Dec. 25, 1951 H. H. SJOLIN 2,579,977

DISPENSING VALVE UNIT FOR VOLATILE PRODUCTS

Filed Sept. 11, 1947

Fig. 1.

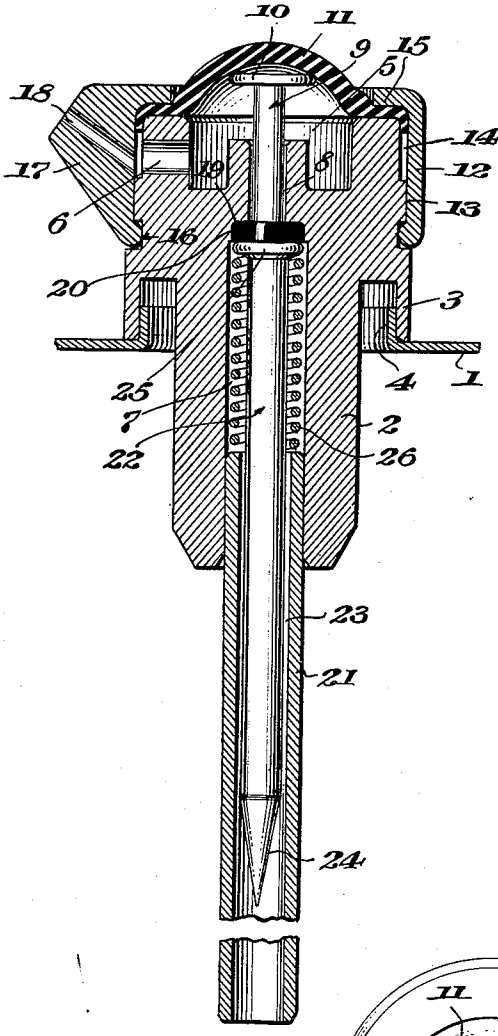


Fig. 2.

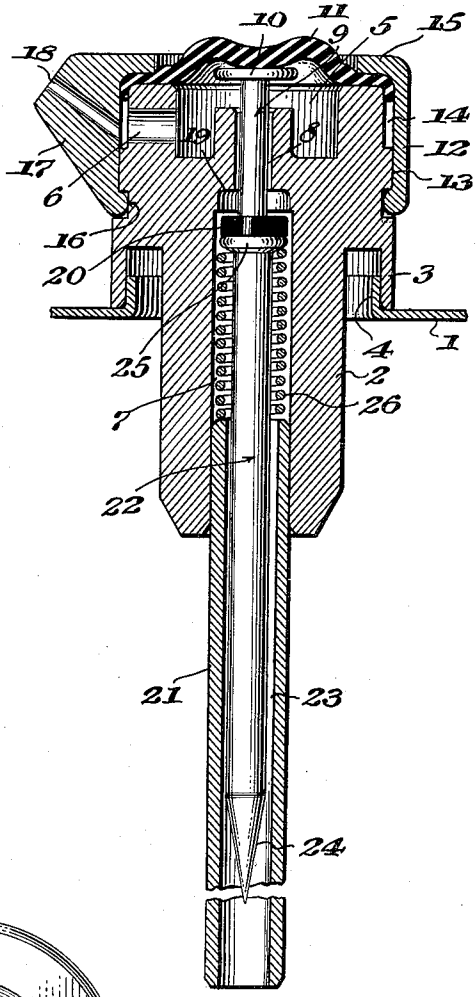
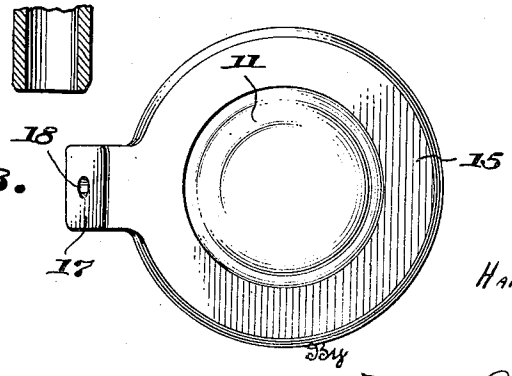


Fig. 3.



Inventor

HARRY H. SJOLIN

By

Mason, Porter, Diller & Stewart

Attorneys

Patented Dec. 25, 1951 2,579,977

UNITED STATES PATENT OFFICE

2,579,977

DISPENSING VALVE UNIT FOR VOLATILE PRODUCTS

Harry H. Sjolin, Oak Park, Ill., assignor to Continental Can Company, Inc., New York, N. Y., a corporation of New York

Application September 11, 1947, Serial No. 773,379

3 Claims. (Cl. 299—95)

1

The invention relates to new and useful improvements in a dispensing valve unit for volatile products, gases or liquids retained in containers under pressure, and is particularly adapted for spraying a liquefied aerosol composition.

An object of the invention is to provide a dispensing valve unit which comprises few parts easily assembled and most of which are of metal which can be made by die casting or screw machinery at very low cost.

A further object of the invention is to provide a dispensing valve unit wherein the valve is moved to open position by a flexible diaphragm forming the upper wall of the dispensing chamber of the valve unit.

A further object of the invention is to provide a dispensing unit of the above type wherein the flexible disc is initially bowed outwardly by the pressure of the holding ring against the peripheral portion of said disc.

A further object of the invention is to provide a dispensing unit of the above type wherein the holding ring and the valve body are formed so as to provide an annular channel extending around the valve body with which channel dispensing passages in the valve body and in the ring make connection for any setting of the ring.

A further object of the invention is to provide a valve unit of the above type wherein the valve body has upper and lower chambers connected by a passage in which moves the valve operating stem with sufficient clearance to provide a restricted flow channel for the product being dispensed.

Another object of the invention is to provide a valve unit of the above type wherein a valve is supported on a rod which extends into the supply tube with sufficient clearance to provide a flow channel for the fluid being dispensed.

A still further object of the invention is to provide a valve unit of the above type wherein the valve is free from the attachment to the operating devices therefor and is centered when moved to seated position by the surrounding portion of the valve body.

These and other objects will in part be obvious and will in part be hereinafter more fully disclosed.

In the drawings which show on a very large scale one embodiment of the invention:

Figure 1 is a vertical sectional view through a valve dispensing unit, a portion of the supply pipe and a portion of the can end to which the

2

valve unit is attached, the valve being in closed position;

Figure 2 is a view similar to Figure 1, but showing the valve moved away from its seat and out of the centering recess therefor so that the fluid to be dispensed may pass the valve;

Figure 3 is a plan view of the dispensing unit.

The invention has to do with a dispensing valve unit for volatile products, gases or liquids retained under pressure. The invention is capable of quite general use but is particularly adapted for the spraying of a liquid aerosol composition. This specific application of the improved dispensing unit will therefore be described in detail.

In the drawings which show on a very enlarged scale the improved dispensing valve unit, a portion of a can end to which the valve unit is attached is indicated at 1.

The valve unit includes a body portion 2 having a depending skirt 3 spaced away from the body portion, which skirt is adapted to extend down over a flange 4 on the can end. The body of the valve unit is soldered to this can end in the usual manner.

The body of the valve unit is shaped so that it may be produced at low cost by automatic screw machinery. The body at the upper end is recessed so as to provide a chamber 5. This will be referred to as the upper dispensing chamber. There is a radial port or passage 6 leading from this chamber to the outer surface of the body. In the lower portion of the body 2 there is a cylindrical bore forming a chamber 7 which will be referred to as the lower chamber.

The upper and lower chambers of the body of the valve unit are connected by a passage 8. Located in this passage and movable vertically therein is a valve operating stem 9. Said valve operating stem 9 is provided with a flat projecting head 10. The upper chamber 5 is closed by a disc 11, preferably of rubber. This disc 11 extends all the way across the upper end of the body of the valve unit and is clamped against said end by a ring 12. The ring 12 in the region 13 has a press fit with the body of the valve unit. Above this section with which the ring makes press fit, the body wall is offset inwardly so as to provide an annular channel 14 which extends all the way around the valve unit. The port or passage 6 leads from the upper chamber 5 to this channel 14.

The ring 12 has an inwardly projecting flange 15 which overlies the peripheral portion of the rubber disc 11. This flange is forced against

the rubber disc with considerable pressure so that the peripheral portion of the rubber disc will be deformed so as to not only provide a tight seal but so as to cause the central portion of the disc to bow outwardly as shown in Figure 1.

While the ring is under the pressure necessary to produce the seal and the bowing of the disc, the lower portion of the ring is bent inwardly into an annular channel 16 and thus the ring is firmly secured to the body of the valve unit. There is a dispensing nozzle 17 formed as an integral part of the ring and a dispensing passage 18 extends through this projecting nozzle and connects with the annular channel 14. When the ring is placed at random on the valve body unit, no matter what the angular position of the nozzle may be, the passage 18 will be connected to the channel 14 and through the channel 14 to the passage 6 leading to the dispensing chamber 5.

At the lower end of the passage 8, the valve body is provided with a horizontal smooth valve seat 19. The valve 20 is adapted to engage this seat for closing the dispensing device. This valve is of larger diameter than the passage 8. The operating stem 9 rests on the valve but is not attached thereto. When the flexible disc 11 is pressed upon, it will move the stem downward and the stem contacting with the valve will move it away from its seat.

A supply tube 21 extends into the chamber 7 and preferably has a press fit connection with the valve body unit. Located in this lower chamber 7 of the valve body unit is a rod 22 which extends downward into the supply tube with a clearance which provides a restricted flow channel 23 for the fluid being dispensed. The lower end of this rod is tapered to a point, as indicated at 24. The upper end is provided with a flat head 25 and the valve 20 rests on this head but is unattached thereto. A spring 26 bears at its upper end against the head 25 and at its lower end against the end of the tube 21. It is the spring that raises the rod which moves the valve against the seat for closing the valve.

The body wall of the chamber 7 at the upper end thereof and for a distance substantially equal to the thickness of the valve is of smaller diameter so that the valve fits therein and will be centered by the valve body relative to the valve seat. When the valve is depressed, it moves out of this recess so that the fluid may pass the valve and into the restricted passage surrounding the valve stem 9. Although the area of the opening between the passageway 8 and the valve stem 9 is approximately equal to the area of the orifice opening 18, the width of the opening between 8 and 9 is about $\frac{1}{10}$ of the diameter of the orifice 18. Therefore, any large specks of dirt, chemical crystals, or other solid foreign matter which would block off the orifice 18 will not pass through the annular opening around the stem 9, and any foreign matter that will pass through the annular opening will not interfere with dispensing the aerosol through orifice 18. The upper dispensing chamber is of a minimum size to permit proper expansion of the volatile liquid after passing through the restricted passage 8 before it is dispensed through orifice 18. This small chamber permits the small accumulation of liquid or vapor therein to be immediately dispersed when the valve is unseated so that there is no delayed spraying action.

It is noted that the spring 26 does not contact with the rod 22. Neither does it contact with the inner wall of the lower chamber and therefore the liquid product to be dispensed will contact the spring passing through the coils thereof and this will aid in the breaking up of the product which is to be atomized and dispensed.

It is noted that the valve 20 is not attached either to the stem or the rod and thus the valve can adjust itself to any irregularities in the valve seat or the surface of the head of the rod on which it rests. When the stem 9 is moved downward, it will clamp the valve 20 against head 25 of the spring urged rod and thereby prevent misplacement of the valve during dispensing and insure proper replacement of the valve on the seat when the valve is again closed.

It is further noted that all of the parts of the valve unit are metal except the rubber disc and the rubber valve, and that these parts may be cheaply made in the most part by automatic screw machinery.

It will also be noted that the parts may be readily assembled. The valve stem 9 may be inserted in the passage 8 of the body of the valve unit the disc 11 applied, and then the ring 12 clamped against the disc, after which the valve 20, the rod 22 and the spring 26 may be placed in the body of the valve and then the tube 21 forced into the valve unit, which completes the assembling of the parts.

It is obvious that many changes in the details of construction and the proportion of the parts may be made without departing from the spirit of the invention as set forth in the appended claims.

I claim:

1. A dispensing device for liquid products retained under pressure comprising a valve body having a lower chamber, an upper expansion chamber arranged one above the other, said body having a passage connecting said chambers, a horizontal valve seat surrounding the passage at the lower end thereof, a valve adapted to engage said seat, a rod disposed in said lower chamber and having a head at its upper end on which said valve is supported, a spring surrounding the rod and engaging the head for seating the valve, a valve operating stem resting freely on said valve and extending upwardly through said passage into the upper expansion chamber, said stem and passage being dimensioned so as to provide a restricted annular flow channel of uniform cross sectional dimensions for discharging the liquid product into said upper expansion chamber, said dispensing device having a dispensing orifice connected to said upper chamber, a flexible disk extending across the valve body and forming the upper wall of said expansion chamber, a ring surrounding the valve body at the upper end thereof, said ring having an inwardly projecting flange adapted to overlie said disk and clamp and seal the same against the end of the valve body so that said disk is exposed for direct finger engagement by the operator, said valve body in the region of the upper half of the ring being smaller in diameter than the ring so as to provide a channel extending around the valve body, a port in the valve body communicating with the upper chamber and the channel, and a dispensing port in said ring communicating with said channel, said disk when depressed engaging said stem for opening the valve.

2. A dispensing device for liquid products retained under pressure comprising a valve body having a lower chamber, an upper expansion

chamber arranged one above the other, said body having a passage connecting said chambers, a horizontal valve seat surrounding the passage at the lower end thereof, a valve adapted to engage said seat, a tube connected to the lower end of said valve body and extending into said lower chamber, a rod disposed in the lower chamber and having a head on which said valve is supported, said rod being extended into said tube with sufficient clearance to provide a restricted flow passage for the product, a spring surrounding the rod and bearing on said head for seating said valve, a valve operating stem resting freely on said valve and extending upwardly through said passage into the upper expansion chamber, said stem and passage being dimensioned so as to provide a restricted annular flow channel of uniform cross sectional dimensions for discharging the liquid product into said upper expansion chamber, said dispensing device having a dispensing orifice connected to said upper chamber, a flexible disk extending across the valve body and forming the upper wall of said upper expansion chamber, and means for clamping the disk to the valve body so that it is exposed for direct finger engagement by the operator, said disk when depressed engaging said stem for opening the valve.

3. A dispensing device for liquid products retained under pressure comprising a valve body having a lower chamber, an upper expansion chamber arranged one above the other directly over and in vertical alignment therewith, said body having a vertical passage extending from the lower chamber to the upper chamber, a horizontal seat surrounding the passage at the lower end thereof, a valve in the lower chamber adapted to engage said seat, a rod disposed in said lower chamber and having a head at the upper end on which said valve is supported, a spring surrounding the rod and engaging the head for seating the valve, a valve operating stem resting freely on the valve and extending upwardly through said

vertical passage into the upper chamber, said stem and passage being dimensioned so as to provide a restricted annular flow channel of uniform cross sectional dimensions discharging directly into said expansion chamber, said dispensing device having a dispensing orifice connected to said upper chamber and leading to the atmosphere, the cross sectional area of said orifice being substantially equal to the cross sectional area of the flow channel, a flexible disc extending across the valve body and forming the upper wall of said expansion chamber, and means for clamping the disc to the valve body so that it is exposed for direct finger engagement by the operator, said disc when depressed engaging the stem for opening the valve.

HARRY H. SJOLIN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,431,526	Jacobsen	Oct. 10, 1922
1,892,750	Rotheim	Jan. 3, 1933
1,966,911	Stephan	July 17, 1934
1,985,455	Mosby	Dec. 25, 1934
2,171,373	Rosenwald et al.	Aug. 29, 1939
2,237,489	Karbe	Apr. 8, 1941
2,351,697	Nielsen	June 20, 1944
2,351,965	Hoffer	June 20, 1944
2,372,392	Pletman	Mar. 27, 1945
2,420,223	Brewer	May 6, 1947

FOREIGN PATENTS

Number	Country	Date
79,738	Austria	Jan. 10, 1920
609,670	France	May 17, 1926
621,978	France	Feb. 19, 1927
290,873	Great Britain	May 24, 1928
28,975	Australia	June 3, 1931