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SPRAY BOMB

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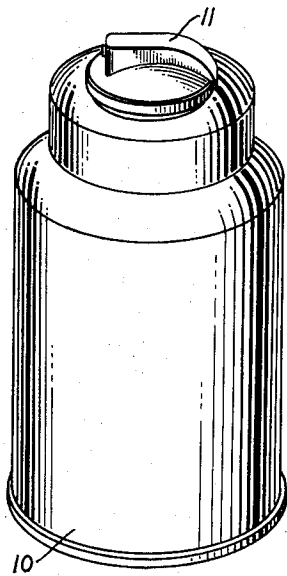


Fig. 1

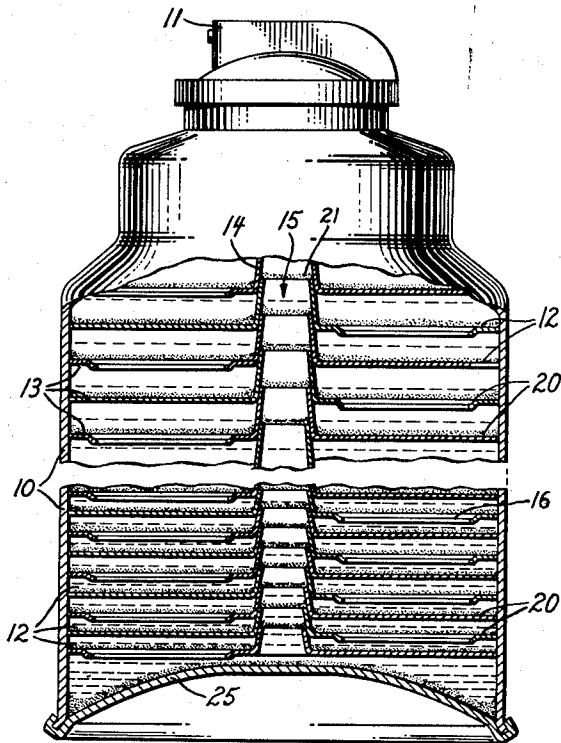


Fig. 2

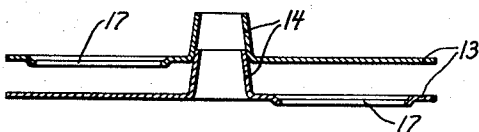


Fig. 3

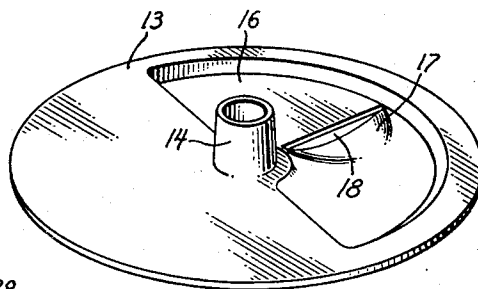


Fig. 4

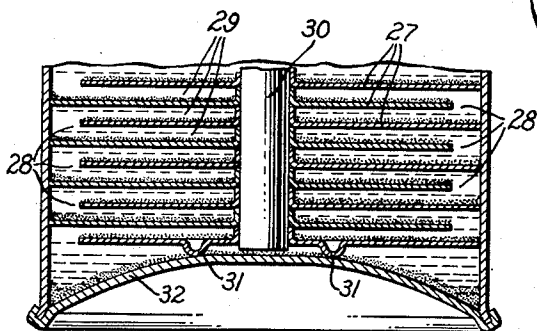


Fig. 5

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1

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SPRAY BOMB

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6 Claims. (Cl. 299—95)

This invention relates to pressure spray dispensers or "aerated solution bombs" known in the trade as "aerosol bombs" or spray bombs and used for dispensing or spraying a great variety of products, such as insecticides, fungicides, perfumes, and deodorants, germicides, various cosmetics, varnishes, some kinds of paints, and the like.

The great advantages of pressure dispensing from such bombs are fully appreciated in the art. However, while great activity has been taking place in this field, serious drawbacks have developed in the attempts to extend this method of dispensing to a much greater number of products wherein its use, if successful, would offer great advantages and would constitute a great progress. Some of such drawbacks resulting mainly from the present construction of the bombs have, in effect, cut off entire industries from the advantages of this method, paint industry being only one example.

One of the most difficult problems in this art has been caused by the phenomenon of settling of heavy particles found in a large number of products dispensing of which from "aerosol bombs" would otherwise be of great practical value. This phenomenon is particularly pronounced in paints, some of which contain in suspension dyeing pigment in the form of either pure finely divided metal or various metal compounds and mineral substances of high specific gravity. After the paint is left standing for some time, such relatively heavy particles gradually descend to the bottom of the container and form thereon a heavy and dense layer of material. While such a phenomenon is commonly observed and is well known, its consequences in cases of ordinary paint containers or cans are not serious. In cases of the aerosol bombs, this phenomenon made dispersing of paints therefrom, with the exception of only several types thereof, totally impracticable. Since the lower end of the discharge or syphon tube must be as close to the bottom of the bomb as possible, it becomes embedded in the dense layer of settled material after the bomb is left standing for some time. When the discharge valve of the bomb is opened, the thick heavy material immediately fills the entire discharge tube and clogs the valve, making the bomb useless. It was this reason that packaging into spray bombs of only such products as fixatives and the like proved practical, while attempts to package into bombs of paints, particularly enamels, proved totally impractical for the reasons explained above.

It should be appreciated in this connection that the shape of the bombs as dictated by the requirements of their practical use is greatly increasing the above problem. In order to eliminate the necessity of providing handles for holding such bombs in use, which handles would increase the cost, complicate handling, and may affect fluid-tightness of the bombs, such bombs are made in the form of easily grasped cylinder 2-3 inches in diameter and 6-8 inches high. The problem of settling is greatly increased by the height of a container, i. e. by the ratio of its height to its volume, and the greater is the height of the bomb as compared to its volume, the more pronounced is the settling problem.

If the product packaged in a bomb contains in suspension heavy particles of several types, the sedimentation becomes, in effect, a "fractional sedimentation" or separation of such product into various layers of its constituents, and making it unsuitable for the intended use. In cases of particularly high containers and heavy constituents, "caking" of the sediment, i. e. its gradual

2

compressing into a dense layer by the weight of the upper layers becomes a difficulty which cannot be eliminated by such expedients as instructions on the bomb "shake well before use," since redissolving such cakes requires mechanical stirring or breaking of the cake, not readily or effectively attainable in a sealed bomb.

Strenuous inventive effort has been directed toward the solution of the above problem, but no practical solution thereof has yet been provided.

It is an object of the present invention to provide an improved method and apparatus for pressure dispensing of liquids subject to the phenomena of settling or sedimentation, fractional sedimentation, and caking whereby the above difficulties and disadvantages are overcome and largely eliminated, and whereby a number of industries, such as paint industry, are enabled to utilize the advantages of pressure dispensers in bringing their products in proper quality to large mass of consuming public.

A still further object of the invention is to provide an improved pressure dispenser or spray bomb for dispersing liquids subject to "settling," such as enamel paints, means being provided whereby such objectionable "settling" and its consequences are overcome and largely eliminated, and the solid inorganic particles found in paints and other solutes and solutions, are, in effect, held in suspension over long periods of time, whereby clogging of the syphon tubes and the valve nozzles is prevented, making it possible and practical to distribute in aerosol bombs commercially such products as enamel paints and the like without decreasing the degree of their pigmentation.

A still further object of the present invention is to provide an improved pressure dispenser or spray bomb having means whereby the mass of the liquid contained therein is divided into a relatively large number of cells each adapted to retain within itself the sediment tending to accumulate at the bottom of the liquid mass contained in the cells, means being also provided to effect return of such sediment into the condition of suspension or to redissolve the same when the use of the bomb begins or is resumed.

A still further object of the present invention is to provide an improved pressure dispenser of spray bomb of the nature specified in the preceding paragraph, in which means are provided to insure predetermined density of the dispersoid or product as it is ejected from the bomb and to prevent undue thinning thereof.

A still further object of the invention is to provide an improved pressure dispenser or a spray bomb, in which no fractional settling and no caking occurs, and in which very light agitation of the contents is fully effective to bring the product into its proper or original condition.

It is an added object of the present invention to provide an improved pressure dispenser or spray bomb of the foregoing nature, which bomb while being fully effective for the purposes intended is simple in construction, dependable in operation and is relatively inexpensive to manufacture.

Further objects and advantages of the invention will be apparent from the following description, taken in connection with the appended drawings, in which:

Fig. 1 is a perspective view of a pressure dispenser or bomb embodying the present invention in its inner construction.

Fig. 2 is a fragmentary vertical sectional view of the bomb of Fig. 1 illustrating the inner construction thereof.

Fig. 3 is a sectional view of two elements of the anti-precipitation assembly.

Fig. 4 is a perspective view of one element of the anti-precipitation assembly.

Fig. 5 is a sectional view of the lower portion of a pressure dispenser of a modified construction embodying the present invention.

It is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or

terminology employed herein is for the purpose of description and not of limitation.

In accordance with the invention I provide a pressure dispenser comprising a container divided into a relatively large number of compartments or cells, each cell having a bottom adapted to receive and support the precipitate or sediment from the quantity of the liquid product constituting the contents of that particular cell. The cells communicate with each other preferably in series, and the contents of the container are removable therefrom through a syphon or discharge tube reaching the bottom of the container. By virtue of such a construction, precipitation or settling of the heavy particles of the contents is of a differential nature, i. e. it is changed from settling or precipitation from the entire volume of the container into precipitation from a large number of small portions thereof, with the layer of settled particles so thin as not only to prevent any possibility of caking, but insuring that even slight movement of the liquid operates to raise this layer and return it into the solution. While natural movement or flow of the liquid in the use of the bomb as well as slight movements thereof caused by vibrations in the buildings due to walking as well as traffic in the streets and similar causes are always taking place, means are provided to create such movements within the liquid from the weakest impulses and thus to disturb constantly such thin layer of precipitate and to prevent any tendency thereof to cake.

Referring specifically to the drawing, the pressure dispenser or spray bomb illustrated therein comprises a container 10 of a suitable type having a dispensing valve 11 provided on the top. The entire effective volume of the container is divided into a relatively large number of compartments or cells 12. Such division is effected with the aid of elements or partitions 13 extending transversely of the container, i. e. horizontally when the bomb is in its upright position.

In the present embodiment the elements are in the form of discs made of thin and light material such as sheet metal or plastic. Central upwardly converging tube portions 14 are provided, as shown, which portions enter or telescope with one another to form a discharge or syphon tube 15 leading from the bottom of the container 10 to the discharge valve 11.

A substantial portion of the disc is depressed as shown at 16 and is provided with an inclined louvre 17 and an opening 18 leading into the subjacent compartment. The volume of the compartments 12 may be made gradually decreasing toward the bottom, or in other words, the distance between the elements 13 is greater at the top than at the bottom of the container.

The anti-precipitator assembly may be pre-assembled and placed into the container before the bottom 20 thereof is put in place. Any practical number of compartments may be used. I prefer to use 15-25 compartments for most of average applications, this number being subject to increase or decrease depending upon the size and shape of the container, nature of the product, etc.

It will now be understood in view of the foregoing that as the valve 11 opens, the pressure within the container acts on the contents forcing them into the syphon tube 15 and through the discharge opening of the valve into the atmosphere, forming a spray. It is very important to appreciate at this point that in conventional pressure dispensers the exit of the contents through the syphon tube induces very slow flow in the mass of the contents from all points thereof toward the lower end of the syphon tube. In my improved pressure container such flow is greatly lengthened and takes place transversely of the container, moving back and forth across it many times. Moreover, due to the restricted cross sectional area of the compartments, the velocity of such flow is greatly increased compared to that taking place in conventional dispensers. Such flow operates to "wash away" the thin layers 20 of precipitate or sediment spread over the large area of each element. Furthermore repeated passage of the product through the relatively restricted openings 18 at the louvres 17, operates to stir and thoroughly remix the product. By virtue of such a process, the product reaching the discharge opening is brought substantially into the same state as it was when originally intended.

It should be appreciated also that because of the stepped construction of the built-up syphon tube 15, the sediment from the mass of the product contained in

the tube itself collects on the ledges or steps 21 formed by the upper edges of the tube extensions 14 and is "washed away" by the upward flow of the product in the syphon tube 15. The small amount of sediment that tends to collect on the bottom 25 of the container under the tube 15 gradually slides further down toward the periphery of the container, and is redissolved by the flow of the product through the lowermost compartment.

The construction shown in Fig. 5 differs from the construction of Figs. 2-4 in that the elements 27 thereof are in the form of flat discs with segments cut away as shown at 28. The cut away ends are arranged alternately or in a staggered relation, as shown, to insure full flow through each compartment 29 diametrically across the container. The syphon tube 30 may be of a conventional construction and pass through all elements 27 centrally thereof, as shown, or at any other location thereof, if desired. Small legs 31 may be provided on the lowermost element by pressing out downwardly extending nipples adapted to rest on the bottom 32 of the container and thus insuring tightness of the built-up assembly. A similar expedient may be provided in the construction of Figs. 2-4, if desired. The distance between the separate elements in the assembly is determined in both of the constructions by the lengths of the central tubular extensions, whether telescoping as in Figs. 2-4, or abutting as in the construction of Fig. 5.

While the present invention has been illustrated and described with reference to pressure dispensers, it will be understood that it is applicable to ordinary containers, such as common paint cans.

By virtue of the above described method and apparatus, the objects of the present invention listed above and numerous additional advantages are attained.

I claim:

1. A pressure dispenser for liquids including solids in suspension, said dispenser including a container, means for dividing sedimentation of the contents of the container into a plurality of portions and returning the same into suspended condition, said means dividing said container into a plurality of cells communicating in series only, with each cell adapted to hold a predetermined portion of said contents, each of said cells having a bottom adapted to receive the sediment only from the portion of the contents contained within such cell, and to support the same while the container is at rest, but to expose it to the agitating action of the flow of the liquid when the dispenser is in use, and a conduit for withdrawing the contents from under the lowermost cell.

2. A pressure dispenser for liquids subject to sedimentation, said dispenser comprising a container, a discharge nozzle at the top of said container, a conduit leading from the bottom of the container to said discharge nozzle, and means for dividing sedimentation of the contents of the container into a plurality of portions and returning the same into suspended condition, said means dividing said container into a plurality of cells, each cell adapted to hold a predetermined portion of the container contents and having a horizontally extending member adapted to receive the sediment from said portion of the contents, with the adjacent cells communicating with one another in series with the aid of openings providing for the series flow of contents of the container from one cell to another and directing said series flow of liquid over substantially the entire combined area covered with sedimentation.

3. A spray bomb including a container, a plurality of horizontally extending partitions extending all the way to the walls of the container and dividing said container into a plurality of compartments, each of said partitions having at least one opening effecting communication between the adjacent compartments only, the opening of adjacent partitions being staggered, and a conduit for withdrawing the contents from under the lowermost partition to effect the flow of liquid over the entire combined area of said horizontally extending partition, and an inclined ramp portion on each of said partitions leading to said opening, said portions being adapted, while the contents of the container are being sprayed, to stir the tended sedimentation back into the suspended condition.

4. In a container for storing liquids containing solids in suspension and subject to settling of said solids, a container receptacle, conduit means for withdrawing the contents from the bottom of the receptacle, a plurality of horizontally extending elements provided within the con-

5

tainer receptacle and adapted to intercept solid particles as the same descend toward the bottom of the container and to support said particles while the container is at rest, and means directing the flow of liquid in withdrawing the same over said elements in series and thus to stir the intercepted particles and to return them into the suspended state.

5. A spray bomb including a container, conduit means for withdrawing the contents from the bottom of the container, means for preventing sedimentation of the contents of the container by dividing the sedimentation into a plurality of portions and stirring the same back into the suspended condition, said means including a plurality of horizontally extending inclined elements provided within said container and adapted to intercept solid particles as the same descend toward the bottom of the container and to support said particles when the container is at rest, but to effect movement of said particles while the contents of the container are being sprayed and thus to return said intercepted solid particles into the suspended state.

6. A spray bomb including a container, means for preventing sedimentation of the contents of the container by stirring the sedimentation back into the suspended condition by the flow of the liquid during its withdrawal, said

6

means being provided within the container and forming lengthened tortuous paths for the contents from the top to the bottom of the container and comprising a plurality of horizontally extending partitions having portions inclined toward withdrawing end and adapted to intercept solid particles of the contents tending to drop toward the bottom of the container and to support said particles while the container is at rest but to stir them into solution while the contents of the container are being sprayed, said partitions and means operating to produce said path, and conduit means for withdrawing the contents of the container from one end of said tortuous path.

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