United States Patent [19]

Eklund

[11] **3,780,776**

[45] **Dec. 25, 1973**

[54] **SAFETY MECHANISM FOR AUTOMATIC NOZZLES**

[75] Inventor: **Hans Eric Eklund,** Malmo, Sweden

[73] Assignee: **AB Ljungmans Verkstader,** Malmo, Sweden

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[21] Appl. No.: **151,330**

[30] **Foreign Application Priority Data**

June 16, 1970 Sweden 8311/70

[52] **U.S. Cl.** **141/207,** 141/226

[51] **Int. Cl.** **B67c 3/26**

[58] **Field of Search** 141/192–195, 198, 206–211, 214, 215, 217, 218, 224–228, 276, 346, 347, 352, 353, 355, 360–362

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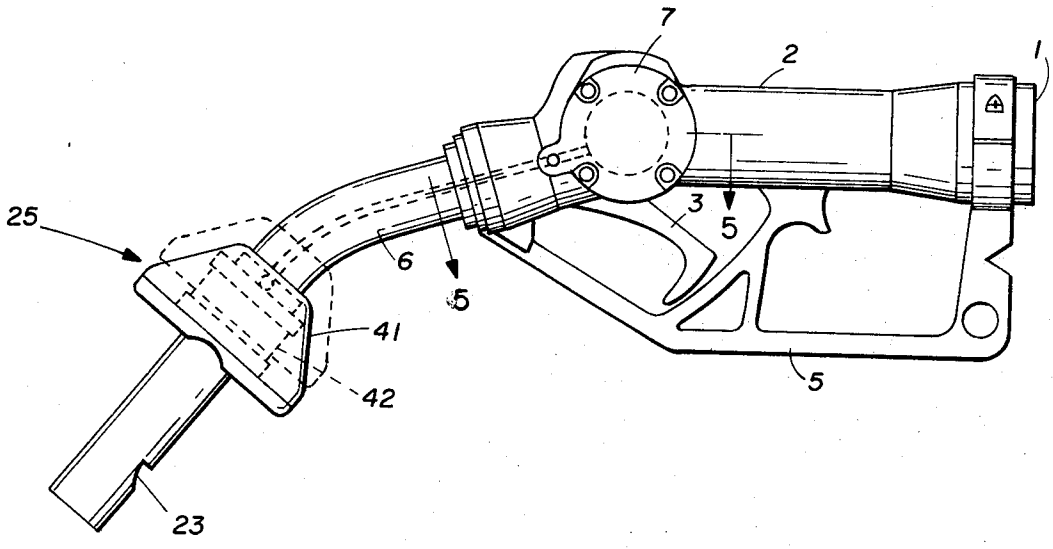
Primary Examiner—Houston S. Bell, Jr.

Attorney—Robert W. Mayer, Thomas P. Hubbard, Jr., Daniel Rubin, Raymond T. Majesko, Roy L. Van Winkle, William E. Johnson, Jr., Eddie E. Scott and Morgan L. Crow

[57] **ABSTRACT**

The safety mechanism of this invention forms a portion of an automatic nozzle for dispensing gasoline or the like. The mechanism includes a pressure control member movably mounted on the nozzle spout to engage the filler pipe on the tank being filled. When the control member engages the filler pipe, pressure is transmitted to a diaphragm and a locking device carried thereby to release the locking device and to permit operation of the nozzle.

9 Claims, 9 Drawing Figures



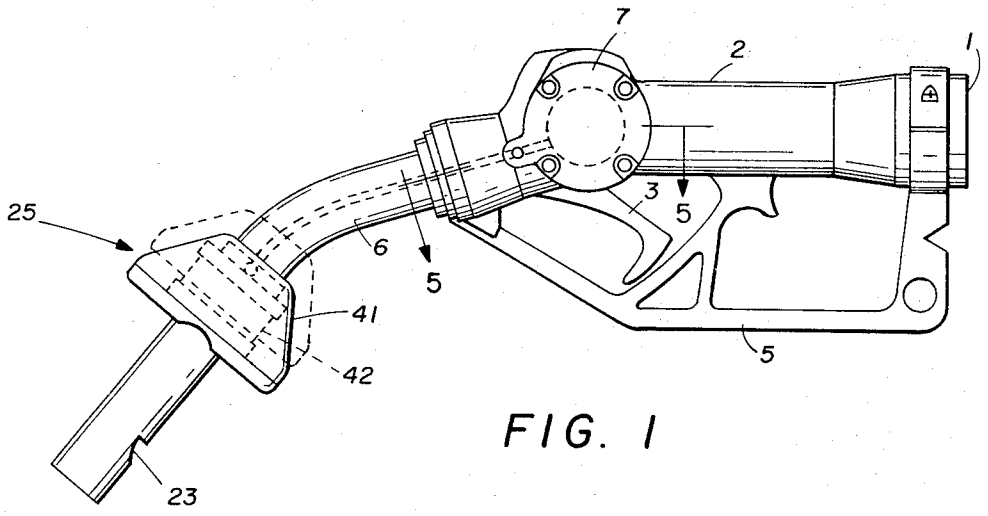


FIG. 1

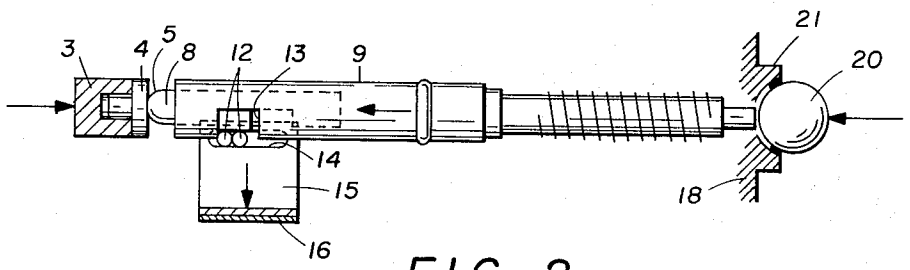


FIG. 2

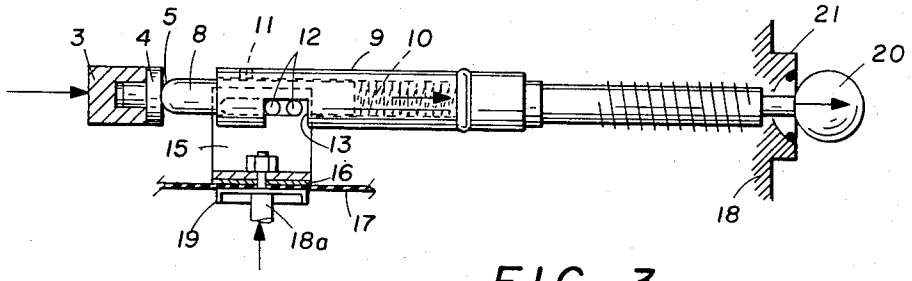


FIG. 3

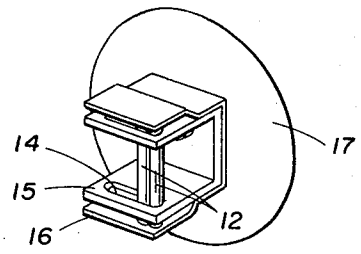


FIG. 4

INVENTOR
HANS ERIK EKLUND

Roy L. Van Winkle
ATTORNEY

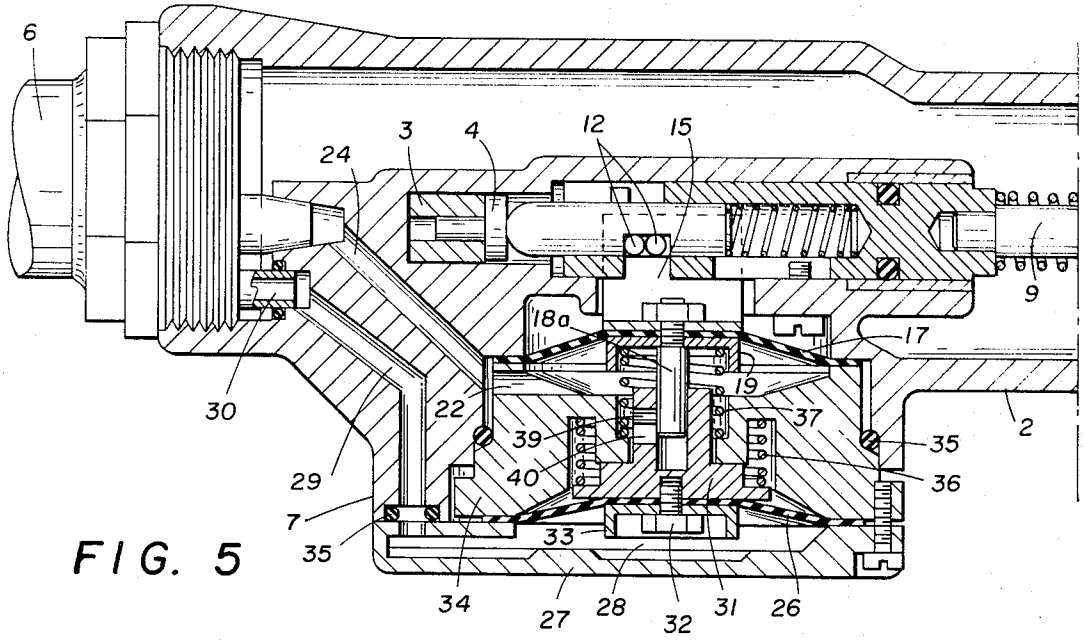


FIG. 5

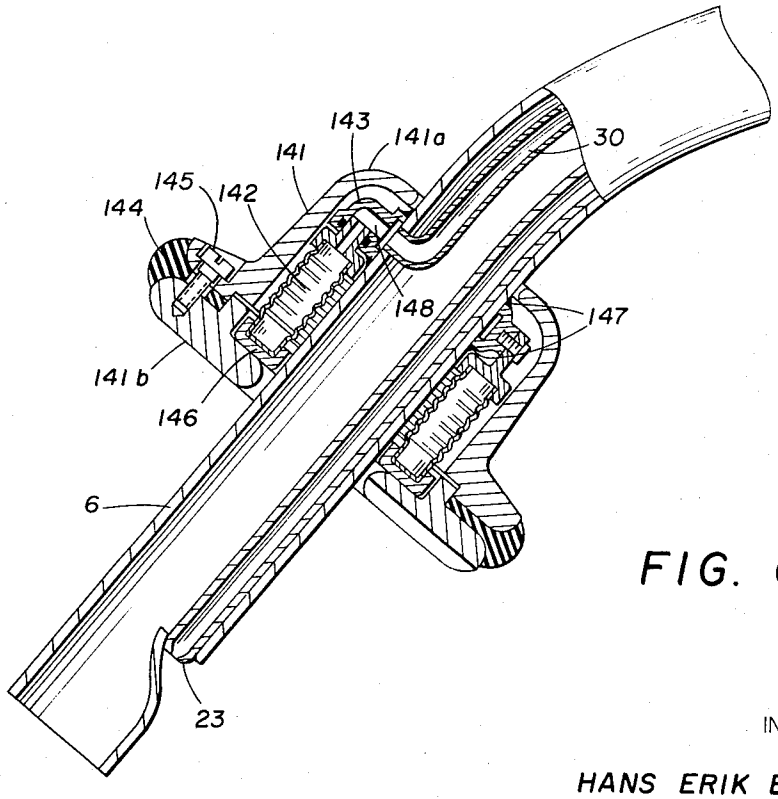


FIG. 6

INVENTOR

HANS ERIK EKLUND

Roy L. Van Winkle

ATTORNEY

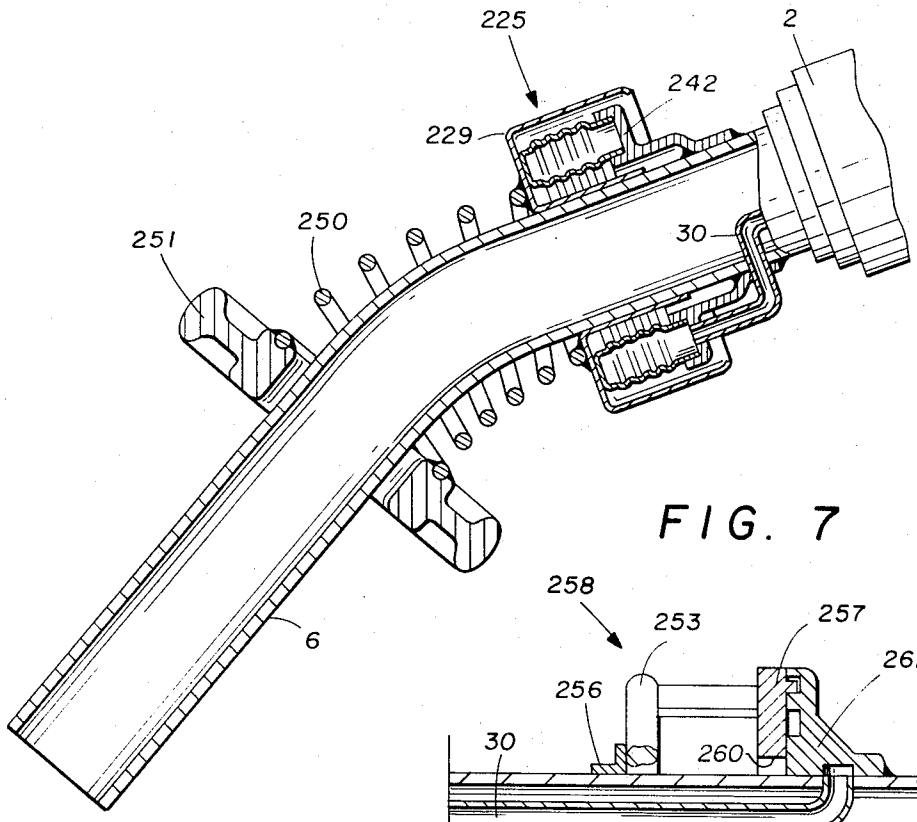


FIG. 7

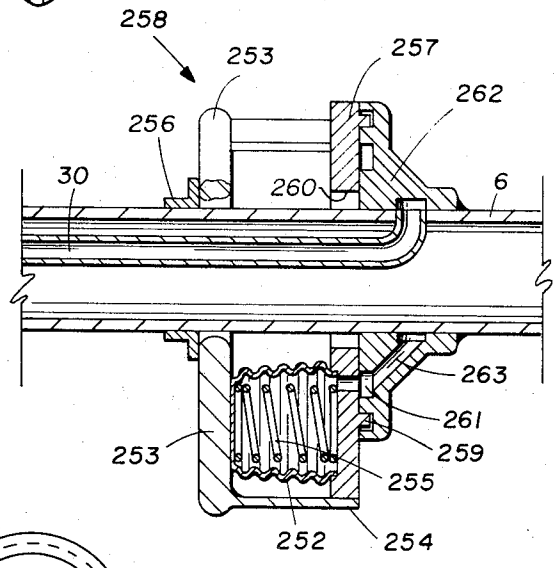


FIG. 8

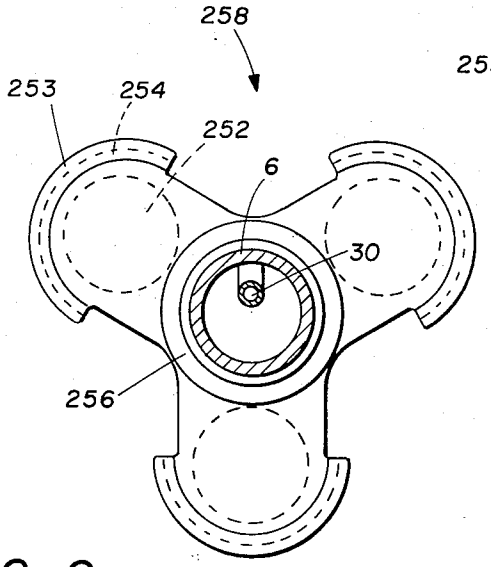


FIG. 9

INVENTOR
HANS ERIK EKLUND
Roy L. Van Winkle
ATTORNEY

SAFETY MECHANISM FOR AUTOMATIC NOZZLES

BACKGROUND OF THE INVENTION

This invention relates to a safety mechanism in a manually operable valve unit for dispensing fluid from one container to another, the valve unit preferably having the form of a pistol-grip hose nozzle which is provided at the end of a hose and includes a valve mechanism that can be reset to open position by means of an actuator. A pistol-grip nozzle suitable for use with this invention is fully described in my copending application Ser. No. 828,940, filed May 29, 1969 U.S. Patent No. 3,638,689 issued Feb. 1, 1972.

The ever-increasing number of gasoline dispensing self-service stations necessitates special safety arrangements which eliminate as far as possible the risks involved when non-technical or untrained persons handle such highly inflammable fluids as gasoline. The hose nozzles therefore should have a safety mechanism that does not permit resetting of the nozzle to the open position until the dispensing pipe or spout of the nozzle is placed in the container that is to be filled, and that the container is empty.

SUMMARY OF THE INVENTION

To this end, the present invention provides a safety mechanism that is associated with a locking mechanism retaining said valve mechanism in open position. The locking mechanism comprises a diaphragm defining a first compartment that communicates with a venturi system for controlling the pressure within the compartment. The locking mechanism is released for resetting the valve mechanism to closed position when the pressure in said compartment deviates from a predetermined range.

The safety mechanism includes a second diaphragm forming a second compartment. The second diaphragm cooperates with the locking mechanism to prevent release of the locking mechanism until a pressure control member is actuated to generate a predetermined pressure in the second compartment.

BRIEF DESCRIPTION OF THE DRAWINGS

Various embodiments of the present invention will be described in more detail in the following, reference being had to the accompanying drawings in which like reference characters in all figures and wherein:

FIG. 1 is an elevation view of a nozzle including an embodiment of a safety mechanism constructed according to the invention;

FIG. 2 diagrammatically illustrates a portion of the valve mechanism of an automatic nozzle; FIG. 3 is similar to FIG. 1, but shows the valve mechanism in a different operating position;

FIG. 4 is a perspective view of a component of the valve mechanism;

FIG. 5 shows a partial section of a mechanism according to the present invention in a pistol-grip type hose nozzle taken along the line 5—5 of FIG. 1;

FIG. 6 is a partial cross section of a pressure control member similar to that shown in FIG. 1;

FIG. 7 is a cross section of another embodiment of the pressure control member;

FIG. 8 is a cross section of still another embodiment of the pressure control member; and,

FIG. 9 is an end view of the embodiment shown in FIG. 8.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A pistol-grip type hose nozzle in which the safety mechanism of the present invention is incorporated is shown in FIG. 1. This nozzle is mounted at the end of a hose with inlet end 1 of housing 2. A nozzle valve mechanism is mounted in the housing 2.

The valve mechanism is operable by means of a lever 3 and a valve-actuating abutment 4 which is shown in FIGS. 2 and 3. The lever 3 is pivotally mounted on the housing 2. The hose nozzle also includes a trigger guard 5 on the housing 2, a dispensing pipe or spout 6, and a diaphragm housing 7 which preferably is formed integrally with the valve housing 2. As shown in FIGS. 2 and 3, abutment 4 on the lever 3 is urged toward a piston 8 that is spring-loaded and movably mounted in a push rod 9. Spring 10, urging the piston 8, toward the abutment 4 is located within the push rod 9 behind the piston 8. The movement of the piston 8 in the push rod 9 is limited by a pin 11 in the piston 8 that travels in a slot in the push rod 9.

The piston 8 has a recess for receiving a pair of locking rollers 12. The push rod 9 also has a recess 13 for receiving the rollers 12 when the rollers are located in the recesses of the piston 8 shown in FIG. 3.

As shown in FIG. 3, the rollers 12 are movable in two opposed slots 14 provided in the limbs of a U-shaped frame 15. The rollers are retained in the slots by means of a U-shaped yoke 16. The frame 15 and the yoke 16 are secured to diaphragm 17 by means of a screw 18a and a nut as shown in FIG. 5.

When the components are in the position shown in FIG. 3, pivotal movement of the lever 3 moves the push rod 9 towards a valve ball 20 which is raised off of ball seat 21 since the locking rollers 12 are located in the recess in the piston 8 and the recess 13 in the push rod 9. The piston 8 and the push rod 9 are coupled together by means of the rollers 12. Further movement of the push rod 9 displaces the main nozzle valve 18 off of its seat (not shown) opening the nozzle to full flow.

It will be observed that the diaphragm 17 in the position shown in FIG. 3 has been urged into the locking position against the valve mechanism, and in this case the requirements for opening the valve are satisfied. If they are not, the diaphragm 17 bulges outwardly from the valve mechanism into the position shown in FIG. 2. In this position, the connection between the piston 8 and the push rod 9 is interrupted, whereby the piston 8 is pressed into the push rod 9 without moving the latter towards the ball 20.

The diaphragm 17 defines a compartment 22 (see FIG. 5) communicating with the rear opening 23 of the dispensing pipe 6 (See FIG. 1) via a pipe extending through said dispensing pipe and a duct 24. The compartment 22 also communicates with the interior of the housing 2 in such manner that the fluid passing therethrough will give rise to an air flow from the opening 23 through the pipe, the duct 24, the compartment 22 and into the interior of the housing 2. During this air flow, the diaphragm 17 is urged into the position shown in FIGS. 3 and 5, in which the valve mechanisn can be opened. For instance, if the fluid level in the container in which the dispensing pipe 6 has been inserted, rises above and blocks the opening 23, the air flow termi-

nates and the diaphragm 17 bulges outwardly into the position shown in FIG. 2. In this position of the diaphragm 17, the valve mechanism automatically returns to its closed position and cannot be reset to open position. To permit resetting, the fluid level in the container into which dispensing is to take place, must be below the opening 23. Accordingly, overfilling of the container is prevented. The foregoing automatic nozzle features are more fully described in the copending patent application which has been referred to hereinbefore.

It has been found desirable to lay down a further requirement that must be satisfied before the valve mechanism can be reset to the open position. According to this requirement, the dispensing pipe 6 must be inserted into the container which is to be filled, or into the fill pipe or opening of said container. In that case, the pressure control member 25 provided on the dispensing pipe 6 (FIG. 1) will be actuated and displaced from the full line position to the broken line position. The member 25 is spring-loaded towards the full line position. The function and construction of this member will be described in more detail in the following.

In the safety mechanism shown in FIG. 5, there is provided in parallel with the diaphragm 17 a further diaphragm 26 which, by means of a diaphragm housing cover 27, defines a compartment 28 communicating with the pressure control member 25 via a duct 29 and a pipe 30 located within the dispensing pipe 6. The diaphragm 26 is mounted on a holder 31 by means of a screw 32 and a cup-shaped support washer 33 that is located on that side of the diaphragm opposite to the holder 31.

The holder 31 is moveable in a body 34 that is interposed between the diaphragms 17 and 26. Sealing rings 35 separate the two compartments 22 and 28 from one another. Between the body 34 and the holder 31, there is provided a compression spring 36 urging the holder 31 and thus the diaphragm 26 in a direction away from the valve mechanism in the housing 2. Between the body 34 and the washer 19 for the diaphragm 17, there also is provided a compression spring 37 urging the diaphragm as well as the frame 15 and the rollers 12 towards the locked position shown in FIG. 3. The screw 18*a* facing the diaphragm 26 carries a pin 39 traveling in a slot 40 in the holder 31. When the components occupy the position shown in FIG. 5, the valve mechanism can be reset to open or unlocked position.

To cause the components to take up the position shown in FIG. 5, air must be conducted through the compartment 22, and this implies that the opening 23 and the duct 24 must be unobstructed. Furthermore, the pressure in the compartment 28 must lie within a given predetermined range within which the diaphragm 26 takes up the position shown in FIG. 5 against the action of the spring 36.

If the fluid level in the container being filled rises above the blocks the opening 23, the air flow through the compartment 22 terminates and the diaphragm 27 bulges outwardly from the valve mechanism against the action of the spring 37. In this case, the rollers 12 in the frame 15 are pulled out of the recesses in the piston 8 and the push rod 9, whereby the valve mechanism returns to the closed position and cannot be reset to open until the diaphragm 17 has returned to the position shown in FIG. 5.

When the diaphragm 26 is in the position shown in FIG. 5, the slot and pin connection 39, 40 allows diaphragm diaphram 17 to move. If however, the pressure within the compartment 28 is not maintained within the predetermined range, the diaphragm 26 bulges outwardly toward the cover 27 under the action of the spring 36. During this movement of the diaphragm 26, the slot and pin connection 39,40 causes the holder 31 to carry the diaphragm 17 and thus the frame 15 with its rollers 12 along so that the piston 8 and the push rod 9 are disengaged, that is, unlatched from one another. As illustrated in FIG. 5, the diaphragm 17 can move without acting upon the diaphragm 26, whereas the diaphragm 26 will act upon the diaphragm 17 via said slot and pin connection 39,40.

As has already been mentioned, the pressure control member 25 is utilized for raising the pressure within the compartment 28 to a value within the predetermined range. In the embodiment shown in FIG. 1, the control member 25 includes a housing 41 that is movably mounted on the dispensing pipe 6 and a bellows 42, which has one end fixedly mounted on the dispensing pipe 6. The other end of the bellows 42 is mounted to the housing 41. When the housing 41 is urged against the fill pipe or opening of a container being filled, the housing 41 is displaced on the dispensing pipe 6 to the position shown by broken lines in FIG. 1. During movement of the housing 41, the bellows 42 is compressed, thereby increasing the pressure within the chamber 28 which is in communication with the bellows via the duct 29 and the pipe 30. The valve mechanism cannot be reset to open or unlatched position until the housing 41 is moved to the position shown by broken lines in FIG. 1.

FIG. 6 shows another embodiment of pressure control member, which is similar to the pressure control member of FIG. 1. In this embodiment, housing 141 consists essentially of two components, 141*a* which accommodates bellows 142 and its mounting 143, and 141*b* which forms the end wall of the housing 141. Between the components 141*a*, 141*b* there is provided a protection ring 144 extending outwardly beyond the periphery of the components 141*a* and 141*b* and manufactured preferably of some shock-absorbing material. The two components 141*a* and 141*b* are connected by means of screws 145.

Against the inside of the component 141b there abuts a support ring 146 which constitutes the end wall of the bellows 142 and which, together with the housing 141, is displaceable along the dispensing pipe 6. The mounting 143 for the bellows is secured to the dispensing pipe 6 by means of welds 147. The mounting 143 also includes a duct 148 that provides communication from the interior of the bellows 142 to the tube 30 leading to the duct 29. FIG. 6 also shows the pipe that extends between the opening 23 and the duct 24.

As shown by the embodiment of FIG. 7, the pressure control member 225 need not be displaceably mounted on the dispensing pipe 6, but may be mounted at the dispensing pipe end adjacent tube valve housing 2. The bellows 242 is fixedly mounted at the end of the dispensing pipe 6 within a housing 229. The housing 229 is displaceable on the dispensing pipe 6 under the force of a spring 250 or other movement-transmitting member. The end of the spring 250 is in engagement with a collar 251 that is movable on the dispensing pipe 6.

FIGS. 8 and 9 show a further embodiment of the pressure control member designated by the reference character 258. In this embodiment of the bellows is divided into three separate bellows unit 252, one of which is shown in FIG. 8. The bellows units 252 extend between an end wall 253 and a mounting plate 257. Walls 254 projecting from the end wall 253 serve as protection for the bellows units 252.

Moreover, the end wall 253 is displaceable on the dispensing pipe 6 for compressing the bellows units 252 against the action of a spring 255 mounted in each of the units 252. The springs 255 urge the end wall 253 against an abutment 256 mounted on the dispensing pipe 6 which limits the outward movement of the end wall 253 and the bellows units 252.

The bellows units 252 are mounted on the plate 257 having a mounting ring 259 for each bellows unit. The center of the plate 257 has a hole 260 allowing the plate to be positioned on the dispensing pipe 6. Within each mounting ring 259 there is provided a hole 261 establishing communication with the interior of the bellows units 252.

The plate 257 engages mounting 262 for the bellows units 252. The mounting 262 is fixedly secured to the dispensing pipe 6 and includes a duct system 263 that is in communication with the pipe 30. The embodiment illustrated in FIGS. 8 and 9 obviously has the same function as the embodiments of the control member previously described. It should also be obvious that a piston-cylinder arrangement can be utilized instead of the bellows described, if desired.

The present invention provides for a pistol-grip hose nozzle, the valve mechanism of which cannot be reset to open position until two independent requirements are satisfied. On one hand, the liquid level in the container which is to be filled must not rise above and block the opening 23 and, on the other hand, the pistol-grip hose nozzle, due to the described safety mechanism, must be pressed against the spout or opening of the container with such a force that the pressure control member increases the pressure within the compartment 28 to within a predetermined range.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A safety mechanism in a manually operable-automatic closing, fluid dispensing nozzle for preventing operation of the nozzle except when the nozzle is positioned in the neck of a tank to be filled, said safety mechanism comprising:

a nozzle housing;

a spout connected with the nozzle housing;

a flow valve in the nozzle housing for permitting and preventing flow therethrough;

a valve lever movable on said housing for opening and closing said valve;

releasable locking means in the nozzle housing associated with said flow valve to prevent opening of said valve when unlocked, said locking means being responsive to a pneumatic signal to permit said valve to close irrespective of the position of said valve lever;

control means located on said spout for generating a predetermined fluid pressure when said control means is in engagement with the neck of the tank to be filled;

pressure responsive means located in and forming a compartment with said nozzle housing, said compartment being in fluid communication with said control means for receiving said fluid pressure; and,

connecting means operably connecting said pressure responsive means and said locking means for preventing said locking means from moving to a locked position when said pressure in said compartment is below said predetermined value, whereby said nozzle cannot be opened to dispense fluid.

2. The safety mechanism of claim 1 wherein said control means includes:

collapsible means in fluid communication with said compartment and having one end fixed to the spout;

housing means engageable with the other end of said collapsible means and moveable on said spout whereby a force applied to said housing means collapses said collapsible means generating the pressure in said compartment to disengage said connecting means and locking means.

3. The safety mechanism of claim 2 wherein said collapsible means comprises an annular bellows encircling the spout.

4. A safety mechanism for use in a manually operable automatic closing, fluid dispensing nozzle wherein the nozzle includes a housing, a spout connected with the housing, a flow valve in the housing, a valve lever, and releasable locking means associated with the flow valve to prevent opening of the valve when unlocked, the locking means being responsive to a pneumatic signal to permit the valve to close irrespective of the position of the valve lever, said safety mechanism comprising:

control means located on the spout including collapsible means for generating a fluid pressure and having one end fixed to the spout and housing means engageable with the other end of the collapsible means and moveable on the spout whereby a force applied to the housing means collapses and collapsible means generating a predetermined pressure;

pressure responsive means located in and forming a compartment with the housing, said compartment being in fluid communication with said collapsible means whereby the generated pressure is applied to said pressure responsive means;

connecting means operably connecting said pressure responsive means and the locking means, said connecting means including a holder member connected to said pressure responsive means, said holder having a bore therein and a slot extending into said bore, said connecting means also including an elongated member connected to the locking means and movably extending into said bore and a pin carried by said elongated member projecting through and moveable in said slot and engaging one end of said slot when the pressure in said compartment is below the predetermined value to prevent the locking means from moving into the locked position wherein the valve can be opened;

a spring located between the housing and locking means biasing the locking means and said elongated member relatively away from said pressure responsive member; and,

a second spring located between the housing and said holder member biasing said pressure responsive

means in a direction to reduce the volume of said compartment and relatively away from the locking means.

5. A safety mechanism for use in a manually operable-automatic closing, fluid dispensing nozzle wherein the nozzle includes a housing, a spout connected with the housing, a flow valve in the housing, a valve lever, and releasable locking means associated with the flow valve to prevent opening of the valve when unlocked, the locking means responsive to a pneumatic signal to permit the valve to close irrespective of the position of the valve lever, said safety mechanism comprising:

control means located on the spout for generating a fluid pressure, said control means including an annular bellows encircling the spout and having one end fixed to the spout, said control means also including housing means engageable with the other end of said bellows and movable on the spout whereby a force applied to said housing means collapses said bellows generating said pressure;

pressure responsive means located in forming a compartment with the housing, said compartment being in fluid communication with said control means;

connecting means operably connecting said pressure responsive means and the locking means to prevent the locking means from moving to a locked position when the pressure in said compartment is below a predetermined value;

abutment means slidably disposed on the spout; and,

resilient means encircling the spout and having one end engaging said abutment means and the other end engaging said housing means, whereby a force exerted said abutment means is transmitted to said housing means.

6. A safety mechanism for use in a manually operable-automatic closing, fluid dispensing nozzle wherein the nozzle includes a housing, spout connected with the housing, a flow valve in the housing, a valve lever, and releasable locking means associated with the flow valve to prevent opening of the valve when unlocked, the locking means being responsive to a pneumatic signal to permit the valve to close irrespective of the position of the valve lever, said safety mechanism comprising:

control means located on the spout for generating a fluid pressure, said control means including a plurality of bellows circumferentially spaced about the exterior of the spout and having one end fixed to the spout said control means also including housing means engageable with the other end of said bellows and movable on said spout whereby a force applied to said housing means collapses said bellows generating said pressure;

pressure responsive means located in and forming a compartment with the housing, said compartment being in fluid communication with said control means; and,

connecting means operably connecting said pressure responsive means and the locking means to prevent the locking means from moving a locked position when the pressure in said compartment is below a predetermined value.

7. The safety mechanism of claim 6 wherein said housing means substantially individually encompasses each said bellows.

8. A safety mechanism for use in a manually operable-automatic closing, fluid dispensing nozzle wherein the nozzle includes a housing, a spout connected with the housing, a flow valve in the housing, a valve lever, and releasable locking means associated with the flow valve to prevent opening of the valve when unlocked, the locking means being responsive to a pneumatic signal to permit the valve to close irrespective of the position of the valve lever, said safety mechanism comprising:

control means located on the spout for generating a fluid pressure;

pressure responsive means located in and forming a compartment with the housing, said compartment being in fluid communication with said control means; and,

connecting means operably connecting said pressure responsive means and the locking means, said connecting means including a holder member connected to said pressure responsive means having a bore therein and a slot extending into said bore, said connecting means also including an elongated member connected to the locking means and movably extending into said bore, and a pin carried by said elongated member projecting into and movable along said slot and engaging one end of said slot when the pressure in said compartment is below the predetermined value to prevent the locking means from moving into the locked position wherein the valve can be opened.

9. The safety mechanism of claim 8 and also including:

a spring located between the housing and locking means biasing the locking means and said elongated member relatively away from said pressure responsive member; and,

a second spring located between the housing and said holder member biasing said pressure responsive means in a direction to reduce the volume of said compartment and relatively away from the locking means.

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(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,780,776 Dated December 25, 1973

Inventor(s) Hans Eric Eklund

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Claim 4, column 6, line 41, change "and" to "said".

Claim 5, column 7, line 10, after "means" and before "responsive", insert --being--.

Claim 6, column 8, line 6, after "moving" and before "a", insert --to--.

Signed and sealed this 9th day of April 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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