Jan. 6, 1953 G. R. SAACKE 2,624,623

AEROSOL DISPENSER AND VALVE CONSTRUCTION

Filed Nov. 9, 1948

FIG. 1

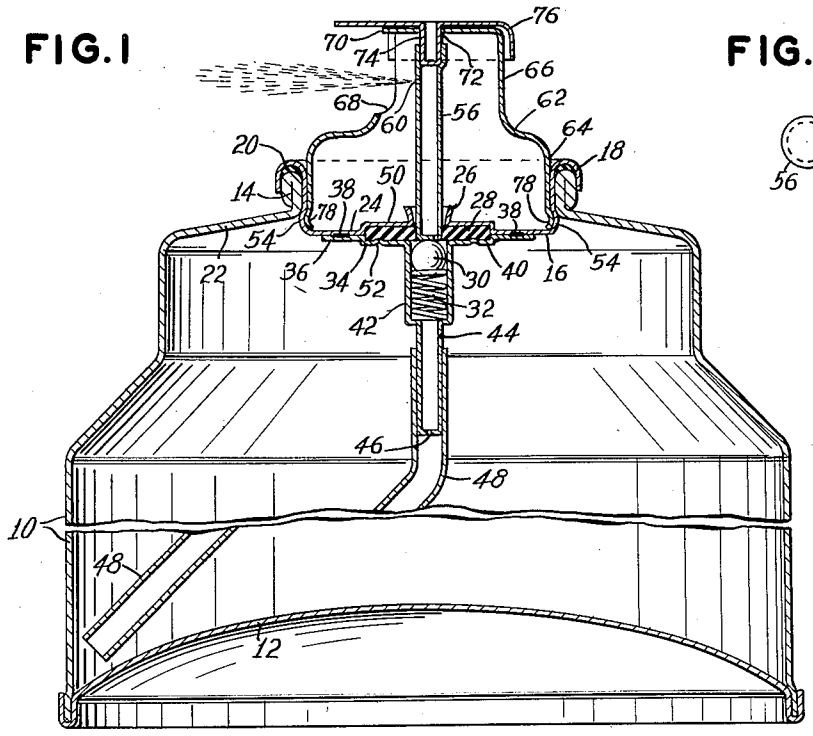


FIG. 4

FIG. 5

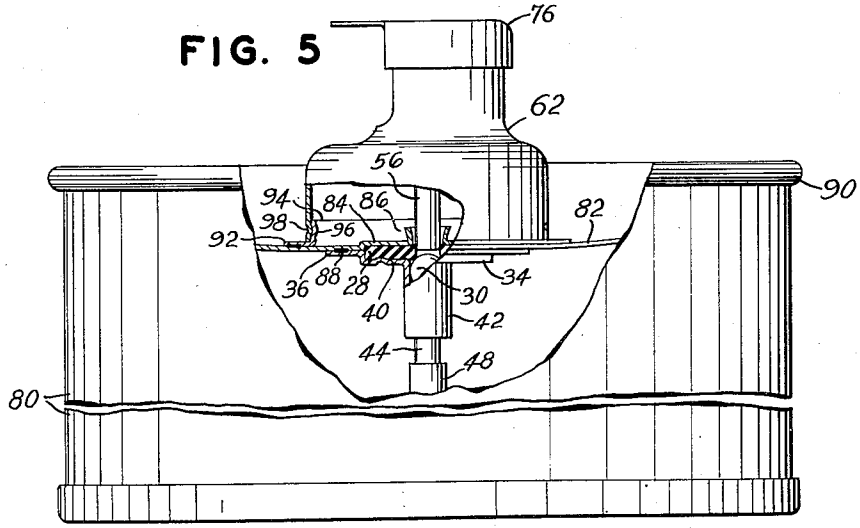


FIG. 2

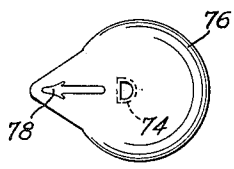
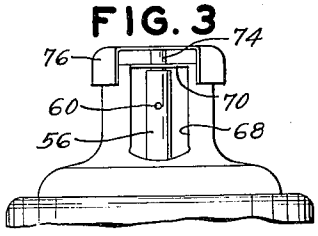


FIG. 3



INVENTOR.
G. Rudolph Saacke
BY
Pennie, Edmonds, Morton and Barrows
ATTORNEYS

Patented Jan. 6, 1953 2,624,623

UNITED STATES PATENT OFFICE

2,624,623

AEROSOL DISPENSER AND VALVE CONSTRUCTION

G. Rudolph Saacke, Brooklyn, N. Y., assignor, by mesne assignments, to Theodore Heilig, Long Beach, N. Y.

Application November 9, 1948, Serial No. 59,107

3 Claims. (Cl. 299—95)

1

My invention relates to improvements in dispensers for aerosol mixtures and more particularly in a new dispenser valve and head structure in which the cover of the container and the dispensing valve mechanism are combined in a unique manner.

Pressurized aerosol dispensers have been widely used for insecticides, germicides, coating materials and other aerosol solutions. At the present time the aerosol container of such dispensers in many instances is of the "tin can" type and the valve is relatively inexpensive, so that it may be sold as a non-refillable dispenser or as a dispenser which may be discarded after its contents have been used.

One of the important problems in the manufacture of such dispensers is the reduction in the cost of manufacturing the dispenser. Some of the costs include, of course, the cost of the metal and the manufacture of the container proper, which cannot be reduced materially below the cost of the present type of "can" construction. However, the costs of manufacturing the dispenser valve and of its assembly to the container can be considerably reduced and the structure improved.

Some of the valves used for discardable dispensers of the type under consideration have been relatively inexpensive, sometimes to the extent that they were quite unsatisfactory.

The primary object therefore of my invention is to provide a dispenser construction which will be suitable for the purposes referred to and which may be manufactured at reasonable costs by mass production methods.

A further object of my invention is to provide an improved dispenser head construction which will be safe and reliable.

Another object of my invention is to provide improved container head and valve structures which are simple to manufacture, assemble and operate.

In accordance with the features of my invention I have discovered that the dispenser valve and container head or cover can be combined in such a way as to provide a safe and reliable structure and at the same time an inexpensive valve construction easy and convenient to assemble. Furthermore the novel structure may be made without the use of screw machines or other machines for threading or machining operations.

A preferred form of construction of my improved dispenser includes a container of the "tin can" sheet metal type having a sheet metal head or cover with a central relatively small opening,

2

a sealing gasket having a central opening of a smaller size than the opening through the cover and mounted under the cover, a casing enclosing the lower portion of the gasket and secured to the underside of the cover around the periphery of the gasket, the casing having a downwardly extending portion axially of the opening in the gasket, a ball-type sealing member in the casing normally engaging the lower rim of the opening in the gasket, and a spring in the casing urging the ball-type closure against the gasket. The portion of the gasket casing extending below the gasket also includes a tubular section through which aerosol mixture is conducted from the container, as for example through the usual standpipe or dip tube.

The gasket, the gasket casing, closure and spring are incorporated inside the container cover as a fixed assembly and the cover then secured on the container proper. The valve operating mechanism is mounted outside the container proper and directly above and in connection with the hole in the cover or head.

The valve operating mechanism preferably comprises a tubular plunger having an end portion projecting through the opening in the cover and into the opening in the gasket which it fits snugly, the tubular plunger having an opening in its lower end and a side orifice through which the aerosol mixture in the container is sprayed and atomized. When the tubular plunger is pushed down it is moved through the opening in the gasket to unseat the ball closure and permit aerosol mixture to flow through the tubular plunger, and only therethrough, to the spray orifice in its side wall.

The upper part of the valve mechanism advantageously includes a dome structure of sheet metal for supporting the tubular plunger in position for actuating the valve mechanism. Such dome structure may comprise a casing surrounding the tubular plunger and secured to the container by a snap or similar connection, the dome-like casing including a relatively large outlet opening opposite the spray orifice, and means for orienting the tubular plunger so that the spray orifice is always aligned with the outlet in the dome-like casing.

My invention includes other features, objects and advantages which will be described in detail hereinafter in connection with the accompanying drawings forming a part of this application and illustrating embodiments of my invention.

In the drawings:

Fig. 1 is a vertical broken sectional view of a

dispenser constructed in accordance with the features of my invention in connection with a "can" type sheet metal container of the crown type, this figure showing the dispenser enlarged to approximately twice its normal dimensions so that the detailed features of construction may be readily illustrated.

Fig. 2 is a view looking down on the actuating means for the tubular plunger of the dispenser.

Fig. 3 is a broken side view showing the upper portion of the valve operating mechanism and spray outlet.

Fig. 4 is a view looking up showing the lower end of the tubular plunger and its inlet opening offset with respect to its axis.

Fig. 5 is a view similar to that of Fig. 1 showing the application of the improved dispenser construction to the dished-head-type of sheet metal can container.

Referring to Fig. 1 of the drawings, the pressure type aerosol dispenser therein shown comprises a sheet metal "crown" type can container 10 similar in external appearance to a known type of container normally closed with a seal cap conventionally used for bottles. The container 10 includes a dished bottom head 12 while its side wall terminates in a relatively small opening provided by a rolled top or bead 14.

The cover for the opening of the container includes a pressed sheet metal member 16 having a rolled rim 18 extending over a rubber composition sealing gasket 20 resting on the roll 14. The cover 16 has a substantially cylindrical side wall which extends slightly below the bead 14 and the under part of the sloping wall 22 of the container 10. The cover 16 also includes an integral sheet metal wall 24 which is pierced centrally to provide a central opening surrounded by an upwardly extending flange 26.

The cover member 16 is directly combined with the valve mechanism and in Fig. 1 this mechanism includes a composition gasket 28 of synthetic rubber material suitable for resisting the action of any aerosol mixture with which the dispenser may be filled. This gasket 28 is a circular disc having an axial opening normally closed by a ball closure 30. The gasket 28 is mounted directly under the surface 24 of the member 16 so that its opening is axially aligned with the opening provided by the flange 26. The ball 30 is normally held against the opening in the gasket 28 by means of a spring 32 and the gasket, ball and spring are all enclosed by a casing 34 having the cross-sectional shape shown in Fig. 1, which includes an annular flange 36 spot welded to the portion 24 at points 38 suitably spaced to hold the casing 34 in place.

The casing 34 of the valve mechanism also includes a cylindrical portion extending downwardly around the periphery of the gasket 28 and a flat portion 40 covering the lower face of the gasket 28 and serving to press the gasket against the surface of the cover portion 24. Casing 34 also includes a downwardly extending cylindrical portion 42 housing the spring 32 and ball 30 in their correct positions, the spring 32 resting on a shoulder formed by a reduction in diameter of the downwardly extending cylindrical portion of the casing, this portion of reduced diameter 44 having an opening 46 for the admission of aerosol fluid and having a pressed-on standpipe or dip tube 48 which may be of metal or plastic and which extends to the bottom of the container so that any liquid contained therein will be delivered into the tube and through the valve mechanism.

The bottom 24 of the cover 16 is advantageously pressed and offset upwardly at 50 to provide a recess into which the gasket 28 is readily received for a portion of its thickness. This offset in the cover aids in orienting the gasket 28 when the cover 16 and casing 34 with its contents, are assembled. The horizontal portion 40 of the casing 34 advantageously includes an annular compression ring 52 projecting upwardly against the gasket 28 to insure proper compression of the gasket and sealing when the casing 34 is welded or otherwise secured to the cover 16.

An important advantage of the present invention is the fact that the portion of the valve structure described above may be assembled with the cover 16 before that cover is attached to the container. This cover assembly may therefore be secured to the container after the container has been filled with aerosol solution by simply inserting the cover assembly with the portion 18 overlying the bead 14 and gasket 20, then with nothing at all in the cover 16 except the slightly projecting flange 26 a tool is inserted within the vertical cylindrical wall to press a bead 54 outwardly from the periphery of the cover side of the wall adjacent to wall 24, under the bead 14 against the wall 22 so that rim 18 is pulled down, the cover locked in and good seal provided. At this point the container and valve mechanism carried by the cover 16 may be tested for leakage by immersion in water.

It will be understood of course that the containers may be filled after the cover 16 is secured in place by forcing the aerosol mixture through the valve mechanism and opening 46, this, however, being a much slower procedure than the filling of the containers with refrigerated mixture before applying the cover mechanism 16.

The means for operating the ball 30 and spraying aerosol mixture from the container as shown in Fig. 1 of the drawings comprises a unitary assembly which is simply snapped onto the filled container as described above, this assembly being shown in Fig. 1 as comprising a tubular plunger 56 extruded to the shape illustrated extending vertically through the opening provided by the flange 26 and the corresponding opening in the gasket 28. This plunger is provided with an offset lower opening 58, or other suitable structure, through which aerosol mixture flows from around the ball 30, into the tube such mixture being discharged as a fine mist or spray through an orifice 60 in the side wall of the tubular plunger at a point substantially above the rim 18. Fig. 1 shows the plunger 56 in depressed position so that the ball 30 is unseated with respect to the gasket 28.

The tubular plunger 56 is supported in upright position by a hood-like casing 62 which has a lower cylindrical portion 64 and an upper axially offset cylindrical portion 66 having a side cut away opposite the orifice 60 to provide a relatively large spray outlet 68. The offset places this out closer to the orifice than it otherwise would be. The casing 62 is pressed and cut from sheet metal so that it includes a cover portion 70 having a D-shaped opening 72 for receiving a D-shaped extension 74 pressed from a sheet metal actuating cap 76. The upper end of the tubular plunger 56 is D-shaped and adapted to receive the D-shaped projection 74 which is press fit into place to permanently connect the elements 56 and 76 together and provide an upper

closure for the upper end of the tubular plunger 56 above the orifice 60.

Certain of the elements of the hood-like casing construction and assembly are shown in Figs. 2, 3 and 4 from which it will be seen that the actuating cap 76 has a D-shaped opening left by forming the projection 74, and is provided with a projection and arrow 78 which indicates the direction in which the orifice 60 points. The cap 76 is cut away under the projection 78 to correspond with the opening 68 as shown in Fig. 3.

It will be noted that when the cap 76 is pressed down as shown in Fig. 1, the top rim of the plunger 56 is somewhat below the cover 70 but that when the plunger is released as indicated in Fig. 3, the upper edge of the tubular plunger 56 is moved to a point adjacent the cover 70 which serves as a stop. In this position the lower end of the plunger 56 as shown in Fig. 5 may be slightly above the ball 30 or merely resting lightly on the ball 30 while the ball is seated against the gasket 28. When the actuating cap 76 is actuated downwardly as in Fig. 1 and then released, the spring 32 acts to not only seat the ball 30 but also to elevate the tubular plunger 56 and the cap 76 substantially to the position shown in Figs. 3 and 5.

It will be noted from the foregoing description of the valve actuating mechanism that when the tubular plunger 56 is press fit to the projection 74, these elements are permanently assembled to the hood-like casing 62 and that the orifice 60 is oriented with respect to the large opening 68. The filled containers containing the covers with the valve assemblies may be provided with the valve operating mechanism by simply inserting the tubular section 64 into the cylindrical wall of the cover 16 while at the same time inserting tubular plunger 56 through the opening provided by the flange 26. The cylindrical wall 64 is provided with outwardly projecting pimples 78 which snap into the recess resulting from the formation of the annular bead or beads 54. By making the valve actuating mechanism separate from the container cover and combined valve closure mechanism, it is possible to conveniently seal the container and provide a very inexpensive structure which is easily and inexpensively assembled.

The invention may be applied to different types of sheet steel or can-type containers, as illustrated by the modified form of construction shown in Fig. 5. In this view the container 80 which is a cylindrical-type container having dished heads which are rolled in for sealing and closure purposes. In the present instance the container 80 is provided with a dished head 82 having a valve assembly substantially identical to that described above in connection with Figs. 1 to 4 of the drawings. For example, it will be noted that the head 82, before being secured to the container 80 is provided with an upwardly pressed section 84 and a central flange 86 forming an opening for reception of the tubular plunger 56 as in Fig. 1. The valve mechanism comprising the casing 34, gasket 28 and other elements are assembled under the head 82 the same as in Fig. 1, the flange 36 being spot welded at 88 to the head 82.

In this modification of the apparatus the hood-like casing 62 carrying the valve actuating and spraying mechanism is secured to the head of the container after the container is filled and tested, the head being rolled on and secured to the cylindrical wall of the container, as for example by the sealing roll 90. The securing means as illustrated comprises a pressed circular angle member having a flange 92 welded to the head 82 and including a cylindrical flange 94 having an annular recess 96 into which internal pimples 98 on the lower portion of the casing 62 are snapped when the hood structure is set in place on container head.

In the apparatus as shown in Fig. 5, the valve elements comprising the gasket, ball, spring and casing, are advantageously assembled on the cover, after which the container is filled with refrigerated aerosol mixture, as for example, a coating composition, insecticide or other mixture, and then the cover is placed on the cylindrical part of the container and rolled or pressed thereon in accordance with the usual procedure to form the bead or roll 90 which may include a rubber or other composition gasket as in Fig. 1. The hood-like casing structure including the tubular plunger is assembled on the container after the container has been tested. The assembly in this way, in either modification, leaves the cover free for closing operations without any hindrance from the valve operating mechanism.

The improved dispenser construction of the present invention not only provides a new and improved dispenser apparatus in which the gasket and ball closure are mounted under the cover, but also a dispenser construction in which a tubular plunger is provided for unseating the ball closure of the valve and effectively conducting away and atomizing the released mixture, since in each instance the tubular plunger is sealed with respect to the gasket which in turn is used for sealing the container. The single washer-like gasket as shown therefore acts as a valve seat, a seal for the tubular plunger and as a seal for the container.

The improved dispenser mechanism may be constructed and assembled from sheet metal by pressing, rolling and other simple operations without the use of a screw machine or other machines of that type.

The opening provided in the cover of the container by the flange 26 in either form of the invention is preferably somewhat larger than the opening in the gasket so that the plunger tube 56 can move freely through the opening in the cover and seal tightly in the gasket. In fact the portion of the plunger tube adjacent the end which extends into the opening of the gasket is advantageously enlarged so that when the plunger is depressed the enlarged portion will begin to enter the gasket and increase the effectiveness of the seal.

The safety factor of the dispenser construction of the present invention is increased by the fact that ball 30 is made larger than the opening in the cover as provided by the flange 26. Therefore, if for any reason the gasket should be dissolved or accidentally or intentionally moved the ball will come up and seal against the underside of the cover and close the opening formed by the flange 26. In providing the opening in the end of the plunger tube 56 adjacent the ball 30 this opening may comprise a slit which extends through the end wall of the tube.

What is claimed as new is:

1. In a dispensing apparatus including a sheet metal container, a thin sheet metal cover for the container having an opening therethrough centrally of the cover, a valve structure combined with the thin metal cover and including a thin sheet metal casing means secured to the lower portion of the cover concentric to said opening,

a spring and ball closure mounted in said casing below said cover for controlling the flow of fluid from the container, said sheet metal casing means including a lower tubular portion adapted to have a dip tube connected thereto, an orifice in the lower end of said tubular portion, and a cylindrical portion concentrically arranged with respect to and above said lower tubular portion and in which said spring and ball are mounted, a sealing gasket having a centrally arranged opening therethrough mounted beneath the cover inside said casing with its opening axially aligned with respect to the opening in the cover, a tubular plunger for actuating said ball having one end portion arranged in the opening in the cover and the gasket, the side wall of the tubular plunger being in sealing engagement with respect to the wall of the opening in the gasket, said end of the tubular plunger having a passageway extending thereinto for the flow of fluid material from the container when the ball is actuated by depressing the plunger, and a spray orifice connected into the opposite end portion of the plunger.

2. In an apparatus for dispensing fluids including a container, a thin sheet metal cover for the container having an opening therethrough, a valve structure combined with the sheet metal cover and including a sealing gasket having an opening therethrough and mounted below the cover with its opening axially aligned with that of the cover, a valve closure means mounted under and seated against the gasket adapted to close the opening in the gasket, a spring for urging the closure means to its seat, a thin sheet metal casing welded to the lower portion of the cover around the gasket and in engagement therewith for retaining the gasket against the lower portion of the cover, the closure means and the spring being enclosed in said casing and held thereby in position under the gasket and cover, a hollow tubular plunger having one end extending through the opening in the cover and adapted to

be moved in the opening in the gasket, the side wall of said end sealing with respect to the wall of the opening in the gasket, said tubular plunger having a passageway through its end wall facing the closure means for the flow of fluid material thereinto, said tubular plunger being adapted to be moved into engagement with the valve closure means to unseat it so that fluid will flow through the opening in the gasket and through said passageway into the hollow plunger, and a spray orifice means connected into the upper portion of the hollow tubular plunger and through which fluid material is adapted to be sprayed.

3. An apparatus for dispensing fluids as claimed in claim 2, including means for retaining the hollow tubular plunger in upright operative position with respect to the cover and valve closure means, and means cooperating with said retaining means for removably holding the retaining means on the container, whereby the tubular plunger is readily assembly in operative position on the container and readily removed therefrom.

G. RUDOLPH SAACKE.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
710,674	Fassmann	Oct. 7, 1902
799,454	Cordner	Sept. 12, 1905
1,800,156	Rotheim	Apr. 7, 1931
2,322,183	Ward	June 15, 1943
2,322,877	Parker	June 29, 1943
2,328,863	Threm	Sept. 7, 1943
2,351,751	Fruin et al.	June 20, 1944
2,369,356	Koehn	Feb. 13, 1945

FOREIGN PATENTS

Number	Country	Date
366,626	Great Britain	Feb. 11, 1932