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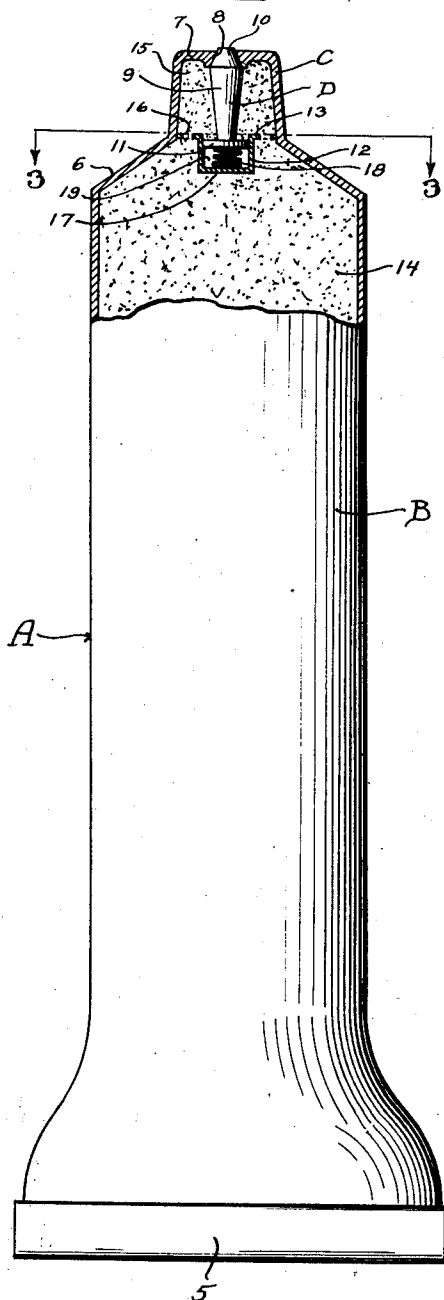
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H. A. WILCOX, JR

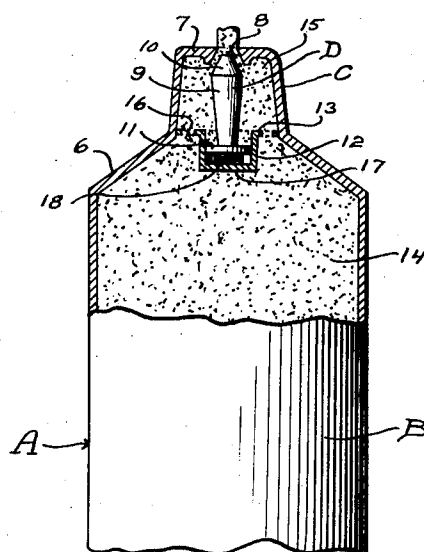
SELF CLOSING NOZZLE FOR COLLAPSIBLE TUBES

Filed Oct. 1, 1924

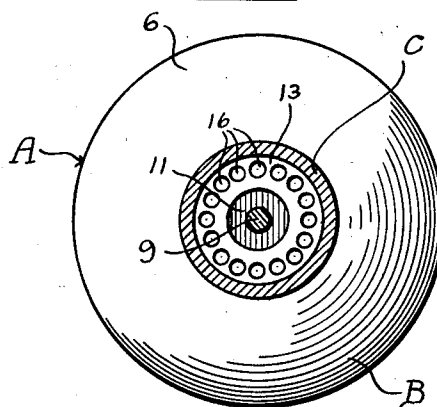
Figure 1.



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SELF-CLOSING NOZZLE FOR COLLAPSIBLE TUBES.

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My present invention relates to improvements in receptacles, and more specifically to collapsible tubes employed for holding semi-fluid materials such as dentifrices, toilet substances, etc., and which are adapted to be expelled by collapsing or compressing of the tube.

The primary object of the invention is to provide a collapsible tube embodying novel features of construction whereby when a pressure is exerted on the material by compressing of the walls of the tube, a desired quantity of the material within the tube may be readily expelled therefrom, and, when said pressure is removed the discharge opening of the tube will be automatically closed thereby sealing the material from exposure to the atmosphere.

A further object of the invention is the provision of a device of the character described which will be simple and efficient in operation, and wherein the control means for the discharge opening of the tube moves inwardly of the tube when a pressure is exerted on the material within the tube thereby permitting of the ready and whole removal of the material from exterior of the discharge end of the tube in an efficient and sanitary manner.

Other objects and advantages of the invention will be apparent during the course of the following detailed description, taken in connection with the accompanying drawing, forming a part of this specification, and in which drawing:—

Figure 1 is a view of a collapsible tube embodying my invention, a portion of the tube being shown in elevation and the discharge end portion thereof being shown in central longitudinal section;

Figure 2 is a view showing the tube partly broken away and being also shown partly in central longitudinal section with the closure means in the position it will assume when a pressure is exerted upon the material within the tube as by compressing of the walls thereof; and,

Figure 3 is a transverse section on line 3—3 of Figure 1 looking in the direction of the arrows.

Referring to the drawing in detail, wherein for the purpose of illustration is shown but the preferred embodiment of the invention, and wherein similar reference characters designate corresponding parts throughout the several views, the letter A may gen-

erally designate the improved dispensing receptacle, which may embody a deformable body B for holding any of various semi-fluid materials, a head or nozzle C, and a control means D operable within the head C for controlling of the flow of material from the receptacle.

The body B, which is preferably in the form of a deformable tube having a flattened portion 5 at the filling end thereof and having its opposite or discharge end portion formed with an inclined wall 6 terminating in the head or nozzle C, may be made of any suitable material as are the collapsible tubes now in general commercial use.

The head or nozzle C which is substantially cup shaped, and being preferably formed integral with the body portion B and which may extend axially of the body B; has its outer or closed end wall 7 provided with an axially disposed discharge opening 8 having its wall converging outwardly.

The control means D preferably embodies a valve rod 9 which is adapted to act as a closure means for the receptacle when pressure is released upon the material in the body portion B. This valve rod 9, which preferably tapers inwardly, has formed at its outer end an outwardly converging head 10 which is adapted to seat snugly in the discharge opening 8 for sealing the material within the receptacle from the atmosphere when a desired quantity of the material has been forced from the receptacle. Formed at the opposite or inner end of the rod 9 is a piston head 11 which is adapted for sliding movement in a cylinder 12 which is held in position by a partition plate 13 rigidly secured to the inner wall of the receptacle at the juncture of the body and head portions B and C respectively. This partition plate 13 which divides the receptacle into major and minor material receiving compartments 14 and 15, respectively, is provided with a plurality of passageways 16 for permitting of the material to flow from one compartment to another when a pressure difference exists between the compartments. The cylinder 12 which extends into the compartment 14 has its inner end closed as by an end wall 17, and has its opposite or outer end opening into the minor compartment 15.

A coil spring 18 disposed in the cylinder 12 is adapted to bear at one end upon the

end wall 17 and at its opposite end upon the inner face of the piston 11 for normally urging the valve rod 9 into seating relation within the discharge opening 8 for closing the tube to the atmosphere when pressure upon the material is released. The air pocket 19 formed beneath the piston 11 may be partially evacuated, and in special cases may be occupied by gases of any preferred character.

The object in so tapering the valve rod 9 is that this rod moves inwardly to an open position under a larger force than it moves to a closed position, and this taper will tend to reduce skin friction when the rod moves to a closed position. This taper is to be very slight so as to form practically no movement of the material around the rod which would tend to create a vacuum as the rod recedes.

In operation, the body of the tube is pressed with the fingers as is ordinarily done with the well known type of tube of this character when desiring to force a quantity of the material from the tube. As long as no flow takes place, this pressure is transmitted undiminished to every part of the tube which is in contact with the material, thus this pressure is applied to the top or outer face of the piston 11 but not to the inner or bottom face of the piston, as the cylinder 12 which is rigidly secured to the tube receives the force. This unbalances the forces acting on the piston 11 and it moves in the direction of the resultant force, or into the cylinder 12 compressing the spring 18 and any air or gas in the pocket 19. This movement of the piston 11 moves the rod 9 which is secured to it in an inward direction, thus opening the discharge passage-way 8 and allowing the material to escape due to the pressure difference between the tube and the atmosphere. When the pressure on the tube is removed, the forces acting on the piston 11 will again become unbalanced and the spring 18 will force the piston and rod outwardly thus closing the discharge opening 8 and making the tube airtight.

It will be apparent from the foregoing description that a novel and efficient control means has been provided for controlling the flow of material from collapsible tubes, whereby the discharge opening of the tubes will be automatically closed when pressure upon the tube is released, and embodying novel features of construction wherein the control means operates wholly inwardly of the tube in a manner for sealing the contents of the tube against contact with the atmosphere.

Various changes in the shape, size and arrangement of parts may be made to the form of the invention herein shown and described without departing from the spirit of the invention or the scope of the claims.

I claim:

1. The combination with a collapsible tube having a discharge opening therein, of a cylinder rigidly secured in the tube and being closed at its inner end, a closure element freely movable in the cylinder and adapted to be moved inwardly by the material within the tube for opening the discharge opening when pressure is exerted on the tube, and spring means within the cylinder and acting upon the closure element for moving the same outwardly through the material into closed position within said opening when pressure is released on the tube.

2. A collapsible tube comprising a body portion and a head provided with a discharge opening, a partition plate having openings arranged concentric with the axis of the plate, secured inwardly of the tube at the juncture of the head and body portion, a cylinder carried coaxially by said plate and having its closed end extending into the body portion, a closure element for the discharge opening having a piston carried by its inner end freely movable in said cylinder, and spring means within the cylinder and acting upon the piston for normally urging the same outwardly to a closed position.

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