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G. E. MATTIMOE ETAL

3,195,587

APPARATUS FOR FILLING PLASTIC BAGS

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2 Sheets-Sheet 1

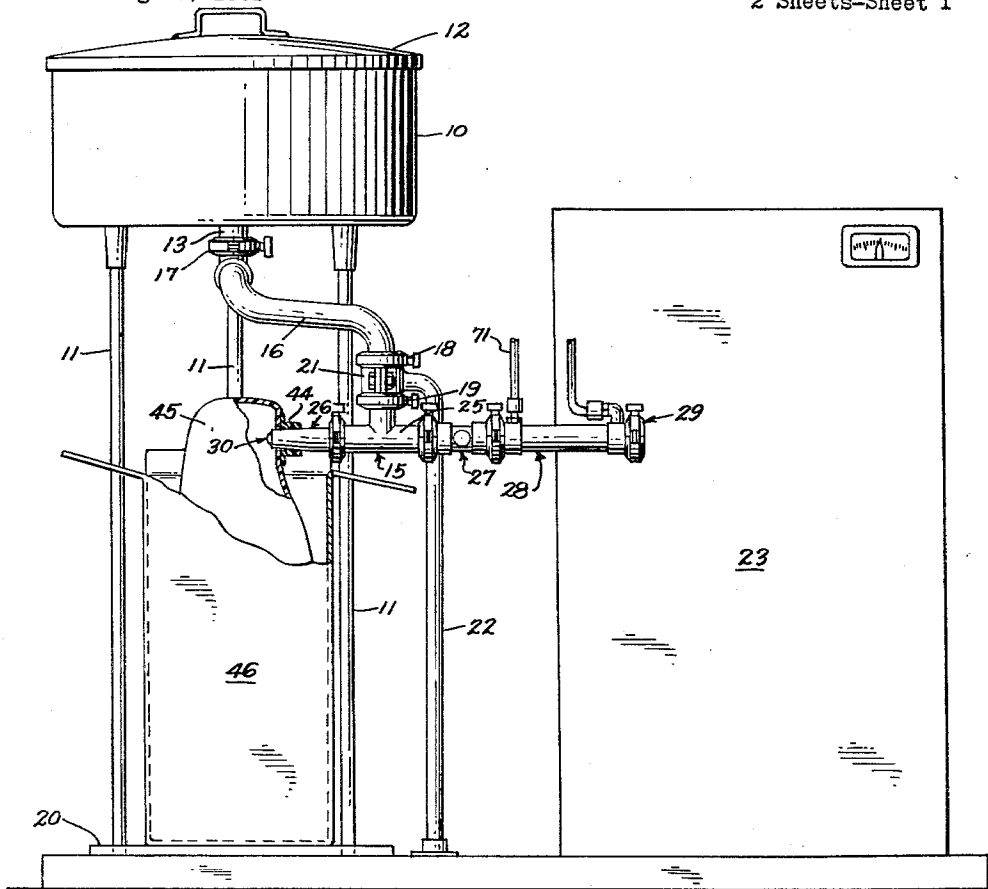


Fig. 1.

INVENTOR.
GEORGE E. MATTIMOE
EVERETT G. STEHN
BY
Adrian C. Stehn
ATTORNEY.

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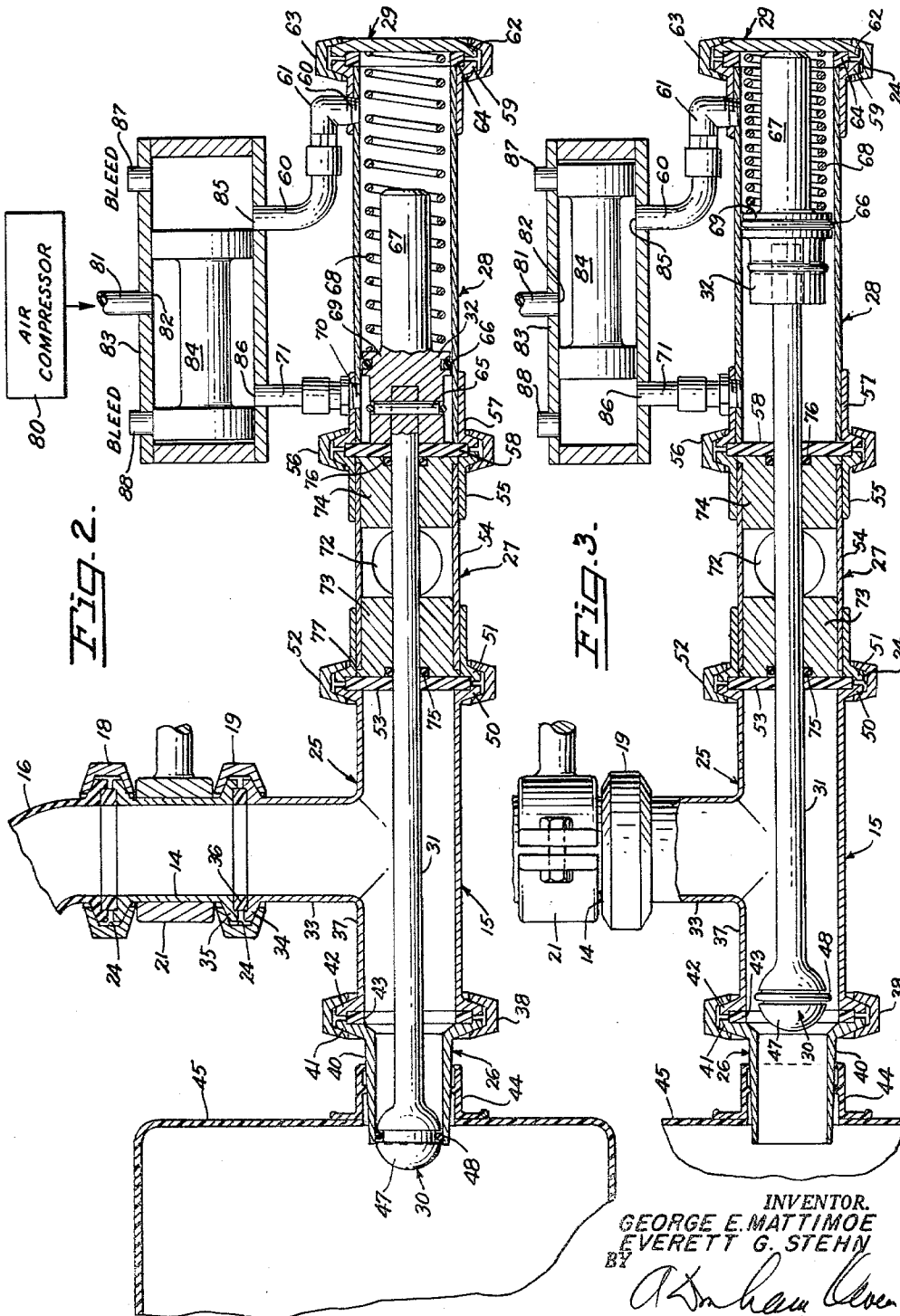
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INVENTOR.
GEORGE E. MATTIMOE
EVERETT G. STEHN

ATTORNEY.

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APPARATUS FOR FILLING PLASTIC BAGS

George E. Mattimoe, Burlingame, and Everett G. Stehn, San Francisco, Calif., assignors to T. R. Mantes Company, Inc., San Francisco, Calif., a corporation of California

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7 Claims. (Cl. 141-83)

This invention relates to an improved filling device. More specifically, the invention relates to a device for rapidly filling plastic bags with a predetermined amount of liquid.

Recently, the dairy industry has begun to distribute milk in disposable plastic bags, each bag being supported, shaped and contained in a corrugated fibreboard container. This means that there is no problem of returns and sterilization of metal cans, no problem of having to use stainless steel metal cans and take special care of them; for the bag, which is characteristically of a fairly light weight polyethylene, is sterilized at the time of manufacture and is delivered in sterile condition. Such bags are easily stored before use, fully collapsed and flat, and are still flat when delivered to the filling machine.

However, there have been some difficulties in filling these bags. They are provided with a spout-like portion that projects out from one of the sidewalls near the upper end of the bag. Heretofore, one operator had to help to hold the bag in place as it was being filled while a filling tube was inserted into the spout with a filling valve extending well inside the bag itself. This usually required that someone else run the filling machine or that the operator divide his attention between several operations, so that the operation was relatively slow and tended to be inaccurate. This procedure has interfered with the accuracy of weighing the net contents of the bag and has interfered with good efficiency generally.

A principal object of the present invention is to provide a valve assembly which provides partial support for the bag spout by the filling valve itself and to provide an adequate filling means for these bag containers. While the valve provides partial support of the bag's spout, it does not have to support the weight of the liquid in the bag because the bottom of the bag rests inside its fibreboard container, and the container rests on a scale platform which supports the weight. There is very little weight, only the weight of a small portion of the lightweight bag, resting on the valve itself. In use the bag spout is simply pushed onto the valve, the bag is filled, and then the spout is taken off the valve.

Another important object of the invention is the provision of a sanitary, easily cleanable valve for dairy use. The necessity here is to provide a valve which can be taken apart completely, very quickly, and can be thoroughly sterilized and reassembled in sterile condition. This cleaning and assembly has to be done very quickly and easily, for it has to be done at least daily, or while changing from one run to another, to insure that the stringent conditions of the U.S. and State Departments of Agriculture and public health services are met.

Another important feature of the invention is the provision of a sanitary valve which is operated pneumatically rather than electrically. This is important in the dairy industry because the use of an electrically operated valve gives rise to the danger of a short circuit through the liquid, and somebody may be electrocuted. The provision of the pneumatic valve of this invention eliminates this danger completely.

Other objects and advantages of the invention will appear from the following description of a preferred embodiment thereof.

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In the drawings:

FIG. 1 is a view in elevation and partially in section of a filling assembly employing the invention to fill a plastic bag as supported and contained by a fibreboard container.

FIG. 2 is an enlarged view in elevation and in section of the filling valve of this invention with a portion of the bag being filled shown as installed. The valve is shown in its closed position.

FIG. 3 is a view similar to FIG. 2 and differing only that the valve is shown in its open, or filling and dispensing position.

As FIG. 1 shows, a liquid storage tank 10 may be supported on suitable standards 11 at a height sufficient to give a desired head for the liquid to be filled. The storage tank 10 is preferably one of those readily available commercially having an inlet valve (not shown) connected to a supply pipe, the inlet valve preferably being opened and closed by a float to maintain a substantially constant level. However, if desired, the tank 10 may be filled by taking off a lid 12 and pouring in sufficient fluid to maintain the desired head. This tank 10 has no particular significance in the invention except as one way of providing a constant head such as a pump with a constant pressure output.

A filling valve 15 embodying the invention is shown connected to a bottom outlet 13 on the tank 10 by a flanged nipple 14 and a flanged flexible conduit 16 of any suitable type. The connection between the conduit 16 and the bottom outlet 13 is preferably made by means of a suitable type of sanitary clamp 17. Another sanitary clamp 18 similarly connects the conduit 16 to the nipple 14, while a third such clamp 19 connects the nipple 14 to the filling valve 15. The valve 15 is supported adjacent a scale platform 20 by a clamp 21 that goes around the nipple 14 and is supported by a standard 22. The platform 20 is part of a suitable weighing mechanism 23. This mechanism may be of any desired type which enables automatic cut-off of a pneumatic circuit controlling the valve 15 when a desired weight or tare weight is reached. Such a device is shown in U.S. Patent 2,604,906.

The filling valve 15 consists of several sections which can be taken apart from each other and are put together with standard sanitary clamps, which are well known in the industry. It will be noted that each clamp normally provides a channel 24 shaped like a U with divergent arms, as seen in cross-section, which encloses two flanges and holds them together when the clamp is tight, a gasket between the flanges preventing leakage. The valve 15 comprises a T 25, a filler spout 26, a bonnet 27, a cylinder 28, and a closure member 29, all clamped together in this manner. The valve also includes a movable valve closure member 30 having an elongated stem 31 and a piston 32 at the opposite end of the stem 31 from the closure member 30. All the metal parts are preferably made from stainless steel, so that they can meet the specifications of the various Departments of Agriculture and can be easily kept clean and sanitary. The gaskets may be made from a suitable sterilizable material such as Teflon.

The T 25 has an inlet arm 33 with a flange 34 that is held opposite a flange 35 on the nipple 14 by the clamp 19, a Teflon gasket 36 being provided between the flanges 34 and 35 to assure that there will be no leakage. The main conduit portion 37 of the T 25 may be substantially cylindrical and has, as shown, a considerably larger inner diameter than the outer diameter of the foot valve 30, so that adequate flow space is provided when the foot valve 30 is retracted.

The nozzle or spout 26 is connected by a suitable sanitary clamp 38 to the T 25, and it comprises an exteriorly

tapered or frusto-conical sleeve 40 having a flange 41 that lies opposite a flange 42 on the T 25, a gasket 43 being compressed between the flanges 41 and 42 to assure complete liquid tightness when the clamp 38 is installed. As will be seen, by taking off the clamp 38, the nozzle 26 and gasket 43 are removed for sterilization.

The forward end of the sleeve 40 is tapered exteriorly and preferably not tapered interiorly. This has the important feature that when the bag spout 44, which is cylindrical, is pushed onto the sleeve 40, minor tolerances and differences in the size of bag spouts 44 are taken care of; in fact, major size differences can be accommodated if desired by the use of the proper exterior taper on the sleeve 40. Also, just as important, when the spout 44 is pushed on, it is held in place by the sleeve 40, and the bag 45 therefore cannot fall off. No one has to hold the bag 45, for once it is pushed on smartly the friction between the bag spout 44 and the sleeve 40 is quite adequate to prevent its coming out again, since none of the weight of the liquid being filled is supported by the spout 44, that being carried by the scale platform 20 which receives the weight through a fibreboard carton 46.

The foot valve 30 itself preferably comprises a stainless steel plug member 47, preferably spherical in shape and having a suitable synthetic elastomer O-ring 48 in a suitable groove. The O-ring 48 provides the actual closure against the wall of the sleeve 40, and it will be seen that it is readily removed for sterilization and cleaning. It will be seen from FIG. 3 that when the foot valve 30 is retracted there is adequate space for liquid flow around it during the filling operation. When the valve 30 is closed, a hemispherical portion of the portion 47 extends forward a small distance out of the nozzle 26 and itself aids in putting the bag spout 44 onto the sleeve 40, by providing a ball-like lead-on member.

A flange 50 at the other end of the T 25 from the nozzle portion 26 is joined to a flanged sleeve 51 that is part of the bonnet 27, by a clamp 52, a suitable gasket 53 being provided. The bonnet 27 may comprise a thin walled stainless steel sleeve 54 with the flanged sleeve 51 at one end and a flanged sleeve 55 at the other end. The flanged sleeve 55 is attached by a similar clamp 56 to a heavy flanged sleeve 57 on the cylinder 28, a gasket 58 preventing leakage. A flanged sleeve 59 on the opposite end of the cylinder 28 is secured to the male cap 29 and has a radial opening 60 for connection to an air supply conduit 61. The cap 29 has a flange 62 secured by a clamp 63 to the cylinder flange 59, with a gasket 64 preventing leakage.

The foot valve stem 31 extends through the T 25 and the bonnet 27 into the cylinder 28, where it is attached by a suitable pin 65 to a piston member 32 having an O-ring receiving groove in which there is an O-ring 66 that engages the inner peripheral wall of the cylinder 28. The piston 32 also has a rod-like projection 67 serving as a spring seating member, and a spring 68 is compressed between a shoulder 69 on the piston 32 and the male cap 29 being retained in the proper alignment by the projection 67. The spring 68 always urges the foot valve 30 toward its closed position. This means that the valve 15 will always fail safe, i.e., fail in a closed position. If the air supply is for any reason cut off, as by failure of a compressor, the spring 68 will hold the valve 15 closed. Similarly, if there is any leakage in the system, the spring 68 will close the valve 15.

A pneumatic system is provided to operate the valve and includes the conduit 60 leading through the flanged sleeve 59 and the cylinder 28, by which air under pressure forces the piston 32 to move to the left as shown in FIGS. 2 and 3. This use of positive air closure during actual operation gives a very quick closure and when used in connection with the air switch shown in U.S. Patent Number 2,604,906 to Robert B. Brown it enables very quick, rapid, and accurate closure of the valve.

For the sake of simplicity, instead of completely reproducing the circuit and air switch of U.S. Patent No. 2,604,906, a simplified, more diagrammatic showing thereof is used in FIGS. 2 and 3, where an air compressor 80 is connected by a conduit 81 to an inlet 82 of a valve body 83. A spool valve 84 sends the compressed air from the inlet 82 to an outlet 85 that is connected to the conduit 60, when moving the piston 32 to the left.

The flanged sleeve 57 also has a radially extending air inlet passage 70 to which an air conduit 71 is secured. Thus, the spool valve 84 sends air from the inlet 82 to an outlet 86 connected to the conduit 71 for moving the piston 32 to the right and opening the valve 30. When the conduit 71 is supplied with air, the conduit 60 is bled through a bleed 87; and when the conduit 60 is supplied with air, the conduit 71 is bled through a bleed 88. The air thus is led into the opposite end of the cylinder 28 from the cap 29. Thus, when it is desired to open the valve, the air switch of U.S. Patent 2,604,906 sends a current of air by the conduit 71 into the passage 70 which operates against the valve side of the piston 32, moving the piston 32 against the pressure of the spring 68 to open the valve member 30. At the same time, the air in the cylinder 28 on the opposite side of the piston 32 is bled out to the atmosphere, as shown in the same U.S. patent and is shown in simplified more diagrammatic form in FIGS. 2 and 3. Thus quick air operation is obtained, and the valve is entirely pneumatic, with no electrical connections whatsoever. The air switch itself requires no electrical connections, as will be seen from referral to the patent.

The bonnet 27 isolates the cylinder 28 from the T 25 and prevents the passage of liquid from the T 25 into the cylinder 28. The bonnet sleeve 54 may have a central transverse opening 72 isolated between two packing glands 73 and 74, each packing gland 73, 74 having an O-ring 75, 76 at its inner periphery preferably located directly adjacent the end gasket 53 or 58 for easy cleaning, so that when the gasket 53 or 58 is taken off, the O-ring 75 or 76 is easily removed. The packing glands 73, 74 have end flanges 77, 78 that engage the ends of the sleeve 54 and are thereby held in place.

Thus it will be seen that the valve 15 provides for easy installation of a cylindrical bag spout 44 on the frusto-conical nozzle 26 over the tapered foot valve forward portion 47, that it enables rapid opening by pneumatic means to fill the bag 45, and provides support for the spout 44 during the filling, so that once installed no further attention need be given to the bag 45 until it is filled. It also provides for rapid pneumatic cut-off and for a fail-safe spring closure of the valve in case the pneumatic system should fail.

The valve is readily cleaned by removing the clamps 17, 38, 52, 56, and 63, taking the nozzle 26 and its gasket 43 from the forward end of the T 25, the bonnet 27 and its gasket 53 from the rear end of the T 25, the cylinder 28 and its gasket 58 from the bonnet 27, and the cap 29 and gasket 64 from the cylinder 28. The bonnet 27 may be further disassembled by removing the two packing glands 73 and 74 and removing the O-rings 75 and 76 from them. Assembly is easily carried out by going through the same steps in the opposite order. This is a very simple operation and takes hardly more time than it takes to describe it, so that it can be done very easily without taking away much of the working time.

To those skilled in the art to which this invention relates, many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. The disclosures and the description herein are purely illustrative and are not intended to be in any sense limiting.

I claim:

1. In a device for dispensing liquid into a circular

spout of a light-weight flexible plastic bag that is mainly confined within and is supported by a stiff carton, the combination of: a scale platform on which the carton is adapted to rest with the bag inside, so that the weight of liquid in the bag is borne by the platform, and a filling valve having a filling spout that has a rigid generally frusto-conical tapered outer periphery, around which the circular bag spout is adapted to fit snugly, the filling spout supporting only the weight of the bag and the frusto-conically tapered outer periphery, around which the size of the bag spout and enabling a snug push fit to achieve full support of the bag by the spout, said valve having a ball-like closure member movable inside said spout and extending less than half beyond said spout in its closed position and fully retracted within said spout in its open position.

2. A filling apparatus for use with milk and other edible liquids, including in combination: a plurality of sanitary clamps; a T having a side entry and two ends; a dispensing spout detachably connected by a said sanitary clamp to one said end in a leak-tight fit; a cylindrical tube detachably connected by another said sanitary clamp to the other said end in a leak-tight fit; a pneumatic cylinder detachably connected by another said sanitary clamp to the other end of said tube; a piston movable axially in said cylinder, with a piston rod extending axially through said tube and said T; valve-rod guide means in said tube; a valve closure member at the end of said piston rod and movable for closure in said spout; and pneumatic means for moving said piston in said cylinder.

3. The apparatus of claim 2 wherein said dispensing spout is tapered exteriorly in a frusto-conical shape to enable a snug fit of varying sizes of receptacles.

4. The apparatus of claim 2 wherein said piston is provided with mechanical spring means urging said valve closure member toward its closed position.

5. The apparatus of claim 2 wherein said valve closure member comprises a ball with an equatorial groove and an O-ring in said groove.

6. The apparatus of claim 2 wherein each connection by sanitary clamp includes gasket means.

7. A filling apparatus for use with milk and other edible liquids, including in combination: a plurality of sanitary clamps; a T having a side entry and two ends; a support tube connected to said entry by a first said sanitary clamp; support means secured to said support tube; a dispensing spout detachably connected by a second said sanitary clamp to one said end in a leak-tight fit; a cylindrical tube detachably connected by a third said sanitary clamp to the other said end in a leak-tight fit and having a transverse opening through its walls; rod guide means in said tube on each side of said transverse opening with an O-ring in each said guide means; a pneumatic cylinder detachably connected by a fourth said sanitary clamp to the other end of said tube, said spout, tube and cylinder, as well as the two ends of said T, all being axially in line, said cylinder having pneumatic inlets adjacent each end; closure means for said cylinder at the opposite end of said tube and connected to said cylinder by a fifth said sanitary clamp; a piston movable axially in said cylinder, with a piston rod extending axially through said tube guide means, and T engaging said O-rings, and extending into said spout; a valve closure member at the end of said piston rod and movable for closure in said spout; and means for sending air pressure into each of said inlets, alternately, while bleeding the other inlet, for moving said piston in said cylinder in either direction.

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LAVERNE D. GEIGER, *Primary Examiner.*

RAPHAEL M. LUPO, *Examiner.*

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,195,587

July 20, 1965

George E. Mattimoe et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 5, line 7, for "frusto-conical" read -- frusto-conically --; line 10, strike out "frusto-conically tapered outer periphery, around which the" and insert instead -- frusto-conical taper accommodating tolerances in the --.

Signed and sealed this 19th day of July 1966.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

EDWARD J. BRENNER

Commissioner of Patents