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 [21] Appl. No. **876,209**
 [22] Filed **Dec. 1, 1969**
 [45] Patented **July 27, 1971**
Continuation of application Ser. No.
566,906, July 18, 1966, now abandoned,
which is a continuation of application Ser.
No. 809,472, Mar. 13, 1969, now abandoned.

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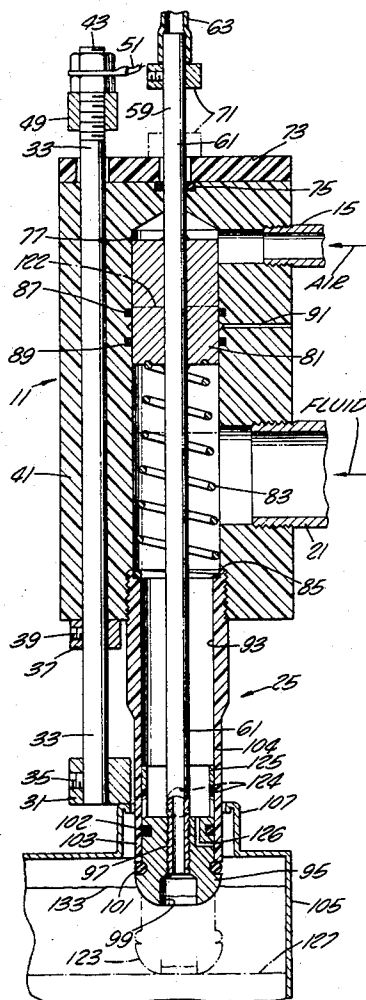
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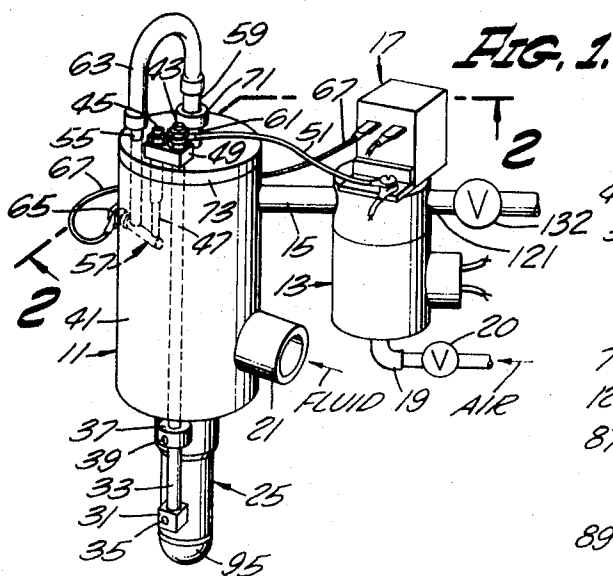
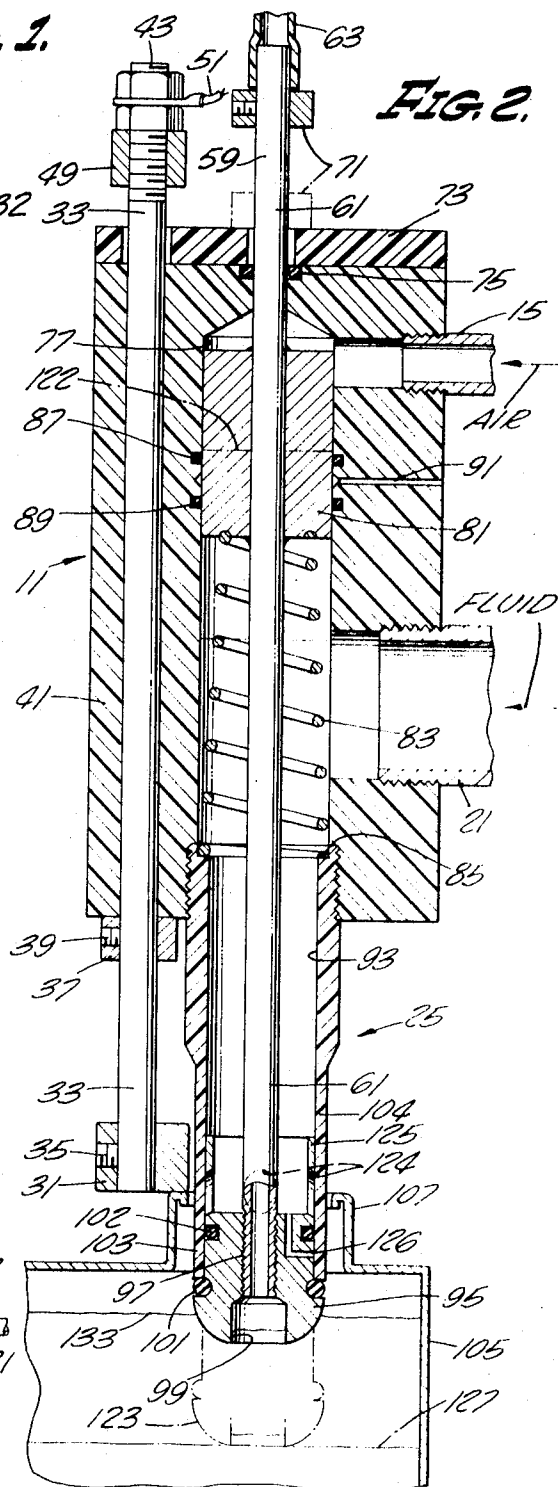
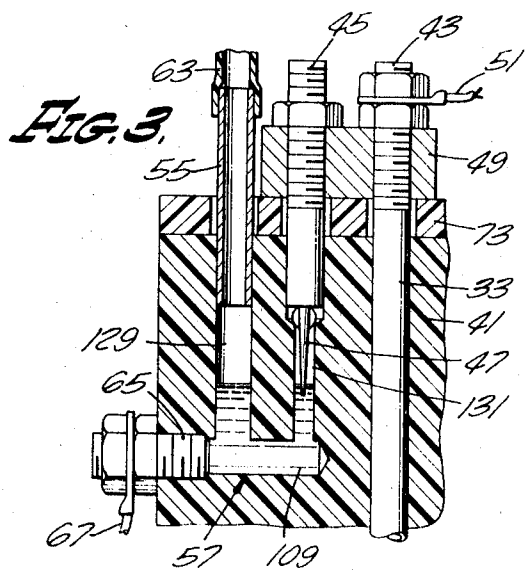
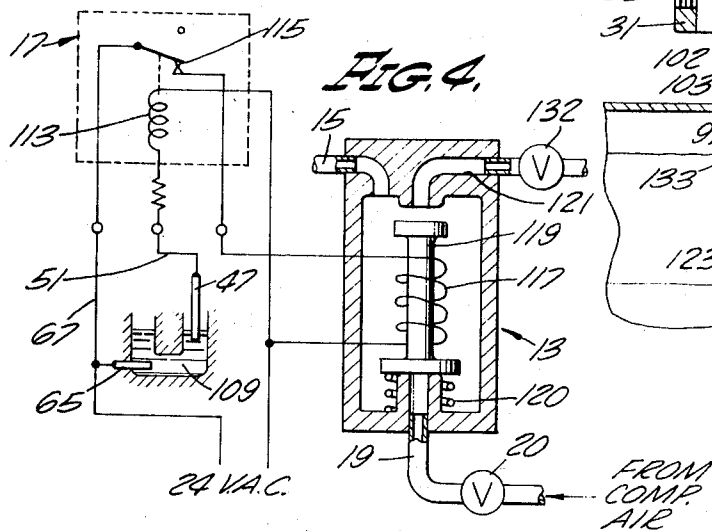
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[54] **AUTOMATIC CONTAINER-FILLER VALVE**
43 Claims, 4 Drawing Figs.

[52] U.S. Cl..... **141/46,**
33/209, 137/392, 141/128, 141/198, 141/351,
200/152, 277/59
 [51] Int. Cl..... **B65b 31/06**
 [50] Field of Search..... **33/209,**
206.5, 206.5 L; 141/1, 7, 46, 59, 70, 114, 128,
156—162, 192—230, 331—362; 137/386, 389,
392; 200/152; 277/59

ABSTRACT: An electromechanical apparatus is disclosed for filling containers and shutting off automatically when the container is filled. The valve does not seal on the container to be filled and has an air-operated slide tip that can move up and down and which moves up as the level of the fluid rises to a predetermined level. The valve dribble-finishes the fill, instead of snapping shut, and reopens to meter fill slowly at the end of the fill cycle, thereby eliminating error resulting from premature shutoff which is ordinarily caused by roiling fluid, entrained air or surface suds.





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AUTOMATIC CONTAINER-FILLER VALVE

The present invention is a continuation of a previously copending application entitled Automatic Container Filler Valve, Ser. No. 566,906, filed in the name of the same inventor on July 18, 1966, now abandoned, which was a continuation of a copending application entitled Automatic Container Filler Valve, Ser. No. 809,472, filed in the name of the same inventor on Mar. 13, 1969, now abandoned.

A mechanical valve can be defined as any device by which the flow of liquid, air or other gas, or loose material in bulk, may be started, stopped, or regulated by a movable part which opens or obstructs passage. Valves have long been used in conjunction with automatic bottle-filling equipment for controlling the flow of the contents with which the bottle or other container is being filled.

Valves presently available are unsatisfactory in that they snap shut and do not reopen to meter fill slowly at the finish of the fill cycle. Roiling fluid, entrained air or surface suds mislead presently used automatic valves and they shut off prematurely and cannot reopen to correct for such low fill error. Suds blowing out the neck also mislead an airblowing type of existing automatic valve, requiring the use of extremely slow fill to avoid making any suds.

It is an object of the present invention, therefore, to provide a novel valve.

It is another object of the present invention to provide a valve for automatically filling containers and shutting off when the contents of the container reach a predetermined level.

It is still another object of the present invention to provide a bottle-filling valve which automatically shuts off unless an unfilled bottle is in place.

It is yet another object of the present invention to provide a valve for filling unsealed containers and thereby to eliminate bulging or collapsing of flexible containers.

It is another object of the present invention to provide a novel valve for dribble-finishing for both speed and, in addition, accuracy.

According to the preferred embodiment of the present invention, an automatic container-filler valve comprises an electromechanical device that does not seal on the container to be filled and which includes a manometer in conjunction with an electrolyte and electrodes which sense fluid entering the tip of the valve, and an air-operated slide-tip valve. With the valve in the normal position without a container or bottle under it to be filled, a movable electrode is in the electrolyte, and current passes through a switch and activates the coil of a three-way solenoid air valve, thereby holding the filling valve in its exhaust condition with respect to an air cylinder.

When a container is placed under the filling valve, the lip of the mount of the container forces a bar on the side of the valve to raise the movable electrode, breaking the electrical contact and deactivating the solenoid coil, and allowing pressurized air to reach a piston. Air pressure on the valve piston then forces the valve tip downward and opens the valve. The fluid which is to fill the container is under pressure and squirts out side holes in the valve tip and runs down the side of the container until the fluid reaches a predetermined level.

When the fluid enters an inverted cup on the valve tip, air is forced up through a tube to the manometer. The manometer legs shift until the electrolyte covers the tip of the electrode which had moved, and electrical contact is reestablished, which causes the air pressure on the piston to exhaust and the valve tip to be withdrawn from the fluid level. As soon as the valve tip is withdrawn, the operation is reversed and several more squirts of fluid will be made, until the valve tip can no longer withdraw from the fluid level.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The present invention, both as to its organization and manner of operation, together with further objects and advantages thereof, may best be understood by reference to the following description, taken in connection with the accompanying drawings, in which:

FIG. 1 is an isometric view of a valve according to the present invention.

FIG. 2 is a sectional view taken along the line 2-2 of FIG. 1.

FIG. 3 is a sectional view showing the manometer of FIG. 1 in detail.

FIG. 4 is a schematic view of the electrical switch and solenoid of FIG. 1.

Turning now to the drawings, FIG. 1 shows valve 11 coupled to solenoid air valve 13 by means of air inlet conduit 15. Switch 17 is mounted upon solenoid 13, to which air is supplied through conduit 19 and air needle valve 20. The fluid that is to fill the bottles is supplied to valve 11 through fluid inlet conduit 21, and exits through nozzle 25.

Bottle sensing bar 31 is affixed to shaft 33 by setscrew 35, and collar 37, which serves as an electrode stop, is affixed to shaft 33 by setscrew 39. Shaft 33 slidably passes through body member 41 of valve 11, and protrudes through the top thereof. The upper end 43 of shaft 33 and the upper extension 45 of movable electrode 47 are both screwed into and bolted to stop bar 49, which is electrically connected to switch 17 by conductor 51 and to electrode 47, and which also serves as an electrode stop.

The upper end 55 of manometer 57 is coupled to the upper end 59 of central tube 61 by hose 63. Stationary electrode 65 of manometer 57 is electrically connected to switch 17 by conductor 67. Collar 71 is mounted upon central tube 61 and limits the downward motion thereof when it abuts mounting plate 73 on the top of body member 41.

FIG. 2 shows the described valve more clearly, especially the internal construction thereof. Central tube 61 passes through mounting plate 73 and O-ring 75 in body member 41 into chamber or cylinder 77. Piston 81 is soldered or welded to tube 61, which passes through it. Compression spring 83 about tube 61 abuts against retaining shoulder 85 and aids the fluid pressure within the lower portion of cylinder 77 in forcing piston 81, and hence tube 61, upward. Air is free to enter the upper portion of cylinder 77, i.e., above piston 81, through air inlet conduit 15. Fluid is free to enter the lower portion of cylinder 77, i.e., below piston 81, through fluid inlet conduit 21. O-rings 87 and 89, separated by grease vent 91, seal piston 81 to the walls of cylinder 77, so as to prevent the passage of air downward past piston 81, or the passage of fluid upward past piston 81.

The lower extremity of cylinder 77 opens into chamber 93 within nozzle 25. Spout 95 is the lowest extremity of nozzle 25. The lower end 97 of central tube 61 is screwed into spout 95. Lower end 97 opens into chamber 99.

The valve as shown in FIG. 2 is in the normally closed condition, in which case spring 83 has pushed piston 81, and consequently spout 95, upward until O-ring 101 abuts against the lower end 103 of sleeve 104 of nozzle 25, and prevents the further flow of fluid out of nozzle 25. FIG. 2 shows the condition of the valve 11 after it has just been inserted within the container 105, which can be a bottle or an F-style can. Mouth 107 of container 105 abuts against bottle sensing bar 31, and as valve 11 is automatically lowered further into container 105, shaft 33 will be raised, until electrode 47 is withdrawn from the electrolyte and the electrical circuit is opened.

FIG. 3 shows how when shaft 33 is raised, stop bar 49 and electrode 47 are also raised. The electric circuit is broken or opened when electrode 47 is lifted completely out of contact with electrolytic solution 109, which is approximately a 5 percent solution of phosphoric acid, by way of example only.

FIG. 4 shows, in schematic form, how the lifting of electrode 47 out of electrolytic solution 109 opens the control circuit and deenergizes coil 113 of switch 17, thereby causing contact 115 of switch 17 to open, and removing the power from coil 117 of three-way solenoid 13. As long as coil 117 is energized, plunger 119 remains in the position shown in FIG. 4 and prevents the air supplied to needle valve 20 by an air compressor from passing through the solenoid.

When the coil 117 is deenergized, compression spring 120 forces plunger 119 to move so as to allow the air from needle valve 20 to pass through conduit 19 into solenoid 13. The new

position of plunger 119 also seals air exhaust port 121 and permits the air from needle valve 20 to pass through solenoid 13 into chamber 77 through air-inlet conduit 15. The air pressure within chamber or cylinder 77 increases and forces piston 81 to move downward, compressing spring 83.

As piston 81 moves downward, as shown by phantom line 122, tube 61 moves downward also, until spout 95 which is rigidly connected thereto reaches the position shown by phantom line 123 in FIG. 2. Further downward motion is prevented by collar 71 abutting against plate 73. As a consequence of the downward movement of spout 95, lower end 103 of sleeve 104 loses contact with O-rings 101 and 102, and the fluid which is to fill container 105 is free to pass through inlet conduit 21 into the lower portion of chamber 77 below piston 81, and out through the four slanted outlet holes 124 in sleeve 125, and also out through hole 126, which exits from spout 95 between O-rings 101 and 102. The needle valve 20 is used in order to cut down the flow of air so that spout 95 moves downward at the desired regulated speed, such as, by way of example only, about 1 inch per second.

The fluid fills the containers 105 until it reaches the top of spout 95, as represented by phantom line 127. As the fluid rises a little higher, it compresses the air within chamber 99 of spout 95, which effect is transmitted through central tube 61, hose 63, and upper end 55 of manometer 57, and causes the level of the electrolytic solution 109 shown in FIG. 3 to fall within left leg 129 and to rise within right leg 131 until it makes electrical contact with electrode 47. As soon as the circuit through electrode 47 is closed, coil 113 of switch 17 is energized, contact 115 of switch 17 is closed, and coil 117 of solenoid 13 is energized. As a consequence, the air passing through conduit 19 is cut off, and the air within chamber 77 passes through conduit 15 and escapes rapidly through air exhaust port 121. Needle valve 132 is used in order to be able to control the rate at which the air escapes through exhaust port 121.

The resulting sudden decrease in air pressure within chamber 77 permits spring 83 to force piston 81 upward, and fluid outlet holes 124 and 126 are again sealed by O-rings 101 and 102 coming in contact with sleeve 104.

As spout 95 rises about the level of the contents of container 105, the electrical circuit is broken and spout 95 again descends. As a consequence of the relatively slow descent of spout 95 caused by needle valve 20, spout 95 will only move downward sufficiently for hole or opening 126 to be exposed, and not the larger holes 124, resulting in a small stream instead of an unrestricted flow. The described process keeps cycling until the contents reaches the level shown by phantom line 133 in FIG. 2. The result is a container filled at high speed with a dribble finish for accuracy.

If the manometer level is set so that the level of the electrolytic solution 109 in leg 131 will be about one-eighth to one-quarter of an inch below the tip of movable electrode 47 when it is lifted out of the electrolyte, surface suds will have little or no effect on the shutoff point, since they will not significantly enter the inverted cup configuration of chamber 99 in the tip of spout 95. Thus, the valve will sense the level of the fluid contents of the container 105 and will not be misled by suds.

Bottle sensing bar 31 will move downward as valve 11 is withdrawn from container 105, so that electrode 47 will drop downward faster than the level of electrolytic solution 109 will fall. Thus, electrode 47 will maintain contact with electrolytic solution 109 as valve 11 is withdrawn from container 105, and the valve 11 will remain in its shutoff condition.

Although switch 17 has been described as a conventional relay utilizing a coil and a set of contacts for ease of description, in practice a TRIAC silicone gate-controlled AC switch manufactured by General Electric Company under the designation TRIAC SC40B has been used very satisfactorily. The TRIAC is a bidirectional triode semiconductor switch which may be gate triggered from a blocking to conducting state for either polarity of applied voltage. The device will per-

form most of the functions of two silicon-controlled rectifiers connected inverse parallel. Switch 17 is used so that sufficient power will be available for the operation of solenoid coil 117, while only a very small current will be required in the electrolyte.

While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention in its broader aspects, and, therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of this invention.

I claim:

1. Apparatus for filling containers with fluid supplied under pressure, comprising:

- a. fluid-level sensing means, including tip means movable in generally upward and downward directions,
- b. filling means defining a fluid path adapted to supply fluid from a fluid source to a container and including valve means in said fluid path, said valve means having open and closed positions, and
- c. control means actuated by said fluid-level sensing means and alternately moving said tip means into its up and down positions in response to the level of the fluid in the container being filled, said control means opening said valve means when said valve means is closed before said fluid level has reached the level of said tip means in its upward position.

2. Apparatus as defined in claim 1 including, in addition, means for partially restricting the flow of said fluid from said valve means.

3. Apparatus as defined in claim 1 including, in addition, container-sensing means coupled to said fluid-level sensing means, said control means moving said tip means downward when said container-sensing means senses the presence of a container in position to be filled.

4. Apparatus as defined in claim 3 in which said control means reopens said valve means when said tip means is moved above the level of said fluid, provided said container-sensing means still senses the presence of said container.

5. Apparatus as defined in claim 4 including, in addition, means for regulating the speed at which said tip means moves.

6. Apparatus as defined in claim 5 in which said valve means can be moved into withdrawn and extended positions by said control means and is closed when in its withdrawn position and open when in its extended position.

7. Apparatus as defined in claim 6 in which said valve means can be moved, in addition, into a partially extended position by said control means, the flow of said fluid from said valve being partially restricted when said valve means is in its partially extended position.

8. Apparatus as defined in claim 7 in which said tip means is an opening which is obstructed by said fluid when said fluid rises in said container to the level of said tip means, said fluid-sensing means operating said control means as a consequence thereof.

9. Apparatus as defined in claim 1 in which said fluid-level sensing means includes a manometer having first and second legs, first and second electrodes, an electrolyte, and means for inserting said first electrode into said electrolyte within said first leg and for the withdrawal thereof.

10. Apparatus as defined in claim 9, including, in addition, container-sensing means coupled to said first electrode inserting and withdrawing means for the operation thereof when said valve means is in position with respect to the container to be filled.

11. Apparatus as defined in claim 10, in which said control means utilizes pressure means to move said valve means, and in which the operation of said control means depends upon the position of said first electrode within said first leg.

12. Apparatus as defined in claim 11, in which said pressure means is a supply of air under pressure.

13. Apparatus as defined in claim 12, in which said filling means includes spout means, and in which said tip means is an opening within said spout and is coupled to said second leg of said manometer.

14. Apparatus as defined in claim 13, in which said spout means includes at least one additional opening through which said fluid is emitted when said valve means is opened.

15. Apparatus as defined in claim 14, in which said valve means can be moved into withdrawn, extended and partially extended position by said control means, and is closed when in its withdrawn position, open when in its extended position, and partially open when in its partially extended position.

16. Apparatus as defined in claim 15, including, in addition, a piston fixedly coupled to said valve for the movement thereof, and a cylinder associated with said piston, said pressure means being coupled to said piston and cylinder.

17. Apparatus as defined in claim 16, in which said second electrode is movable and is inserted within said electrolyte when said valve means is not inserted within said container, and in which said control means includes a three-way solenoid air valve which shuts off said air supply when the coil of said solenoid is electrically activated, and including, in addition, switch means which activates said coil when said movable electrode is inserted within said electrolyte.

18. Apparatus as defined in claim 17 in which said inserting and withdrawing means withdraws said movable electrode from said electrolyte when said container sensing means is moved by the container to be filled as said valve means is positioned within said container, and in which said solenoid permits said air to pass into said cylinder above said piston when said movable electrode is withdrawn from said electrolyte, thereby forcing said piston and valve means to move downward, "opening" said valve means and permitting said fluid to flow from said valve and fill said container.

19. Apparatus as defined in claim 18, in which said filling means includes spout means having a pair of O-rings and at least one additional opening therebetween.

20. Apparatus as defined in claim 1 in which said filling means includes spout means having a pair of O-rings and at least one opening therebetween.

21. Apparatus for filling containers with fluid supplied under pressure, comprising:

- a. fluid-level sensing means including tip means and a manometer having first and second legs, first and second electrodes, an electrolyte, and means for making and breaking contact between said first electrode and said electrolyte within said first leg, said tip means being coupled to one of said legs of said manometer,
- b. filling means defining a fluid path adapted to supply fluid from a fluid source to a container and including valve means in said fluid path, said valve means having open and closed conditions and said filling means including spout means, said spout means including at least one opening through which said fluid is emitted when said valve means is in its open condition, and
- c. control means activated by said fluid-level sensing means and in response thereto either opening or closing said valve means, the operation of said control means depending upon whether or not said first electrode is in contact with said electrolyte within said first leg.

22. Apparatus as defined in claim 21 including, in addition, container-sensing means coupled to said means for making and breaking contact for the operation thereof when said valve means is in position with respect to the container to be filled.

23. Apparatus as defined in claim 22 in which said means for making and breaking contact between said first electrode and said electrolyte includes means for inserting said first electrode into said electrolyte and for the withdrawal thereof.

24. Apparatus for filling containers with fluid supplied under pressure, comprising:

- a. fluid-level sensing means, including tip means movable in generally downward and upward directions,

b. filling means defining a fluid path adapted to supply fluid from a fluid source to a container and including valve means in said fluid path, said valve means having open, partially restricted and closed positions, and

c. control means activated by said fluid-level sensing means and moving said tip means in said generally downward and upward directions in response to the level of the fluid in the container being filled, the flow of said fluid from said valve means being partially restricted when said control means has moved said tip means to a position between its extreme downward and upward positions.

25. Apparatus for filling containers with fluid supplied under pressure, comprising

- a'. means defining a fluid path adapted to supply fluid from a fluid source to a container,
- a. fluid-level sensing means, including tip means movable in generally downward and upward directions,
- b. valve means in said fluid path having open and closed positions,
- c. control means connected to said fluid-level sensing means and said valve means, said control means being actuated by said fluid-level sensing means for moving said tip means in said generally downward and upward directions in response to the level of the fluid in the container being filled and for controlling the operation of said valve means, and
- d. restriction means in said fluid path partially restricting the flow of said fluid from said valve means when said control means has moved said tip means to a position in between said generally downward and upward directions.

26. Apparatus for filling containers with fluid supplied under pressure, comprising

- a'. means defining a fluid path adapted to supply fluid from a fluid source to a container,
- a. fluid-level sensing means, including tip means movable in generally downward and upward directions,
- b. valve means in said fluid path having at least open and closed positions,
- c. control means connected to said fluid level sensing means and said valve means, said control means being activated by said fluid-level sensing means for moving said tip means in said generally downward and upward directions in response to the level of the fluid in the container being filled and for controlling the operation of said valve means, and
- d. restriction means in said fluid path partially restricting the flow of said fluid from said valve means when said control means has moved said tip means to a position in between said generally downward and upward directions.

27. Apparatus for filling containers, comprising

- a'. means defining a fluid path adapted to supply fluid from a fluid source to a container,
- a. valve means in said path for regulating the supply of fluid to a container, said valve means having a closed position wherein no fluid is supplied to said container and having a plurality of operative positions wherein fluid is supplied to said container,
- b. said apparatus including fluid-level sensing means for sensing a predetermined fluid level in said container, said sensing means being movable to a plurality of positions,
- c. control means connected to said valve means and to said fluid-level sensing means responsive to said fluid-level sensing means for controlling the positioning of said sensing means, said control means responding to said sensing means and causing said valve means to move at least to its closed position upon the fluid in said container reaching a predetermined level.

28. Apparatus as in claim 27 wherein

said plurality of operative positions of said valve means includes an open position for allowing a full flow of fluid into the container being filled and a restricted position for allowing a restricted flow of fluid into the container being filled, and

said control means causes said valve means to move to its restricted position upon the fluid in said container reaching a first level for providing a final slow fill of the container, and causes said valve means to move to its closed position upon the fluid in said container reaching a second higher level.

29. Apparatus as in claim 28 wherein,

said control means includes second settable valve means coupled with said first-named valve means for regulating the rate of movement of said first valve means.

30. Apparatus in claim 27 including

means responsive to the positioning of a container and the valve means in a predetermined cooperative relationship for setting pressure responsive means of said control means and for causing said valve means to move to a first operative position, said first operative position being an open position for rapid fill of said container, and

said pressure responsive means being responsive to fluid level in the container for causing said valve means to move from its first operative position.

31. Apparatus for filling containers with fluid, comprising,

a'. means defining a fluid path adapted to supply fluid from a fluid source to a container,

a. valve means in said path said valve means having at least first and second positions of operation comprising respectively a closed position wherein fluid is prevented from flowing to a container and an open position wherein fluid is allowed to flow to said container,

b. said apparatus including fluid-level sensing means responsive to the level of fluid in said container, said fluid level sensing means being movable to a plurality of positions for detecting a plurality of fluid levels with said container, and

c. control means coupled with said valve means for controlling said valve means in response to fluid-level as sensed by said fluid-level sensing means and for controlling the positioning of the sensing means, said control means comprising first means for moving said valve means to at least one of the positions thereof and comprising second means responsive to said fluid-level sensing means for controlling the operation of said first means.

32. Apparatus as in claim 31 wherein

said second means includes second valve means responsive to a pressure condition sensed by said fluid-level sensing means for controlling the operation of said first means in positioning said first valve means.

33. Apparatus as in claim 32 wherein

said second valve means comprises a control fluid inlet and first and second control fluid outlets, said first control fluid outlet being coupled with said first means, and restriction means coupled with said control fluid inlet and said second outlet for regulating the rate of movement of said first valve means.

34. Apparatus as in claim 33 wherein

said restriction in said control fluid inlet is settable for regulating the rate of movement of said valve means to said open position, and said restriction in said second control fluid outlet is settable for regulating the rate of movement of said first valve means from its open position.

35. Apparatus as in claim 31 wherein

said second means includes second valve means responsive to a pressure condition sensed by said fluid-level sensing means, and

said second valve means comprises a control fluid inlet for receiving a control fluid and a control fluid outlet, said control fluid outlet being coupled with said first means for controlling the positioning of said first valve means, and restriction means coupled with said control fluid inlet for regulating the rate movement of said first valve means to said open position.

36. Apparatus as in claim 31 wherein

said second means includes second valve means responsive to a pressure condition sensed by said fluid-level sensing means, and

said second valve means comprises a control fluid inlet for receiving a control fluid, and first and second control fluid outlets, said first control fluid outlet being coupled with said first means for controlling the positioning of said first valve means, and

restriction means coupled with said second outlet for regulating the rate of movement of said first valve means from its open position.

37. Apparatus for filling containers with fluid, comprising

a'. means defining a fluid path adapted to supply fluid from a fluid source to a container,

a. valve means in said fluid path for filling containers, said valve means having a first closed position wherein fluid is prevented from flowing to a container, a second open position wherein fluid is allowed to flow to said container, and a third position intermediate said closed and open position wherein a restricted flow of fluid is provided to said container,

b. fluid-level sensing means responsive to the level of fluid in said container, said fluid-level sensing means sensing a plurality of fluid-levels in said container comprising at least a first fluid-level and a second higher fluid-level, and

c. control means coupled with and responsive to said fluid-level sensing means, and coupled with said valve means for controlling the positioning of said valve means in response to fluid level as sensed by said fluid-level sensing means, said control means comprising second valve means for controlling the rate of movement of said first valve means, said second valve means initially causing said first valve means to move to its second position and being responsive to said fluid-sensing means for positioning said first valve means to said third position when said fluid-level in said container is above said first level.

38. Apparatus as in claim 37 wherein

said second valve means includes a control fluid inlet for receiving a control fluid and a fluid outlet coupled with said first valve means for controlling the operation of said first valve means, and

restriction means coupled with said control fluid inlet for regulating the rate of movement of said first valve means to said second position thereof.

39. Apparatus as in claim 37 wherein

said second valve means comprises a control fluid inlet for receiving a control fluid, and first and second control fluid outlets, said first control fluid outlet being coupled with said first valve means for controlling the operation of said first valve means, and

restriction means coupled with said second control fluid outlet for regulating the rate of movement of said first valve means from said second position thereof.

40. Apparatus as in claim 37 wherein

said fluid-level sensing means includes cavity means in said valve means and includes pressure responsive means, said cavity means serving to impart a pressure change to said pressure sensing means in response to fluid-level in said container, and said pressure responsive means being coupled with said second valve means for controlling the operation thereof.

41. Apparatus as in claim 40 including

third means responsive to the positioning of a container and said first valve means in a predetermined cooperative relationship for setting said pressure responsive means and causing the same to activate said second valve means to cause said first valve means to move to its second position for initial filling of said container.

42. Apparatus as in claim 41 wherein

said pressure sensing means comprises a manometer having an electrolyte and movable electrode, and said third means sets said electrode to a predetermined position upon said positioning of said container and said first valve

means in said predetermined cooperative relationship, and

said cavity of said fluid-level sensing means communicates with a chamber within which said electrolyte is contained for causing said electrolyte to contact said movable electrode when said fluid-level in said container reaches said first level.

43. Apparatus for filling containers with fluid, comprising

40'. means defining a fluid path adapted to supply fluid from a fluid source to a container,

a. valve means in said fluid path for filling containers, said valve means having a first closed position wherein fluid is prevented from flowing to a container, a second open position wherein fluid is allowed to flow to said container, and a third position intermediate said closed and open positions wherein a restricted flow of fluid is provided to said container, said valve means being controlled to move to its second position for initial rapid fill of said container and being controlled to move from said second position

through said third position toward said first position for a final slower fill of said container, ultimately moving to said first position after said container is filled to a predetermined level,

b. fluid-level sensing means responsive to the level of fluid in said container and being movable in response to the level of fluid in said container, said sensing means being responsive to a first fluid level in said container for moving said valve means from its second position, and being responsive to a second higher fluid-level for causing said valve means to ultimately move to said first position thereof while providing said final slower fill when the level of fluid in said container is between said first and second fluid levels, and

c. control means coupled with and responsive to said fluid-level sensing means, and coupled with said valve means for controlling the positioning of said valve means as a function of the fluid-level sensed by said sensing means.

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