Oct. 15, 1935. E. G. DE VALERA 2,017,686

DISPENSING CAP

Filed Sept. 11, 1934

Fig. 1.

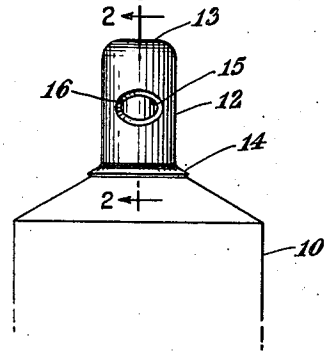


Fig. 2.

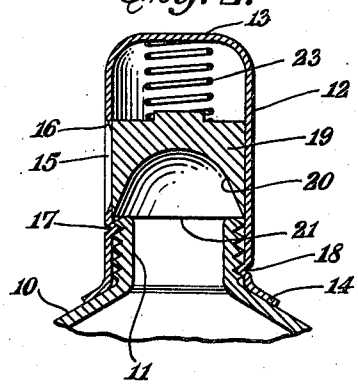


Fig. 3.

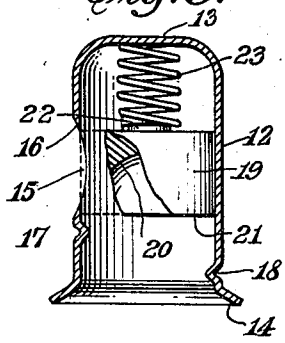


Fig. 4.

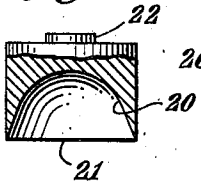


Fig. 5.

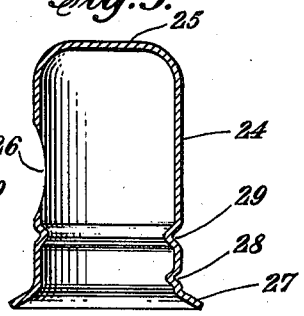


Fig. 6.

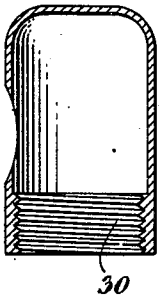


Fig. 7.

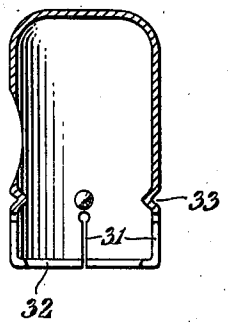
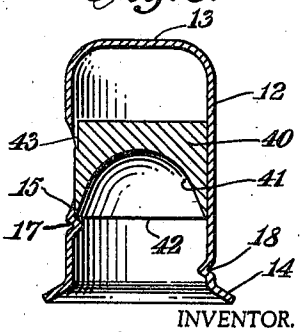


Fig. 8.



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2,017,686

DISPENSING CAP

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Application September 11, 1934, Serial No. 743,525

3 Claims. (Cl. 221—60)

This invention relates to content dispensing devices in general, and particularly to a removable cap adapted to be associated with an orifice-provided extension of collapsible tubes.

The prime object of this invention is to provide an inexpensive, simple, readily applicable device of this kind, which may be momentarily associated with any existing collapsible tube, without the use of tools and without requiring special skill, and which will permit the dispensing of any desired quantity of the contents of the tube, by merely pressing against the exterior thereof.

Another object of this invention is to provide a device of the character described, in which is operably mounted a valve or piston provided with an extended or enlarged pressure-receiving area, which area is adapted to face the orifice of a collapsible tube, through which the contents of the latter are usually discharged.

Another object of this invention is to provide a cap which is open at one end and closed at the other end, and equipped with a side discharge aperture having a sharp, marginal edge, and a valve provided with a sharp peripheral edge, adapted to cooperate with the sharp edge of said discharge aperture.

Another object of this invention is to provide within such device, means for effectively actuating the valve so as to cause its return to its closing position, after it had been caused to move to its opening position.

The foregoing and still further objects will become more fully apparent from the following description, and from the accompanying drawing, forming a part of my disclosure, but not being intended to limit my invention to the actual structure shown. In the drawing,

Fig. 1 is an elevation of my device in one of its preferred forms, shown secured to a collapsible tube,

Fig. 2 is a cross sectional view taken on lines 2—2 of Figure 1,

Fig. 3 is a similar cross sectional view through the unattached form of my device,

Fig. 4 is an elevation, partially in cross section, through one form of my valve,

Figures 5, 6 and 7 illustrate cross sectional views through modified forms of my cap or cylinder, and

Fig. 8 is a cross sectional view through a modified form of my device, employing compressed air for the operation of the valve.

Referring now to the drawing, numeral 10 denotes a collapsible tube, terminating in an orificed extension 11, which is usually provided with an external thread. Secured to extension 11 is shown a cap or cylinder 12, which is closed at one of its ends 13, and open at its opposite end, which latter is preferably flanged, as indicated at 14. Flange 14 is intended to bear against the tube area adjacent to its extension 11. Cylinder 12 is provided with a side aperture 15, having a sharp, peripheral edge, indicated at 16. For the purpose of securing the cylinder 12 to the extension of the tube, I preferably indent the cylinder in two places. One indentation is shown at 17 and is adapted to engage the upper course of the thread of the extension, while the lower indentation 18 is intended to engage one of the lower threads of the extension.

Within the cylinder is operatively mounted a piston or valve 19, corresponding to the cylindrical form of cap 12, and tightly fitted against the interior wall of the latter. Yet this fit is not so tight as to prevent a relatively easy movement of the piston within the cylinder. The end of the piston or valve facing the orifice of extension 11 is provided with a recess presenting an enlarged pressure-receiving area 20, which latter terminates in a sharp, peripheral edge 21. The other end of the valve is preferably provided with a spring seat 22, adapted to receive and to guide an expansion spring, indicated at 23, interposed between the valve and the closed end 13 of cylinder 12. The indentations 17 and 18 are preferably made after the insertion of spring 23 and of piston 19 into the cylinder. The upper indentation 17 is intended to prevent valve 19 from leaving the cap, before the latter is attached to an existing extension of a collapsible tube, as clearly illustrated in Figure 3.

When the device is secured to a tube, the piston normally rests against the upper face of extension 11, in which position the valve is closed, in the manner illustrated in Figure 2. When the content of the tube is brought under pressure, this pressure is sufficient to overcome the tension of spring 23, whereby the valve is lifted so as to partially clear the lower edge portion of aperture 15, thus permitting a desired amount of the tube's content to ooze out. The moment the pressure against the tube is released, spring 23 moves valve 19 to its closing position, and the sharp edge 21 of valve 19, cooperating with sharp edge 16 of aperture 15, cuts off a further discharge. In this manner a collapsible tube provided with my device is capable of automatically dispensing a desired quantity of its content without any other operation except that of compressing the tube.

Referring now to Figure 5, there is illustrated a cap or cylinder 24, provided with a closed end

25 and a side opening 26. The lower end of the cylinder is again flanged at 27, and above the flange there is provided an indentation 28, adapted to engage the lower portion of the thread of a tube extension. Instead of an upper indentation I have provided in this modified form a peripheral groove 29, adapted to serve both as rest for the valve and also as abutment for the upper edge of the tube extension.

The illustration in Figure 6 portrays another modified form of the cap in which the side flange and indentations are missing, but where the lower end of the cap is internally threaded at 30. This thread is to correspond with the thread of the extension of the tube. In Figure 7 still another modified form of the cap construction is shown, in which the lower end is slotted at 31, thus providing several resilient legs, terminating in gripping flanges 32, adapted to engage the lower end of a tube extension. Above slots 31 are provided indentations 33, designed to form abutments for both the piston and the upper edge of the tube extension.

Referring now to Figure 8, this modification again consists of a cap or cylindrical member 12, having a closed end 13 and a flanged lower end 14 and the usual indentations 17 and 18. There is again provided a sharp-edged side opening 15 in the cylinder for discharging the content of a tube. Within the cylinder there is mounted a piston or valve 40, again provided with an enlarged pressure-receiving area 41 and a sharp, peripheral lower edge 42, the latter adapted to cooperate with the sharp edge of opening 15. Near the upper end of piston 40 there is cut either one, or a plurality of minute passages 43, adapted to establish connections between the atmosphere and the interior space of the cylinder, above the piston. This passage or passages 43 serves as automatic valves or cut-offs for the air above the piston. When pressure is exerted against the pressure-receiving area 41, the piston is moved upwards and partially clears the lower edge of opening 15, thus permitting a discharge of the tube's content. As the piston moves upwards, its passage 43 is covered by the upper edge portion of opening 15. The air entrapped between the upper end of the piston and the closed end of the cylinder is compressed sufficiently, so that when the pressure against the piston by the content of the tube is released, the compressed air behind the piston will move the latter to its closing position, shown in Figure 8.

In both constructions described, the operation of the valve is automatically caused by pressure within the tube. In either construction the valve is correctly fitted within the interior wall of the cap. It is obvious, of course, that the construction shown in Figure 8 requires greater precision, although the content of the tube usually provides sufficient lubrication and seal for the smooth and correct operation of the valve.

In all of my constructions the proper operation of my device depends upon the enlarged or extended effective pressure area provided in the piston. Through the employment of a generously designed pressure-receiving area, only a relatively slight pressure upon the tube is required to either overcome the spring tension against the piston, or to compress the air, in the modified form of Figure 8, for efficient operation of my devices.

While I have shown and described specific forms of my invention, it is quite evident, from the different modifications illustrated, that it is capable of a great many modifications and improvements, and I therefore reserve for myself the right to make such improvements and changes as may become necessary in the course of manufacturing the device for various purposes, all within the broad scope of my invention, as set forth in the annexed claims.

I claim:

1. A dispensing cap, comprising in combination, a cylinder, closed at one end, and open at its other end, and provided with a sharp-edged side opening, a valve operatively mounted in said cylinder and adapted to either partially clear, or close said side opening, the valve end nearest the open end of the cylinder having an enlarged pressure-receiving area and a sharp, peripheral edge cooperating with the said opening of the cylinder, a minute passage formed at the other end of the valve and adapted, when the valve is at its closing position, to provide connection between the atmosphere and the space formed between the valve and the closed end of the cylinder, the valve being adapted, when moved into the cylinder by pressure exerted against its pressure-receiving area, to trap and compress the air between its inner end and the closed end of the cylinder, said compressed air being designed to move the valve to its closing position, when the pressure against the pressure area of the valve is released.

2. In a dispensing cap intended to be associated with the threaded, orificed, neck member of a collapsible tube or the like, a hollow cylinder open at one end and closed at its other end, and provided with a sharp-edged side opening, a piston operatively mounted within said cylinder and provided with a concave depression, the latter adapted to face the orifice of such neck member, and terminating in a sharp peripheral edge, oppositely disposed and vertically spaced indentations on said cylinder, said indentations being adapted to make interlocking connection with the threaded neck member for removably retaining the said dispensing cap in assembled operative position on said tube neck, the uppermost indentation on said cylinder also providing a stop for the piston to retain same in said cylinder when the latter is removed from said threaded neck.

3. In a dispensing cap, as set forth in claim 2, resilient means for actuating said piston within said cylinder.

ERNEST G. DE VALERA.