April 30, 1968 L. P. ROSELL ET AL 3,380,491

UNIVERSAL ELECTRIC NOZZLE

Filed March 26, 1965 2 Sheets-Sheet 1

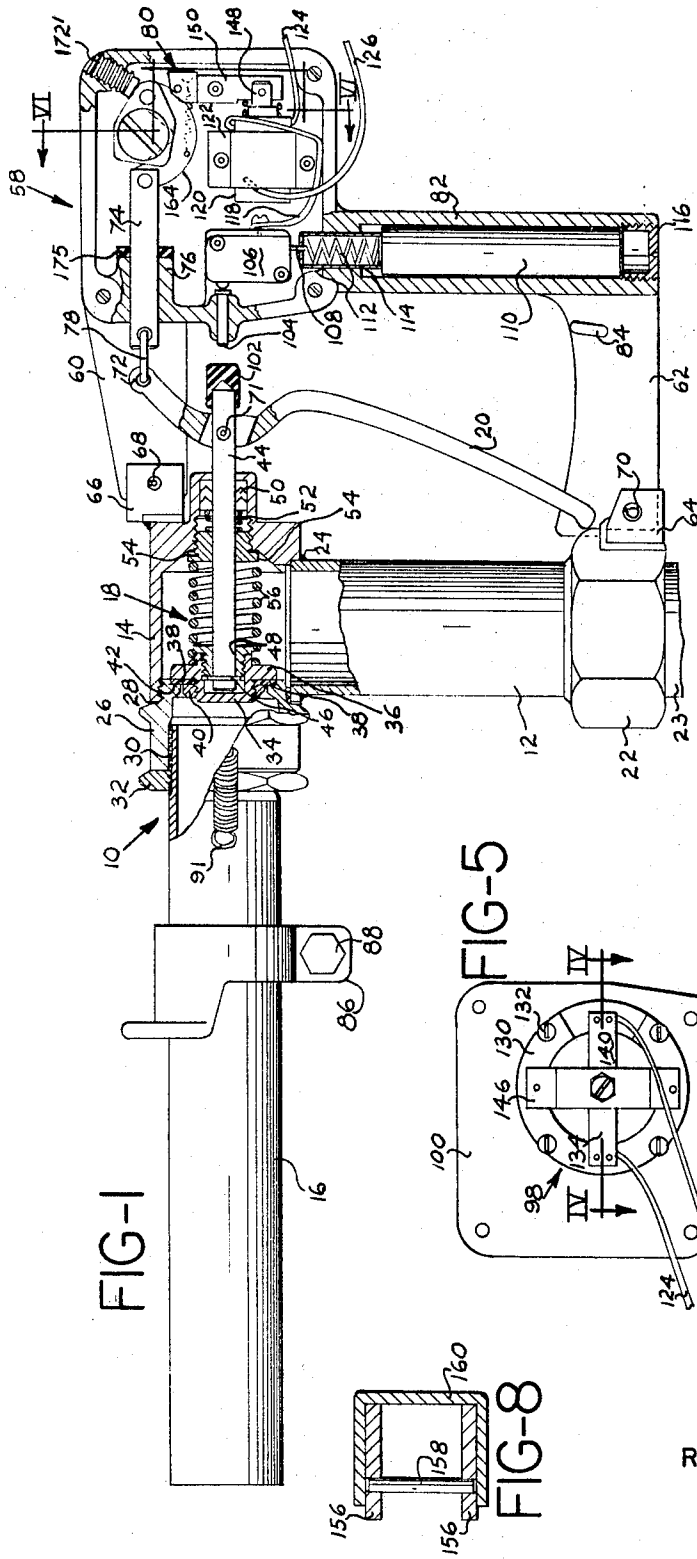


FIG-1

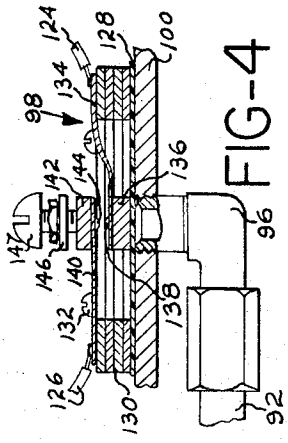


FIG-4



FIG-5

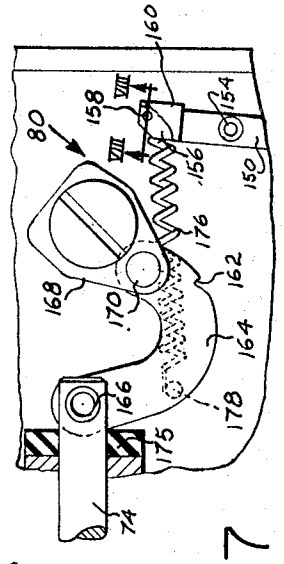


FIG-7



FIG-8

INVENTOR
RICHARD D. PENTECOST
BY LESTER P. ROSELL
Toulmin & Toulmin
ATTORNEYS

April 30, 1968 L. P. ROSELL ET AL 3,380,491

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Filed March 26, 1965 2 Sheets-Sheet 2

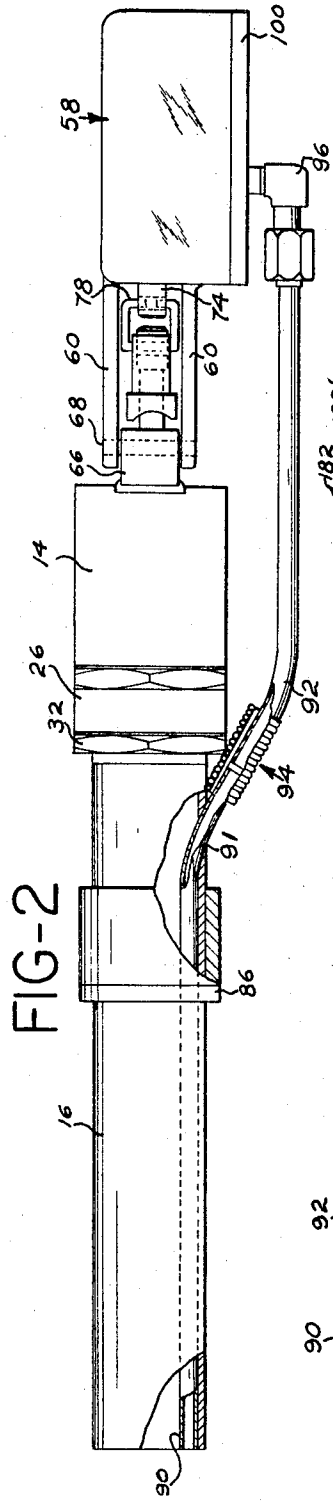


FIG-2

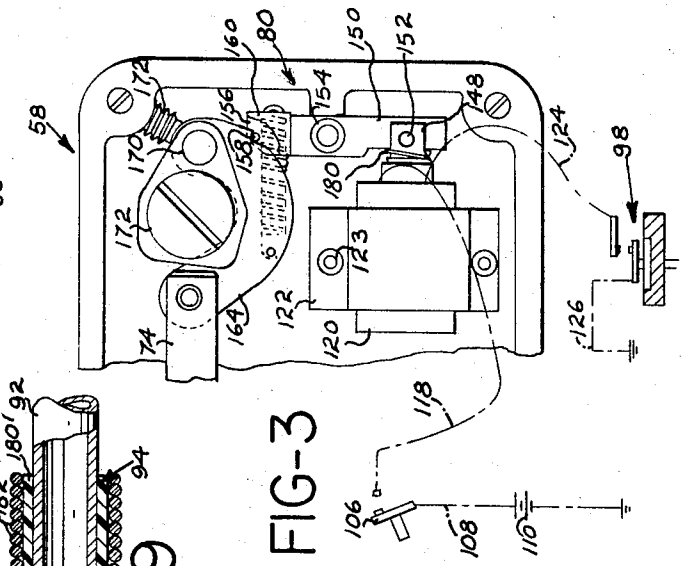


FIG-3

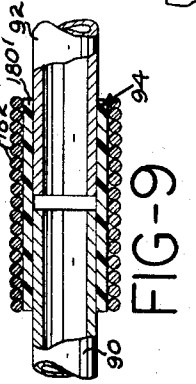


FIG-9

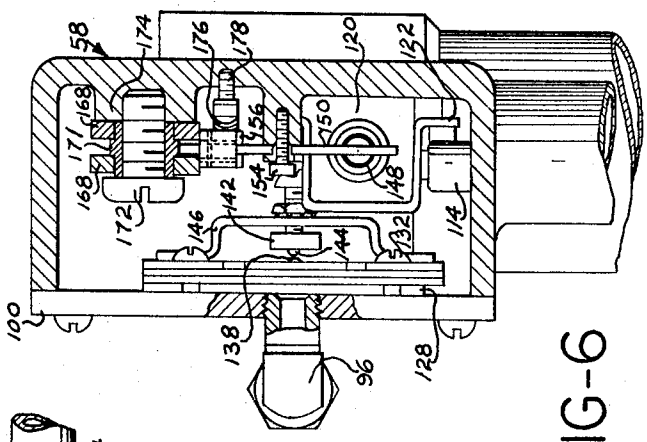


FIG-6

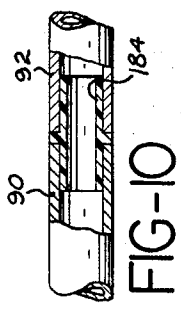


FIG-10

INVENTOR.
RICHARD D. PENTECOST
BY LESTER P. ROSELL

Toulmin & Toulmin

ATTORNEYS

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3,380,491

# UNIVERSAL ELECTRIC NOZZLE

Lester P. Rosell, Dayton, and Richard D. Pentecost, Eaton, Ohio, assignors to Emco Wheaton, Inc., Dayton, Ohio, a corporation of Ohio

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11 Claims. (Cl. 141—209)

## ABSTRACT OF THE DISCLOSURE

An automatic tank filling nozzle which fills the tank to a predetermined level and then closes a valve in the nozzle. The nozzle is provided with an actuator disabling linkage which seats the valve and prevents subsequent opening of the valve when the tank is full. Operation of the disabling linkage is controlled by an electromagnetic latch device whose operation is in turn controlled by a pressure switch connected by tubing to the nozzle outlet. When the level in the tank rises to a point above the lower end of the tubing it causes an increase in pressure in the tubing which is sensed by the pressure switch which in turn initiates closing of the valve through the disabling linkage.

This invention relates to dispensing nozzles, and more particularly it relates to a dispensing nozzle of the automatic trip type which shuts off automatically upon filling a container with liquid when the liquid therein reaches a predetermined level.

Some of the prior art automatic dispensing nozzles utilize a vacuum conduit having one end in the dispensing spout of the nozzle and the other end operatively connected to a diaphragm actuated means in the nozzle body. As soon as the end of the conduit in the spout is covered with liquid, the diaphragm actuated means is effective to close off the valve in the nozzle.

When such nozzles are dispensing corrosive liquids, corrosive vapors from the liquids are drawn up the vacuum conduit while the end of the conduit is uncovered. These corrosive vapors soon attack the diaphragm actuated means and destroy the normal operation of the nozzle.

The automatic trip type nozzle of this invention is not subjected to such corrosive vapors and is therefore especially adapted for handling corrosive liquids.

Applicants' nozzle generally comprises a nozzle body having a valved passage extending therethrough and in which passage a valve member is located with the valve stem for operating the valve extending out of the body. The automatic trip mechanism is conveniently incorporated in a housing which is detachably mounted on the nozzle body

The trip mechanism utilizes a normally open pressure actuated switch means which is mounted in the housing and a suitable conduit has one end operatively connected to the pressure switch means and the other end is positioned in the discharge spout of the nozzle.

As the nozzle discharges liquid into the container being filled, the level of the liquid will rise until it covers the discharge spout and the conduit therein. The air which is trapped in the conduit will be subjected to an increase in pressure as the liquid level rises further until a sufficient predetermined pressure is reached which will close the pressure actuated switch means.



Closing of the above switch means is effective to operate a solenoid which in turn is effective to release latch means in the housing thereby permitting the valve member to be closed. There are other features of this invention which will be subsequently described in detail. However, it should be noted that by this construction applicants have provided an economical automatic trip nozzle which is not subjected to the corrosive effects of the nozzles as in prior art constructions.

Accordingly, a primary object of this invention is to provide an automatic trip type nozzle for handling corrosive liquids.

Another object of this invention is to provide an automatic trip type nozzle having the automatic tripping means enclosed in a housing which can be conveniently attached to existing nozzles.

A further object of this invention is to provide a low cost automatic trip type nozzle which is especially adaptable for handling corrosive liquids.

Another object is to provide an automatic trip type nozzle which is rugged, dependable and of simple construction.

These and other objects and advantages of this invention will become more readily understood upon reading the attached specification and drawings in which:

FIGURE 1 is a side view of the automatic nozzle of this invention showing some of the parts in cross section;

FIGURE 2 is a top view of the nozzle shown in FIGURE 1;

FIGURE 3 is a slightly enlarged view of the latch means and switch means shown in FIGURE 1;

FIGURE 4 is a cross section of the diaphragm switch shown in FIGURE 5 and taken along the lines IV—IV of FIGURE 5;

FIGURE 5 is a plan view of the diaphragm switch which is attached to the back of the cover plate in the housing;

FIGURE 6 is a cross sectional view taken along the lines VI—VI of FIGURE 1;

FIGURE 7 is a plan view of the latch means in the released position;

FIGURE 8 is a cross section taken along the lines VIII—VIII of FIGURE 7;

FIGURE 9 is a cross sectional view of one form of flexible coupling means used in this invention, and

FIGURE 10 is a second embodiment of the flexible coupling means used herein.

Referring to the drawings in more detail, FIGURE 1 shows a side view of the automatic nozzle of this invention, which nozzle is generally designated **10**. The nozzle consists of an inlet **12** which is secured to a valve body **14**. A suitable dispensing spout **116** is also connected to valve body **14**. A valve member generally designated **18** is mounted in the housing **14** in known manner, and lever **20** is used to open the valve member.

The inlet **12** has a coupling member **22** thereon which is internally threaded to receive the input pipe or connection **23**. The inlet **12** is suitably secured to the valve body **14** by welding as at **24**. One end of the valve body **14** is internally threaded to receive a disc seat member **26** as shown. A suitable sealing gasket **28** made of Teflon is positioned between the disc seat **26** and the valve body **14**. The disc seat member **26** is internally threaded at **30** and receives the threaded end of discharge spout **16**. A

suitable locking nut 32 is positioned as shown to secure the discharge spout 16. The valve member 18 comprises a valve basket 34 which has a flange 36 thereon as shown. A suitable Teflon gasket 38 is positioned on one side of the flange as shown, and a sutiable locking nut 40 secures the gasket in position.

The valve disc seat 26 is provided with a valve seat at 42 against which the gasket 38 is positioned. A suitable valve stem 44 has a C-ring 46 on one end thereof and is secured to the valve basket by a stem retaining nut 48 as shown. Suitable packing 50 is positioned around the stem 44 and a suitable spring 52 and retaining nut 54 are used as shown. A valve spring 56 is positioned between the valve basket 34 and retaining nut 54 as shown, and the spring member biases the valve basket against the valve seat.

The nozzle members are suitably made out of stainless steel when the nozzle is to be used in connection with corrosive liquids. The actuating mechanism for automatically shutting off the nozzle is located in a housing or bodyguard generally designated 58.

The housing 58 is detachably secured to the nozzle by a pair of joining members 60 and another pair of joining members 62. Both these pairs are suitably spaced as shown in FIGURE 2, and are apertured at one end to receive roll pins which secure the housing to the nozzle body. Spacers 64 and 66 are secured on the nozzle body and are of a sufficient thickness to provide for an adequate clearance in which lever 20 can be manipulated. The pairs of joining members 60 and 62 are detachably secured to these spacers by roll pins 68 and 70.

The operating lever 20 is pivotally joined to the valve stem 44 by a valve pin 71. The upper end 72 of the lever 20 is pivotally joined to a stem 74 which is slidably mounted in a boss 76 of housing 58. The upper end 72 is pivotally joined to stem 74 by a generally rectangularly shaped split ring 78. The stem 74 slides in and out of the housing to provide a shiftable fulcrum means for lever 20 as will be later explained.

The latch means generally designated 80 are mounted in the housing 58 as shown. The housing also has a handle portion 82 which is used in connection with actuating lever 20. Lever 20 is pulled against the handle portion 82 to open the valve and the lever can be conveniently held in the open position by the lug member 84 as is known in the art.

The open end of the discharge spout 16 has a conduit 90 located therein as shown in FIGURE 2. The discharge spout is apertured as at 91 to permit the conduit 90 to be led out of the spout as shown in FIGURE 2 and the conduit is sealingly secured to the spout as by welding. The conduit 90 is joined to conduit section 92 by coupling member 94 which provides for an airtight connection. The conduit section 92 is connected to a pressure fitting 96 which is operatively connected to diaphragm switch 98, which is located inside housing 58.

When filling a tank with liquids, the discharge spout is placed in an opening of the tank and a split circular clamp 86 is positioned on the spout for the particular level of liquid in the tank at which the nozzle will automatically shut off. The clamp 86 is adjustably positioned on the spout by means of a fastener 88. When the level of liquid in the tank covers the open end of conduit 90, it traps a column of air within the conduit. As the level of liquid rises in the tank, the pressure on this trapped column of air increases, and accordingly, actuates the diaphragm switch 98 which is in housing 58. Upon actuation, the latch means 80 are released and valve spring 56 moves the valve member 18 to closed position thereby shutting off the supply of liquid in the tank.

The outer end of valve stem 44 has a resilient bumper 102 thereon which pushes plunger 104 when the lever 20 is moved to the open position. The plunger 104 is slidably mounted in housing 58 and actuates micro-switch 106 is a normally open switch. Switch 106 has one lead 108 which is connected to one terminal of battery 110 via electrically conducting spring member 112. The spring member 112 is conveniently located inside an insulating sleeve 114 as shown, and the battery is located in handle portion 82 as shown. A threaded plug member 116 is used to retain the battery in the handle portion and ground the other terminal of the battery.

The other lead 118 from the switch 106 is connected to a solenoid 120 which has a bracket 122 and fasteners 123 to secure the solenoid to the housing. The other lead 124 from the solenoid 120 is connected to the diaphragm switch 98 as shown in FIGURES 3 and 4. The remaining lead 126 from diaphragm switch 98 is conveniently grounded.

The diphragm switch 98 consists of a flexible diaphragm 128 which is positioned against the cover 100 of the housing 58. Suitable arcuately shaped insulating segments 130 are used to make the perimeter of the diaphragm air-tight and are secured to the cover 100 by fasteners 132 as shown in FIGURES 4 and 5. Lead 124 from the solenoid is connected to conducting leaf 134 as shown. This leaf 134 has an insulating block member 136 thereon which rests against diaphragm member 128. The block member 136 is secured to a leaf 134 by a fastener which also forms contact 138. Another electrically conducting leaf 140 is secured to the insulating segments 130 as shown and the leaf 140 is connected to lead 126. Another insulating block member 142 is secured to the leaf 140 by a suitable fastener which also forms the contact 144. There is a suitable bracket 146 provided for supporting the screw 147 which bears against block member 144 and adjusts the spacing between the contacts 138 and 144. When the pressure in conduit 90 reaches a predetermined amount, the diaphragm member 128 will be pushed towards contact 144 and accordingly the switch will be closed.

It should be noted that switches 106 and 98 are series connected switches, and switch 106 provides a safety measure in that the solenoid will be actuated only when switch 106 is first closed.

The solenoid 120 has a plunger 148 extending therefrom which is connected to a latch lever 150 by a pin 152 as shown in FIGURE 3. The latch lever 150 is pivotally mounted between its ends by a pin 154 which is secured to the housing 58. The forward end of the latch lever has a U-shaped member 156 which is secured at its middle to the latch lever 150 as shown in FIGURE 6. The legs of the U-shaped member are suitably apertured to receive pin or roller member 158 as shown in FIGURES 7 and 8. Another U-shaped member 160 is used to retain the roller 158 onto the latch lever and the member 160 may be soldered to member 156.

The roller 158 fits into a notched recess 162 on the curved link 164 which forms part of the latch means 80. The curved link 164 is pivotally joined to stem 74 as shown in FIGURE 7. The other end of link 164 is pivotally joined to a pair of spaced links 168 by pin means 170. The spaced links 168 are mounted on a bushing member 171 which is apertured to receive fastener 172, which secures the bushing to a boss 174 on the housing 58 as shown in FIGURE 6.

It should be noted that the latch means as shown in FIGURE 1 is in the latched position, and in this position, the valve can be actuated by lever 20 to be opened. The latch means as viewed in FIGURE 7 is in the unlatched position, and in this position, the fulcrum 72 of the lever 20 is in a second position in which the valve cannot be opened.

When the roller 158 is removed from the notch 162 upon energization of solenoid 120, the spring 56 of the valve member pulls the stem 74 to the position shown in FIGURE 7. A cushioning member 175 as shown in FIGURE 7 provides a cushion against which the curved link 178 abuts when the valve member is driven to the closed position.

The curved link **164** has one end of spring member **176** secured thereto by suitable pin **178**. The remaining end of the spring **176** is secured to the housing **58** by a fastener **178** as shown in FIGURE 6. The valve spring **56** is, of course, much stronger than spring **176**. The spring member **176** returns the curved link to the position shown in FIGURE 1 in which the roller **158** engages the notch **162**. A suitable spring member **180** mounted on the plunger **148** of the solenoid also biases the pin **158** towards the notch **162**. The curved link **164** provides a near dead center lock for retaining the stem member **74** in the position shown in FIGURE 1. A suitable set screw **172'** which is mounted in the housing is used to adjust the position of the link **164**.

The curved link **164** is adjusted by screw **172'** to provide for an adjustment in which the link abuts the screw before reaching dead center. In this position, only a small force is necessary by roller **158** to keep link **164** from being released and moving to the position shown in FIGURE 7.

As soon as the latch means is released the stem **74** moves to the left as viewed in FIGURE 7. In this position, the lever **20** is ineffective for opening the valve as the fulcrum for end **72** of lever **20** has moved too far to the left. Only when the fulcrum means comprising stem **74** is shifted to the position shown in FIGURE 1 is the lever **20** effective for opening the valve.

The lever **20** is usually retained behind lug **84** when the valve is in the open position and when the latch means is released upon filling the tank to a predetermined level, the lever **20** will jump free of the lug **84** and return to the FIGURE 1 position. In this position, switch **106** is opened and the solenoid is de-energized. This provides for long life of the battery which, in the embodiment shown, is a 6.75 volt Mercury battery which still had a useful life after having been used over 50,000 times.

The coupling member **94** shown in FIGURE 9 consists of a resilient sleeve member **180'** which is protected by a coil spring **182** which is positioned therearound. Plastic sleeve member **180** is corrosion resistant and provides for a tight air seal between conduit sections **90** and **92**.

FIGURE 10 is another modification of the flexible coupling shown in FIGURE 9. This connection consists of a tubular member **184** which has an integral flange thereon as shown. The insert **184** is positioned in the ends of conduit sections **90** and **92** as shown. Both these connections as shown in FIGURES 9 and 10 provide for a flexible coupling which enables the conduit section **92** to be detachably removed from the housing **58** without breaking the conduit.

While the latch means uses a curved link **164** as shown in FIGURE 7, other means are envisioned. For example, a semi-circular plate could be pivotally secured to the housing and have a notch on the periphery similar to notch **162**. A straight connecting link would then be pivotally joined at its ends to stem **74** and the semi-circular plate near the notch. The rest of the latch means would be the same.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions; and accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

What is claimed is:

1. In an automatic trip nozzle; a nozzle body having a flow passage therethrough with a seat, a valve member movable in the body to control said seat and having a stem projecting from the body, a first spring biasing said valve member toward said seat, an actuating lever pivotally connected at a point near one end of the stem, a rotary member having a radial point thereof pivotally connected to said one end of said lever, said radial point being radially spaced from the center of rotation of said rotary member, said rotary member having one rotated position wherein said lever is effective for lifting said valve member from said seat and a second rotated position wherein said lever is ineffective for lifting said valve member off said seat, a second spring biasing said rotary member toward its said first position, a latch operatively engageable with said rotary member to hold it is in its said first position, electromagnetic means connected to said latch energizable to move the latch to ineffective position, a battery, a first normally open switch in series with said battery and electromagnetic means operable into closed position by said actuating lever upon movement thereof into nozzle open position, a second normally open switch also in series with said battery and electromagnetic means, and pressure operable means connected to be sensitive to pressure downstream from said seat for closing said second switch, said first spring overcoming said second spring when said latch is moved to ineffective position so said valve member will close regardless of the position of said lever.

2. In an automatic trip nozzle; a nozzle body having a flow passage therethrough with a seat, a valve member movable in the body to control said seat, and having a stem projecting from the body, a first spring biasing said valve member toward said seat, an actuating lever pivotally connected at a point near one end of the stem, an axially moveable fulcrum member pivoted to said one end of said lever having a first axial position wherein said lever can move said valve member off its seat and a second axial position wherein said lever is ineffective for moving said valve member off its seat, a second spring biasing said fulcrum member toward its first position, a latch opeartively engageable with said fulcrum member to hold said fulcrum member in its said first position, electromagnetic means connected to said latch energizable to move the latch to ineffective position to release said fulcrum member from its said first position, a battery, a first normally open switch in series with said battery and electromagnetic means operable into closed position by said actuating lever upon movement thereof into nozzle open position, a second normally open switch also in series with said battery and electromagnetic means, a diaphragm actuator associated with said second switch and sensitive to pressure to close said second switch, said nozzle including a discharge spout, and a tube leading from said diaphragm to the outlet end of said spout to supply pressure to said diaphragm when the outlet end of said spout is closed by liquid, said first spring overcoming said second spring upon movement of said latch to ineffective position so said valve member will close regardless of the position of said lever.

3. In an automatic trip nozzle; a nozzle body having a flow passage therethrough with a seat, a discharge spout on the body forming the downstream end of said passage, a valve member in the body spring urged toward said seat and having a stem projecting from the body, a lever pivoted between the ends to said stem, a fulcrum member pivoted to one end of said lever and movable from a first position wherein said lever is effective for moving said valve member away from said seat to a second position wherein said lever is ineffective for moving said valve member away from said seat, a spring biasing said fulcrum member toward its first position with a smaller force than the force exerted on said fulcrum member by the spring acting on said valve member, a latch operatively engageable with said fulcrum member to retain it in its first position, a solenoid energizable to withdraw said latch, a battery and first and second normally open switches in series with said solenoid, means operated by said lever in its nozzle open position for closing said first switch, a diaphragm sensitive to pressure for closing said second switch, and a tube leading from said diaphragm to the outlet end of said discharge spout for supplying pressure to said diaphragm when liquid closes the outlet end of said spout.

4. In an automatic trip nozzle; a nozzle body having a flow passage therethrough with a valve seat therein, a dis-

charge spout on the downstream end of said passage, a valve member movable in the body to control said seat and having a valve stem projecting from said body, first spring means biasing said valve member towards said seat, an actuating lever pivoted between its ends to said valve stem, a housing detachably secured to said nozzle body, shiftable fulcrum means mounted in said housing and operatively connected to one end of said lever and shiftable between first and second positions, said lever being effective in only the first position of said fulcrum means for moving said valve member away from said seat to open the passage, latch means mounted in said housing for releasably holding said fulcrum means in said first position, electrically operated means operatively connected to said latch means for moving said latch means to release said fulcrum means thereby permitting said spring means to urge said valve member towards said seat to close said passage and to urge said fulcrum means to said second position wherein said lever is ineffective for moving the valve member to open said passage, said electrically operated means comprising a normally open pressure actuated switch, a conduit having one open end in said discharge spout and the other open end operatively connected to said pressure switch, a source of voltage, and a solenoid operatively connected to said latch means and energizable to move said latch means away from said fulcrum means, said source of electrical energy and switch being in series with said solenoid, and second spring means biasing said fulcrum means toward its said first position, said second spring means being overcome by said first spring means upon movement of said latch means into release position.

5. The nozzle as claimed in claim 4 in which said latch means comprises a link member pivoted to said fulcrum means, said link member being movable to a near dead center position when said latch means is in said first position, a latch lever engageable wtih said link member to releasably retain said link member in said near dead center position, said second spring means urging said link member to said near dead center position and thereby biasing said fulcrum means toward its first position, said solenoid having a plunger connected to said latch lever to withdraw it from said link member to release said link member and fulcrum means upon actuation of said solenoid.

6. The nozzle as claimed in claim 5 in which said shiftable fulcrum means comprises, a stem slidably mounted in said housing and having a first end extending from said housing and a second end therein, means pivotally joining said first end of said stem to said one end of said actuating lever, said latch means further comprising a second link member having one end pivotally mounted in said housing and also having a free end, said link member which is movable to said near dead center position being curved and having one end pivotally joined to said second end of said stem and the other end pivotally joined to the free end of said second link, said curved link member having a notch on the outer perimeter thereof to receive a roller, said latch lever having a roller thereon adapted to be moved into said notch to releasably hold said curved link member from movement away from said dead center position.

7. The nozzle as claimed in claim 5 further comprising a normally open contact switch means in series with said pressure actuated switch, battery and solenoid and adapted to be closed by said valve stem when said fulcrum means is in said first position and said flow passage is substantially opened.

8. An automatic trip nozzle for discharging liquids into a container comprising a nozzle body having a flow passage therethrough and a valve seat therein, a discharge spout forming the downstream end of said passage, a valve member in said body movable between open and closed positions and having spring means urging said valve towards said seat and also having a stem projecting from said body, a lever pivoted between its ends to said stem, a housing detachably secured to said body, shiftable fulcrum means mounted in said housing and operatively connected to one end of said lever, said fulcrum means being shiftable between first and second positions in which first position said lever is effective for moving said valve member to open position, biasing means urging said fulcrum means toward said first position, latch means in said housing releasably holding said fulcrum means in said first position, pressure actuated switch means operatively connected to said latch means, and a tube leading from said discharge spout to said switch means to actuate said switch means, said tube being vented to the atmosphere at said spout, the pressure on the air in said tube being increased as the vented end thereof is covered by liquid being discharged from said spout into said container to thereby actuate said switch means, said switch means when actuated being effective to move said latch means and thereby release said fulcrum means from said first position, said spring means on said valve member being effective to close said valve upon release of said latch means and to shift said fulcrum means to said second position in which said lever is ineffective for opening said valve member, said spring means being stronger than said biasing means.

9. An automatic trip mechanism for a nozzle having a flow passage therethrough and a valve member therein movable between open and closed positions for controlling the flow of liquid therethrough, a discharge spout on the downstream end of said passage, said valve member having a valve stem extending from said nozzle and spring means urging said valve member to closed position, said trip mechanism being of the type which automatically moves the valve member to closed position when the level of liquid in the container being filled rises above the discharge spout of the nozzle, said mechanism comprising a housing detachably secured to said nozzle, an actuating lever pivoted between its ends to said valve stem to move said valve member away from the closed position, latch means in said housing operatively connected to said actuating lever to releasably hold said valve member in open position, and electrically operated means in said housing for releasing said latch means upon said level of the liquid reaching a predetermined level above the end of said discharge spout and comprising; solenoid means operatively connected to said latch means for releasing said latch means upon energization, a battery, and a normally open pressure actuated switch means in series with said battery and said solenoid means, conduit means having one end operatively connected to said pressure switch means and the other end extending out of said housing, and coupling means on said last-named end, said coupling means being adapted to sealingly receive one end of a conduit having the remaining end positioned in said discharge spout.

10. The trip mechanism as claimed in claim 9 in which said electrically operated means further comprises a normally open contact switch means in series with said battery, solenoid and pressure switch means and also adapted to be closed by said valve stem when said actuating lever moves said valve member to open position.

11. An automatic trip mechanism for a nozzle having a flow passage therethrough and a valve member therein movable between open and closed positions for controlling the flow of liquid therethrough, a discharge spout on the downstream end of said passage, said valve member having a valve stem extending from said nozzle and spring means urging said valve member to closed position, said trip mechanism being of the type which automatically moves the valve member to closed position when the level of liquid in the container being filled rises above the discharge spout of the nozzle, said mechanism comprising a housing detachably secured to said nozzle, an actuating lever pivoted between its ends to said valve stem to move said valve member away from the closed posi-

tion, shiftable fulcrum means mounted in said housing and operatively connected to one end of said lever and shiftable between first and second positions in which first position said lever is effective to move said valve member away from said closed position, latch means mounted in said housing and operatively connected to said fulcrum means to releasably hold said fulcrum means in said first position, a battery, and a normally open pressure actuated switch means in series with said battery and said solenoid means, conduit means having one end operatively connected to said pressure switch means and the other end extending out of said housing, and coupling means on said last-named end, said coupling means being adapted



to sealingly receive one end of a conduit having the remaining end positioned in said discharge spout.

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LAVERNE D. GEIGER, *Primary Examiner.*

E. J. EARLS, *Assistant Examiner.*