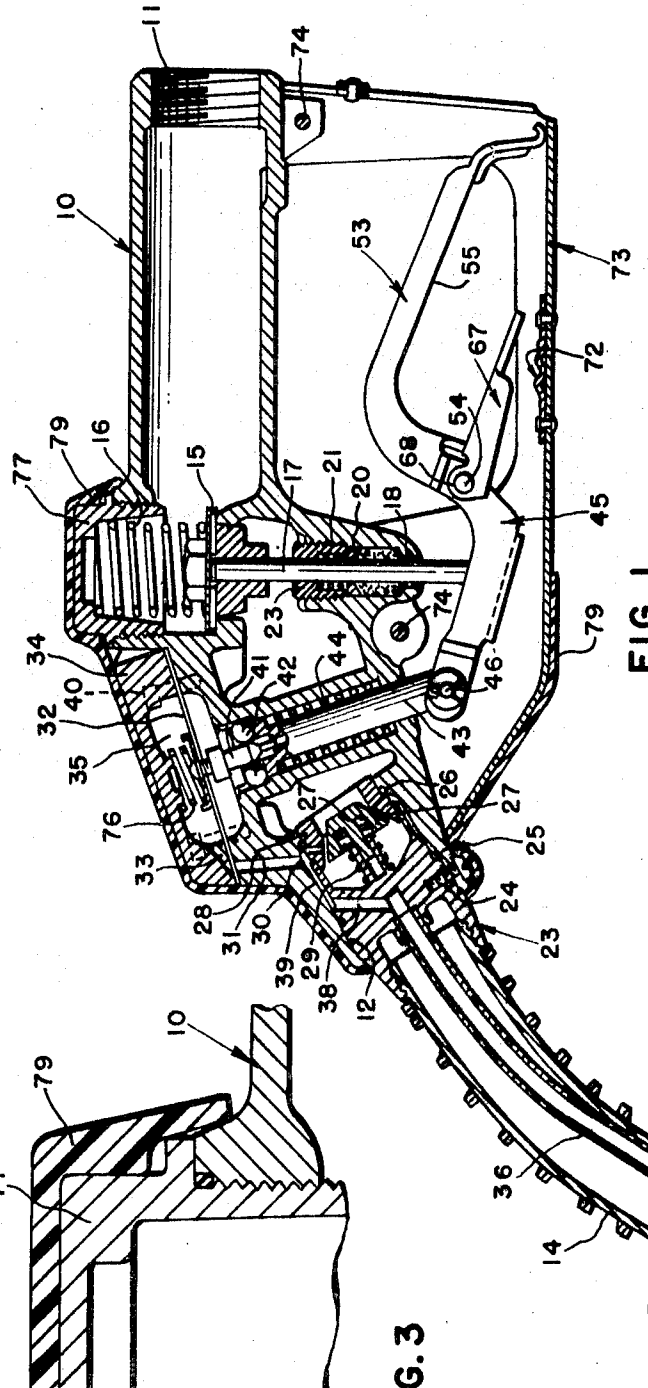


FIG. 1

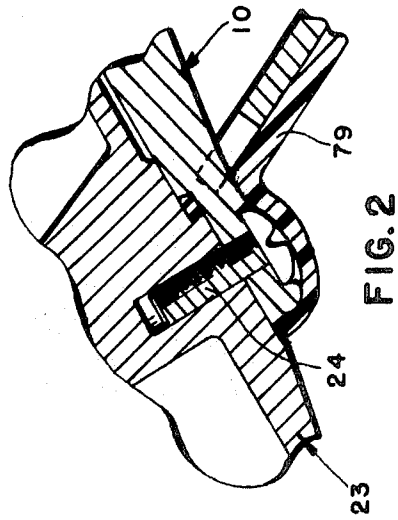


FIG. 2

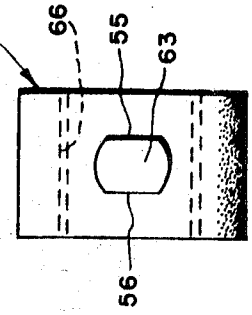


FIG. 7

FIG. 3

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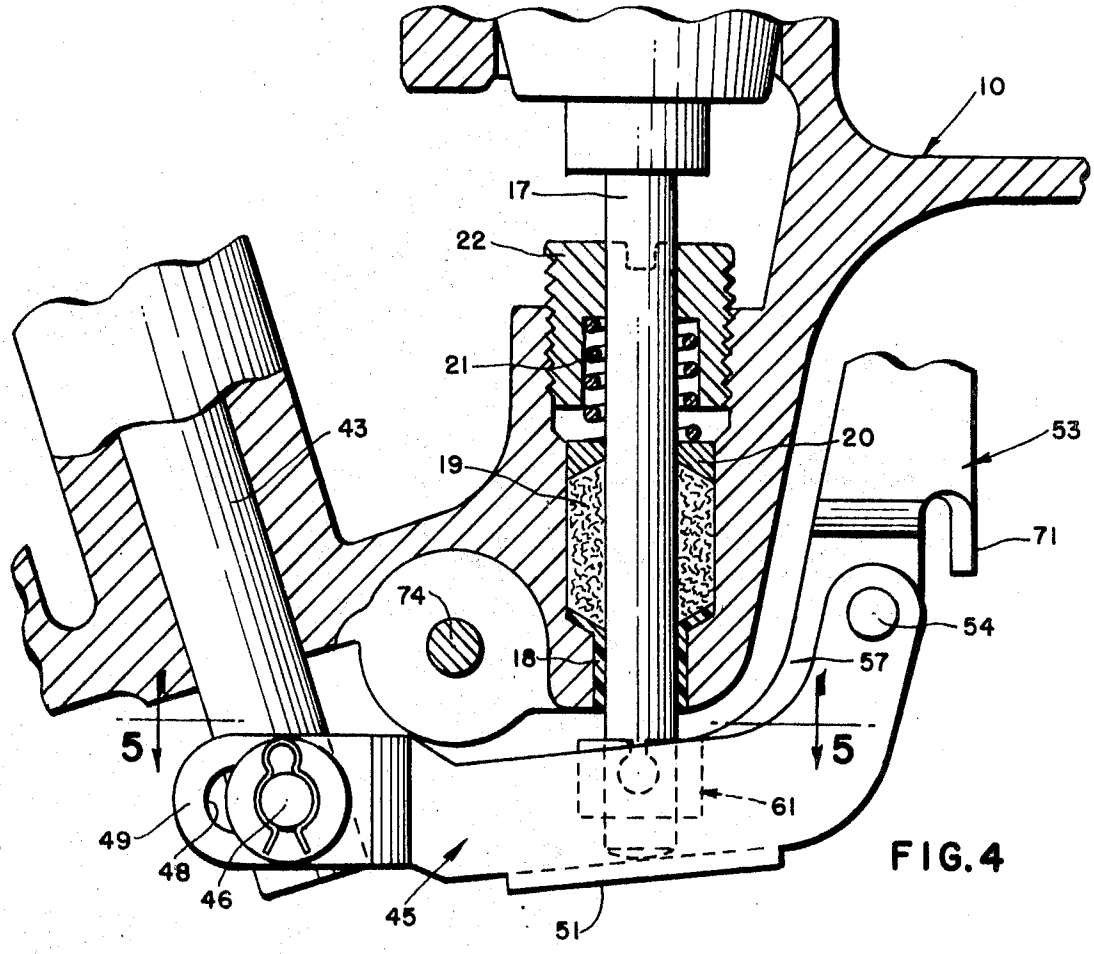


FIG. 4

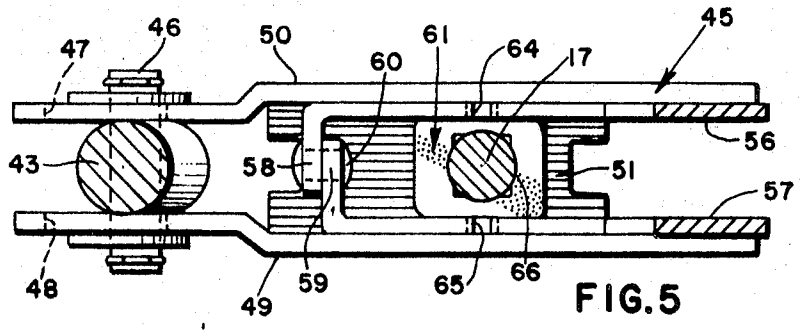


FIG. 5

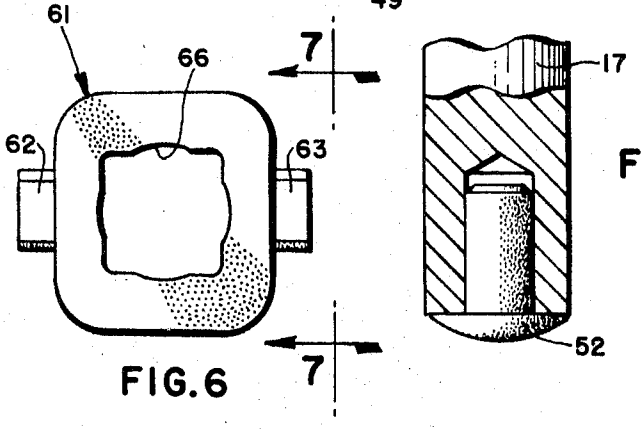


FIG. 6

FIG. 8

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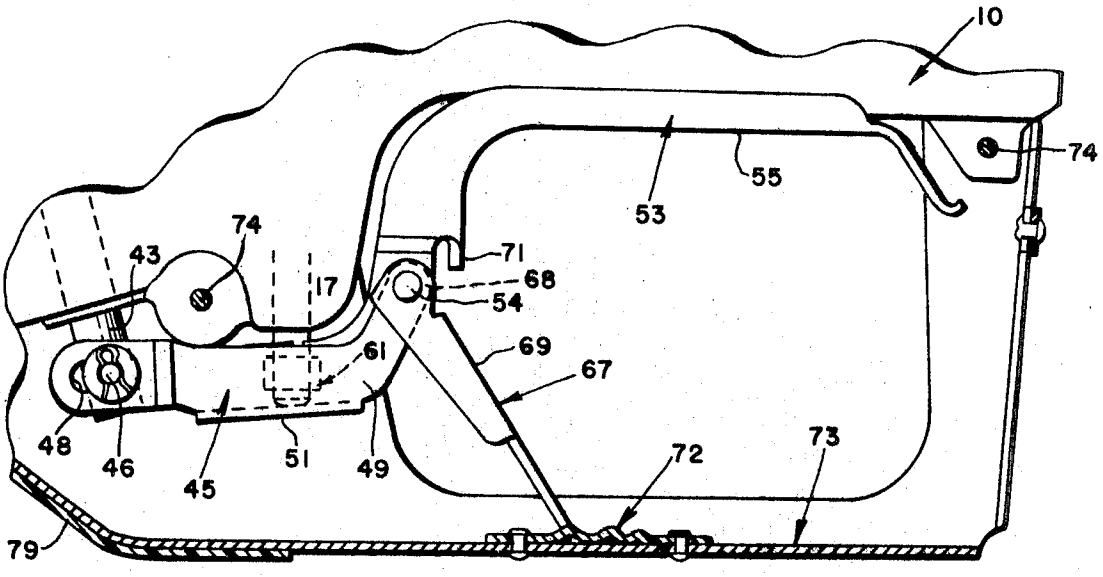


FIG.9

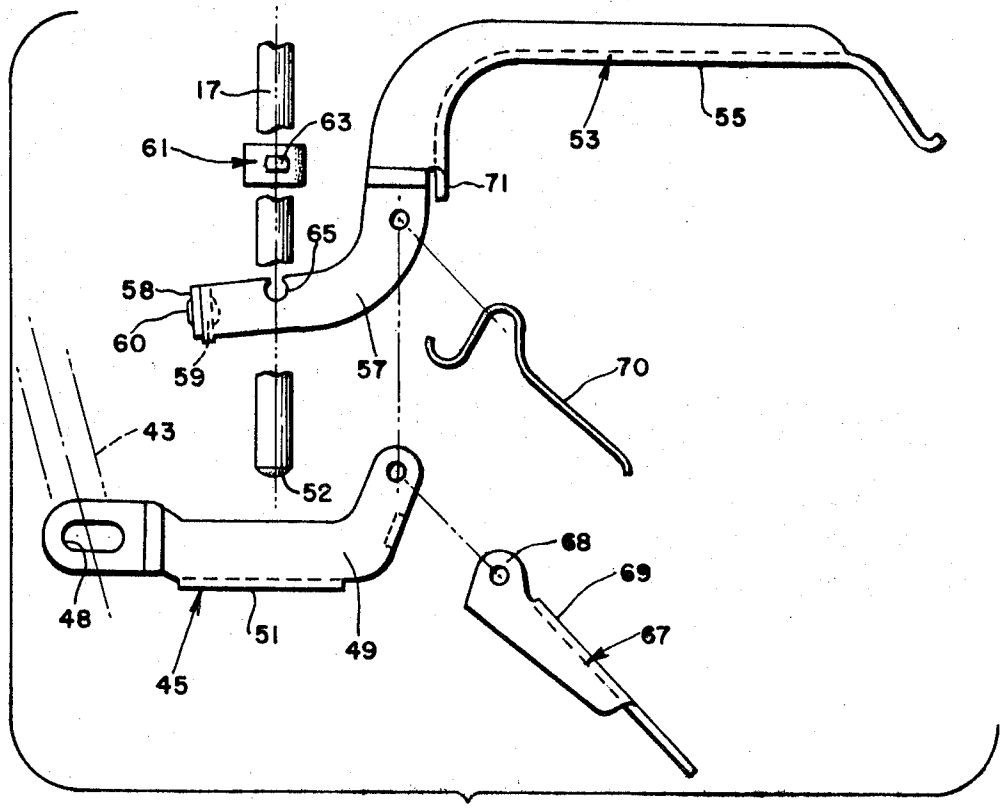


FIG.10

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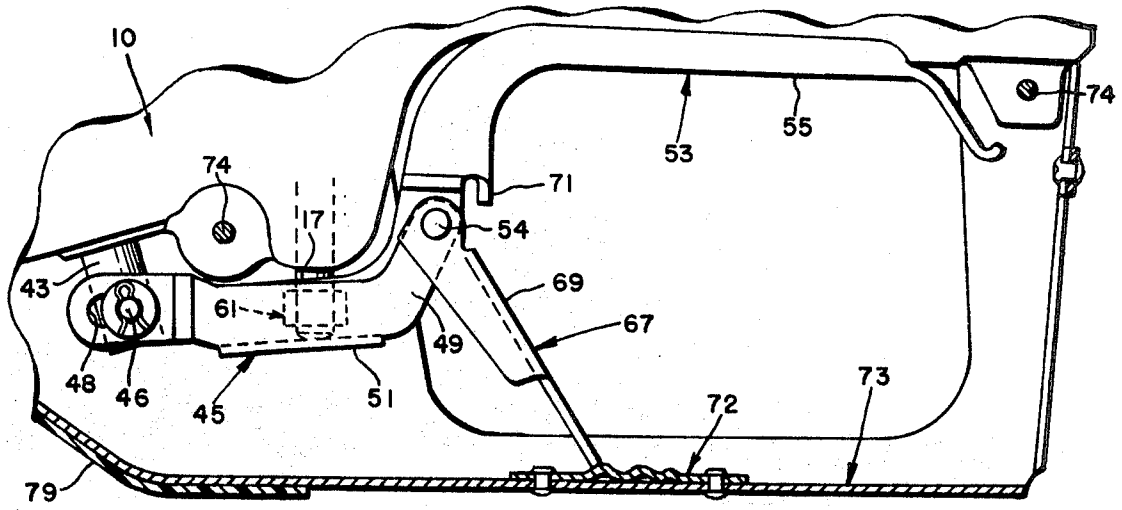


FIG. 11

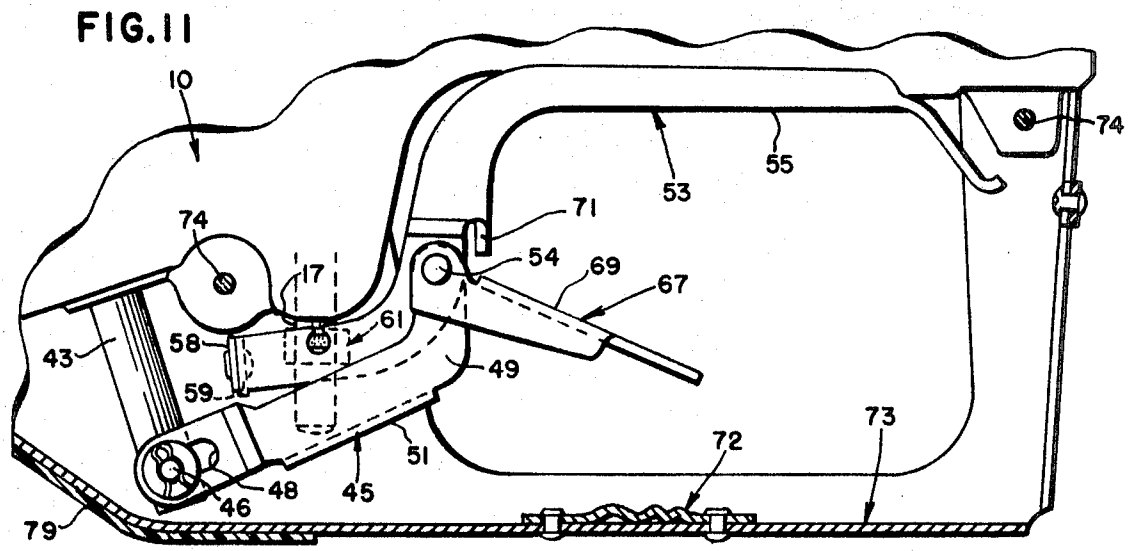


FIG. 12

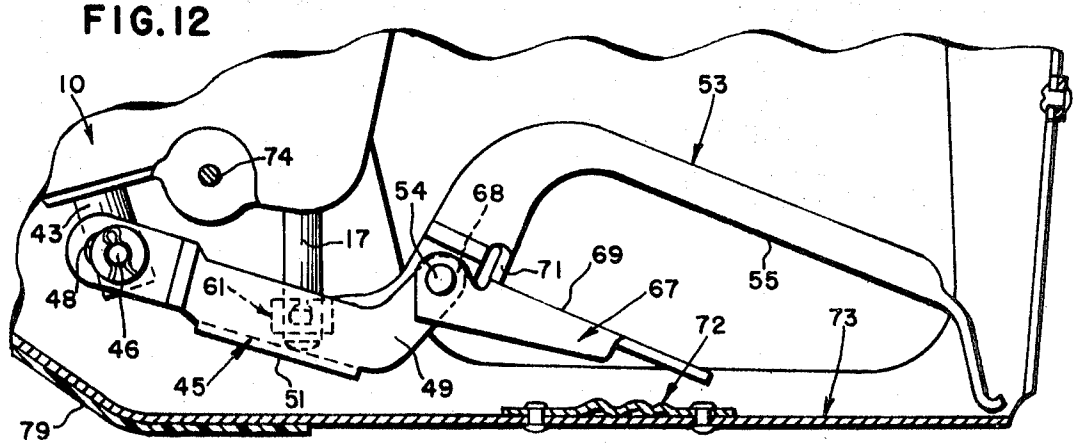


FIG. 13

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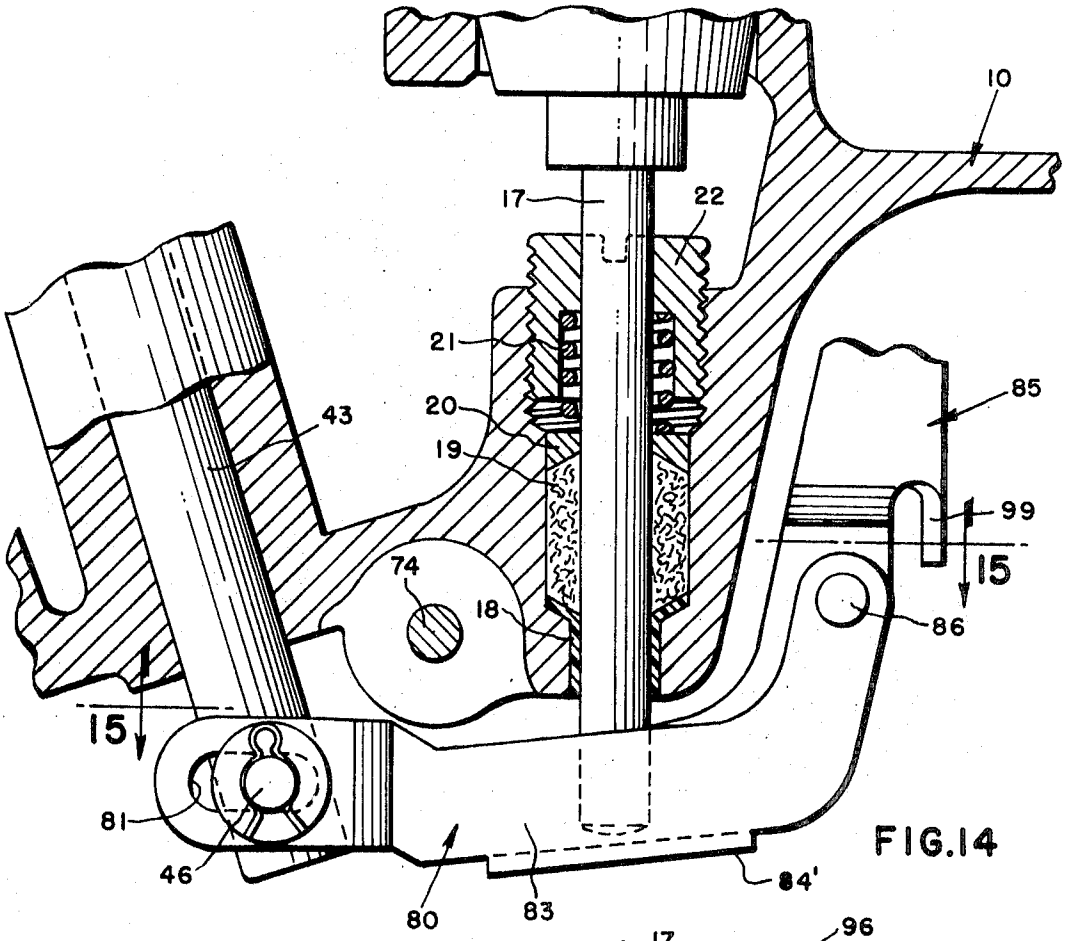


FIG.14

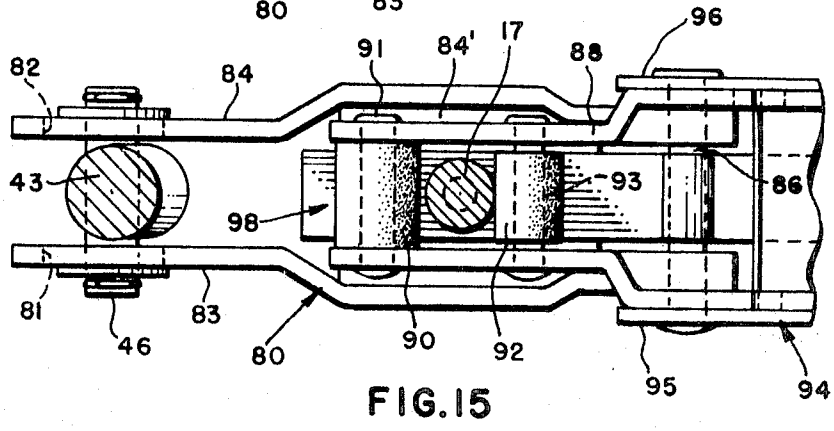


FIG.15

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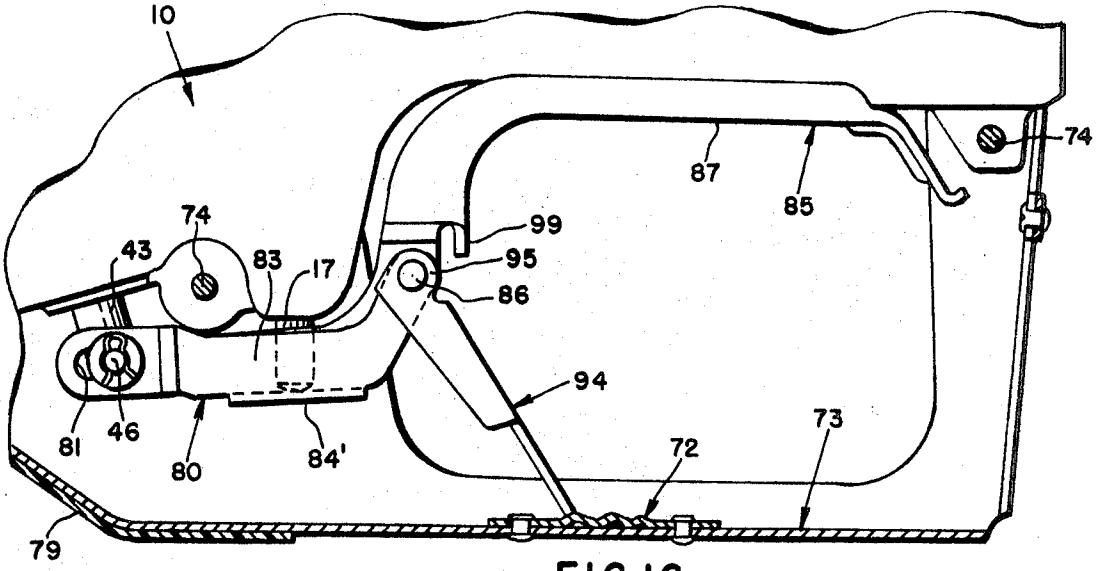


FIG.16

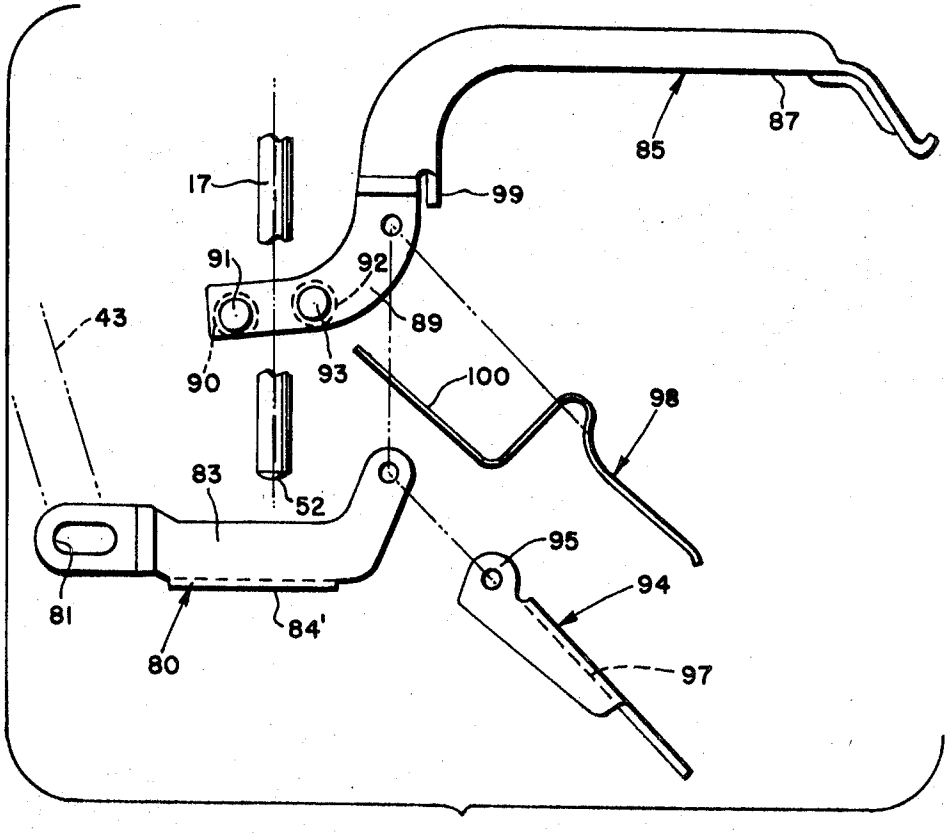


FIG.17

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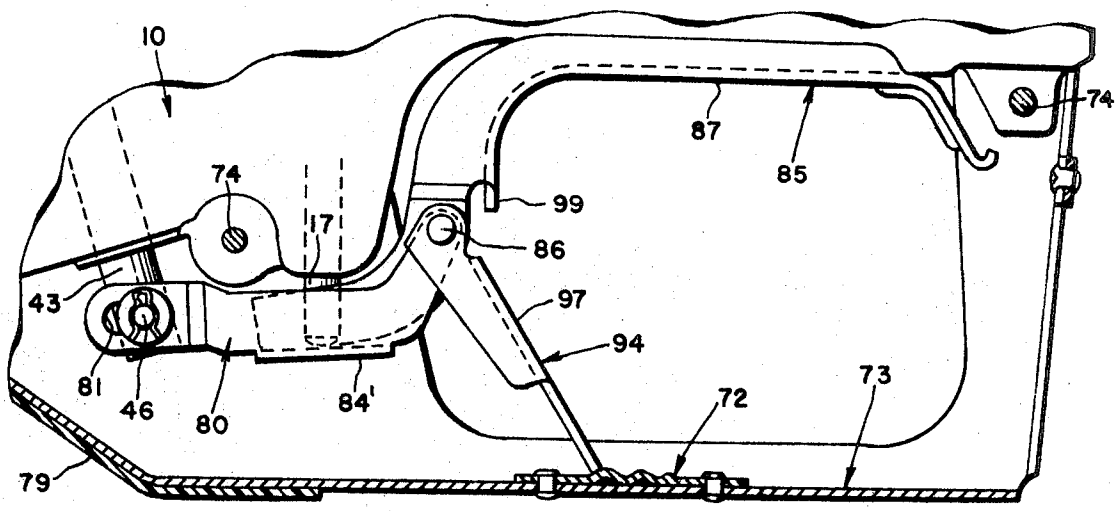


FIG.18

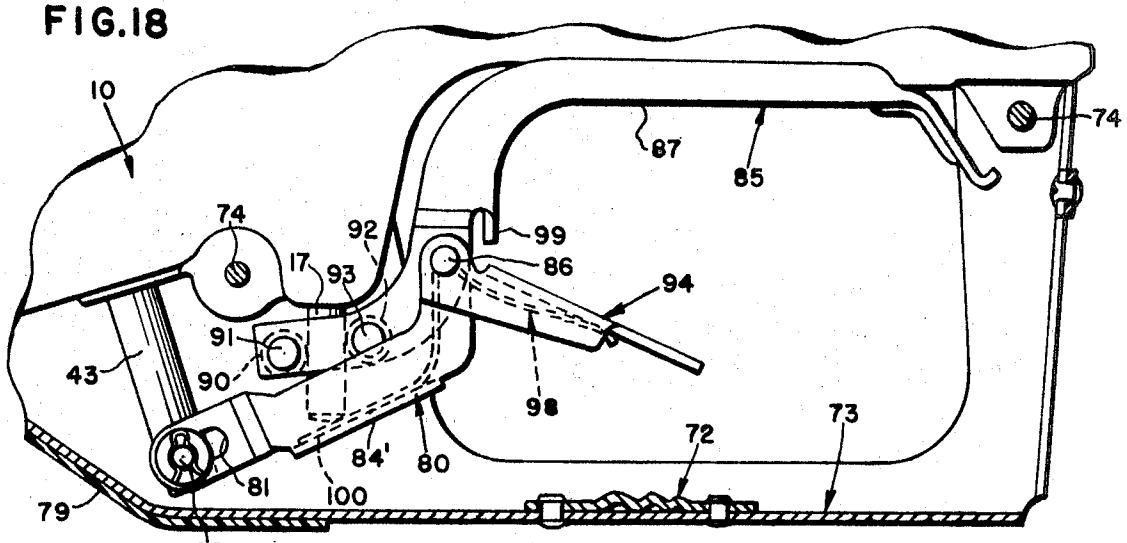


FIG.19

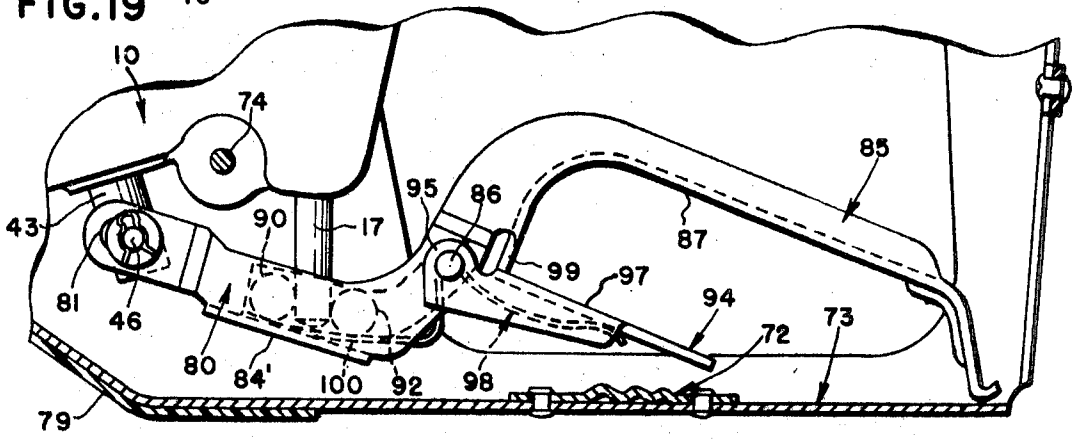


FIG.20

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AUTOMATIC SHUT-OFF DISPENSING NOZZLE

In fuel nozzles, it is desired to automatically stop the flow of fuel to a vehicle tank, which is being filled, when it is full to prevent the loss of fuel. This enables the attendant to perform other functions such as checking the oil, for example, while the tank is being filled.

Various types of automatic shut-off nozzles have previously been suggested. However, because of the friction of various portions of the valve moving elements of the shut-off mechanism, the shut-off valves of the previously suggested nozzles have failed to close in some instances when the vehicle tank becomes filled. As a result, fuel is lost, and the customer is unhappy if he has to pay for it. If the station absorbs the loss, it reduces the profits. Furthermore, it is difficult to ascertain the amount of fuel lost in these situations. Fuel losses also contribute to air pollution and the present invention therefore helps to prevent this undesirable occurrence.

In one previously suggested automatic shut-off nozzle, the valve stem has passed through an opening in a handle and engaged a lever, which has one end pivotally mounted on the handle. In this previously suggested nozzle, the handle has been pivotally connected to the body at its end remote from its gripping portion, and the other end of the lever has been releasably supported on a rocking arm, which is movable to a lever releasing position when the vehicle tank becomes filled.

Additionally, the previously suggested nozzle requires an additional support in the body for the lever to limit the movement of the lever when it ceases to be supported by the rocking arm. This increases the cost of the nozzle.

Furthermore, by using a releasable connection between the rocking arm and the lever, the possibility exists that the lever may not always be properly seated on the rocking arm. As a result, shut-off of fuel flow may occur before the vehicle tank is filled.

The present invention satisfactorily solves the foregoing problems by providing a positive and continuous connection between a lower lever and latch plunger, which is released from a position in which it retains the lower lever to hold the valve open when the vehicle tank is full. The lower portion of the valve stem is guided by means, which is mounted on a handle. As a result, the lower portion of the valve stem is guided with a minimum of friction.

In the present invention, the pivotal connection of the handle to the body is eliminated. Instead, it is only necessary to pivotally connect the handle to the lower lever, which has a portion that engages the valve stem to open the valve when the handle is moved. Thus, a less expensive and less complicated arrangement is utilized.

It also has been previously suggested to use a device to hold a valve actuating handle in an open position during filling of a vehicle tank. The previously suggested holding devices have required the attendant to employ both hands to properly position the handle holding means. As a result, it has been difficult for the attendant to lock the handle in the desired position while still holding the license plate holder, for example, out of the way of the nozzle during insertion of the nozzle into the filler pipe of the vehicle tank.

In the present invention, a trigger, which may be operated by the attendant with the same hand as moves the handle to a valve opening position, holds the handle in a valve open position. The trigger does not affect the movement of the lower lever by the valve spring when the vehicle tank is filled. Thus, even if the trigger should fail to release from its retaining means, this does not have any effect on the valve moving to its closed position to prevent further fuel flow to the vehicle tank.

By connecting the latch plunger to the lower lever rather than to the handle as some previously suggested automatic shut-off nozzles did in which a lower lever was not used, there is eliminated any side force on the plunger due to the handle. As a result, when the tank is filled and the latch plunger locking retaining means is released, the latch plunger may easily move since there is no side force acting on the plunger to retard its movement. This enables a smaller force to be used for moving the plunger.

With an automatic shut-off fuel nozzle, the possibility exists that the attendant may fail to remove the nozzle from the vehicle after the tank is filled. As a result, the driver of the vehicle may move the vehicle with the spout of the nozzle still disposed in the vehicle tank. With previously available fuel nozzles, this has resulted in the pump possibly being removed from its pedestal due to the force upon the nozzle. If this should occur, a fire hazard could be created.

The present invention satisfactorily solves the foregoing problem by providing a spout that may be broken away from its body whenever a predetermined force is exerted thereon such as the force when a vehicle moves with the spout of the nozzle still in the vehicle tank. Thus, the present invention reduces the possibility of the dispensing pump being damaged thereby minimizing the possibility of a fire hazard.

In the past, the spout has been surrounded by a spring having a circular cross section. The spring is used to position the spout within the vehicle tank filler pipe. The circular cross section has provided a relatively small contact area with the filler pipe.

The present invention provides an improved spring for use with a spout of a fuel nozzle. The present invention employs a spring having a square cross section to increase the contact area with the filler pipe of the vehicle tank.

An object of the invention is to provide an automatic shut-off nozzle having a relatively friction-free valve actuating mechanism.

Another object of this invention is to provide an automatic shut-off dispensing nozzle in which only one hand of the attendant is required to position the handle in a valve open position for automatic shut-off upon filling of the tank.

A further object of this invention is to provide a fluid nozzle having its spout connected to the body so that it may be broken away without damage to any of the rest of the nozzle when a predetermined force is exerted on the spout.

Other objects, uses, and advantages of this invention are apparent upon a reading of this description, which proceeds with reference to the drawings forming part thereof and wherein:

FIG. 1 is a sectional view, partly in elevation, of the nozzle of the present invention.

FIG. 2 is an enlarged sectional view showing the break away connection of the spout to the nozzle body.

FIG. 3 is an enlarged sectional view of a portion of the nozzle body and showing a sealing arrangement between the body and a cap and a fender guard mounted thereon.

FIG. 4 is an enlarged sectional view, partly in elevation, of the valve stem and one form of the actuating mechanism therefor.

FIG. 5 is a sectional view, partly in plan, of a portion of the structure of FIG. 4 and taken along line 5—5 of FIG. 4.

FIG. 6 is an enlarged top plan view of a guide for the lower portion of the valve stem.

FIG. 7 is a side elevational view of the guide of FIG. 6 and taken along line 7—7 of FIG. 6.

FIG. 8 is an enlarged vertical sectional view, partly in elevation, of the lower end of the valve stem.

FIG. 9 is an enlarged elevational view showing the handle held in the position of FIG. 4.

FIG. 10 is an exploded elevational view of the valve actuating mechanism of FIG. 4.

FIG. 11 is an enlarged elevational view of the valve actuating mechanism of FIG. 4 in the position in which the handle is retained in a valve open position.

FIG. 12 is an enlarged elevational view, similar to FIG. 11, but showing the valve moved to a closed position due to release of the latch plunger and the handle retaining means released.

FIG. 13 is an enlarged elevational view, similar to FIGS. 11 and 12, but showing the handle returned to its inactive position with the valve still in its closed position and the latch plunger returned to its locked position.

FIG. 14 is an enlarged sectional view, partly in elevation, of the valve stem and another embodiment of the actuating mechanism therefor.

FIG. 15 is a sectional view, partly in plan, of a portion of the structure of FIG. 14 and taken along line 15—15 of FIG. 14.

FIG. 16 is an enlarged elevational view showing the handle held in the position of FIG. 14.

FIG. 17 is an exploded elevational view of the valve actuating mechanism of FIG. 14.

FIG. 18 is an enlarged elevational view of the valve actuating mechanism of FIG. 14 in the position in which the handle is retained in the valve open position.

FIG. 19 is an enlarged elevational view, similar to FIG. 18, but showing the valve moved to a closed position due to release of the latch plunger and the handle retaining means released.

FIG. 20 is an enlarged elevational view, similar to FIGS. 18 and 19, but showing the handle returned to its inactive position with the valve still in its closed position and the latch plunger returned to its locked position.

Referring to the drawings and particularly FIG. 1, there is shown a nozzle body 10 having an inlet 11 to which a hose is connected to supply fluid to the body 10 and an outlet 12 to which a spout 14 is connected for dispensing the fluid to a container. The spout 14 has a spring 13 of square cross section thereon to contact the filler pipe of the container being filled.

The body 10 has a valve 15 supported therein for controlling the flow of fluid through the body 10 from the inlet 11 to the outlet 12. A spring 16 continuously urges the valve 15 to its closed position.

A stem 17 is connected to the valve 15 and has its lower portion extending exterior of the body 10 and slidably disposed within the body 10. The valve stem 17 passes through the body 10 but not in contact therewith due to a guide 18 (see FIG. 4) disposed between the stem 17 and the body 10 and in surrounding relation to the stem 17. The guide 18 is formed of a suitable plastic material such as acetal resin, for example. This material has a relatively low coefficient of friction that minimizes the sliding friction between the stem 17 and the body 10. The guide 18 also eliminates wear on the stem 17 so as to not affect the sliding action of the stem 17.

Fluid cannot flow from the body 10 to the exterior thereof through the passage in the body 10 for the stem 17 due to a packing 19 (see FIG. 4), which is disposed in surrounding relation to the stem 17. A gland 20 is disposed above the packing 19 and has a spring 21 acting thereon. A retainer 22 acts against the spring 21 and retains the packing 19 in a position to prevent any leakage of fluid from the body 10 through the passage for the stem 17.

A spout adapter 23 (see FIG. 1) is connected to the outlet 12 of the body 10. The spout adapter 23, which has the spout 14 threaded in its end, is fixed to the body 10 by a screw 24 (see FIG. 2). The screw 24 may preferably be formed of a material that will break or shear when subjected to a predetermined force. Thus, if the spout 14 should be retained in a vehicle tank when the vehicle is moved, the screw 24 breaks or shears and allows the spout adapter 23 to be pulled from the body 10 without any damage to the body 10 or to the pump to which the body is connected by a hose.

Sealing rings 25 and 26 are disposed between the spout adapter 23 and the body 10. Thus, fluid cannot escape between the body 10 and the spout adapter 23.

A poppet valve 27 is slidably mounted on the spout adapter 23 and is continuously urged into engagement with a seating ring 28, which is threaded on the spout adapter 23 and has the sealing ring 26 cooperating therewith, by a spring 29. Thus, only the pressure of the fuel flowing from the inlet 11 and past the valve 15 can overcome the spring 29 and move the poppet valve 27 to an open position.

As the fuel flows between the poppet valve 27 and the seating ring 28, venturi effect is created in a passage 30 in the seating ring 28. The passage 30 communicates through a passage 31 in the body 10, an opening in a diaphragm 32, and a passage 33 in a cap 34 to a chamber 35, which if formed between the diaphragm 32 and the cap 34.

The passage 31 also communicates with a tube 36, which is connected with an opening 37 in the spout 14 adjacent the discharge end of the spout 14. The tube 36 communicates with the passage 33 through a passage 38 in the spout adapter 23 and a passage 39, which is formed between the spout adapter 23 and the body 10.

Accordingly, as long as the opening 37 is not closed due to the fuel within the tank reaching a predetermined level that indicates that the tank is filled, the venturi effect created by the flow of the fluid between the seat ring 28 and the poppet valve 27 draws air through tube 36. However, as soon as the opening 37 is blocked, the chamber 35 has its pressure reduced due to the air therein being drawn therefrom because of the venturi effect in the passage 30 whereby the diaphragm 32 moves upwardly. This venturi effect is more particularly described in U.S. Pat. No. 3,085,600 to Briede.

The diaphragm 32 and the cap 34 are secured to the body 10 by screws 40. Thus, the diaphragm 32 is held between the body 10 and the cap 34 to form the chamber 35.

The diaphragm 32 has a latch retaining pin 41 secured thereto for movement therewith and disposed between three balls 42, which are positioned within passages in a latch plunger 43. When the retaining pin 41 is in the position shown in FIG. 1, the balls 42 prevent downward movement of the plunger 43, which is slidably mounted within the body 10.

When the diaphragm 32 is moved upwardly due to the tank being filled, the retaining pin 41 is moved upwardly therewith. The upward movement of the retaining pin 41 disposes a tapered portion of the retaining pin 41 between the balls 42 whereby the balls 42 may move inwardly to allow the plunger 43 to be moved downwardly against the force of its spring 44. The correlation between the tapered portion of the pin 41 and the latch plunger 43 is more specifically shown in U.S. Pat. No. 2,582,195 to Duerr.

The lower end of the plunger 43 is connected to a lower lever 45 (see FIG. 4) by a pin 46. The pin 46, which is secured to the plunger 43, extends through slots 47 and 48 in bifurcated portions 49 and 40 of the lower lever 45 to provide a pin and slot connection between the plunger 43 and the lower lever 45. Thus, the lower lever 45 can both pivot and slide relative to the latch plunger 43.

The bifurcated portions 49 and 50 of the lower lever 45 are spaced from each other for a greater distance adjacent the stem 17 as shown in FIG. 5. The portions 49 and 50 are secured to each other by a channel portion 51, which is disposed beneath the stem 17 and connects the bottoms of the greater spaced parts of the portions 49 and 50. The upper surface of the channel portion 51 is adapted to engage the lower end of the stem 17, which has a plastic button 52 (see FIG. 8) therein for engagement with the upper surface of the channel portion 51 to reduce friction during the sliding relation between the lower lever 45 and the stem 17, when the lower lever 45 is moved.

The lower lever 45 is pivotally connected to a handle or upper lever 53 by a rivet 54. The handle 53 includes a gripping portion 55 (see FIG. 9) having a pair of bifurcated arms 56 and 57 (see FIG. 5) extending from opposite sides of the gripping portion 55. The arm 56 has its end 58, which is substantially perpendicular to the arm 56, secured to end 59, which is substantially perpendicular to the arm 57, of the arm 57 by a rivet 60.

As shown in FIG. 10, the end 59 of the arm 57 extends beneath the end 58 of the arm 56. Thus, only the end 59 of the handle 53 engages the upper surface of the channel portion 51 of the lower lever 45. As shown in FIG. 5, the arms 56 and 57 of the handle 53 are disposed inside of the bifurcated portions 49 and 50 of the lower lever 45.

The lower portion of the valve stem 17 slidably extends through a guide 61, which is formed of a suitable plastic material such as acetal resin, for example. The guide 61 is pivotally supported on the handle 53 by having lugs 62 and 63 (see FIG. 6) extending from opposite sides thereof. The lugs 62 and 63 are disposed in keyhole slots 64 and 65 (see FIG.

5), respectively, in the bifurcated arms **56** and **57**, respectively, of the handle **53**.

As shown in FIG. **7** for the lug **63**, each of the guide lugs **62** and **63** has two opposite sides closer to each other than the other two opposite sides. As a result, the lugs **62** and **63** are disposed within the keyhole slots **64** and **65** by inserting the narrow portion of each of the lugs **62** and **63** through the narrow portion of each of the keyhole slots **64** and **65**. Then, the guide **61** is rotated 90° so that the guide **61** is both retained on the handle **53** and pivotally mounted thereon.

As shown in FIG. **6**, the guide **61** has a central passage **66** extending therethrough and slightly larger in the corners (see FIG. **5**) then the diameter of the stem **17**. This enables the stem **17** to slide freely with a minimum amount of friction and still be maintained in the desired vertical plane while being supported. Furthermore, the pivotal mounting of the guide **61** permits the handle **53** to be moved relative to the guide **61** and the stem **17** without any binding action on the stem **17**.

Thus, when the handle **53** is raised from the position of FIGS. **1** and **13** to the position of FIGS. **9** and **11**, the lower lever **45** is moved therewith because of the pivotal connection through the rivet **54**. As the handle **53** is raised upwardly from the position of FIGS. **1** and **13** to the position of FIGS. **9** and **11**, the end **59** of the arm **57** of the handle **53** engages the upper surface of the channel portion **51** of the lower lever **45**. Accordingly, the handle **53** and the lower lever **45** function as a single unit at this time and pivot about the axis of the pin **46**. The latch plunger **43** is locked at this time due to the position of the retaining pin **41** with respect to the balls **42**.

As the handle **53** moves upwardly, the channel portion **51** of the lower lever **45** engages the valve stem **17** to move it upwardly against the force of the spring **16** to open the valve **15**. This allows fluid to flow from the inlet **11** to the outlet **12** of the body **10**.

The handle **53** may be held in any one of three positions to provide different flow rates by a trigger **67**, which is pivotally mounted on the rivet **54**; thus, the trigger **67** is pivotally connected to both the lower lever **45** and the handle **53**. The trigger **67** includes a pair of bifurcated ears (one shown at **68**) disposed on opposite sides of the bifurcated portions **49** and **50** of the lower lever **45**. The bifurcated ears are connected to each other by a central connecting portion **69**.

The trigger **67** is continuously urged counterclockwise about the axis of the rivet **54** by a spring **70** (see FIG. **10**), which is supported on the rivet **54** between the arms **56** and **57** of the handle **53**, acting on the connecting portion **69**. The counterclockwise movement of the trigger **67** by the spring **70** is limited by engagement of the central connecting portion **69** of the trigger **67** with a depending tab **71** on the handle **53**.

When it is desired to lock the handle **53** in a position in which the valve **15** is held open, the central connecting portion **69** of the trigger **67** is disposed in engagement with one of the notches or steps of a rack **72**. The rack **72** is fixed to a guard **73**, which is secured to the nozzle body **10** by rivets **74**.

The trigger **67** holds the handle **53** in the desired position until the tank is filled. When this occurs, the opening **37** is blocked by the level of the fluid in the tank whereby the latch plunger **43** is released from the balls **42** due to the diaphragm **32** being moved upwardly because of the reduced pressure in the chamber **35**.

When the plunger **43** is released, the force of the spring **16** closes the valve **15** by moving stem **17** downward against the lower lever **45** to pivot counterclockwise about the rivet **54**. This pulls the plunger **43** downwardly.

Because the handle **53** is held against movement by the trigger **67** being disposed in the rack **72**, the lower lever **45** pivots counterclockwise about the rivet **54** during the downward movement of the stem **17**. The pin **46** moves to the position of FIG. **12** when the maximum counterclockwise movement of the lower lever **45** is completed with the handle **53** still held by the trigger **67**. At this time, the trigger **67** ceases to have sufficient force exerted thereon so that the trigger **67** no longer has sufficient frictional engagement with the notch or step of the rack **72** to remain engaged therewith. As a result, the spring **70** pivots the trigger **67** counterclockwise until the central connecting portion **69** of the trigger **67** engages the tab **71** of the handle **53**.

When the trigger **67** has its end released from the notch or step of the rack **72**, the handle **53** falls. As a result, the plunger spring **44** returns the plunger **43** to the position of FIGS **1** and **13**. This results in the lower lever **45** being returned to the position of FIGS. **1** and **13** wherein the channel portion **51** engages end **59** of the handle **53**.

If the spout **14** has been removed from the tank being gilled, the opening **37** is no longer blocked. As a result, the pressure in the chamber **35** increases to allow a diaphragm spring **76**, which acts on the upper surface of the diaphragm **32**, to move the diaphragm **32** downwardly and return the retaining pin **41** to the position shown in FIG. **1** in which the plunger **43** is locked against downward movement.

If the attendant should desire to hold the handle **53** during the entire filling operation rather than utilizing the trigger **67**, the mechanism of the present invention still stops flow to the tank when the tank becomes filled. This is because the lower lever **45** pivots counterclockwise about the rivet **54** when the latch plunger **43** is no longer held by the balls **42**. Therefore, the spring **16** still moves the stem **17** downwardly against the lower lever **45** and causes the lower lever **45** to pivot counterclockwise about the axis of the rivet **54** even though the attendant is holding the handle **53**.

As shown in FIG. **3**, the body **10** has a cap **77** threaded thereto. The spring **16** acts against the cap **77** as shown in FIG. **1**. A sealing ring **78** is employed between the body **10** and the cap **77** to prevent any leakage of fluid at the threaded connection of the cap **77** to the body **10**. Thus, any nicks in the body **10** adjacent the cap **77** or in the cap **77** will not cause leakage.

The body **10** also has a plastic fender guard **79** mounted thereon. As shown in FIG. **3**, the plastic fender guard **79** fits over the cap **77**.

Referring to FIG. **14**, there is shown another form of actuating mechanism for opening the valve **15** through moving the valve stem **17**. The actuating mechanism includes a lower lever **80**, which is connected to the lower end of the plunger **43** by the pin **46**. The pin **46** extends through slots **81** and **82** (see FIG. **15**) in bifurcated portions **83** and **84** of the lower lever **80** to provide a pin and slot connection between the plunger **43** and the lower lever **80**. Thus, the lower lever **80** can both pivot and slide relative to the latch plunger **43** in the same manner as the lower lever **45** does.

The bifurcated portions **83** and **83** of the lower lever **80** are spaced from each other for a greater distance adjacent the stem **17** as shown in FIG. **15**. The portions **83** and **84** are secured to each other by a channel portion **84'**, which is disposed beneath the stem **17** and connects the bottoms of the greater spaced parts of the portions **83** and **84**.

The lower lever **80** is pivotally connected to a handle or upper lever **85** by a rivet **86**. The handle **85** includes a gripping portion **87** (see FIG. **16**) having a pair of bifurcated arms **88** and **89** (see FIG. **15**) extending from opposite sides of the gripping portion **87** and disposed inside of the bifurcated portions **83** and **84** of the lower lever **80**.

The arms **88** and **89** are held in spaced relation to each other by a spacer **90**, which is disposed at the ends of the arms **88** and **89** and fixed thereto by means of a rivet **91**. The spacer **90** is formed of a suitable plastic material such as acetal resin, for example.

The lower portion of the valve stem **17** slidably extends between the spacer **90** and a roller **92**, which is rotatably mounted between the arms **88** and **89** on a rivet **93**. The roller **92** is formed of a suitable material such as nylon, for example. The roller **92** must be formed of a material that is capable of resisting the impact forces when the nozzle is dropped, for example.

The roller **92** is spaced from the spacer **90** a slightly greater distance than the diameter of the stem **17** to permit movement of the stem **17** therebetween. The clearance may vary between

0.005 and 0.030 inch. This arrangement enables the stem **17** to slide freely with a minimum amount of friction and still be maintained in the desired vertical plane.

The roller **92**, which bears against the stem **17**, changes the sliding action between the stem **17** and the roller **92** into rotation of the roller **92**. This reduces wear of the valve **17**.

The handle **85** may be held in any one of the three positions to provide different flow rates by a trigger **94**, which is pivotally mounted on the rivet **86**; thus, the trigger **94** is pivotally connected to both the lower lever **80** and the handle **85**. The trigger **94** includes a pair of bifurcated ears **95** and **96** (see FIG. **15**) disposed on opposite sides of the bifurcated portions **83** and **84** of the lower lever **80** and pivotally mounted on the rivot **86**. The bifurcated ears **95** and **96** are connected to each other by a central connecting portion **97** (see FIG. **17**).

The trigger **94** is continuously urged counterclockwise about the axis of the rivet **86** by a spring **98** (see FIG. **17**), which is supported on the rivet **86** between the arms **88** and **89** of the handle **85**, acting on the central connecting portion **97**. The counterclockwise movement of the trigger **94** by the spring **98** is limited by engagement of the central connecting portion **97** of the trigger **94** with a depending tab **99** on the handle **85**.

The spring **98** includes a portion **100**, which extends beneath the bottom of the stem **17** and above the channel portion **84'** of the lower lever **80**. Accordingly, the spring **98**, which is formed of a suitable material such as spring tempered stainless steel, for example, engages the bottom of the stem **17** rather than the channel portion **84'** of the lower lever **80** engaging the stem **17**. This reduces wear since the channel portion **84'** is formed of carbon steel, which wears easier than stainless steel. Thus, it is not necessary for the stem **17** to have the plastic button **52** therein as when using the valve actuating mechanism of FIG. **4**.

When the handle **85** is raised from the position of FIG. **20** to the position of FIGS. **16** and **18**, the lower lever **80** is moved therewith because of the pivotal connection through the rivet **86**. As the handle **85** is raised upwardly, the spacer **90** engages the channel portion **84'** of the lower lever **80** through the interposed portion **100** of the trigger spring **98**. Accordingly, the handle **85** and the lower lever **80** function as a single unit at this time and pivot about the stem **17** through the roller **92** engaging thereagainst until the bottom of the stem **17** is engaged by the channel portion **84'** acting thereon through the interposed trigger spring **98**.

When the bottom of the stem **17** is engaged by the channel portion **84'** of the lower lever **80** through the interposed trigger spring **98**, the handle **85** and the lower lever **80** pivot about the axis of the pin **46**. The latch plunger **43** is locked at this time due to the position of the retaining pin **41** with respect to the balls **42**.

As the handle **85** moves upwardly, the channel portion **84'** of the lower lever **80** exerts an upward movement on the stem **17** through the interposed portion **100** of the trigger spring **98** against the force of the spring **16** to open the valve **15**. This allows fluid to flow from the inlet **11** to the outlet **12** of the body **10**.

When it is desired to lock the handle **85** in the position in which the valve **15** is held open, the central connecting portion **97** of the trigger **94** is disposed in engagement with one of the notches or steps of the rack **72**. Thus, the trigger **97** holds the handle **85** in the desired position until the tank is filled.

When the plunger **43** is released due to the tank filling, the force of the spring **16** closes the valve **15** by moving the lower lever **80** counterclockwise about the rivet **86**. This pulls the plunger **43** downwardly.

Because the handle **85** is held against movement by the trigger **94** being disposed in the rack **72**, the lower lever **80** pivots counterclockwise about the rivet **86** during the downward movement of the stem **17**. The pin **46** moves to the position of FIG. **19** when the maximum counterclockwise movement of the lower lever **80** is completed with the handle **85** still held by the trigger **94**.

At this time, the trigger **94** ceases to have sufficient force exerted thereon so that the trigger **94** no longer has sufficient frictional engagement with the notch or step of the rack **72** to remain engaged therewith. As a result, the spring **98** pivots the trigger **94** counterclockwise until the central connecting portion **97** of the trigger **94** engages the tab **99** of the handle **85**.

When the trigger **94** has its end released from the notch or step of the rack **72**, the handle **85** falls. As a result, the plunger spring **44** returns the plunger **43** to the position of FIG. **20** wherein the channel portion **84'** engages the spacer **90** by means of the interposed portion **100** of the trigger spring **98**.

Thus, in the embodiment of FIGS. **14–20**, the valve stem **17** is guided by the roller **92** and is maintained in engagement therewith. The roller **92** also permits the stem **17** to function as the initial fulcrum or pivot about which the handle **85** moves during its initial movement until the channel portion **84'** bears against the bottom of the stem **17** through the interposed portion **100** of the trigger spring **98**. When this occurs, all further pivotal movement of the handle **85** occurs about the axis of the pin **46**.

An advantage of this invention is that the flow of fluid through the nozzle is always shut off when the fluid in the tank reaches a predetermined level irrespective of whether the handle is held by the attendant. Another advantage of this invention is that only one hand of the attendant is required to both open the valve and set it for a predetermined flow of fluid. A further advantage of this invention is that there are positive connections between the various valve actuating linkages to insure that the mechanism is reset when the attendant releases the handle.

For purposes of exemplification, particular embodiments of the invention have been shown and described according to the best present understanding thereof. However, it will be apparent that changes and modifications in the arrangement and construction of the parts thereof may be resorted to without departing from the spirit and scope of the invention.

What is claimed is:

1. An automatic shut-off dispensing nozzle comprising a body having an inlet and an outlet, a valve in said body for controlling fluid flow from said inlet to said outlet, a valve stem connected to said valve, means urging said valve to its closed position, a plunger slidably mounted in said body, means to retain said plunger in a first position until the fluid in a container being filled by the nozzle reaches a predetermined level, a lever continuously connected to said plunger, a handle connected only to said lever, said handle being pivotally connected to said lever, said handle having a portion extending toward said lever and beyond the pivotal connection with said lever and lying adjacent thereto, guide means on said portion guiding said stem, said lever moving said stem to open said valve when said handle is moved, and said valve urging means moving said valve to its closed position when said retaining means releases said plunger, whereby side thrust on the plunger is substantially reduced and the end of the valve stem is guided thus resulting in an improved start and shut-off operation.

2. The nozzle according to claim **1** including means to retain said handle in a position in which said valve is held in an open position.

3. The nozzle according to claim **2** in which said retaining means is pivotally connected to said handle at the pivotal connection of said handle to said lever.

4. The nozzle according to claim **3** in which said body has a guard associated therewith and said guard has means supported thereby to cooperate with said retaining means to hold said retaining means in a desired position.

5. The nozzle according to claim **1** in which said stem extends through said handle, said guide means slidably supporting said stem irrespective of the position of said handle, and said support means is pivotally connected to said handle.

6. The nozzle according to claim **1** in which said lever is connected to said plunger by a pin and slot arrangement whereby said lever can both pivot and slide relative to said plunger.

7. The nozzle according to claim 6 in which said stem extends through said handle, said guide means slidably supporting said stem irrespective of the position of said handle, and said supporting means is pivotally connected to said handle.

8. The nozzle according to claim 1 in which said lever supports said handle when said valve is in its closed position and said plunger is in its first position.

9. The nozzle according to claim 1 in which said stem has a non-metallic bottom end and said lever has a portion engaging the non-metallic bottom end of said item.

10. The nozzle according to claim 1 in which said stem extends through said handle, and said guide means is supported thereon and slidably engages said stem irrespective of the position of said handle.

11. The nozzle according to claim 1 including a cap threaded to said body and acting on said urging means remote from said valve, and means disposed between said cap and said body to form a fluid seal adjacent the threaded connection.

12. The nozzle according to claim 4 including resilient means acting on said retaining means to urge it to an ineffective position and said resilient means having a portion disposed between said stem and said lever.

13. The nozzle according to claim 6 in which said stem extends through said handle, and said guide means is supported thereon and slidably engages said stem irrespective of the position of said handle.

14. The nozzle as set forth in claim 1 wherein, the lever has a channel portion, the extending portion of the handle extending into the channel portion.

15. The nozzle as set forth in claim 1 wherein, the guide means comprise a pair of spaced rollers mounted in the extending portion of the handle.

16. The nozzle as set forth in claim 15 wherein, the spaced rollers are of a non-metallic material.

17. The nozzle as set forth in claim 1 wherein, the guide means comprise a block supported within the extending portion of the handle and has an opening therein to receive the valve stem.

18. The nozzle as set forth in claim 17 wherein, the block is of a non-metallic material.

19. The nozzle as set forth in claim 1 wherein, the extending portion of the handle comprises bifurcated arms.

20. The nozzle as set forth in claim 1 wherein, the valve stem is slidably mounted in the body to open said valve, and means disposed between said stem and said body, said means being formed of a material having a low coefficient of friction.

21. The nozzle as set forth in claim 1 wherein, a spout is connected to said body, said connection including means to allow said spout to be disconnected from said body when a predetermined force is exerted on said spout.

22. The nozzle as set forth in claim 21 wherein, the means comprises a shearable portion.

23. The nozzle as set forth in claim 1 wherein, a spout is connected to said body, said spout being surrounded by a spring of a square cross section.

24. The nozzle as set forth in claim 2 in which said handle retaining means is provided with a resilient means acting on said retaining means to urge it to an ineffective position.

25. The nozzle as set forth in claim 24 in which said resilient means comprises a leaf spring mounted on said pivotal connection with one end thereof bearing against said handle retaining means and the other end bearing against the lever.

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