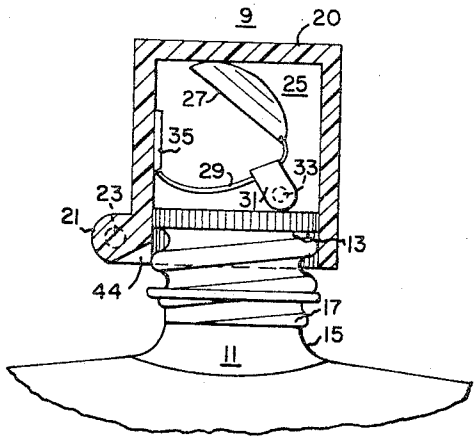
Feb. 18, 1969 L. A. TENENOUSER 3,428,099

DISPENSER

Filed Sept. 6, 1966

FIG.1



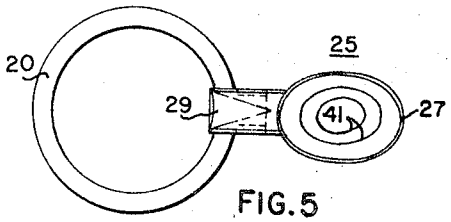


FIG.5

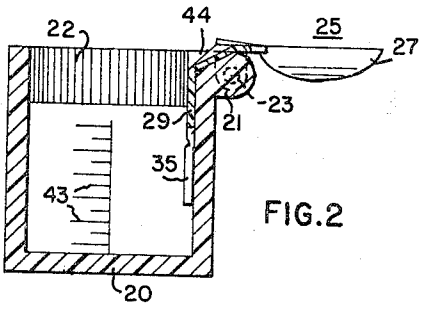


FIG.2

FIG.3

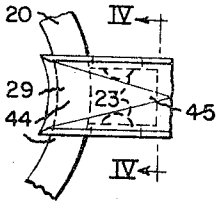
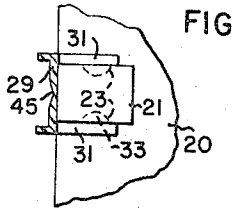


FIG.4



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3,428,099

DISPENSER

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U.S. Cl. 141—380 5 Claims
Int. Cl. B65b 1/04; A47j 43/28; B25f 1/00

ABSTRACT OF THE DISCLOSURE

A dispenser for a pharmaceutical product is disclosed which includes a container having a dispensing device including a dispensing bowl on a flexible arm. The bowl can be flexed from a position wholly within the container to dispensing position.

This invention relates to the dispenser art and has particular relationship to dispensers for pharmaceutical products. Because this invention is particularly applicable to the dispensing and administering of pharmaceutical products, the specification and the claims of this application, in the interest of brevity, describe and claim this invention as serving pharmaceutical purposes.

To the extent that this invention is applicable to dispensers of other types, such other type dispensers are within the scope of this invention and, to this extent, words such as "pharamaceutical" are used in this application with the intention that they include within their scope such other types of practice of this invention.

The dispenser according to this invention is used with containers for pharmaceutical products. A pharmaceutical product is distributed in a container having a neck or mouth for which there is a closure cap. In the interest of health and sanitation the structure of the cap and container are regulated by law. Typically, the receptacle may contain a pharmaceutical product in liquid or powder form which is to be administered in measured quantities, by tablespoon or teaspoon. It is desirable that the container be provided with a dispenser for administering the product. It is an object of this invention to provide such a dispenser.

In accordance with the teachings of the prior art, a pharmaceutical container is provided which includes a spoon secured to, and extending from the center of, the cap. This cap and spoon are enclosed within a shield. This prior art container is uneconomic in that the producing of the cap with the spoon extending from it presents serious manufacturing difficulties which render the composite structure costly. In addition, the meeting of health and sanitation regulations imposed on the pharmaceutical cap is complicated. The use of the composite structure in administering a dose of a pharmaceutical product is awkward. The composite product cannot be held conveniently by the cap in administering the product. The spoon militates against ready, reliable application of the cap to close the container.

It is an object of this invention to overcome the above-described disadvantages and to provide an administering dispenser, which shall have a low cost of manufacture, shall not complicate meeting health and sanitation regulations and shall be readily usable in administering a product.

In accordance with this invention a dispenser is provided which includes a cylinder having a flexible administering device secured to the inner wall thereof. The cylinder is open at one end and is dimensioned to engage at the open end a standard cap, meeting regulations, frictionally or resiliently. The dispensing device is similar to a flexible spoon and has a dispensing bowl extending from

an arm. In the standby condition of the dispenser the device is bowed or flexed into the cylinder. When the product is to be administered the device is flexed out of the cylinder and the bowl is set in dispensing position and the product is poured into the bowl. After administering the product the cylinder and device are thoroughly cleaned and the device is flexed back into standby position within the cylinder, for locking the device in administering position. The cylinder may also be composed of transparent material and be graduated so that specific quantities of the product may be measured out. In this case the product may be poured into an auxiliary container and from it into the administering device or the arm of the administering device may be set in a vertical or inclined position and the product poured into the bowl as the cylinder is dipped and the bowl simultaneously turned to the horizontal position. For this mode of use the stem or arm of the administering device has a groove so that by tipping the cylinder, with the device in administering position, the product flows readily from the cylinder through the groove into the administering bowl.

For a better understanding of this invention, both as to its organization and as to its method of operation, together with additional objects and advantages thereof, reference is made to the following description taken in connection with the accompanying drawing; in which:

FIGURE 1 is a view partly in section and partly in side elevation showing a container on which is mounted a dispenser, according to this invention, in the standby position;

FIG. 2 is a view partly in section of the dispenser in FIG. 1 in position to administer a product;

FIG. 3 is a fragmental plan view showing the locking mechanism for the dispenser in accordance with this invention;

FIG. 4 is a view in section taken along line IV—IV of FIG. 3; and

FIG. 5 is a plan view of the administering device according to this invention in administering position.

The dispenser **9** according to this invention is shown as mounted on a pharmaceutical container **11** having a standard cap **13** meeting regulations. The container **11** has a neck or mouth **15**. Typically, the outer surface of the neck **15** may have a thread **17** which engages a cooperative internal thread (not shown) in the cap **13**. Alternatively the cap **13** may be of flexible material and may be held by friction in closing relationship with the neck **15**. The outer surface of the cap **13** is serrated or scalloped or otherwise roughened to receive and hold the dispenser **9**.

The dispenser **9** includes a cylinder **20** open at one end which has a snout-like projection **21** extending from its rim. On both sides the outer surface of projection **21** has a depression **23**. The inner surface near the rim of the cylinder **20** at the opening has ridges or serrations **22** or is otherwise roughened so that the dispenser **9** is held firm by engagement of the ridges **22** in the rim with the surface of the cap **13**. An administering device **25** is secured to the inner surface of the cylinder **20**. This device **25** is generally similar to a flexible spoon and includes a bowl **27** and a stem **29**. A pair of tabs **31** extend from the stem **29** near the bowl **27**. Each tab **31** has an external dimple **33**. The device **25** is secured to the inner surface of the cylinder **20** by engagement of the end or tab **35** of the stem **29** with this surface (FIGS. 1 and 2).

In the standby condition of the dispenser **9**, the administering device **25** is flexed or bowed into the cylinder **20** (FIG. 1) into an arc with the bowl **27** and the stem **29** well within the cylinder **20**. When the dispenser is to be used, the device **25** is flexed so that the bowl **27** is substantially horizontal and is locked in this position by en-

gagement of dimples **33** in the tabs **31** with the depressions **23** in the projection **21**.

The bowl **27** may have the volume of a tablespoon or greater and may have graduations **41** in teaspoons or fractions of teaspoons. The cylinder **20** may also have graduations **43**. With the bowl **27** in administering position the pharmaceutical product from the container **11** may be measured out in the bowl **27** or may be measured out in the cylinder **20** and poured into the bowl **27** by dipping the cylinder **20** and turning the bowl **27** from a vertical or inclined position to horizontal position. For setting the bowl **27** in vertical or inclined position a second set of dimples (not shown to avoid confusion) may be provided in the projection **21**. To facilitate transfer of the product from the cylinder **20** to the bowl **25**, the cylinder **20** has a snout-like form **44** inside of the projections **21** and the arm or stem **29** has a groove **45** near the bowl **27**. The patient receives the product from the bowl.

The administering device **25** is, in accordance with this invention, composed of a material or materials which led themselves to the flexing back-and-forth between the bowed stand-by position (FIG. 1) and the administering position (FIG. 2). In the interest of convenience and economy, both the bowl **27** and the arm **29** are composed of this material but it is within the scope of this invention to construct or mold the arm **29** of a highly flexible material and the bowl **27** of a harder more resistant material and to weld, or otherwise secure, the arm to the bowl.

The arm is preferably composed of plastic material but the plastic material must exhibit adequate flexibility to assure that the arm **29** does not crack on repeated flexing. The material must be rigid enough so that when the device **25** is removed from the cylinder **20** the bowl **29** is properly set for administering the product.

Materials which can be used in the practice of this invention and their principal properties are tabulated in Table I below:

TABLE I

Properties	ASTM Test Method	Acetal Polymers and Copolymers	Modified Acrylic Molding Compound	Cellulose Acetates
Compression molding, temp., ° F			300–400	210–390.
Compr. molding pres., p.s.i.			2,000–5000	100–5000.
Injection molding temp., ° F		350–480	400–490	335–490.
Inj. molding pres., p.s.i.		1×10^4–2×10^4	10^4–2×10^4	8×10^3–32×10^3.
Mold shrinkage, in./in.		.025–.030	0.004–0.008	0.003–0.010.
Specific gravity	D792	1.410–1.425	1.08–1.18	1.23–1.34.
Refractive index, n_d	D542	1.48		1.46–1.50.
Tensile strength, p.s.i.	D638, D651	8,800–10,000	5,000–9,000	1,990–11,000
Elongation, percent	D638	15–75	15–50	6–70.
Modulus of Elasticity in Tension, 10^5 p.s.i.	D747	3.75–4.10	2.0–4.0	0.65–4.5.
Compressive strength, p.s.i.	D695	18,000	4×10^3–14×10^3	2.2×10^3–36×10^3.
Flexural strength, p.s.i.	D790	12,000–14,000	8×10^3–13×10^3	2×10^3–13×10^3.
Impact strength, ft.-lb., per in. of notch (½"x½" bon, Izod test).	D256	1.1–4	0.5–4.5	0.4–5.2
Hardness, Rockwell	D785	M76–M94, R118	R99–R120	R35–R125.
Clarity		Translucent to opaque.	Translucent to opaque.	Translucent to opaque.

In Table I, the rows labeled "tensile strength"; "elongation," "Modulus of elasticity," "flexural strength" are of importance. During the flexing the outer surface of the arm **29** is subjected to tension and must be capable of withstanding the stress. The table shows that some of the compounds in each class tabulated have high tensile strength. It is desirable that the elongation should be at least 50%. The table shows that some compounds of the acetal polymers and copolymers have elongation as high as 75%. Compounds having elongation between 50% and 75% should be selected. The same applies to the cellulose acetates. The only acrylic compounds suitable are those which have elongation of about 50%. The modulus of elasticity should not be too high or too low; the arm **29** would be excessively stiff for a high modulus and excessively plastic for a low modulus. Numerous suitable compounds are covered by the table.

Rubbery materials can also be used for the arm **29** or the whole device **25**. Examples of rubbers that can be used include the following: natural, styrene butadiene (SBR), neoprene, Butyl, nitrile copolymers, Polysulfides (Thiokols), silicones, fluorocarbons, acrylics, chlorinated sulfonated polyethylene (Hypolon), polymethanes, butadiene acrylonitrite copolymers, chloroprenes, ethylene-propylene copolymers, fluorinated copolymers, isobutylene polymers, polybutadiene polymers, polyisobutylenes, polyisoprenes, and others. A description of the rubbers listed above can be found in the "Rubber Red Book," 18th Edition, pp. 606–648 Palmerton Publishing Co. Inc. 1966. Newer synthetic elastomers such as the polyepichlorohydrins (hydrins) and their copolymers with ethylene oxide, ethylene propylene copolymers, etc. could also be used.

A description of the compounding design of several of these rubbers is found in the "Rubber Handbook," pp. 238–292, R. T. Vanderbilt Co., 230 Park Ave., New York, N.Y. (1958).

In addition, various combinations of above rubbers and rubbers comprising combinations of suitable monomers that give polymers which have elongations in excess of 50% and rubbery materials that may be vulcanized (crosslinked) or non-vulcanized also can be employed. These could include ethylene vinylacetate, ethylene ethylacetate, block copolymers of styrene-butadiene, etc.

Table II below presents the composition of four typical materials, identified as A, B, C, D, that can be used.

TABLE II

	Parts by weight			
	A	B	C	D
Neoprene W	1,000	1,000	1,000	1,000
Agents Stalite	2	2	2	2
Magnesia	4	4	4	4
Stearic Acid	0.5	0.5	0.5	0.5
Zinc Oxide	5	5	5	5
Thiate B [1]	0.5	0.5	0.5	0.5
FEF Black [2]	25.2	25.2	25.2	25.2
Silicon Dioxide		54.6		
Dixie Clay			109.2	
Zinc Oxide				312

[1] Thiate B=A trialkyl thiourea (R. T. Vanderbilt Co.).
[2] EFF Black=Fast Extrusion Furnace Black.

Table III below tabulates the important properties of the materials A, B, C, D.

TABLE III

	Cure, Min. at >30° F.	Modulus at 300%, p.s.i.	Tensile Strength, p.s.i.	Percent Elongation	Shore A Hardness
A	20	2,050	2,800	370	57
B	30	970	2,800	800	81
C	20	1,330	1,930	710	71
D	20	820	1,000	650	79

While the moduli of elasticity for materials A, B, C, D, are lower than for the materials in Table I, the percent elongation are substantially higher and for this reason these materials are suitable.

Table IV below presents the formulation of three additional materials E, F, G. (Typical molded reinforced rubber formulations.)

TABLE IV

	Parts by weight		
	E	F	G
Styrene Butadiene Rubber (Type 1006 Hot)	100	100	100
Bondogen [1]	2	2	2
Stearic Acid	2	2	2
Zinc Oxide	5	5	5
Agerite Stalite [2]	1	1	1
Sulfur	2	2	2
Altax [3]	1.5	1.5	1.5
Cumate [4]	0.1	0.1	0.1
HAF Black [5]	50.4		
SRF Black [6]		75.6	
Calcium Carbonate			185.5

[1] Bondogen=A mixture of an oil soluble sulfonic acid of high molecular weight with a high boiling hydrophyllic alcohol and a paraffin oil.
[2] Agerite Stalite=mixture of octylated diphenylamines.
[3] Altax=benzothiazyl disulfide.
[4] Cumate=copper dimethyldithio carbonate.
[5] HAF Black=high abrasion Furnace black.
[6] SRF Black=semi reinforcing furnace black.
NOTE.—Items 1-4—Trademarks of R. T. Vanderbilt Co. Information source—R. T. Vanderbilt Co., "Rubber Handbook," edited by George G. Winspear, 230 Park Ave., N.Y., N.Y. 1958.

Table V below presents the properties of materials E, F, G.

TABLE V

	Cure, min. at >28° F.	Modulus at 300%, p.s.i.	Tensile strength, p.s.i.	Percent Elongation	Shore A Hardness
E	15	2,600	3,200	330	66
F	20	2,550	2,650	310	66
G	15	300	900	550	60

Note the high percent elongations.

The administering device **25** may also be composed of spring steel but this would be costly.

The materials which can be used may be thermoplastic or thermosetting and the device **25** may be made by molding in accordance with the type of material.

The cylinder **20** may be of the same or similar material, or weld compatible (having coefficients of expansion in the same range and wetting) with, as the handle **29**. In this case the end or tab **35** can be secured to the inner surface of the cylinder **20** by a process analogous to welding. This is particularly applicable where both materials are thermoplastic. In this case the tab **35** and the region of the cylinder to which it is to be joined are both softened by heat and a joint is made. The tab **35** may also be attached or secured by adhesives (epoxy resins, for example), heat sealing, friction fittings and the like. The entire dispenser **9** including the administering device **25** may also be molded as a unit with the administering device **25** integral with the cylinder **20**.

While preferred embodiments of this invention have been disclosed herein, many modifications thereof are feasible. This invention then is not to be restricted except insofar as is necessitated by the spirit of the prior art.

I claim as my invention:

1. A dispenser for a pharmaceutical product comprising a container, receiving and administering device for the product having a flexible portion and means for receiving and holding the product for administration, and means securing said device to the inner wall of said container in a position such that said device is capable of being flexed to a position within the container when the dispenser is in stand-by condition and into receiving position for, and administering position of, the product when the product is to be administered, at least the said flexible portion of said device being composed of an adequately flexible material to achieve the flexing aforesaid.

2. The dispenser of claim **1** wherein the cylinder and device include cooperative mechanisms for locking the device in administering position.

3. The dispenser of claim **1** wherein the cylinder includes graduations for indicating quantities of the product.

4. The dispenser of claim **1** wherein the device includes a dispensing bowl on a flexible arm and at least the portion of the arm contiguous to the bowl has a groove so that by dipping the cylinder the product flows under gravity from the cylinder to the bowl.

5. A dispenser for a pharmaceutical product including a container from which an external projection extends, a product-receiving-and-administering means having a flexible arm from which the administering means extends, a tab secured to said arm and to the inner wall of said container flexibly suspending said receiving-and-administering-means from said inner wall in a position such that said receiving-and-adminstering means may be moved from a stand-by position in which it is flexed wholly within the container to a dispensing position in which said administering means is supported on said projection in product-administering relationship.

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U.S. Cl. X.R.

30—141, 327; 7—1