DISPENSING OF REACTIVE CLEANSING MATERIALS

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This is a division of pending application Serial No. 213,666, filed July 31, 1962 for Multicompartiment Dispensing of Different Fluid Materials, now Patent No. 3,217,931, dated Nov. 16, 1965.

This invention relates to the multiple dispensing of incompatible reactive fluid cleansing materials which must or should be kept separated until at least just prior to the time of actual application and use, to ensure that the reacting or recently reacted mixture of these materials is used at a time wherein it possesses optimum cleansing power.

It has generally been proposed to simultaneously discharge two separate liquid and/or powder materials from multiple container units for mixing prior to use. The present invention is concerned with the multiple dispensing of incompatible cleansing materials such as an abrasive containing fluid and a bleaching agent adapted to release chlorine, the abrasive containing fluid having a component such as a detergent capable of chemical combination with the released chlorine to thereby render the chlorination ineffective for bleaching, in such manner that the chlorine has time to act as desired on the surface being cleaned before said chemical combination renders it ineffective. For example, the invention contemplates the simultaneous discharge of a first fluid such as a suspension of inert abrasive particles in a liquid vehicle containing a surface active agent or detergent capable of reacting with the chlorine in a second fluid containing a bleaching agent that releases chlorine, such discharge being so timed with application of the mixture to the surface being cleansed that the mixture is applied to the surface before the chlorine has reacted and thus the mixture possesses optimum cleaning and bleaching power. Should such reaction take place prematurely as by incorporating the fluids in a single container, the chlorine would react with the detergent and become ineffective at the time of use.

It is therefore the major object of this invention to provide a novel cleansing process wherein there is separated cleansing fluids of which is adapted to release chlorine and the other having a component combinable with chlorine are admixed for use before chemical reaction therebetween renders the chlorine ineffective for bleaching.

A further object of the invention is to provide a novel process for cleansing wherein a first liquid containing a surface active agent capable of combination with chlorine and inert abrasive particles and a second liquid containing releasable chlorine are admixed in a confined region at or near the point of use for application to the surface to be cleansed before substantial chemical reaction between the agent and chlorine. A further object of the invention is to provide a novel process for cleansing wherein liquid streams containing respectively abrasive cleaner particles and a bleaching solution such as sodium hypochlorite are mixed at or near the point of actual application by simultaneous discharge from a multicompartiment container.

Further objects will appear as the description proceeds in connection with the appended claims and the annexed drawings wherein:

FIGURE 1 is a side elevation partially in section and partially broken away showing a multicompartiment dispensing container according to a preferred embodiment of the invention; FIGURE 2 is a bottom plan view of the container mouth fitting; FIGURE 3 is a fragmentary section showing a further embodiment wherein a different fitting is employed; FIGURE 4 is a fragmentary section on line 4—4 of FIGURE 5 showing another fitting embodiment of the invention; FIGURE 5 is a bottom plan view of the fitting of FIGURE 4; and FIGURE 6 is a fragmentary section showing a still further embodiment of the fitting of the invention.

Referring to FIGURES 1 and 2 the multicompartiment container comprises an outer flexible walled receptacle 11 providing a first liquid compartment 12, an inner flexible walled receptacle 13 providing a second liquid compartment 14, and a fitting 15 of special construction. The outer receptacle 11 is here a cylindrical bottle preferably made of a semirigid material such as polyethylene which has all of the external appearance and characteristics of the usual squeeze bottle dispenser.

Receptacle 11 has a reduced diameter neck 16 preferably formed with external threads 17. The internal surface 10 of neck 16 is preferably a smooth cylinder. Fitting 15 is preferably a symmetrical molded polyethylene plug unit of special shape having an axially extending cylindrical silt 18 projecting from an annular radial lip 19. Skirt 18 is of such size and shape that it fits snugly and smoothly with essentially a snap friction fit within the cylindrical bore of neck 16, and the fitting is pushed into the receptacle 11 until lip 19 snaps and seats upon the flat end 21 of neck 16. This provides a liquid tight peripheral seal between the fitting 15 and receptacle 11, and the fitting 15 is thereby mounted tightly in place on receptacle 11 during all normal operation. The external diameter of lip 19 is preferably the same or less than the external diameter of neck 16.

Outwardly of lip 19 fitting 15 is formed with a generally conical end closure wall 22 reducing fairly sharply to a tip 23, and, as shown in FIGURE 2, end wall 22 is formed with two concentric rows of discharge openings 24 and 25. Fitting 15 is internally formed with a reduced diameter skirt 26 that is concentric with skirt 18 and integrally joins the conical end wall of the fitting in a circular junction 27 that separates the inner row of openings 25 from the outer row of openings 24. Skirt 26 is preferably at least as axially long as or longer than skirt 18.

An annular space 28 is thus provided between the skirts which is open at its inner end to the interior of receptacle 11, and has its outer end closed except for openings 24.

In this embodiment the inner receptacle 13 is in the form of a sac of semirigid material such as polyethylene, and it has a resilient neck portion 29 formed with an end bead 41 and slipped with a friction tight supporting fit over the open end of skirt 26 having a tapered tip 26′ to facilitate mounting. Preferably an external bead 32 is formed on skirt 26 to coax with lip 31 in holding sac 13 suspended within the receptacle 11, even when sac 13 is filled with a liquid.

When sac 13 is mounted on fitting 15 the interior of the sac is open only into the space 33 within the skirt 26, and the other end of space 33 is closed except for openings 25.

A cap 34 has an internally threaded skirt 35 rotatably and axially displaceably mounted on threaded neck 16. Cap 34 is formed with an outer end portion 36 that is conical with essentially the same shape as the conical wall...
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22 of fitting 15, and an opening 37 is formed at the apex of the cone. Cap 34 is of such shape and size that when it is turned on its threaded engagement with neck 16 to the material discharge position of FIGURE 1 the conical portions of the cap and fitting define an annular conical mixing space 38 between them, and the only outlet for mixing space 38 is opening 37. The inner diameter of cap skirt 35 preferably has a smooth rotatable fit with the outer diameter of fitting lip 19 so that there is no leakage of material from fitting lip 19.

When cap 34 is rotated on threads 17 to close the container, the cap 34 axially displaces from the position of FIGURE 1 until its conical end 36 is tightly in full surface engagement with fitting end 22, so that space 38 is essentially extinguished, openings 24 and 25 are closed by cap portion 36, and cap opening 37 is closed by the fitting lip 23. When cap 34 is drawn tight the corner 30 of wall 36 engages lip 19 to clamp the fitting tightly onto the neck of receptacle 11.

In practice the sac 13 may be filled with one liquid and attached to fitting skirt 26. The receptacle 11 has in the meantime been filled with a second liquid. The bore of neck 16 is sufficiently large that the fitted and mounted sac 13 may be lowered into receptacle 11 until the fitting skirt 18 snaps into place on neck 16. Then the cap 34 is mounted on threads 17 and tightened into place, and the assembly is complete and ready for shipment or storage operations.

When it is desired to use the container, cap 34 is rotatably backed off to essentially the FIGURE 1 position. Lateral pressure exerted by squeezing receptacle 11 will result in discharge of liquid from receptacle 11 through openings 24 into mixing space 38. This pressure is also transmitted through the liquid in receptacle 11 to squeeze sac 13 and thereby also displace liquid therefrom through openings 25 into space 38.

Due to the conical shape of space 38, the streams of liquids exiting through openings 24 and 25 will angularly intersect within space 38 and the liquids from the respective compartments will therefore become thoroughly mixed just prior to discharge from the container through cap opening 37.

By selecting the openings 24 and 25 in suitable relative size and/or number the relative proportions of the discharged compounds from the separate compartments of the sac 12 or 13 may be accurately controlled. If desired only one discharge opening need be provided for each compartment, although a series of openings usually results in increased mixing action.

The container of the invention has particular value for the simultaneous proportionate dispensing of any two liquids that would be unstable in the presence of each other but which provide a temporarily beneficial condition or mixture when brought together.

FIGURE 3 shows another form of fitting and end closure for the receptacle. Here fitting 41 is a plug unit formed with concentric inner and outer skirts 42 and 43, with the outer skirt smoothly sliding with the bore of receptacle neck 16 until the radial lip 44 abuts the end of the neck, as in the other embodiment. Skirt 42 is longer than outer skirt 43 and is formed with a bead 45 to coat with and support the reduced upper end of sac 13.

In this embodiment fitting 41 has a substantially planar end wall surface 46 outwardly of lip 44, and a central discharge opening 47 communicates through axial bore 47 to the interior of sac 13. Opening 47 is surrounded by a series of openings 48 arranged in a circle and connected by inclined passages 49 to the annular space 51 located in the fitting 41 and the interior of receptacle 11. It will be noted that openings 48 are radially outwardly of the circular juncture 50 between skirt 42 and wall 46.

A cap 52 is threadedly mounted on neck 16, and cap 52 is internally formed with a mixing space recess 53 that is large enough to extend over all of the fitting openings 47 and 48. A discharge aperture 54 is provided for cap 52, and aperture 54 is closed by a suitable friction fit cap 55.

As in the embodiment of FIGURES 1 and 2, sac 13 and receptacle 11 may contain two distinct liquids which are brought into contact only when receptacle 11 is squeezed and they are discharged in intersecting streams into the mixing space enclosed by the cap structure.

FIGURES 4 and 5 illustrate a further embodiment of the invention which is useful where the liquids of the separate compartments are not volatile.

In this embodiment the neck 60 of outer receptacle 11 is not threaded because no cap is contemplated. The fitting 61 has an outer skirt 62 fitting snugly into the bore of neck 60 and an axially abutting radial lip 63 as in the other embodiments.

Also fitting 61 has an inner skirt 64 concentric with skirt 62 and mounting the inner compartment sac 13 as in FIGURE 1. The sac here is straight-walled. Skirt 64 integrally joins the outer closure end wall 65 of fitting 62 along a circular juncture 66. The closure end wall of the fitting may be conical as shown or any other suitable shape.

In this embodiment the only discharge opening is an opening 67 in wall 65 bridging juncture 66 so as to effectively provide an outlet for the inner compartment on one side of juncture 66 and for the outer compartment on the other side of juncture 66. Opening 67 may be located, shaped or sized to proportion the relative sizes of the compartment outlets. Also, if desired opening 67 may comprise two separate, but adjacent apertures through wall 65 on radically opposite sides of juncture 66.

In this embodiment there is no defined mixing space within the fitting and/or cap structure, but the adjacently issuing streams from the respective compartments mingle during and following ejection at opening 67.

In the embodiment shown in FIGURE 6, the outer receptacle is the same as that of FIGURES 1 and 3, but the fitting 71 has no outer skirt structure. Fitting 71 comprises an inner beaded skirt 72 upon which inner compartment sac 13 is mounted as in FIGURE 3, and a radial lip 73 adapted to abut the outer flat edge of receptacle neck 16.

An annular cap 74 is mounted on neck threads 17 and when tightened it tightly clamps lip 73 onto the receptacle neck 16. The closure end wall 75 of the fitting has a central opening 76 communicating through an axial passage 77 with the interior of sac 13, and a surrounding row of openings 78 connected by inclined passages 79 with the interior of receptacle 11. If desired a friction cap 81 may be mounted on the fitting over the openings 76 and 78.

In this embodiment the liquid from sac 13 discharged from opening 76 mingles and admixes with the intersecting streams of liquid from openings 78 immediately upon ejection from the container, when the outer receptacle 11 is squeezed.

The foregoing arrangement has proved particularly valuable in the proportionate dispensing of two distinct liquids which are incompatible or for some other reason must or should be kept separate until the time of use has arrived.

For example, in a preferred form of the invention the inner sac contains a liquid bleach compound such as a high strength sodium hypochlorite composition (15% available chlorine) containing liquid potassium silicate as a stabilizer, and the outer receptacle contains a liquid souring cleaning into the containing suspended inert abrasive scouring particles and a detergent component that is capable of chemically reacting with the sodium hypochlorite. The preparation of bleaches such as sodium hypochlorite in strengths of about 15% available chlorine is well known in the art as exemplified for example, by
What is claimed and desired to be secured by Letters Patent is:

1. A method of cleansing a surface comprising the steps of providing a plurality of confined, segregated liquid storage regions, providing in one of said regions a bleaching solution that is capable of liberating chlorine, providing in another of said regions a solution containing a detergent that is capable of so chemically reacting with chlorine liberated from the bleaching solution as to render it ineffective for bleaching only a predetermined period after mixture therewith, discharging said bleaching solution and said detergent containing solution from their respective storage regions in separate streams, combining said streams to provide an admixture of said bleaching solution and said detergent containing solution, causing said detergent to react with chlorine released from said bleaching solution in said admixture, and so dispensing said admixture in a single stream onto said surface that flow of said bleaching solution and said detergent containing solution from said storage regions to said surface is continuous and at such a rate that said predetermined period terminates after application of said admixture to said surface, whereby said chlorine is rendered ineffective for bleaching after it is applied to said surface.

2. The method defined in claim 1 wherein the bleaching compound in said bleaching solution is selected from the group consisting of sodium hypochlorite and potassium hypochlorite.

3. The method defined in claim 2 comprising the step of providing a suspension of inert abrasive scouring particles in said detergent containing solution.

4. The method defined in claim 1 comprising the steps of effecting discharge of said bleaching solution and said detergent containing solution under pressure from their respective regions by simultaneously reducing the volumes of said regions and by admixing the discharged streams of said solutions in a chamber before dispensing the admixture onto said surface.

5. The method defined in claim 4 wherein the pressure applied to discharge one of said solutions is transmitted through said one solution to pressurize the other of said solutions.

6. The method defined in claim 5 comprising the step of providing a single multi-compartment container of the squeeze bottle type for defining said segregated regions and said chamber.

7. The method defined in claim 1 wherein the bleaching compound in said bleaching solution is sodium hypochlorite, and wherein a suspension of inert abrasive scouring particles is provided in said detergent containing solution.

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