

Sept. 6, 1960

T. J. MAHON ET AL
DISPENSING DEVICE

2,951,644

Filed Jan. 3, 1958

3 Sheets-Sheet 1

FIG. 3.

FIG. 2.

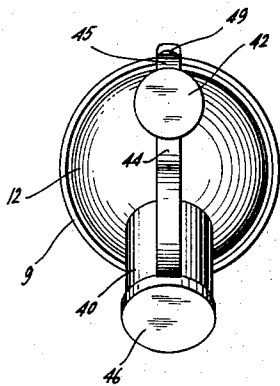
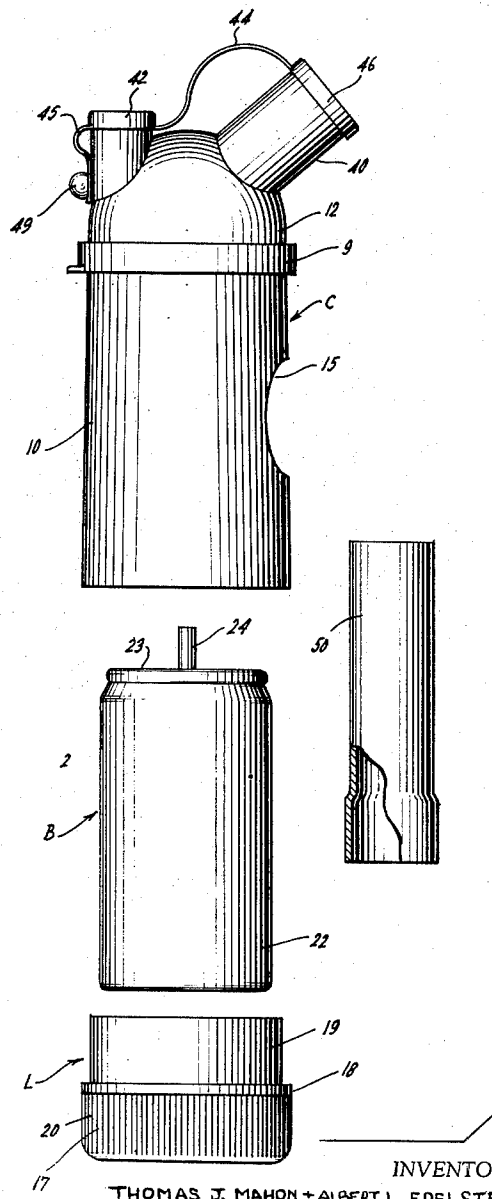
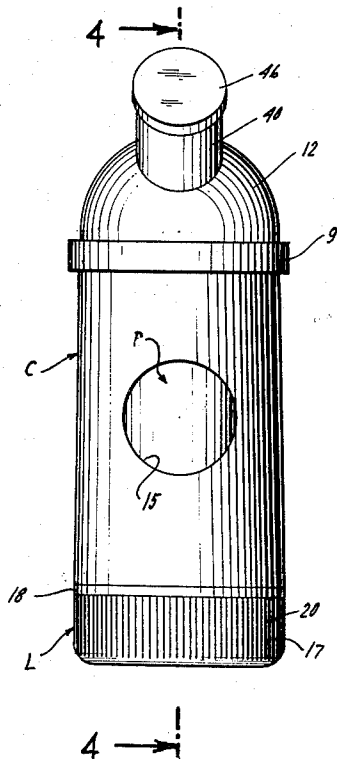


FIG. 1.



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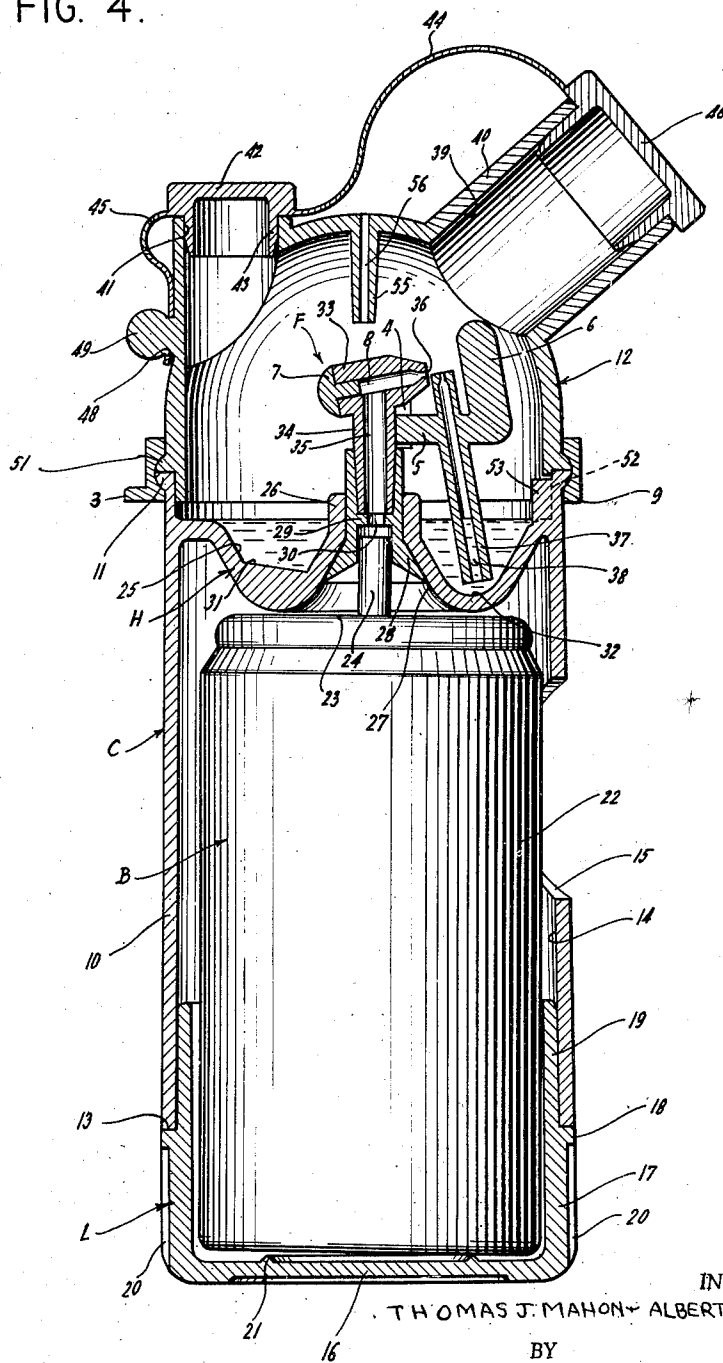
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Filed Jan. 3, 1958

3 Sheets-Sheet 2

FIG. 4.



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3 Sheets-Sheet 3

FIG. 6.

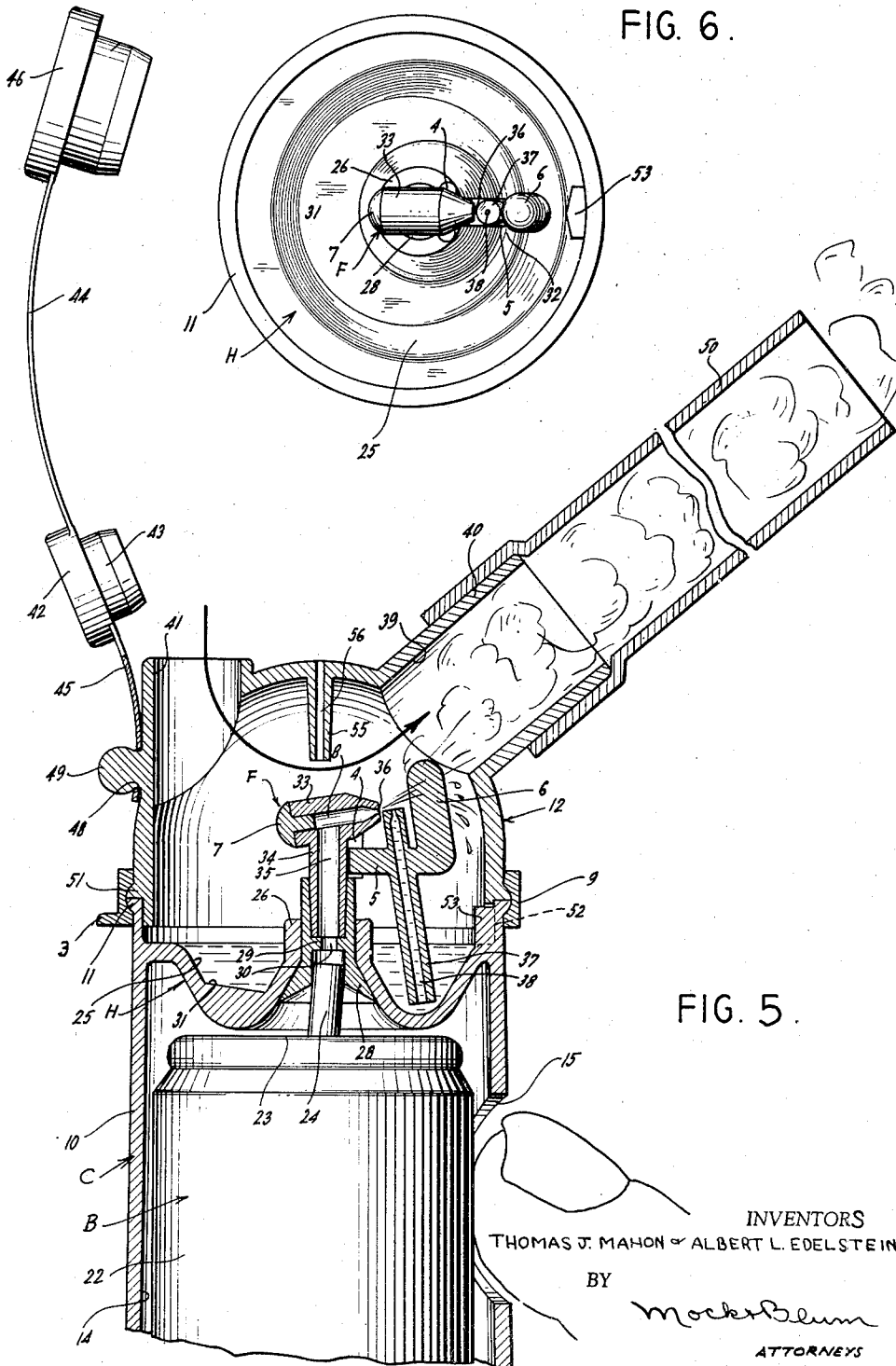


FIG. 5.

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2,951,644

DISPENSING DEVICE

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5 Claims. (Cl. 239—308)

The present invention relates to dispensing devices broadly, and is concerned primarily with a dispensing device designed for the introduction of a fluent medicine in a nebulized condition into the oral passages of a patient.

At the present time the medical profession recognizes the desirability of treating certain afflictions and diseases by introducing a medicine which originally is in a fluent state into the oral cavity and passages in a nebulized condition. In particular, it has been found that coughs may be effectively reduced by increasing the moisture and pliability of the mucous membranes of the respiratory tract. Proper humidification not only contributes to this result but also aids in the liquefaction of bronchopulmonary secretions. This of course involves treatment by inhalation which has proven to be effective.

When a medicine is properly nebulized for treatment by inhalation, the average size of the medicinal particles should be about two microns in diameter. The permissible range is from one to four microns, but it is important that these limits be not exceeded in either direction. When particles of this size are created in admixture with a gas such as Freon, the resulting solution may be considered as properly nebulized.

This nebulization eliminates the undesirable cold feel which attends the use of an atomized medicine in which the particles are too large and cause excessive evaporation.

While the present invention is designed primarily for the nebulization of medicines for treatment by inhalation, the device provided hereby is also believed to have broad utility in such fields as the atomization of paints and cosmetics.

With this thought in mind, the present invention has in view as a highly important object the provision of a new and improved dispensing device of the character aforesaid which is specifically designed to eliminate and prevent the emergence of droplets from the discharge spout or opening thereof. In achieving this end, an arrangement is employed which provides a baffle against which the atomized medicine is impinged with the result that the droplets fall back into the medicine supply and only the nebulized medicine is discharged.

In providing a dispensing device of the character aforesaid, it is highly desirable that the device be susceptible of easy operation by the user because such devices are intended primarily for operational use by the patient rather than by doctor or nurse. With this condition in mind, another highly important object is to provide a dispensing device of the character aforesaid which is of a novel constructional design that affords this easy and simple operation.

More in detail, the invention has as an object the provision of a dispensing device of the character aforesaid, which includes as a characteristic and essential element a so-called aerosol bomb which constitutes the motivating force for the atomizing operation. At the present time there is now well known and available to the public an aerosol bomb which comprises a reservoir or container

2

from which extends a discharge nipple that is adapted to be distorted from its normal position to open a valve at the inner end thereof and thus permit the discharge of the gaseous contents of the container. The present invention has as an object the provision of a dispensing device of the type indicated which is particularly constructed and designed to make use of an aerosol bomb of this type.

In accordance with the present invention, the nebulizing gas may be taken from either the gas phase or the liquid phase of the aerosol bomb. This is important from the viewpoint of practical operation.

More in detail, the invention has as an object the provision of a dispensing device of the character aforesaid, which comprises an outer container or casing within which is loosely assembled an aerosol bomb so that the latter may be laterally displaced or moved within the outer container by the user applying pressure thereto through an access opening in the outer container. Formed as a part of this outer container is a head, the underside of which is formed with a recess for receiving the discharge nipple of the aerosol bomb. Thus, when the bomb is moved laterally the discharge nipple is distorted to release the contents of the bomb.

Still another object of the invention is to provide in a dispensing device of the type indicated an outer container provided with a removable closure at its lower end. This removable closure permits the replacement of the aerosol bomb from time to time as occasion demands.

In a dispensing device of the type with which this invention is concerned, it is important that provision be made for introducing the fluent medicine which is to be atomized thereinto and to maintain this medicine in such a position that portions thereof will be entrained or picked up by the escaping gas to achieve the atomizing action.

With this thought in mind, a further object is to provide in a dispensing device of the character noted a main or outer casing having a head at one end and which head is formed with an annular groove or trough designed to receive the fluent medicine to be dispensed. This trough is formed on the upper face of the head opposite to that which is formed with the socket receiving the discharge nipple of the aerosol bomb. Moreover, it is provided about a central neck which is designed to receive a nebulizing fitting having a passage that communicates with the discharge nipple.

Still another object in view is to provide, in a dispensing device of the type indicated, a nebulizing fitting having a depending extension which extends down to the lowermost point of the groove or trough receiving the fluent medicine. This extension is formed with a small diameter bore, the upper end of which is positioned just at the end of the main passage in the nebulizing fitting. Thus, as the gas under a pressure emerges from the discharge end of the passage in the nebulizing fitting, it passes across the upper end of the bore in the depending extension and causes an attenuation of the air in this bore to withdraw the fluent medicine from the trough and cause the withdrawn medicine to be nebulized.

To the end of efficient operation, it is desirable that the dispensing device be capable of nebulizing substantially all of the fluent medicine that is introduced into the trough. With this end in view, a further object is to provide in a dispensing device of the character aforesaid an annular trough or groove, the bottom of which is inclined relative to the longitudinal axis of the outer casing with the lower end of the extension on the atomizing fitting being located at the lowermost point of the bottom of said groove.

It has been found that in many instances it is desirable that the nebulized medicine include air in addition to the gas from the aerosol bomb. Thus, another object in view is to provide, in a dispensing device of the type noted,

means for causing the gas that is released from the bomb to pick up air substantially at the same point where the fluent medicine is drawn from the trough.

More in detail, the invention has as an object the provision in a dispensing device of the type indicated, an outer casing having a removable dome enclosing the annular trough, the neck upstanding centrally from the trough, and the nebulizing fitting carried thereby, with the dome being formed with an opening that communicates with the atmosphere. Air is drawn through this opening for admixture with the gas and fluent medicine.

Still another object of the invention is to provide, in a dispensing device of the type noted, an outer casing having a removable dome formed with a discharge spout that is located substantially opposite to the discharge end of the passage in the nebulizing fitting. This discharge spout preferably includes a removable extension that may be applied as occasion demands.

During periods of nonuse, it is desirable that the open end of the discharge spout be closed, and this is also true for the air vent or opening in the top wall. Thus, a further object of the invention is to provide a dispensing device of the character aforesaid with a closure unit that includes closure elements for the open end of the discharge spout and air vent respectively, and which is adapted to be swung into and out of closed position.

Various other more detailed objects and advantages of the invention such as arise in connection with carrying out the above noted ideas in a particular embodiment will in part become apparent and in part be hereinafter stated as the description of the invention proceeds.

The invention therefore comprises a dispensing device consisting essentially of an outer casing having a main body portion defined by a head and a removable end closure and formed with an access opening.

Loosely received in this main body portion is an aerosol bomb having a discharge nipple snugly received in a socket formed in the underside of said head with the nipple being adapted to be distorted by movement of the bomb relative to the casing to discharge the gaseous contents of said bomb. The face of this head opposite to the socket is formed with an annular groove or trough designed to receive a fluent medicine with a neck upstanding centrally from said trough.

Rotatably mounted in this neck is a nebulizing fitting having a passage communicating with said discharge nipple and an extension the lower end of which is located at the lowermost point of said trough. The casing is formed with a removable dome enclosing said fitting and formed with an upwardly inclined discharge spout and an air vent. A closure member having closure elements for said air vent and discharge spout, respectively, is carried by said top.

For a full and more complete understanding of the invention, reference may be had to the following description and accompanying drawings, wherein:

Figure 1 is a view in side elevation of a dispensing device designed in accordance with the precepts of this invention.

Figure 2 is a top plan view of the dispensing device.

Figure 3 is a view in side elevation showing the outer casing, aerosol bomb, end closure, and discharge spout in exploded relation.

Figure 4 is a longitudinal section through the dispensing device and is taken about on the plane represented by the line 4—4 of Figure 1.

Figure 5 is a detailed sectional view of the upper end of the device with the closure member in open position and the bomb moved into position distorting the discharge nipple to cause discharge of the gaseous contents of the bomb; and

Figure 6 is a top plan view of the outer casing with the dome removed.

Referring now to the drawings, wherein like reference characters denote corresponding parts, and first more

particularly to Figures 1 and 3, the dispensing device of this invention is shown as comprising an outer casing or container C, an aerosol bomb B, and a lower end closure L.

The outer casing C may be made from any appropriate material, although the invention has particularly in mind the use of a plastic such as one of the acetates or vinyl chlorides. There are today many plastics well known and available to the public as such which are suitable for the manufacture of this outer casing C. The outer casing C comprises a main body portion 10 which is generally cylindrical and which terminates at one end at a head 11 (Figures 4 and 5) where a removable dome 12 is joined to the cylindrical portion 10 by a retaining ring 9. The opposite or lower end of the cylindrical portion 10 is open as indicated at 13 (Figure 4), with this open end being adapted to be closed by the lower end closure L. The cylindrical portion 10 provides an inner bore 14 and is formed with side access opening 15.

The retaining ring 9 is formed with a projection 3 (Figure 5) which is intended to function as a finger grip to enable a user to quickly and easily remove the retaining ring 9 and thus disassemble the dome 12 from the main body portion of the casing C. This quick disassembly is of importance because it provides for cleaning of the upper portion of the casing C in an easy manner.

The end closure L comprises an end wall 16, to the outer periphery of which is integrally joined a cylindrical skirt 17. Extending outwardly from this skirt 17 is an annular flange 18 which abuts the open end 13 of the main body portion 10 of the casing C. Extending up into this main body portion 10 and integrally joined to the skirt 17 is a reduced extension 19 which holds the end closure element in position through the medium of a friction fit. It is evident that this end closure L may be removed by simply pulling outwardly or downwardly on the skirt 17. To facilitate this operation, the outer surface of this skirt 17 may be knurled or formed with a series of longitudinal ribs as indicated at 20 in Figures 1 and 3. The inner face of the end wall 16 is formed with an annular rib 21 which bears against the aerosol bomb B as will now be described.

An aerosol bomb such as represented at B is now well known and available to the public as such. It comprises a main container or receptacle 22 which receives an appropriate gas under pressure. One gas which has been found suitable for the particular purposes of this invention is Freon. The container 22 has a bottom wall that rests on the annular rib 21 of the end wall 16. It also has a top wall at 23, from which projects a discharge nipple 24. At the lower end of the discharge nipple 24 and within the container 22, there is a discharge valve (not illustrated) which is closed when the nipple 24 is in the normal position illustrated in Figures 3 and 4. However, when this discharge nipple is distorted or canted from this normal position relative to the container 22, the valve is opened to permit discharge of the gaseous contents of the container. This distorted position is depicted in Figure 5.

Like the outer container C, the aerosol bomb may be made from any material desired, such as metal or one of the plastics above noted.

It will be noted that when the bomb B is assembled in the container C, it is loosely positioned in the bore 14. That is, it is movable therein. Thus, the finger of a user may be brought into engagement with the bomb B through the access opening 15 and move the bomb relative to the casing C. The purpose of this is to move the bomb so that the discharge nipple 24 is distorted in a manner to be later described and thus discharge the gaseous contents of the bomb.

Integrally joined to the cylindrical wall 10 and extending across the upper end of the bore 14 is a head which is referred to in its entirety by the reference character H. This head H is of a configuration providing an

5

annular groove 25 about a central neck 26 with a socket 27 being formed on the underside of the head H. Received in this socket 27 is a fitting carrier 28 that may be made from any flexible material commonly employed in the manufacture of such articles as gaskets, although the invention has particularly in mind the use of polyethylene. This carrier 28 has an intermediate wall at 29 formed with a discharge opening 30 in the wall 29.

It is important to note that the annular groove or trough 25 has a bottom which is inclined with respect to the longitudinal axis of the casing C. Thus, the highest point of the trough is represented at 31, while the lowest point is indicated at 32.

A nebulizing fitting is referred to in its entirety by the reference character F. It comprises a main body portion 33 from which extends a reduced extension 34 that is snugly received in the carrier 28 above the wall 29. A passage 35 extends upwardly through this extension 34 and communicates with a cross passage 8 in the main body portion 33. The cross passage 8 terminates at a restricted discharge end 36 at one side of the main body portion 33, with its other end being closed by a removable plug 7.

Cooperating with the fitting F is a baffle 6 carrying a depending extension 37, the lower end of which is located substantially at the lowermost point 32 of the trough 25. It is formed with a fine bore 38, the upper end of which is reduced and located substantially at the discharge end 36 of the passage 35.

The baffle 6 has a rounded upper edge, as shown in Figure 5, and is comparatively small, having just sufficient extent to engage a substantial part of the Freon and medicine emerging from the discharge opening 36. Except for a vertical adjustment, to be later described, the position of the baffle 6 relative to the opening 36 is fixed and this makes it entirely practical to maintain the small size of the baffle 6. This is important because, with this small extent, the baffle will not materially interfere with the free flow of air through the dome as will later be described.

The removable dome 12 of the casing C is formed with a discharge opening at 39; and extending upwardly and outwardly from the discharge opening 39 is a neck 40. The discharge opening 39 under normal conditions is located opposite to the discharge end 36 of the fitting F.

The baffle 6 and extension 37 are mounted on an arm 5, the inner end of which is secured to the fitting F just below the main body portion 33, as by being received in the slot shown at 4.

This arm 5 is received in the slot 4 with a friction fit. This provides for a vertical adjustment of the baffle 6, together with the tubular extension 37, relative to the discharge opening 36, and yet assures that the unit 6-37 will remain in an adjusted position.

The removable dome 12 is formed with a circular opening at 41 which is normally closed by a top or plug 42. This plug 42 is preferably made from a material having properties of resiliency and elasticity such as polyethylene. It includes a skirt 43 which extends through the opening 41 with a snug fit. Thus the opening 41 constitutes an air jet when the plug 42 is removed. Integrally joined to plug 42 at the outer periphery thereof is a strip 45 that is of the same material as plug 42, namely polyethylene. This strip 45 carries a cup-shaped closure element 46 for the discharge neck 40. The open position for these closure elements 42 and 46 is depicted in Figure 5, and the closed position in Figure 4. The strip 45 is continued beyond the closure 42; and the extending portion 44 is formed with an opening 48 which receives a knob 49 formed on the dome 12 with a snap fit.

The neck 40 is adapted to receive a discharge spout 50 that is removably positioned thereon.

Depending from an upper region of the dome 12 is a

6

vent tube 55 having a through passageway 56, which opens at its inner end centrally of the dome.

The dome 12 is provided with a bead at 51 that is complementary to the bead 11 on the container C. The retaining ring 9 fits over the beads 11 and 51. As shown in dotted lines in Figs. 4 and 5, the dome 12 is formed with a recess 52 just below the bead 51; and this recess 52 receives a lug 53 on the container C as shown in Fig. 6.

Operation

While the manner of using the dispensing device of this invention and its mode of operation is believed to be obvious from the illustration of the drawings and description of parts given, it will be briefly outlined as follows:

It is evident that the lower end closure L may be removed so as to take out an expended bomb B and replace it with a fresh bomb having an adequate supply of the gas under pressure. When the bomb B is being positioned, the discharge nipple 24 is inserted in the carrier 28, after which the end closure L is assembled in the position depicted in Figure 4.

The fluent medicine is now introduced into the trough 25, preferably through discharge neck 40.

When the medicine is to be nebulized and introduced into the oral cavity of the patient, the strip 45 carrying the closure elements 42 and 46 is swung into the open position illustrated in Figure 5. The patient now grasps the casing C in one hand and, by using either a finger or thumb, moves the bomb B within the casing so as to bring the discharge nipple 24 into a distorted position relative to the main body portion of the bomb. This causes the gaseous contents of the bomb to be discharged and the gas passes upwardly out of the discharge nipple 24 through the opening 29 in the carrier 28 and thence through the passages 35 and 8 in the fitting F and out of the discharge end 36 of the latter passage. At this point the escaping gas causes an attenuation of the bore 38 of the extension 37. This attenuation or partial vacuum draws the fluent medicine from the trough 25 and causes it to be admixed with the gas with the nebulizing action. At the same time, air enters through the air vent 41 and is admixed with the gas and fluent medicine. This nebulized mixture now impinges against the baffle 6, causing any droplets or liquid portions of the medicine which have not been atomized to fall back into the trough 25, with the result that only medicine that is substantially fully nebulized passes out through the open end of the discharge spout.

The movement of the Freon gas, with the medicine entrained thereby, out of the discharge opening 36, causes air to be aspirated through the jet 41 and out the neck 40. This movement of the air is impaired but little, if any, by the baffle 6, due to the small size of the latter. Thus, a large percentage of air is present in the mixture that is ultimately delivered to the nostrils of the user. Moreover, the rounded upper edge of the baffle 6 facilitates the passage of the admixed air, Freon and medicine over the baffle 6.

During periods of nonuse, the open end of the discharge neck 40 and the air vent 41 may be closed by bringing the closure elements 42 and 46 into the effective positions depicted in Figure 4.

The permanently open vent tube 55 enables the plugs 42 and 46 to be inserted easily without air compression in the dome and also permits the escape of gas inadvertently released when the plugs are in their closed locations.

It is evident that with the air vent 41 closed by the plug 42 and the neck 40 by the closure 46, the dispenser may be carried about on the person even though medicine is present in the trough 25. It is true that manipulation of the container might cause displacement of the medicine but as the dome 12 is completely closed in this

7

condition, except for the tube 55 which opens centrally of the dome, no harm is done by the medicine splashing about.

It is important to note that the discharge spout 36 is directed generally towards the side wall of the dome 12 and not in alignment with the neck 40. This insures the impingement of substantially all heavier particles of the Freon and admixed medicine before reaching the discharge neck and eliminates the possibility of any droplet being delivered to the neck 40.

While a preferred specific embodiment of the invention has hereinbefore been set forth, it is to be clearly understood that the invention is not to be limited to the exact constructions, designs and materials illustrated and described because various modifications of these details may be provided in putting the invention into practice within the purview of the appended claims.

What is claimed is:

1. In a dispensing device, a normally upright casing, a head on the upper end of said casing formed with a central through socket and an upwardly facing trough, a dome covering said head on the upper end of said casing and having an outwardly inclined discharge spout, a propellant container received in spaced relation in said casing beneath said head, an upstanding normally closed discharge nipple on said container and extending snugly into said socket for fluid communication therethrough, said nipple being openable upon relative displacement between said container and nipple and resiliently urged out of said displaced relation to close said nipple, and a nebulizing fitting carried by said head interiorly of said dome and communicating with said nipple and trough for

8

aspiration of fluid from said trough by propellant from said container and the projection of said fluid and propellant through said discharge spout.

2. A dispensing device according to claim 1, in combination with securing means removably attaching said dome to said casing to afford access to said head and fitting, and a removable closure on said spout, whereby said device is portable without spilling fluid from said trough.

3. A device according to claim 1, said casing being provided with an opening affording manual access to said container for effecting said relative displacement.

4. A dispensing device according to claim 1, said fitting having a discharge opening directed generally toward and at an angle away from said discharge spout, and a baffle interposed between said discharge opening and the lower region of said spout for receiving the heavier particles of projected propellant and fluid while the lighter particles thereof pass through said spout.

5. A dispensing device according to claim 1, in combination with a removable lower-end closure on said casing for releasably retaining said container in said casing.

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