Dec. 18, 1956 K. B. ENGSTRUM 2,774,628

APPARATUS FOR DISPENSING UNDER PRESSURE

Filed May 10, 1954

Fig. 1.

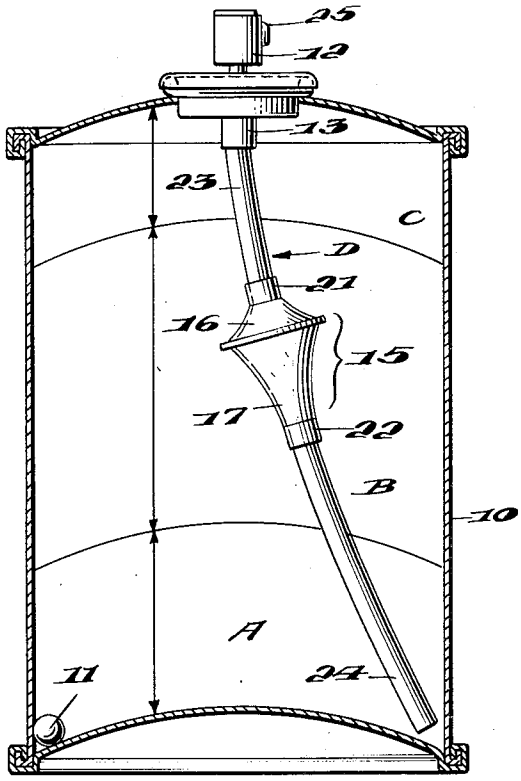


Fig. 2.

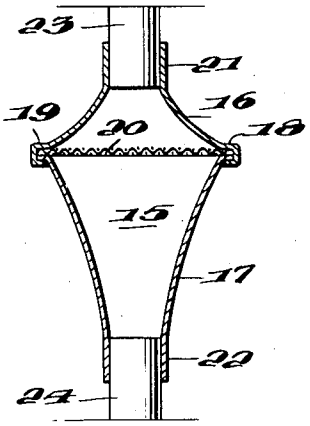


Fig. 3.

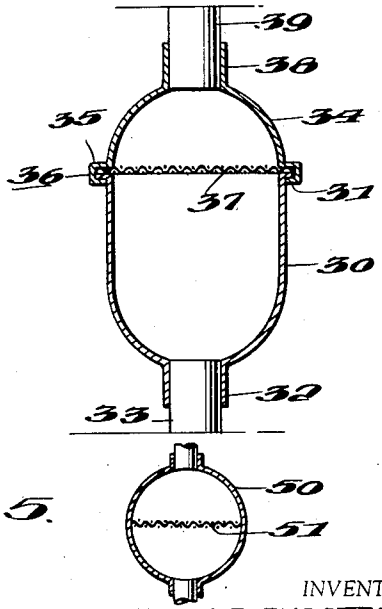


Fig. 4.

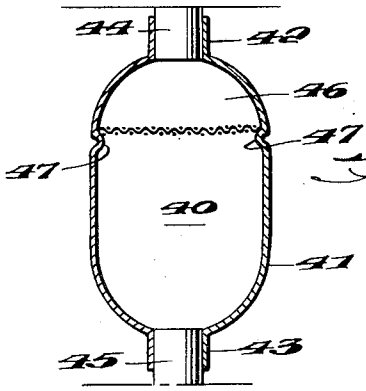


Fig. 5.

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APPARATUS FOR DISPENSING UNDER PRESSURE

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10 Claims. (Cl. 299—95)

The present invention relates to an apparatus for dispensing under pressure, substances such as soft settlings of pigments in paint or the like, in a fine highly dispersed spray from a container loaded with a highly volatile self-propellant solvent, such as halogenated hydrocarbons, that is, methyl chloride, dichloro-difluoro methane and the like, contained therein in a liquid and/or gaseous phase.

Heretofore aerosol containers, that is, pressure charged containers having a small quantity of material, which is to be dispensed, have been used with some success. However, there are several problems in this method of material dispensing, which the prior art has failed to solve, namely, the problem of valve clogging due to flocculation of the material, particularly when relatively large quantities of such material are dispensed. Because of this lack of utility for dispensing quantities of material from pressurized storage containers, the known dispensers of this type are not suitable for producing efficient durable paint coatings or for extensive operations. For example, if enough pigment material is stored in the container for providing reasonably thick coatings or for covering an extensive surface, the particles of the material flocculate and tend to clog the discharge or syphon tube and/or the valve to such an extent that efficient operation is impaired and often a complete shutdown results. Accordingly, means must be provided for cleaning the valve and discharge tube, prevent the tube and valve from clogging, or means must be provided to deflocculate or disperse these flocculates or clots of material formations in the syphon tube prior to discharge through the valve. In other words, it is this known undesirable condition of the clogging of the syphon or dispenser tube and associated valve that limits the use and efficiency of aerosol containers or the like for satisfactorily surface coating automobiles, walls, floors and the like without brushes or the prior art spray guns.

An object of the present invention is to eliminate valve clogging by preventing any flocculated material from entering the discharge valve from the syphon means of a pressurized dispensing container.

Another object is to provide a novel means in the discharge tube adapted to redisperse or deflocculate the material into a fine dispersed condition prior to discharge through the container's discharge valve.

Another object is to provide a system of dispersing clots of material in a mixture being dispensed under pressure through a discharge valve comprising the steps of pressure feeding a mixture with any undispersed clots of material through an arresting means, such as a perforated barrier or screen in a discharge tube and thereby arresting the clots against the barrier, and then dispersing the clots of material arrested by the barrier or screen by the jet action of the pressure dispensing medium.

Still another object is to provide as an article of manufacture a novel syphon means with a redispersion chamber, which may be quickly attached during manufacture and assembly to any form of standard atomizing nozzle

usable with pressurized dispensing containers now on the market and generally known to the trade as "aerosol bombs."

With these and other objects in view, the present novel method and apparatus consists in the novel construction, arrangement, and combination of parts described in the following specification and illustrated in the accompanying drawings, wherein four forms of this invention are disclosed, as means to practice the same.

In the drawings wherein like reference characters refer to like parts on the figures:

Figure 1 is a longitudinal cross sectional view taken through a container adapted to house the present novel invention;

Fig. 2 is a longitudinal section of one embodiment of the invention and as shown in side elevation in Fig. 1;

Fig. 3 is a longitudinal section of another embodiment of the invention; and

Fig. 4 is a longitudinal section of a third embodiment of the device formed of fewer parts, that is, with the redispersion chamber made in one integral unit.

Fig. 5 is a longitudinal section of a fourth embodiment of the device made spherical form.

Referring in detail to the drawings and first with particular reference to the embodiment disclosed in Figures 1 and 2, numeral **10** indicates a hermetically sealed container containing a formation or layer A of solid material, such as settled paint pigment, a formation or layer of highly volatile solvent such as a liquefied gas B, and a layer or formation of vaporized gas C. The liquefied gas may be of any suitable kind. It may be a halogenated hydrocarbon, such as for example methyl chloride, dichloro-monofluoro methane (Freon 12) and the like.

Also, in the container **10**, if desired, may be placed a pigment redispersing means **11**, such as a metallic ball having a specific gravity greater than the paint pigment formation A. It is, of course, to be understood that the paint pigment may include a vehicle or carrier, such as linseed oil or the like for providing a proper paint mixture for combining with the volatile solvent of formations B and C in the container **10** in its respective liquid and vapor phases.

Mounted in the top of the container is a valve unit **12**, which may be of any type constructed for spray discharge. This valve unit inside the container **10** includes a nipple **13** with an internal bore adapted to be coupled to the end of a syphon or discharge unit D.

This syphon or discharge unit D includes an intermediate enlargement, such as a chamber **15**, and tube sections hereafter referred to in detail. The chamber **15** comprises two truncated conically-shaped hollow sections **16** and **17**, respectively, secured together to form a bell-shaped body and rolled over to form a joint **18**, see Fig. 2. This joint **18** includes the peripheral edge **19** of a screen or foraminous barrier **20** across the chamber **15** in the line of material discharge either at right angles to the axis of the syphon line or at acute angles thereto. The chamber **15** on each side of the screen or barrier **20** is formed with sockets or nipples **21** and **22**, respectively. The volume of the chamber **15** below the screen or foraminous barrier must be greater than the volume of the tube section **24**, to permit expansion of the gaseous propellant therein. The internal bore of each socket or nipple is frictionally coupled around the external bore of the respective ends of each of the individual sections **23** and **24** of the syphon tube D, so that tube section **23** connects the chamber **15** to the valve nipple **13** and tube section **24** extends arcuately downward into the soft settling of the paint formation A. The section **24**, preferably is offset from the center of the container bottom, that is, it extends toward the bottom side of the container **10** in the axial direction of the valve nozzle discharge port **25**. This

provides for greater efficiency during use, as when coating a surface the container is usually tilted in the direction of the discharge port 25 and with the tube in this position it will remain immersed in the mixture to be dispensed.

Before describing the operation and functioning of the invention illustrated in Figures 1 and 2, a brief description of the second and third embodiments of Figures 3 and 4 will be given as the novel redispersion chambers of these embodiments each operate and function in the same manner.

In Figure 3 the syphon unit is identical to the first unit, except as to formation and shape and comprises an inverted bell-shaped or cup-like body 30 formed with a flange 31 and a coupling socket or nipple 32 for receiving and frictionally embracing the exterior circumference of the end of a tube section 33 as in the first embodiment. A dome or cap 34 having a flange portion 35 may be turned over and folded under the flange 31 by the body 30 to form a joint 36 or the joint may be formed in any suitable manner as by welding or otherwise. Prior to forming the joint 36, a screen or foraminous barrier 37 is seated over the flange 31 and across the wide open part of the body 30 and thus when the flange portion 35 is turned over and folded under flange 31, the screen or foraminous barrier is sealed in operative position. The volume of the body 30 in this form also must be greater than the volume of the tube section 33 to permit expansion of the formulation of the pigment solvents and the gases therein.

The dome or cap 34 includes a coupling socket or nipple 38 for frictionally coupling around the exterior end of the syphon tube section 39.

The chamber 40 of the third embodiment, illustrated in Fig. 4, is formed with a single wall 41 having aligned coupling sockets or nipples 42 and 43 for receiving the ends of discharge tube sections 44 and 45, respectively, and as in the other embodiments, the volume of the chamber 40 below the screen or foraminous barrier must be greater than the volume of the tube section 45 to permit expansion of the formulation of the pigment solvents and gases by the gaseous propellant therein. Also, the screen or foraminous barrier 46 is seated in an annular bead 47 and fused thereto for the purposes, which will be apparent hereinafter under the heading "Method of operation of the device."

Method of operation of the device

When the present invention is to be used the container 10 is usually agitated by shaking, to thereby cause the pigment redispersing means 11 to disperse the paint pigment formation A in the bottom of the container. This step of the operation is conventional and essential to all devices of this type now on the market and after thoroughly shaking the container the valve unit 12 is actuated and the dispersed pigment formation A combined with the highly volatile solvent will be discharged under pressure in an atomized spray over a surface to be treated.

This much of the operation is usually satisfactory, particularly if the redispersing means 11 has succeeded in thoroughly dispersing or deflocculating the paint pigment formation. However, as often as necessary, the user may temporarily stop to rest or to recondition a part of the surface being treated, which cessation of operation will often leave some of the paint mixture with pigment in the syphon tube section below the screen or foraminous barrier, such as disclosed in Figures 2, 3 and 4. When this happens, the pigment mixture left in the lower tube section will flocculate or clot and clog the syphon tube and cannot be redispersed by the usual redispersing means 11. Accordingly, the present invention was developed to provide for a very fine redispersion or deflocculation of clots of flocculated pigment collected below the screen or barrier in the syphon tube below the same. For example, when the valve unit 12 is again actuated after a temporary shutdown, the highly volatile solvent and pressure propellant by jet action blasts the clots and redisperses the pigment in the syphon tube and in the redispersion chamber 15, for example, said chamber being of a volume below the screen or barrier greater than the volume of the lower tube section to permit expansion of the formulation of the pigment solvents and gases by the gaseous propellant therein for approaching a maximum effective action.

A fourth embodiment of this invention is illustrated in Figure 5, wherein the chamber 50 is spherical and the screen or barrier 51 may be positioned equidistantly between the chamber openings.

Thus, it is believed clear to others skilled in this art that the present novel syphon tube unit D will not permit pigment clots to remain in the syphon tube to cause a forced shutdown as with the prior art devices. This is because of the novel redispersing chamber with its screen or barrier which co-acts with the highly volatile solvent and high pressure forces of the self propellant mediums to thoroughly deflocculate or redisperse the pigment clots known to heretofore collect in the syphon tube and valve mechanisms. Also, as many changes could be made in the above construction, combinations and arrangement of the parts without departing from the scope thereof, it is to be expressly understood that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. For use with an atomizing nozzle formed to discharge fluent mixtures under pressure from a container loaded with a liquefied gaseous medium, a syphon means inside of the container comprising a tube and a chamber, a foraminous barrier across said chamber, said chamber having tube connected socket openings on each side of said barrier, and a section of said tubing being in connection with one of said sockets and to said atomizing nozzle, said chamber below said barrier having an internal volume greater than the internal volume of said tubing below said barrier.

2. For use with an atomizing nozzle formed to discharge fluent mixtures under pressure from a container loaded with a liquefied gaseous medium, a syphon means inside of the container comprising a chamber, a foraminous barrier across said chamber, said chamber having openings on each side of said barrier, and discharge tubing coupled in said openings and to said atomizing nozzle, said barrier serving to separate any flocculated material from deflocculated material in said fluent mixture discharging through said syphon means, thereby preventing clogging of said atomizing nozzle, said chamber below said barrier having an internal volume greater than the internal volume of said tubing below said barrier, whereby any flocculated material in said chamber below said barrier is deflocculated by pressure into a fine dispersed state for efficient atomization by said nozzle.

3. A syphon discharge unit for coupling to valves of pressurized spray containers comprising a syphon tube, a bell-shaped chamber interposed in said tube, and an arresting screen across said chamber, said chamber below said screen having an internal volume greater than the internal volume of said tube below said screen.

4. The syphon discharge unit described in claim 3, wherein the said chamber is formed of two sections having flanged rims, and said screen is sealed between said flanged rims extending across the chamber, said chamber below said screen having an internal volume greater than the internal volume of said tube below said screen.

5. The syphon discharge unit described in claim 3, wherein the chamber body is formed as an integral unit with an internal annular support, and said screen is secured thereto across the chamber.

6. A syphon discharge unit comprising a syphon tube, a hollow sphere interposed in said tube, and a screen centrally disposed therein, said chamber below said screen having an internal volume greater than the internal volume of said tube below said screen.

7. A syphon discharge unit for hermetically sealed containers comprising a syphon tube with an enlarged intermediate hollow chamber completely housed within an operatively associated container, and a foraminous barrier dividing said chamber into sections, the volume of said section below the barrier being greater than the volume of the tube below the barrier, to thereby permit expansion of the formulation of pigments, solvents and gases by the gaseous propellant in said container.

8. A pressurized dispensing container having therein a soft settling of substance, a super-imposed formation of liquefied gas above the substance and a superimposed vapor phase formation, a valve at the top of the container, a tube connected to the valve inside the container extending from the valve to a position adjacent the bottom of the container into said settling of substance, said valve normally hermetically sealing said container, means for dispersing the settled substance in the bottom of the container around the end of the tube therein, a redispersion chamber connected intermediate the tube through which the container contents passes when the valve is open, said barrier means mounted in said chamber, said chamber being of greater volume below said barrier than the volume of the tube connected to the chamber below said barrier.

9. A pressurized dispensing container having therein a soft settling of substance, a superimposed formation of liquefied gas above the substance and a superimposed vapor phase formation, a valve at the top of the container, a tube connected to the valve inside the container extending from the valve to a position adjacent the bottom of the container into said settling of substance, said valve normally hermetically sealing said container, means

for dispersing the settled substance in the bottom of the container around the end of the tube therein, a redispersion chamber connected intermediate the tube through which the container contents passes when the valve is open, and a perforated barrier across said chamber and the internal bore of the tube adapted to retain flocculated material therein for re-dispersion, said internal bore of said tube below said barrier being of relatively smaller volume than the volume of said chamber below the barrier.

10. In a pressurized container with a valve, said container having a soft settling of material, a superimposed formation of liquefied gas above the pigment and a superimposed vapor phase formation, a tube extending from the valve at the top of the container to an offset position adjacent the bottom of the container into the said settling of material, means comprising a freely movable agitating member in said container adapted to disperse and intermix the pigment with the said liquefied gas to produce a dischargeable volatile mixture, said tube being formed with an intermediate redispersion chamber through which the container contents passes, and a perforated barrier across said chamber in the tube and the internal bore of the tube below said valve adapted to retain flocculated material therein for redispersion when said valve is open, said internal bore of said tube below said barrier being of relatively smaller volume than the volume of said chamber below the barrier.

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