

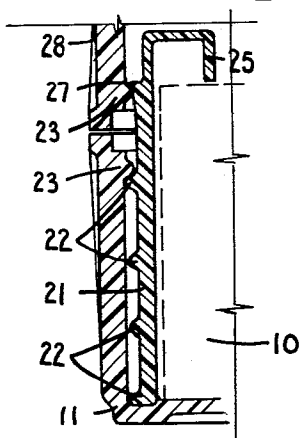
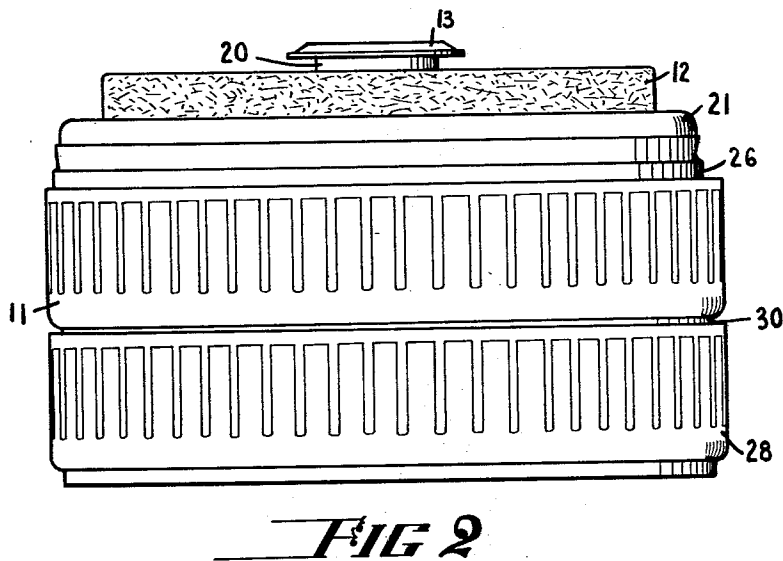
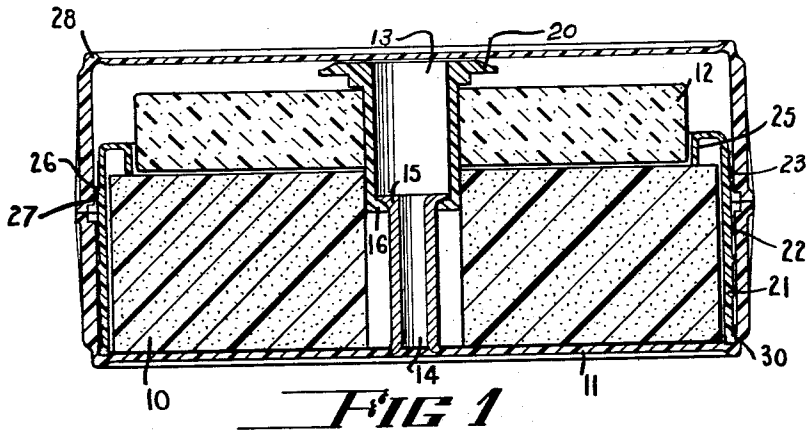
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DISPENSER HAVING A RESILIENT SPONGE AND PISTON

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3,134,544

DISPENSER HAVING A RESILIENT SPONGE AND PISTON

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5 Claims. (Cl. 239—55)

This invention relates to an improved means for the dispensing of volatile liquids and relates to the method of manufacture of such means.

In the dispensing of certain liquids, it is convenient to arrange the dispensing means in the form of a pump and furthermore it is convenient to arrange the dispensing means in the form of a sponge. Accordingly one of the objects of this invention is to provide a dispensing means wherein use is made of an absorbent sponge, and wherein use is made of a pump principle so that a quantity of liquid is dispensed upon relative movement of portions of the dispensing means. This feature of the invention is achieved by means of a resilient sponge having an open cell structure disposed beneath a pervious piston. The sponge can according to this invention be a polyurethane foam being of open cell structure and therefore capable of releasably containing the liquid to be dispensed. For example, the liquid to be dispensed could be a liquid which consists of or contains perfume or insect repellent or a mixture of both.

In its simplest form the invention may be said to consist of a dispensing means comprising a container having a base and sides but being open ended at its top, cover means releasably closing said open top end, a resilient sponge having an open cell structure disposed within said container contiguous with its base, and a pervious piston vertically movable in said container, whereby depression of said piston displaces liquid when retained in said sponge upwardly through said piston, but upon release of said piston said sponge urges said piston upwardly.

When perfume is to be released, it is desirable that the rate of evaporation should be limited by some means, and for this reason most perfume which is sold in liquid form is diluted in some solvent, such as alcohol. In the case of a perfume dispenser for dispensing perfume to the air however it is desirable to avoid the use of liquids in bottles or other containers from which they can be spilt, and one of the further objects of this invention is to provide a dispenser which will release the perfume at a sufficiently steady rate to be useful over a period of days or even weeks instead of hours, and will retain the perfume liquids within a solid block. This feature of the invention is achieved by using a piston formed from material which is porous so as to absorb the perfume, hygroscopic so that there is a partial pressure at the surface of the block caused by the moisture present and the perfume evaporation rate is thereby limited, non-poisonous so as to be safe, and possessing a long life so that it does not break down during storage.

A still further desirable feature of a perfumed dispenser is the ability to control the rate of evaporation, and this is achieved in this invention either by control of the piston which constitutes pump means whereby perfume from the container is pumped into and through the piston which if porous then becomes a perfume containing block.

An embodiment of the invention is described hereunder with reference to and is illustrated in the accompanying drawings, in which:

FIG. 1 is a central section through dispensing means showing cover means closing the open top of a container,

FIG. 2 is a side elevation of same showing the cover

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means removed from the open top of the container and forming a support therefor, and

FIG. 3 is a fragmentary section showing in exaggerated form the interconnection between the container, cover and sponge retaining sleeve.

According to this embodiment, a liquid retaining sponge 10 is formed by treating a resilient polyurethane foam (either polyether or polyester) in benzyl alcohol, whereupon the foam "grows" to several times its original size. The polyurethane sponge is treated by first depositing a small annular piece within the cylindrical container 11 with the cover 28 removed, then positioning the piston 12 in the container 11 and over the sponge 10, then inserting the piston retaining sleeve 13 over the upstanding tubular stem 14 in the container 11, then riveting the upper end 15 of the stem 14 over the inturned annular lip 16 of the retaining sleeve 13.

A small quantity of benzyl alcohol is then placed in the container around the outside of the piston 12, and this quickly reacts with the polyurethane foam sponge to expand it, thereby urging the piston 12 upwardly against the retaining flange 20 of the piston retaining sleeve 13. This then provides a pump return means for the piston 12, so that the piston 12 can be urged downwardly but springs backwardly under the force exerted by the "plastic memory" of the polyurethane foam.

A sponge retaining sleeve 21 has on it a plurality of outwardly disposed annular ridges 22, one of the outwardly disposed ridges 22 engaging beneath an inwardly disposed ridge 23 on the inner surface of the cylindrical container 11, while the lowermost ridge 22 sealably engages the inner wall of the container 11. Both the cylindrical container 11 and the sponge retaining sleeve 21 are formed from resilient plastic material so that the sleeve 21 can be "clipped in" to the container 11.

The upper end of the sponge retaining sleeve 21 is turned inwardly and downwardly to thereby form a sponge retaining lip 25.

An upper conical surface 26 on the sponge retaining sleeve 21 is engaged by an inwardly disposed ridge 27 on the cover 28 thereby providing means whereby the cover 28 can be "clipped" to the cylindrical container 11. In this embodiment the cover 28 is moulded in the same die as the container 11, so that these two elements are of similar general shape.

In order to achieve conditions of more even rate of dispensing than can be achieved with, say, a wick, the piston 12 is itself an absorbent material adapted to contain a considerable quantity of perfume and release it slowly at a much steadier rate than heretofore. The piston 12 is also slightly hygroscopic so that the partial pressure of moisture absorbed by the piston 12 slightly represses the rate of evaporation of the volatile liquids contained within the piston 12. Furthermore the piston 12 has a characteristic of molecular absorption of the volatile liquids when they are perfume or insect-repellent liquids, so that the function of pumping the piston 12 against the expanded polyurethane foam sponge 10 is to urge liquid into the piston 12 from the sponge 10.

In this embodiment the piston 12 consists of cellulose acetate in compressed granular form, each grain size being within the range of from one millimeter to two millimeter mean minimum dimension. The cellulose acetate grains are mixed in a rotary mixer with ethylene glycol monoethyl ether ($\text{CH}_2\text{OHCH}_2\text{OC}_2\text{H}_5$) in the proportions of 2 parts cellulose acetate to 1 part ethylene glycol. The addition of the ethylene glycol monoethyl ether is necessary to soften and swell the acetate so that in further processing it can be compressed, bonding the granules into a porous block capable of absorbing the liquid rapidly, since the liquid can quickly flow into the pores. The addition of the ethylene glycol monoethyl ether also

increases its hygroscopic tendencies, thereby assisting in the levelling out of the rate of the evaporation of volatile substances.

The ratio of 2 parts of cellulose acetate to 1 part of ethylene glycol can if desired be varied, whereupon the block will become either more porous or more tightly compressed, but the ratio of 2:1 mentioned above is found to be satisfactory for most practical purposes.

During the mixing, the ethylene glycol monoethyl ether is added in three stages, equal amounts being added in each stage and at intervals of about one hour whilst the mixing continues. It is found desirable to allow complete absorption of the ethylene glycol monoethyl ether and at the same time prevent coagulation of the mix. At the end of the three hour mixing period the mix is in a condition where it is dry but will not coagulate when squeezed lightly in the hand, and in this condition it is fed into a press where it is pelletized under a pressure of about 500 kilogrammes per square centimeter. The block is then air-dried for a period of about 120 hours, before being impregnated with perfume and insect-repellent.

As shown in FIG. 2, the cylindrical container 11 can be supported by the cover 28 by simply inverting the cover which then engages with its mouth disposed around the reduced diameter portion 30 of the cylindrical container 11. If however it is desired to reduce the rate of diffusion of the volatile substances from the piston 12, say for example if the dispensing means is to be used in a small room, the cover 28 can be positioned loosely over the top of the piston 12 exposing portion only of its surface area to the atmosphere. This is a further control over the rate of diffusion which is in addition to the control which is exercised by pumping of the piston 12 within the cylindrical container 11.

A consideration of the above embodiment will indicate that the dispensing means is of convenient size and shape for packaging purposes, that it does not suffer with the disability of packaging in bottles in that the liquid is retained within the expanded polyurethane foam sponge 10 and cannot be readily spilt from the device. Further it will be seen that the fingers can control the pumping action by being applied to the retaining flange 20 of the piston retaining sleeve 13, in which case the fingers need not necessarily have direct contact with the volatile liquids which are to be dispensed. Further it will be seen that the dispensing means consists of a cartridge which can be readily recharged with perfume or insect repellent if that is desired.

What I claim is:

1. Dispensing means comprising:
 - a container having a base and sides but being open ended at its top,
 - a resilient sponge of polyurethane foam having an open cell structure and expanded with benzyl alcohol disposed within said container contiguous with its base, and
 - a piston formed of mutually bonded cellulose acetate granules vertically movable in said container above said resilient sponge whereby depression of said piston displaces liquid when retained in said sponge upwardly into and through said piston, but upon release or said piston said sponge urges said piston upwardly.
2. Dispensing means comprising:
 - a container having a base and sides but being open ended at its top,
 - a sponge retaining sleeve within said container,
 - a cover of resilient plastic engageable on said sponge sleeve,
 - a sponge of open cell structure resilient polyurethane foam expanded with benzyl alcohol within said container near its base,
 - a piston composed of mutually bonded cellulose acetate granules disposed on top of said sponge, and piston

retaining means fixed to the container retaining said piston to said container, whereby depression of said piston displaces liquid when retained in said sponge upwardly into and through said piston, but upon release of said piston said sponge urges said piston upwardly.

3. Dispensing means comprising:
 - a container having a base and sides but being open ended at its top,
 - a sponge retaining sleeve within said container,
 - a cover of resilient plastic engageable on said sponge sleeve,
 - a sponge within said container near its base,
 - a piston composed of cellulose acetate granules having a mean minimum dimension of between 1 and 2 millimeters, softened with ethylene glycol monoethyl ether and mutually bonded under pressure, said piston being disposed on top of said sponge, and piston retaining means fixed to the container retaining said piston to said container,
- whereby depression of said piston displaces liquid when retained in said sponge upwardly into and through said piston, but upon release of said piston said sponge urges said piston upwardly.

4. Dispensing means comprising:
 - a container having a base and cylindrical sides but being open ended at its top, said cylindrical sides being of reduced diameter near the base,
 - an inwardly disposed ridge within said container near its open top,
 - a sponge retaining sleeve of resilient plastic within said container,
 - an outwardly disposed ridge on said sponge retaining sleeve engaging said inwardly disposed ridge,
 - a cover of resilient plastic,
 - an inwardly disposed ridge on said cover engaging an outwardly disposed ridge on said sleeve, said cover being removable from said sleeve and engageable on said reduced diameter portion near the base of said container to thereby support said container,
 - a sponge within said container near its base,
 - a piston composed of mutually bonded cellulose acetate granules disposed on top of said sponge, and piston retaining means fixed to said container retaining said piston to said container,
- whereby depression of said piston displaces liquid when retained in said sponge upwardly into and through said piston, but upon release of said piston said sponge urges said piston upwardly.

5. Dispensing means comprising:
 - a container of resilient plastic having a base and cylindrical sides but being open ended at its top, said cylindrical sides being of reduced diameter near the base,
 - an inwardly disposed ridge within said container near its open top,
 - a sponge retaining sleeve of resilient plastic within said container,
 - an outwardly disposed ridge on said sponge retaining sleeve engaging said inwardly disposed ridge,
 - an inwardly and downwardly turned annular sponge retaining lip on said sponge retaining sleeve,
 - a cover of resilient plastic,
 - an inwardly disposed ridge on said cover engaging an outwardly disposed ridge on said sleeve, said cover being removable from said sleeve and engageable on said reduced diameter portion near the base of said container to thereby support said container,
 - a sponge of open cell structure resilient polyurethane foam expanded with benzyl alcohol within said container near its base,
 - a piston composed of cellulose acetate granules having a mean minimum dimension of between 1 and 2 millimeters, softened with ethylene glycol monoethyl

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either and mutually bonded under pressure disposed
on top of said sponge,
a central stem upstanding from said base,
a piston retaining sleeve slidable over said central
stem, and
a retaining flange on the top end of said piston retain-
ing sleeve retaining said piston to said container,
whereby depression of said piston displaces liquid when
retained in said sponge upwardly into and through
said piston, but upon release of said piston said 10
sponge urges said piston upwardly.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,134,544

May 26, 1964

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It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 4, for "from" read -- form --; column 3, line 63, for "or" read -- of --; column 4, line 24, for "sponse" read -- sponge --.

Signed and sealed this 3rd day of November 1964.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents