Nov. 5, 1935. T. ROMANO 2,019,798

DISPENSING TUBE CAP

Filed Oct. 9, 1933

Fig. 1.

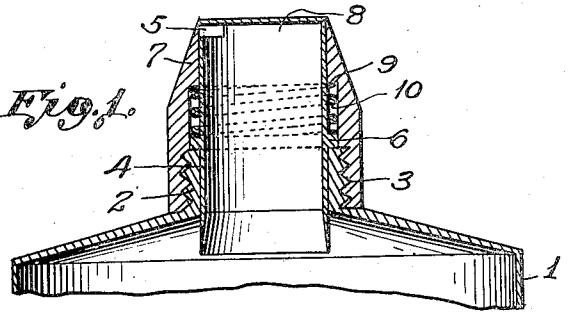


Fig. 2.

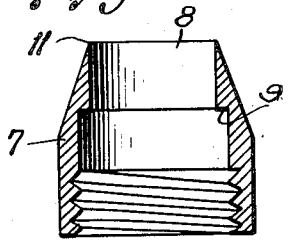
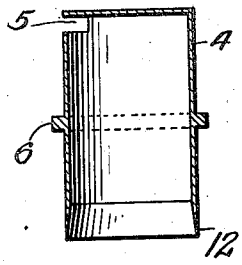


Fig. 3.



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DISPENSING TUBE CAP

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7 Claims. (Cl. 221—60)

The present invention concerns collapsible tubes of the type used to contain tooth-paste, cold-cream, and the like. The invention is so constructed that by the simple application of pressure to the body of the tube an opening is provided through which a ribbon of the contents is ejected, and by the simple withdrawal of pressure the tube is caused to close and to sever cleanly the ribbon of ejected contents from the mass within the tube at the point of emission. Thus the commonly used type of detachable, threaded cap is completely eliminated. No form of screwing, pushing, or snapping is necessary to close the tube or seal the closure. Moreover, there is no interior chamber where a portion of the mass of the contents is left to harden; there is no exterior horizontal surface adjacent to the point of emission where a portion or residue of the ejected contents can accumulate. The substance is transmitted directly from the undivided mass within the tube and valve stem to the intended surface,—of a tooth-brush, for instance. Only one hand is necessary for the management of the tube from the moment it is picked up until it is replaced on the shelf; the other hand is free for the manipulation of the surface to which the ribbon of contents is to be transmitted. Thus the tube is opened and closed in a manner more economical, convenient, and hygienic than any other yet devised.

The device may be examined in the accompanying drawing: Fig. 1 is a cross-sectional view of the device assembled in its closed position in the upper part of a collapsible tube; Fig. 2 is a vertical cross-sectional view of the casing; Fig. 3 is a vertical cross-sectional view of the valve stem.

My invention relates to a dispensing tube comprising a flexible body (1) having a conical end and provided with a neck having therein an axial bore or bearing opening (2), extending therethrough, and said neck being cut with an external or male thread (3); a tubular valve stem (4) is slidably mounted within the bearing opening of the afore-mentioned neck (2) in line with the long axis of said dispensing tube, said valve stem (4) being open at the inner end and closed at the outer end and being ported on the side adjacent to the closed end thereof as at (5) to permit ejection of the contents of said dispensing tube, said closed end being marked with an arrow showing the position of said port (5), and said valve stem (4) having externally an annular flange or collar (6); and the outer end of said valve stem (4) being laterally enclosed by a cylindrical cap or casing (7), said cap having a conical end and a suitable thread to mesh and hold securely to said dispensing tube (1), said cap (7) having an open bearing (8) in the top of same in line with said open bearing in neck (2) of said tube (1) when assembled, said cap having internally an annular step or shoulder (9) as shown; and a spring (10) seated on said shoulder (6) of said valve stem (4) and also on the annular step (9) on said cap; the afore-mentioned conical end on said cylindrical cap (7) forming a cutting edge (11), and the valve stem (4) having a chamfer on its internal cylindrical surface at its open end to provide a cutting edge (12).

The device is so constructed that the closed end of the valve stem is normally flush with the top of the enclosing casing; that the bearing openings slidably mounting the valve stem fit snugly the tubular surface thereof; and that the annular flange on the valve stem makes sliding contact with the internal cylindrical wall of the casing below the bearing opening therein; the spring serving to maintain the valve stem in its normal position by means of the said flange, which holds it against the neck of the tube; the spring being compressed against the step in the casing by means of the flange when pressure is exerted on the exterior of the tube, thus causing the contents of the tube to force the valve stem outward into its open position, the expansion of the spring upon release of pressure automatically retracting the valve stem to closed position.

The close contact of the lower cylindrical wall of the valve stem with the enclosing bearing opening in the neck of the tube prevents any portion of the contents from reaching the flange and spring at any time. The annular collar or flange necessarily fits snugly against the enclosing cylindrical wall of the cap or casing; otherwise the spring might become jammed between the flange and the wall.

A very important feature of this invention is the conical shape of the top or outer open end of the casing, which not only provides a cutting edge to sever the ejected contents from the mass within at the point of emission but also eliminates a horizontal surface adjacent to the open port where the emitted contents or a portion thereof would stick or cling, necessitating unsanitary wiping and inconvenient cleaning.

The casing, spring, and valve stem being detachable and separate from each other can be replaced if damaged. Moreover, there is no interior chamber where a small portion of the contents can be separated from the main body of

the mass within the tube; the interiors of the tube and valve stem are in direct communication and form one undivided chamber.

What I claim as my invention is:—

1. A dispensing tube comprising a flexible body having a conical end provided with a neck, said neck having a bearing opening extending therethrough; a hollow valve stem, open at one end, and closed at the other, slidable within said bearing opening and ported on the side near the top adjacent to said closed end, an external annular collar or flange being provided on said valve stem intermediate its length by means of which it rests upon the outer end of said neck, the open end being inserted within said neck and communicating directly with the interior of the flexible body; a cylindrical casing having an axial bore consisting of two cylindrical sections of unequal diameter, forming an annular step at the juncture thereof, said casing being detachably imposed upon the exterior of said neck at the end of the larger bore, and the smaller bore extending through the outer end of said casing being diametrically equal to and in alignment with the bearing opening in the neck of the tube and laterally enclosing the upper surface of said valve stem to the closed end thereof, thus furnishing a closure to the port therein and forming an additional bearing opening slidably mounting said valve stem, with the periphery of the external flange making sliding contact with the internal cylindrical wall of larger bore within said casing; and a coil spring detachably seated on the step in said casing and on the flange or collar on said valve stem, said valve stem being caused to move longitudinally outward in the bearing opening by pressure on the exterior of the tube a sufficient distance to expose the port beyond the outer end of the casing and being limited in its movement by the step in said casing and by said spring, said spring being compressed against said stem by means of the flange, and said port being automatically closed when upon release of pressure the valve stem is by the expansion of the spring against the flange drawn inward to its normal position.

2. A dispensing tube comprising a flexible body having a conical end provided with a neck, said neck having a bearing opening therethrough; a tubular valve stem slidable within the same and resting on the outer end thereof by means of an external annular flange intermediate its length, said valve stem being closed at its exterior end and open at the end inserted in said neck; a hollow cylindrical cap, said cap having externally a conically shaped end and having internally at the same end a bearing opening, and said cap being held securely to the neck of the tube at its opposite end by means of threads, being at that end of sufficiently enlarged diameter to enclose the said neck; and a detachable coil spring providing for automatic closing of said tube, said spring being enclosed within the larger internal circumference of said casing between the flange on said valve stem and an annular step within the casing formed by the juncture of the two cylindrical sections of unequal bore; said conically shaped end being especially designed to provide a cutting edge and to eliminate a horizontal surface adjacent to the point of emission, said cutting edge being an automatic tool which is caused to function by the spring operated closing of said valve stem.

3. A dispensing tube comprising a flexible body having a conical end provided with a neck, said neck having a bearing opening therethrough; a tubular valve stem slidable within the same and seated thereon by means of an external annular flange intermediate its length, said valve stem being open at the end inserted in said neck and closed at its exterior end and having a port adjacent to its closed end; a hollow cylindrical casing imposed externally upon said neck by means of threads and laterally enclosing said valve stem; and a coil spring enclosed within said casing, said spring being detachably seated upon the flange on said valve stem and upon an annular step in said casing formed by the abrupt narrowing of the cylindrical interior thereof to create a bearing opening in line with and equal in diameter to the bearing opening in said neck, thus providing an additional slidable mounting for the valve stem and a closure for the port therein; said neck, valve stem, casing, and spring being so constructed and so assembled that the closed end of the valve stem shall be flush with the top of the casing when the valve stem is in normal position, being maintained in said normal position by reason of the action of the spring, and being caused to slide outward by pressure on the body of the tube, compressing the spring and exposing the port beyond the open outer end of the casing, and being retracted upon release of pressure by the automatic action of the spring.

4. A dispensing tube comprising a flexible body having a conical end provided with a neck, said neck having a bearing opening therethrough, a tubular valve stem slidable within the same, a hollow cylindrical cap having externally a conically shaped end and laterally enclosing said valve stem, and a coil spring enclosed within said cap and detachably seated on an annular flange or collar on the external cylindrical surface of said valve stem and on an annular step on the internal cylindrical surface of the herein mentioned cylindrical cap of suitable strength to close said valve; said spring being so situated that the outward movement of said valve stem, caused by pressure on the body of the tube, enables said annular collar to compress said spring against said annular step, said valve stem being automatically returned to and secured in its closed position when the withdrawal of pressure from the body of the tube permits said spring to expand and retract said annular collar against the neck of said tube.

5. A dispensing device comprising in combination a collapsible tubular body provided with a relatively rigid, externally threaded neck, said neck having an axial bore or bearing opening extending therethrough and communicating directly with the interior of the tubular body, a cylindrical cap or casing having an axial bore consisting of two cylindrical sections of unequal diameter, forming an annular step or shoulder at the juncture thereof, the end of the larger bore being threadedly connected to the neck of the tube, and the smaller bore extending through the outer end of the cap being of substantially the same diameter as the bearing opening through the neck and in alignment therewith, forming an additional bearing, a tubular valve stem slidably mounted within the bearing openings through the neck and cap, the inner end of said valve stem being open and the outer end closed, said valve stem having a discharge port in its side wall adjacent the closed outer end, said port being opened when the valve stem is extended outwardly of the cap, and closed by

the inner wall of the bearing opening in said cap when the valve stem is in its fully retracted position, in which latter position the outer closed end of the valve stem lies flush with the outer end of the cap, said valve stem also having an external annular flange or collar intermediate its length, which rests on the outer end of the tube neck when the valve stem is in retracted position and the periphery of which makes sliding contact with the cylindrical bore of larger diameter in the cap, and a coil spring enclosed within the larger bore of the cap between said shoulder or step within said cap and said flange or collar on said valve stem, said coil spring being compressed by the outward movement of said valve stem due to external pressure on the walls of the collapsible tube, and automatically retracting said valve stem to its inner limit on release of pressure.

6. A collapsible tube provided with a neck, a hollow, cylindrical valve stem slidable within said neck, and resting thereon by means of an external annular flange intermediate its length, a cylindrical cap or casing with open ends enclosing said valve stem vertically, said casing having an axial bore consisting of two cylindrical sections of unequal diameter forming an annular step or shoulder at the juncture thereof, said casing being securely imposed externally upon said neck by means of threads at the end of the large diameter and being at its outer or smaller end of equal diameter with said neck to fit snugly the upper cylindrical surface of the valve stem, and a coil spring providing an automatic closure for the tube enclosed within the wider cylindrical surface of the casing between the annular step formed at the junction of the unequal cylindrical sections and the flange on the exterior of the valve stem; said valve stem having an open end inserted in the neck of the tube, a closed end normally flush with the outer end of the casing, and a delivery port adjacent to said closed end normally sealed by the enclosing casing, and also having an internal chamfer at its open end forming a cutting edge facilitating the automatic return or inward movement of said valve stem to its sealed position; said valve stem being caused to slide into its open position with the port outward of the casing by application of pressure to the exterior of the tube.

7. A collapsible tube provided with a neck having a casing with open ends securely affixed externally thereto by means of threads, and having a hollow valve stem enclosed vertically by said neck and said casing and slidable longitudinally within the same, said valve stem having an open end inserted within said neck and having its other end closed and having a port adjacent to said closed end, and said casing having enclosed therein a spring to provide an automatic closure, said casing, spring, and valve stem being so arranged as to eliminate any and all internal chambers other than the undivided interiors of said tube and said valve stem, and said casing having a conical top eliminating a horizontal surface adjacent to the point of emission and providing therefor a cutting edge caused to operate by the automatic closure of said valve stem.

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