United States Patent [19]

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[11] **3,786,837**

[45] **Jan. 22, 1974**

[54] **FILLING APPARATUS**

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[22] Filed: **Nov. 26, 1971**

[21] Appl. No.: **202,684**

Related U.S. Application Data

[62] Division of Ser. No. 4,863, Jan. 22, 1970, abandoned.

[52] **U.S. Cl.**..... **137/625.32,** 251/155, 251/147, 251/209, 251/315, 137/625.3

[51] **Int. Cl.**..... **F16k 5/10,** F16k 23/00

[58] **Field of Search**... 251/155, 153, 154, 209, 152, 251/147; 137/625.32, 625.31; 222/422, 568, 554; 239/562

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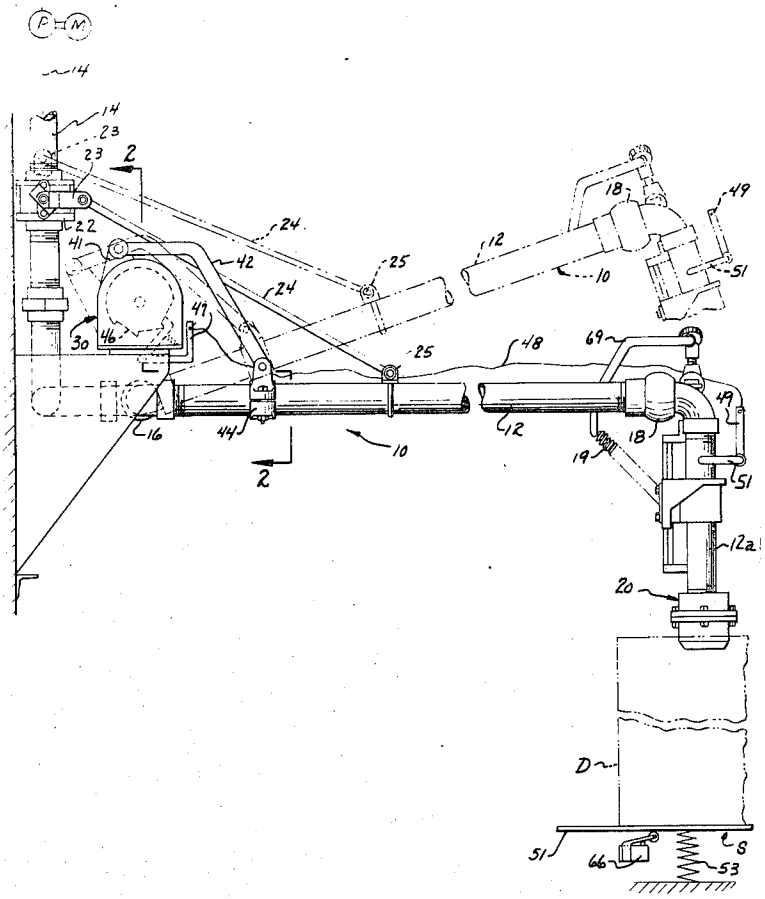
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[57] **ABSTRACT**

An outwardly extending discharge line is pivotally connected to a supply line. A torsion spring unit urges the discharge line from a lower dispensing position to a raised position. Apparatus is provided for automatically opening and closing a valve in the supply line in response to movement of the discharge line between its positions. An outlet valve is provided at the outlet of the discharge line and is opened and closed by a pneumatic cylinder controlled by movement of a scale. The outlet valve is a ball-type valve having a valve insert with openings of a size such that surface tension of the fluent material will prevent dripping. The insert is formed of a bearing material and is adjustable against the ball valve element to accommodate any wear.

3 Claims, 7 Drawing Figures



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SHEET 1 OF 2

Fig. 1

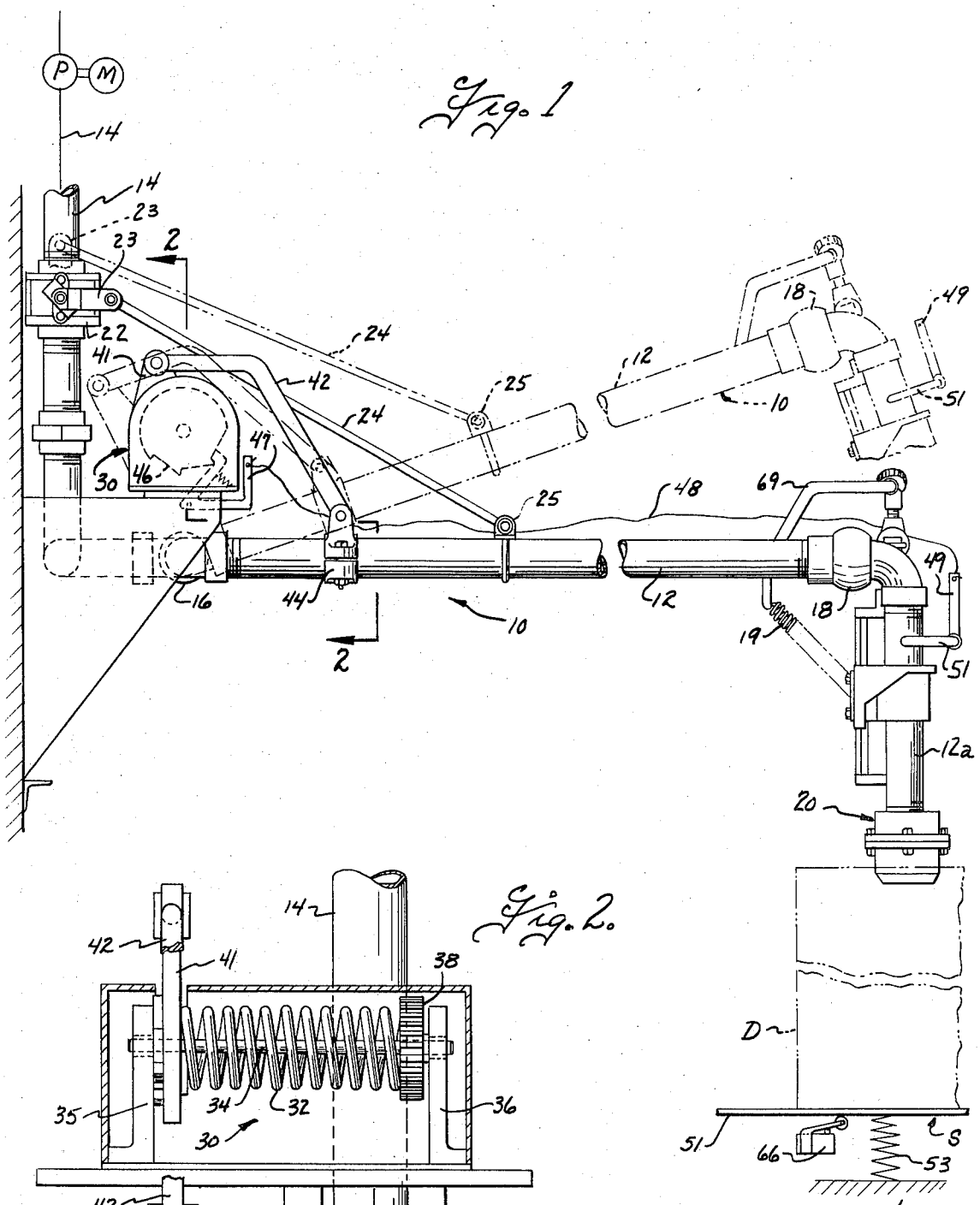


Fig. 2.

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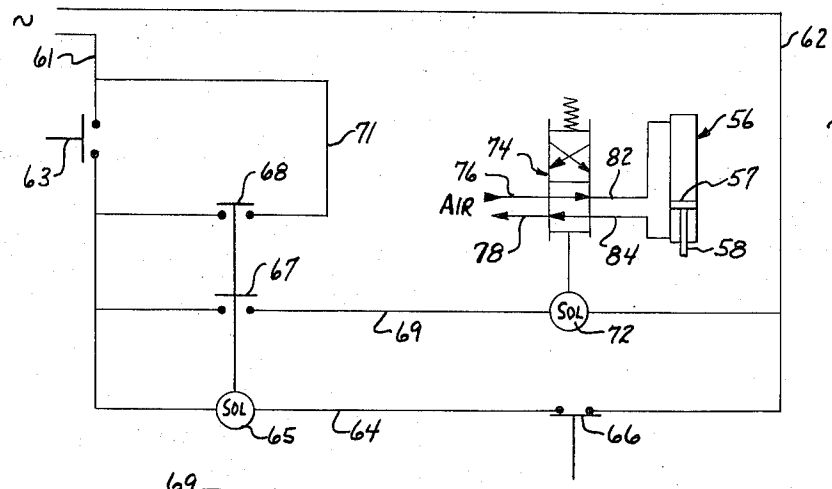


Fig. 7.

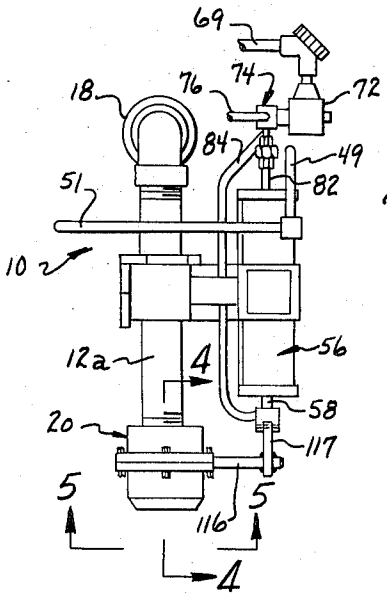


Fig. 3.

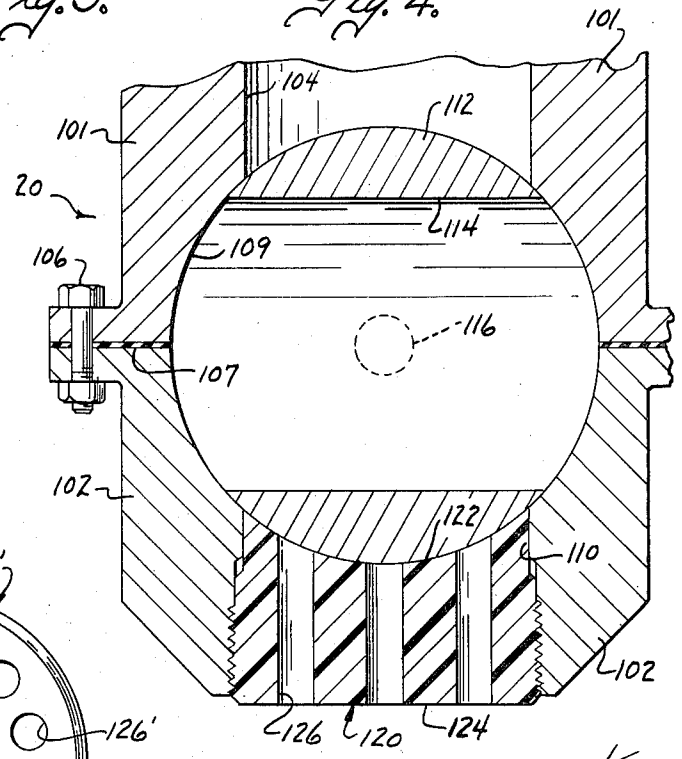


Fig. 4.

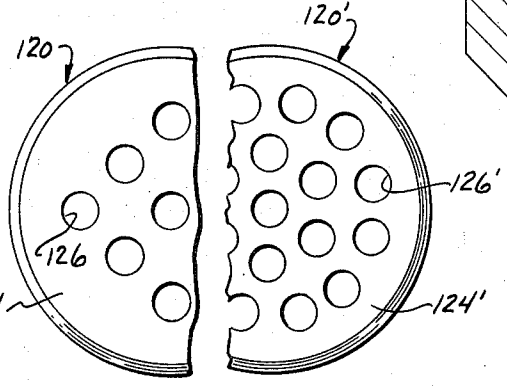


Fig. 5.

Fig. 6.

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FILLING APPARATUS

This is a division of application Ser. No. 4863, filed Jan. 22, 1970, and now abandoned.

BACKGROUND

This invention pertains generally to dispensing and more particularly to a filling apparatus for dispensing fluent material.

In the handling of paint and like materials, there is a danger that the material will harden on the inside of the conduit and thereby restrict the conduit. This danger is increased if the conduit is emptied from time to time. Pivotally mounted discharge lines have been previously known. Where the control valve in such a discharge line is located upstream of the pivot, the discharge line is allowed to drain each time the valve is closed. Where the valve is at the outlet end, there is a possibility of drainback when the discharge line is moved to its raised position. Either situation is disadvantageous when handling paint for the reason previously indicated. Thus, it is desirable that there be provided an apparatus in which the discharge line remains full under all circumstances. Additionallly, it is desirable that any dripping at the outlet be minimized.

SUMMARY

The present invention relates generally to dispensing and more particularly to a filling apparatus for dispensing fluent material. In one aspect, the present invention is realized through the provision of a discharge line which is movable between a dispensing position and a raised position, an outlet valve at the outlet end of the discharge line for controlling flow therefrom, a second valve for controlling flow to thee discharge line, and apparatus operative in response to the movement of the discharge line for opening and closing the second valve. Another aspect of the invention is realized though the provision of a ball-type valve at the outlet of the discharge line and a nozzle insert at the valve outlet and having a plurality of openings of a size such that the surface tension of the fluent material will prevent dripping therefrom.

It is a general object of the present invention to provide a filling apparatus for fluent material in which the discharge line remains full at all times.

Another object is to provide a filling apparatus in accordance with the foregoing and including valves at the inlet and outlet of the discharge line and means for controlling the inlet valve in response to movement of the discharge line from a dispensing position to a raised position.

Still another object of the present invention is to provide a filling apparatus in which the outlet valve is automatically shut off when a predetermined quantity of the fluent material is dispensed.

Yet another object is to provide a filling apparatus with a movable discharge line and a spring for resiliently urging the discharge line to a raised position.

It is another object of the present invention to provide a filling apparatus with a discharge valve that prevents dripping from the outlet nozzle.

These, and other objects and advantages of the present invention, will become apparent as the same becomes better understood from the following detailed description when taken in conjunction with the accompanying drawings.

DRAWING

FIG. 1 is a view, in part diagrammatic and in part elevational, of one embodiment of the present invention and showing the relation of the parts in raised position in phantom lines;

FIG. 2 is a sectional view, on an enlarged scale, taken generally along broken line 2—2 of FIG. 1;

FIG. 3 is an end view as seen from the right of FIG. 1;

FIG. 4 is a sectional view taken along line 4—4 of FIG. 3 and on a greatly enlarged scale;

FIGS. 5 and 6 are partial views of two different embodiments of the nozzle insert and as seen from line 5—5 of FIG. 3; and

FIG. 7 is a diagrammatic view of the electric and pneumatic control circuits used in the present invention.

DESCRIPTION

Reference is now made more particularly to the drawings which illustrate the best presently known mode of carrying out the invention and wherein similar reference characters indicate the same parts throughout the several views.

Referring first to FIG. 1, the filling apparatus, generally designated 10, includes an outwardly extending discharge line 12 and a supply line 14. The discharge line 12 is pivotally connected to the supply line 14 by means of a swivel joint 16 to allow the discharge line to be moved in a generally vertical plane between a lower dispensing position and a raised position. The dispensing position is illustrated in FIG. 1 in whole lines while the raised position is shown in phantom lines. A pump P, driven by a motor M, is interposed in the supply line 14 to pump a fluent material such as point to the discharge line 12. In the embodiment illustrated, discharge line 12 has a downwardly extending branch 12*a* connected to the remainder of the discharge line by means of a second swivel joint 18. Swivel joint 18 permits lateral movement of branch 12*a* so that its lower end can be associated with an opening in a drum D and accommodate slight irregularities in position. A spring 19 urges the branch 12*a* to a generally vertical position.

An outlet valve, generally designated 20, is located at the outlet end of discharge line branch 12*a* for controlling flow from the discharge line. The outlet valve will hereafter be described in greater detail. A second valve 22 is located adjacent the connection of the discharge line 12 to the supply line 14. In the embodiment illustrated, valve 22 is advantageously in the supply line. Valve 22 is of a type that is rotatable between an open and closed position and the rotation is under control of an external valve arm 23.

Apparatus is provided for opening and closing valve 22 in response to movement of the discharge line 12. In the embodiment illustrated, an arm 24 is pivotally connected to valve arm 23 and to a clamp 25 on the discharge line 12. As can be seen in FIG. 1, movement of the discharge line to a raised position operates to move valve arm 23 to a generally upright position and thus close valve 22. Likewise, movement of the discharge line 12 to its dispensing position moves the valve arm 23 and opens valve 22.

Means is provided for moving the discharge line 12 to its raise position. In the embodiment illustrated, this

is a torsion spring unit, generally designated **30.** The unit is of the type described in U. S. Pat. No. 3,038,714 to R. M. Klaus et al, and reference is made thereto for a complete description. In general, the unit includes a helical spring **32** circumjacent a shaft **34** which extends between supports **35** and **36.** One end of the spring **32** is held by a fixed but adjustable sprocket **30.** The other end is secured to a movable arm **41.** Arm **41** is pivotally connected to one end of a second arm **42.** Arm **42** has its opposite end pivotally connected to a clamp **44** on the discharge line **12.** In this manner, when the discharge line **12** is lowered, the spring **32** is wound tighter. A rotatable keeper **46** moves with arm **41.** A latch **47** is arranged to engage the keeper and hold the discharge line **12** in its dispensing position. A cable **48** is attached to a handle **49** affixed to the depending branch **12***a* by means of a U-shaped mounting **51.** In this manner, the latch **47** can be disengaged from the keeper **46** by operating the remote handle **49.** When released, the spring **32** tends to unwind and lift the discharge line **12** to its raised position. Stops can be provided to limit the travel of the discharge line **12** to preselected dispensing and raised positions. In the alternative, tension or compression springs, or other means may be utilized for automatically moving the discharge line **12** to its raised position.

Referring again to FIG. **1,** it can be seen that drum D, into which the fluent material is dispensed, is positioned on a scale generally designated S. The scale S may be of any convenient construction and may, for example, include a platform **51** and a spring **53.** In the alternative, the scale may be a beam balance type. It is contemplated that the tare of the drum D may be set on the scale and that the scale be further set to measure a predetermined quantity of the fluent material dispensed into the drum D.

An actuating means, responsive to the scale S is operative for closing the outlet valve **20** when the preselected quantity of the fluent material has been dispensed into the drum D. For this purpose, outlet valve **20** is under control of a pneumatic cylinder, generally designated **56.** Movement of the piston **57** (see FIG. **7**) and piston rod **58** operates to open and close valve **20** as hereafter explained.

Referring now to FIG. **7,** the circuitry which comprises the actuating means for controlling the outlet valve **20** will be described. As shown, conductors **61** and **62** are connected to a power source. An on-off switch **63** is interposed in conductor **61.** When switch **63** is closed, this completes a circuit through line **64,** solenoid **65,** and normally closed limit switch **66.** When actuated, solenoid **65** operates to close normally open switches **67** and **68** interposed in conductors **69** and **71,** respectively. Switch **68,** when closed, and conductor **71** provide a holding circuit bypassing on-off switch **63.**

When switch **67** is closed and maintained closed, by means of the holding circuit, a circuit is completed through conductor **69** and solenoid **72.** When actuated, solenoid **72** operates to move a pnumatic valve **74** from the position illustrated in FIG. **7** to its second position. As shown, pneumatic valve **74** is a two-way valve connected to supply line **76** and return line **78.** The valve is also connected to lines **82** leading to the upper end of cylinder **56,** and **84** leading to the lower end of cylinder **56** (see FIG. **3**). When pneumatic valve **74** directs air from supply line **76** to line **84,** piston **57** is moved to its raised position to open valve **20.**

At this point, with the dispensing line **12** in its lowered position, both valves **20** and **22** are in open position and the fluent material is dispensed into the drum D. Limit switch **66** is located adjacent the scale S as shown in FIG. **1.** When the predetermined quantity of the fluent material is dispensed into the drum D, limit switch **66** is moved to its open position whereby breaking the completed circuit through line **64.** This operates to break the holding circuit and remove power to the solenoid **72.** Pneumatic valve **74** is then returned to the position shown in FIG. **7** and air is supplied from supply line **76** to line **82** and the piston **57** is returned to its lower position to turn off valve **20** and stop the flow of fluent material to the drum D.

When the drum D is filled, the operator can operate handle **49** to release the latch **47** and allow the discharge line **12** to be moved to its raised position. As explained above, valve **22** is moved to its closed position in response to movement of the discharge line to the raised position, and the quantity of fluent material between valves **20** and **22** is trapped in the discharge line **12.** This prevents flow from the discharge line, in either direction, and assures that the line is full of the material to be dispensed. As previously explained, when the fluent material is a material such as paint or the like which can harden, it is advantageous to hold the liquid in the lines to alleviate the drying of the material. In certain circumstances, a drainback of the material can create an intermixing of the material with the subsquent material to be dispensed. This can have disadvantages particularly when handling paint.

Referring now to FIGS. **4–6,** a preferred embodiment of the discharge valve **20** will be described. As shown, discharge valve **20** is a ball-type valve formed of first and second members **101** and **102.** Member **101** has an inlet **104** connectable to the branch **12***a* of the discharge line. Members **101** and **102** are provided with peripheral flanges which are clamped together as by fasteners **106.** A resilient gasket **107** is provided between the members to form a seal. Members **101** and **102** provide a spherical chamber **109** intermediate the inlet **104** and an outlet chamber **110** in member **102.** A ball valve element **112** is disposed in the chamber **109** and has a passage **114** therethrough. As usual, the ball valve element **112** is movable between the position illustrated in FIG. **4** to prevent flow through the valve, and a position 90° therefrom which communicates the passage **114** with the inlet chamber **104** to permit flow to the outlet chamber **110.** A shaft **116** is attached to the ball valve element **112** to move it between its positions. An arm **117** is affixed to shaft **116** and has an outer end pivotally connected to piston rod **58** for mechanical operation of the valve **20,** as explained above.

A nozzle insert generally designated **120,** it threaded into the outlet chamber **110** as shown in FIG. **4.** Preferably, nozzle insert **120** has a semispherical upper surface **122** for engagement by the ball valve element **112.** The nozzle insert is preferably made of graphite impregnated Teflon to provide a lubricated bearing surface at surface **122.** Since the insert is semispherical, and threaded into the outlet, it can be easily adjusted against the ball valve element **112** to accommodate any wear. Nozzle insert **120** has an outer face **124** as shown in FIG. **5.** In the embodiment of FIG. **5,** a plurality of openings **126** are provided through the insert between faces **124** and **122.** In the embodiment shown in FIG. **5,** there are nine such openings of about one-quarter

inch diameter. It has been found that openings of this size, when utilized with a vinyl paint of average viscosity prevents dripping of the paint from the openings. By coordinating the size of the openings with the surface tension of the fluent material, dripping is thus prevented.

An alternate insert 120' is illustrated in FIG. 6. In this embodiment, there are 19 openings of one-quarter inch diameter. The number of openings may be chosen commensurate with the flow characteristics desired through the outlet.

Valve 20, in some uses, need not be mechanically operated as above described. For example, arm 117 on shaft 116 (see FIG. 3) can be manually operated. Under this circumstance, an operator can move the valve to a partially opened position where only a limited number of openings 126 communicate with passage 114. In this manner, an accurate, but lesser flow rate can be easily achieved. This is to be contrasted with a ball valve having a full flow outlet which, when partially opened, has an erratic flow stream. Thus, the utilization of a plurality of openings, as illustrated, has a double advantage. It prevents dripping when the valve is off and it provides an improved flow when the valve is in a partially opened position. Of course, the partially opened position can be achieved mechanically if desired.

While a preferred embodiment of the invention has herein been illustrated and described, this has been done by way of illustration and not limitation, and the invention should not be limited except as required by the scope of the appended claims.

I claim:

1. In a filling apparatus including a discharge line for transporting a fluent material, the combination of: a ball-type valve at the outlet of the discharge line for controlling dispensing therefrom, the valve having an inlet connected to the discharge line, an outlet, and a spherical chamber intermediate the inlet and outlet; a ball valve element closely received in the chamber and having a flow passage therethrough; and the element movable between a closed position and an open position when the flow passage communicates the inlet and outlet; the improvement comprising: a nozzle insert at the valve outlet and having a semi-spherical inner surface providing a continuation of the spherical chamber; the nozzle insert having plurality of cylindrical openings therethrough; each opening having a length greater than its diameter and sized so that the surface tension of the fluent material will prevent dripping therefrom; the nozzle insert being formed of a suitable bearing material to provide a good bearing between the insert and the ball valve element; and means adjustably mounting the nozzle insert for selective movement against the ball valve element to accommodate any wear.

2. The combination of claim 1 wherein the nozzle insert is formed of graphite impregnated "Teflon."

3. The combination of claim 1 wherein the nozzle insert is threaded into the valve outlet to provide said last-mentioned means.

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