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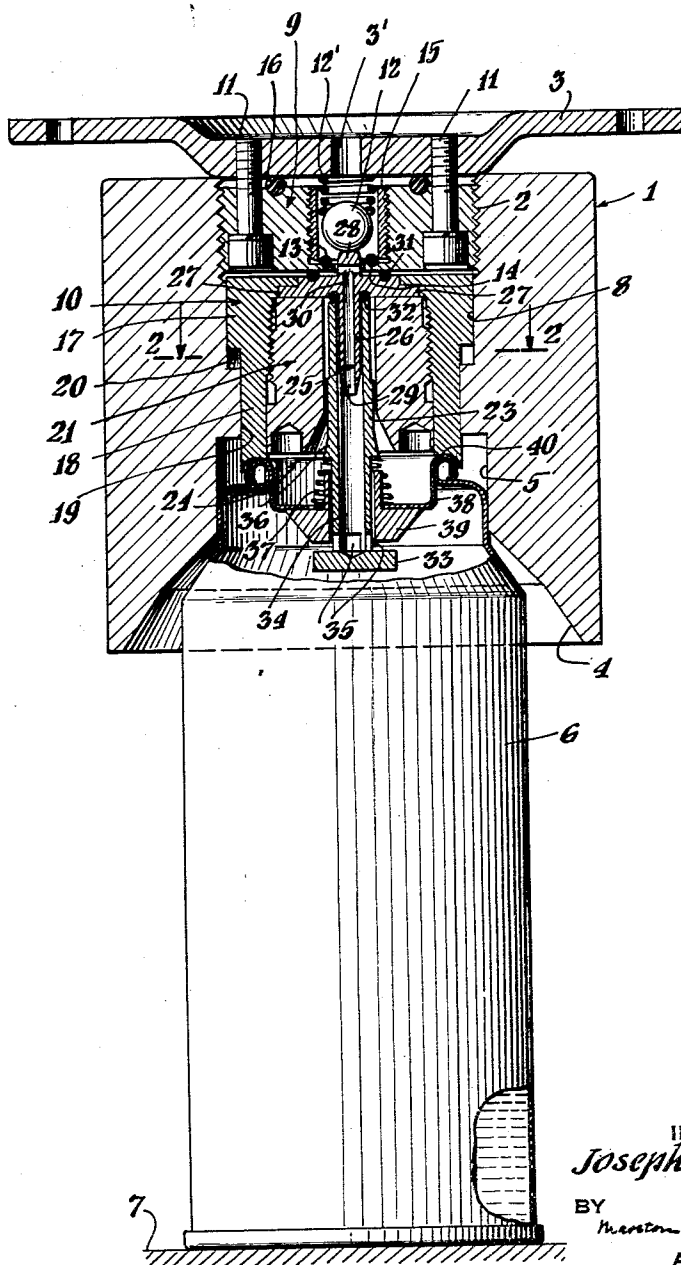
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FILLING VALVE MECHANISM

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Fig. 1



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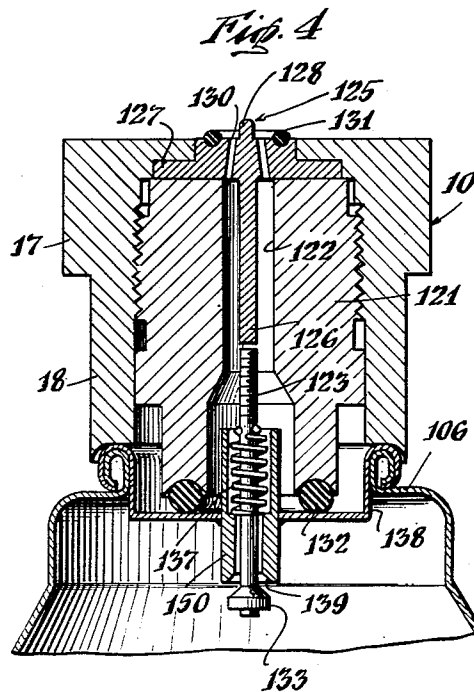
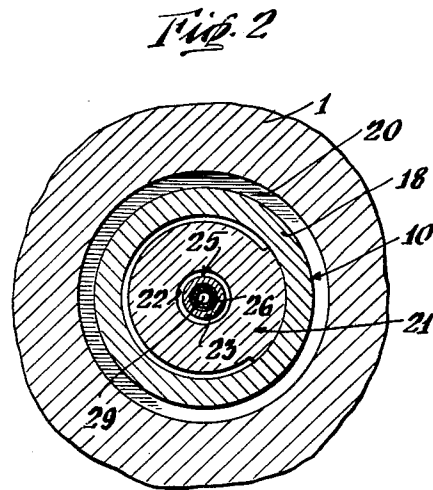
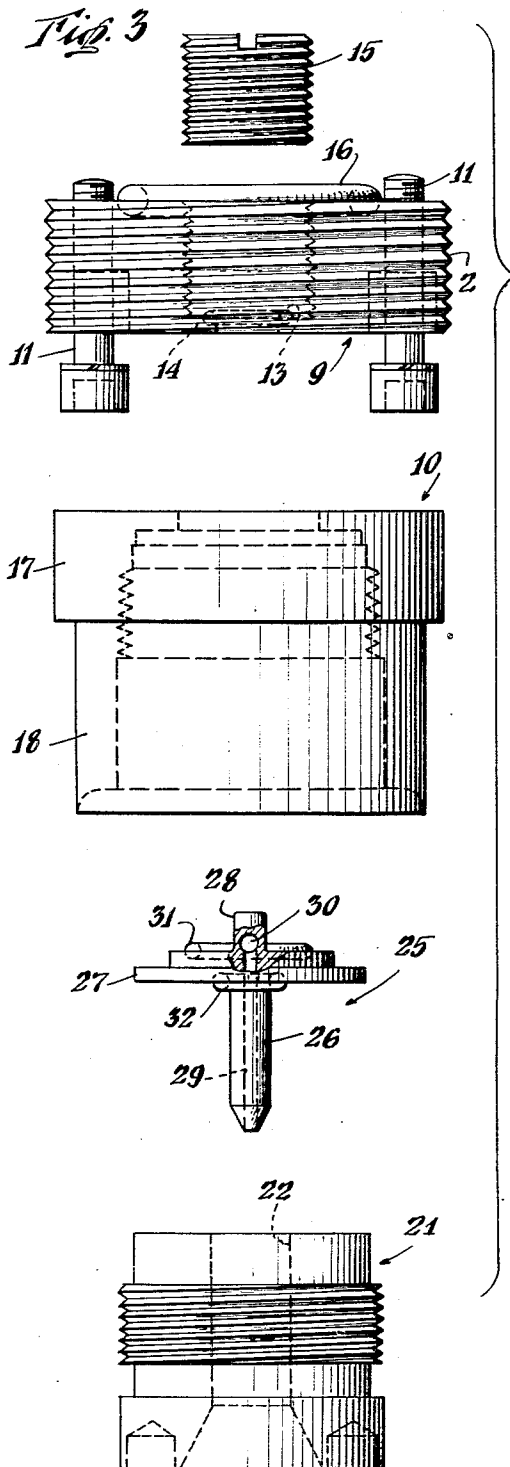
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FILLING VALVE MECHANISM

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6 Claims. (Cl. 62—1)

This invention relates to a filling valve mechanism adapted to charge aerosol containers with liquefied propellant gas.

Many types of material, such as varnishes, lacquers, insecticides, cosmetic preparations, shaving creams and the like are now sold in large volume in pressure containers having a finger-operated valve at the top. A liquefied gas or low-boiling liquid furnishes the propelling power for expelling the material through the finger valve on the container. Accordingly it has become a matter of considerable economic importance to have available a rapid and economic method of charging the containers with propellant, and adequate apparatus for carrying it out.

One commonly followed procedure in loading such pressure containers is to fill each container, before applying the finger valve, with its entire contents except the propellant, then position and affix the finger valve, and finally introduce the propellant through the finger valve.

Two difficulties, among others, have been experienced with devices hitherto used in such a process. One is that gas pressure has been relied on to open the finger valve on the container to permit the introduction of propellant; this method is insufficiently positive in operation and requires higher gas pressures than would otherwise be necessary. The other is that leakage of gas has caused a relatively high loss of propellant, has been uncomfortable for the operators and has necessitated more expensive ventilating equipment than would otherwise be needed.

It is one object of my invention to provide a simple and effective device for introducing propellant through the finger valves of pressure containers.

It is another object of my invention to provide a device of this kind that automatically and positively opens the container valve without the use of excessive gas pressure.

It is a further object of my invention to provide a device of this kind that, simultaneously with opening the container valve, also opens a valve in the outlet from a propellant-metering vessel.

It is a still further object of my invention to provide a device of this kind in which the propellant-metering-vessel and delivery ducts are effectively sealed against leakage.

Other objects and advantages of my invention will be apparent to those skilled in the art from the following disclosure.

My invention consists of a filling valve mechanism which is readily adapted to be used with commercially available measuring and filling equipment in which the filling head and container are vertically reciprocable with respect to each other. The Majonnier-Dawson is such a machine, in which the filling head, operated by an air cylinder, the timing of which is controlled by the filling line, is movable vertically while the container remains fixed. Alternatively my invention is applicable

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to machines in which the filling head is fixed and the container is moved vertically or in which both container and filling head are moved vertically towards and away from each other.

My invention in its preferred form comprises a bell-shaped container-centering guide below and connected with the metering device of a filling machine and containing an inner sliding guide member, a valve controlling the flow of propellant from the metering device, a pin with a flanged head serving to open both the metering device valve and the container finger valve and introduce propellant therethrough, and suitable gaskets to seal the propellant gas- and liquid-tight against leakage into the surrounding atmosphere.

One embodiment of my invention is described below and shown in the accompanying drawings, but the description and drawings are intended to be illustrative only and not to limit my invention, the scope of which is defined in the appended claims.

In the drawings:

Fig. 1 is a vertical axial section of my filling valve mechanism shown positioned below a conventional metering device and in filling position on a pressure container;

Fig. 2 is a horizontal section on line 2—2 of Fig. 1;

Fig. 3 is an exploded view on the interior parts of the bell-shaped container-centering guide; and

Fig. 4 is a sectional view of a modified valve-operating pin and its guide.

Like reference characters in the figures refer to like elements.

A bell shaped container-centering guide 1 is screwed on valve housing 9 by means of threads 2. Valve housing 9 is secured to the metering device of a filling machine, shown in part at 3, by cap screws 11. Passageway 3' provides communication between the interior of the metering device and the valve in housing 9. The lower open end of guide 1 is beveled at 4 and recessed at 5 to surround the upper part of and to center a container 6 to be charged with propellant. The container is mounted on fixed platform 7 of the machine.

Centering guide 1 is pierced axially by a bore 8 within which are the valve housing 9 and a sliding member 10. The valve housing has a threaded central bore containing valve ball 12 adapted to seat when closed on ring gasket 13. The valve ball 12 may if desired be spring-biased to a closed position as by spring 12'. Gasket 13 is held in place on flange 14, formed at the bottom of the valve housing bore, by threaded bushing 15 screwed into the threaded bore. A liquid- and gas-tight joint between valve housing 9 and metering device 3 is formed around the central passageway by ring gasket 16 located in a suitable circular groove in housing 9.

Sliding member 10 has a head portion 17 of a diameter to provide a sliding fit in bore 8 and a shank portion 18 of smaller diameter to provide a sliding fit in reduced portion 19 of bore 8. The shoulder 20 formed in bore 8 by the reduced diameter at 19 of bore 8 retains the sliding member in guide 1.

Sliding member 10 has a threaded axial bore in which is screwed tubular pin guide 21. This guide has an axial bore 22 of a diameter to provide a loose slip fit around hollow stem 23 of finger valve 24 of container 6.

Tubular pin 25 has a shank 26 of a diameter to slip easily into the bore of stem 23, and a stepped head 27. A portion of the shank 26 extends above head 27 at 28 a sufficient distance to lift valve ball 12 off its seat when the sliding member is in its upper position with respect to guide 1 as shown in Fig. 1. The bore 29 of pin 25 extends from the bottom of shank 26 up through the shank and part way through its extension 28 to a point above head 27; at this point it is continued as a trans-

verse duct 30 opening into the side of extension 38. Head 27 retains pin 25 in position by bearing on guide 21 as shown in Fig. 1. Head 27 is provided with an upper ring gasket 31 and a lower ring gasket 32 cemented or otherwise suitably secured in circular grooves in the head. These serve to form liquid- and gas-tight joints around the propellant passageway when the device is in use.

Finger valve 24 of container 6 is of conventional type forming no part of this invention but illustrated to clarify the operation of the filling valve mechanism. It comprises stem 23 ending in a disc 33 at its bottom; it has a central bore 34 opening at its lower end in transverse ducts 35. The stem has an enlargement 36 bearing on a coil compression spring 37, which in turn bears on container cap 38. This spring biases the valve in a raised or closed position with disc 33 bearing against valve seat 39, formed by a downward extension of cap 38. The latter is crimped on the top of the container. This valve is adapted to be opened either by direct downward displacement, as in the filling operation, or by sideways deflection.

The entire assembly of filling cylinder and container guide with its above described parts is adapted to be raised and lowered by compressed air or otherwise in accordance with filling demands. Means for accomplishing this are not shown, since the operation and mechanism for carrying it out are well known in the art and form no part of this invention.

In use my valve mechanism is operated as follows: Each container 6 is filled with a suitable amount of the intended contents minus the propellant. Cap 38 with associated valve 24 is then crimped in place. The container is then placed under the filling-head-guide assembly which is in the raised position. When the assembly is in this position head 17 of sliding member 10 rests on shoulder 20 in the bore of guide 1 and extension 28 of hollow pin shaft 26 is below valve housing 9, permitting valve ball 12 to seat on gasket 13 and thus preventing outflow of propellant from metering device 3.

The filling head assembly is then lowered over the container by mechanism referred to but not described above. As the assembly descends, bevel 4 and recess 5 act to center the container; hollow shank 26 of pin 25 enters stem 23 of finger valve 24, and gasket 32 comes to bear on the top of stem 23, depressing it and opening the finger valve. Simultaneously in the descent of the assembly, sliding member 10 comes to rest at 40 on the container cap and is thus displaced upwards with respect to descending container guide 1; this causes upper extension 28 of the shank of hollow pin 25 to enter valve housing 9 and lift valve ball 12 off its seat, releasing liquid propellant in metering device 3. A free path is thus provided for the propellant from the metering device into the container through passage 3', past valve ball 12, through ducts 30 and 29 of hollow pin 25, through bore 34 and around depressed disc 33 of finger valve 24, and so into container 6.

The entire propellant content of metering device 3 thus flows by this route under its own vapor pressure and by gravity into container 6. Alternatively mechanical pressure may be applied to the propellant. It will be seen from the drawings that this route of flow is entirely isolated from the outside atmosphere by the solid walls of the various elements and by the four ring gaskets 16, 13, 31 and 32. Hence leakage and loss of propellant are eliminated.

When the metering device 3 is empty, the filling head assembly is retracted upwards by the operation of the filling machine. As this assembly rises, pressure on finger valve stem 23 is released and this valve is closed by spring 37, while sliding member descends with respect to guide 1, carrying with it hollow pin 25 and permitting valve ball 12 to reseat itself on gasket 13. The result is that container 6 is filled and sealed and may be re-

moved, and the metering device also is sealed and ready to be refilled by action of the filling machine; the cycle may then be repeated.

When my invention is used for filling containers having a finger valve with a solid stem, a modified valve operating pin and pin guide, as illustrated in Fig. 4, may be used. In this case pin 125 has a solid shank 126, a stepped flange 127 (similar to 27 in Figs. 1 and 2) pierced by ducts 130. Raised portion 128 acts to lift valve ball 12 when filling head is in position on the container to be filled. In this position the pin 125 depresses solid stem 123 of the finger valve against pressure of spring 137, thus opening the valve by separating disc 133 from seat 139. Propellant is then free to flow through ducts 130, bore 122 of pin guide, and body 150 of the finger valve into container 106. Ring gaskets 131 and 132 prevent escape of the propellant into the surrounding atmosphere.

It will be clear from this disclosure to those skilled in the art that various changes may be made in mechanical details without departing from the spirit of my disclosure as defined in the following claims.

I claim:

1. In a filling machine having a filling head comprising a device adapted to deliver metered amounts of liquid propellant to a vertical cylindrical pressure container provided with a vertically operable finger valve and having means for reciprocating filling head and container vertically with respect to each other, the improvement which consists of a filling valve mechanism fixed vertically below and communicating with the metering device, said mechanism comprising: guide means having a frusto-conical bore segment adapted to center the pressure container on linear axial approach of filling head and container, a passageway for propellant through the guide means, a normally closed valve in the passageway to retain propellant in the metering device, a sliding member within the guide means adapted to bear on the top of the container, a valve operating member centered axially within the sliding member and adapted on approach of the filling head and container to open the normally closed valve in the passageway and to depress and thus open the finger valve in the pressure container whereby propellant may flow from the metering device into the pressure container, and gaskets surrounding the passageway to isolate it from the atmosphere during filling of the container.

2. In a filling machine having a filling head comprising a device adapted to deliver metered amounts of liquid propellant to a pressure container provided with a vertically operable finger valve and having means for reciprocating filling head and container vertically with respect to each other, the improvement which consists of a filling valve mechanism fixed vertically below and communicating with the metering device, said mechanism comprising: (1) a container-centering guide mounted below and communicating with the metering device through a central bore and adapted on approach to each other of filling head and container to surround and center the upper part of a container to be filled; (2) a valve and valve housing within the bore of the centering guide, the valve tending normally to assume a closed position and being adapted when closed to retain propellant in the metering device; (3) a sliding member within the bore of the centering guide having limited axial freedom of travel with respect to the centering guide and having a central bore; (4) a centrally bored pin guide fixedly disposed within the bore of the sliding member; (5) a pin having a shank within the bore of the pin guide adapted to depress the stem of the finger valve of a container to be filled, having a flanged head adapted to center the pin in the pin guide and an upward extension adapted to contact and open said first valve (2) as filling head and container contact each other; and (6) circular gaskets making liquid- and gas-tight connections respectively with said finger valve and said first valve housing (2), whereby when said filling head is

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brought into contact with said container an isolated path is provided for flow of propellant from said metering device through said first valve (2), and through said finger valve into said container, and when said filling head and container are separated the outlet from the metering device is closed. 5

3. A filling valve mechanism as defined in claim 2 in which valve (2) is a ball valve.

4. A filling valve mechanism as defined in claim 3 in which the ball valve is spring-loaded. 10

5. A filling valve mechanism as defined in claim 2 in which pin (4) has a hollow shank adapted to transmit propellant therethrough.

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6. A filling valve mechanism as defined in claim 2 in which pin (4) is provided with a solid shank and its flanged head is provided with ports to transmit propellant therethrough.

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