

Aug. 20, 1935.

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2,011,742

CLOSURE FOR CONTAINERS

Filed May 15, 1933

2 Sheets-Sheet 1

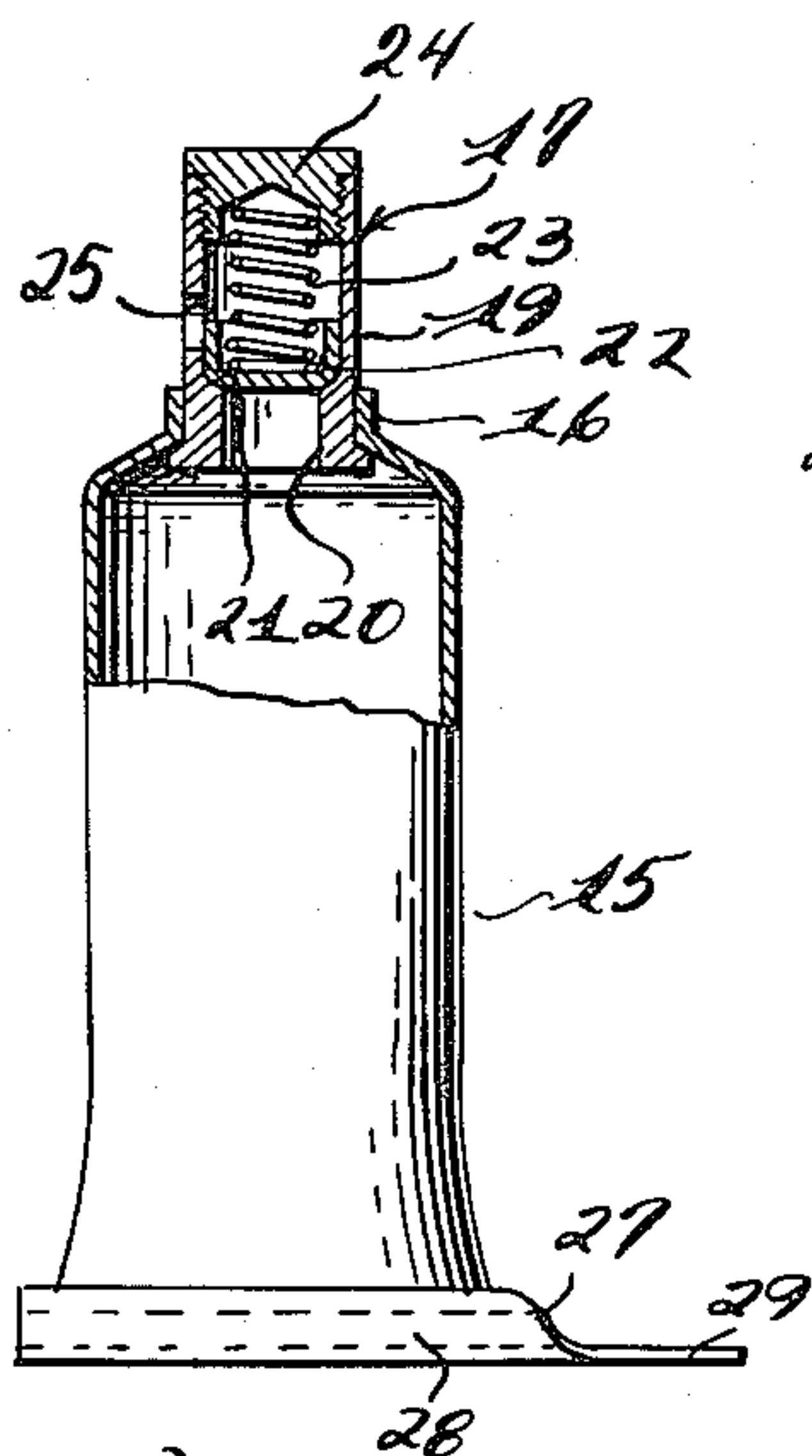


Fig. 1.



Fig. 2.

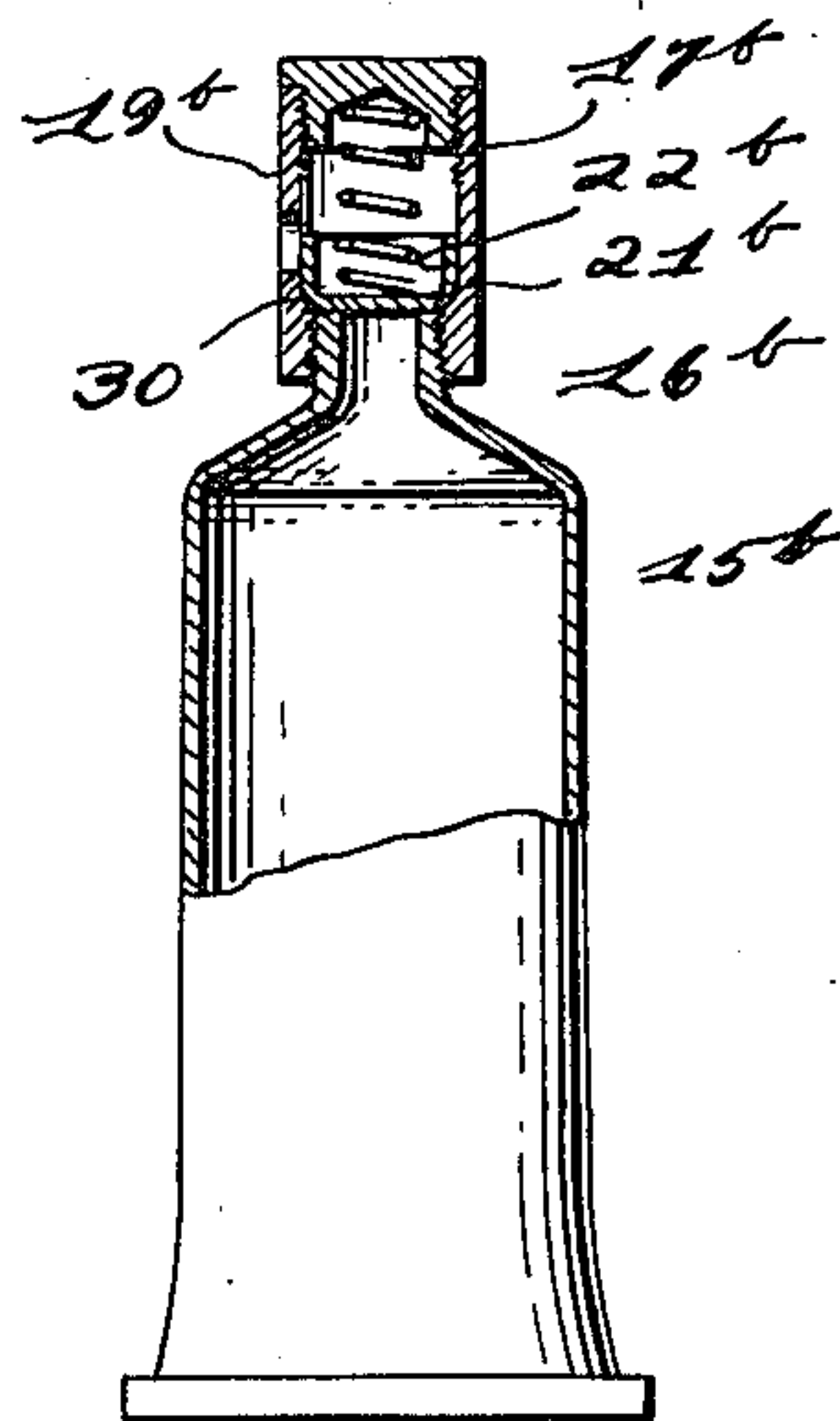


Fig. 3.

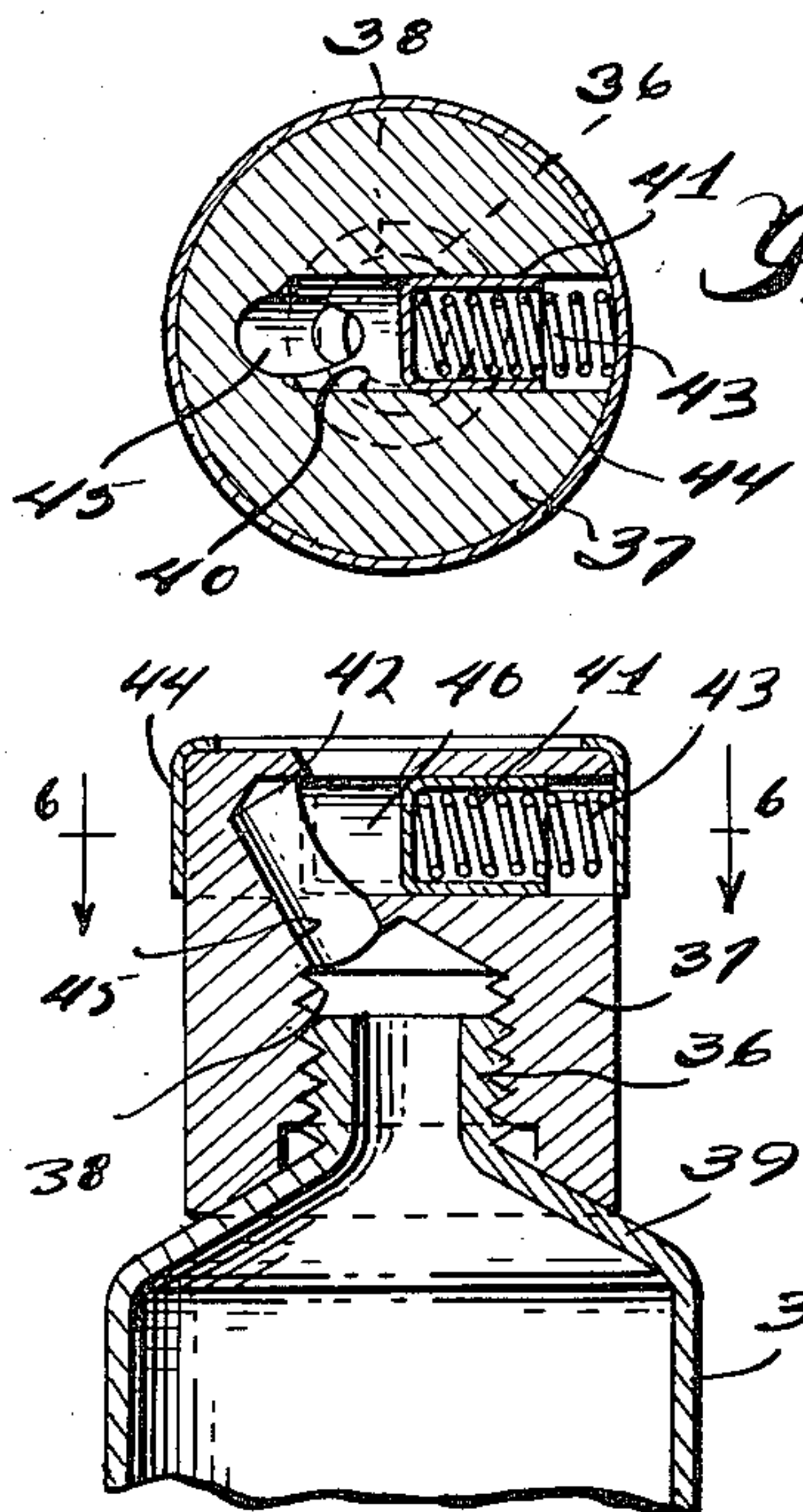


Fig. 4.

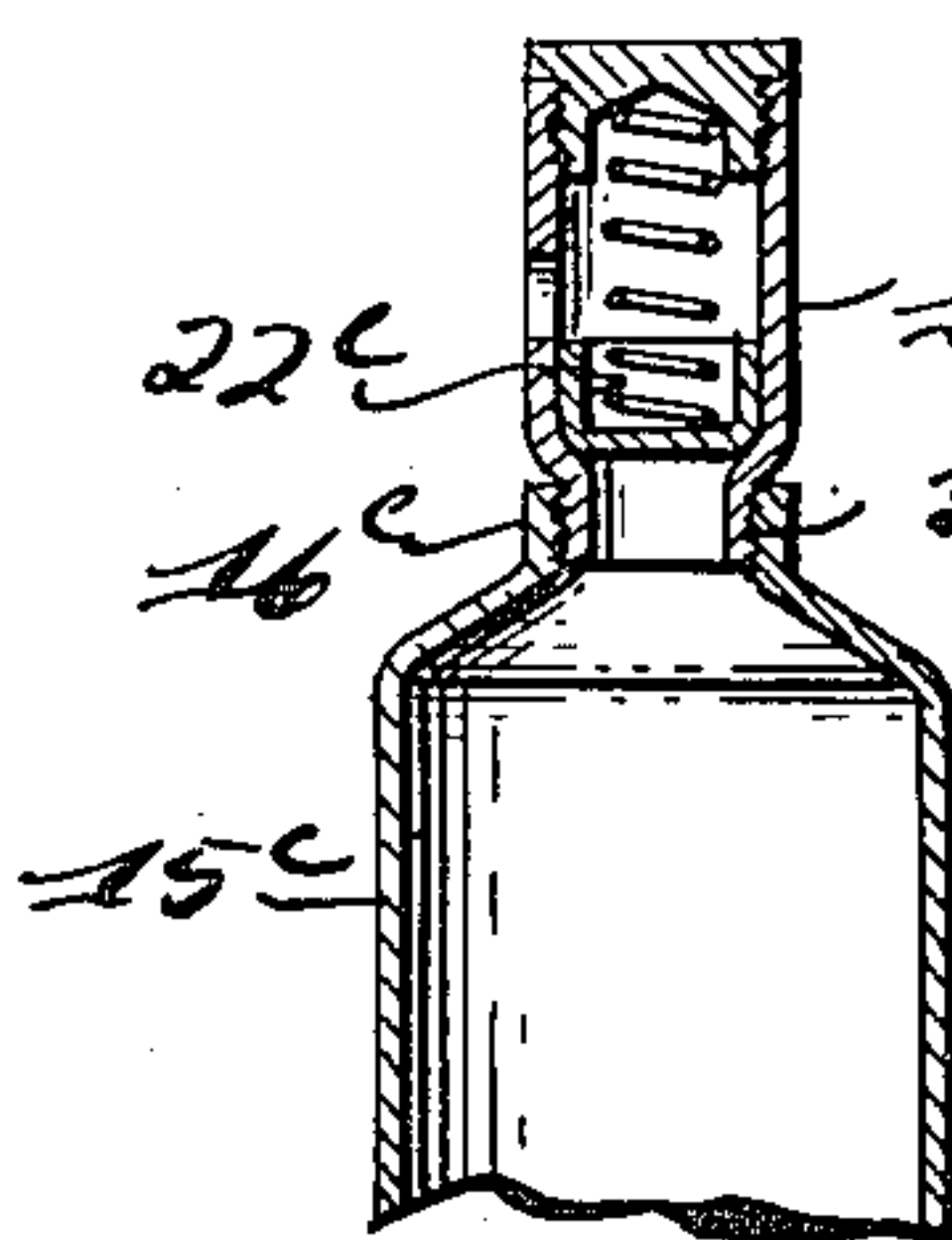


Fig. 5.

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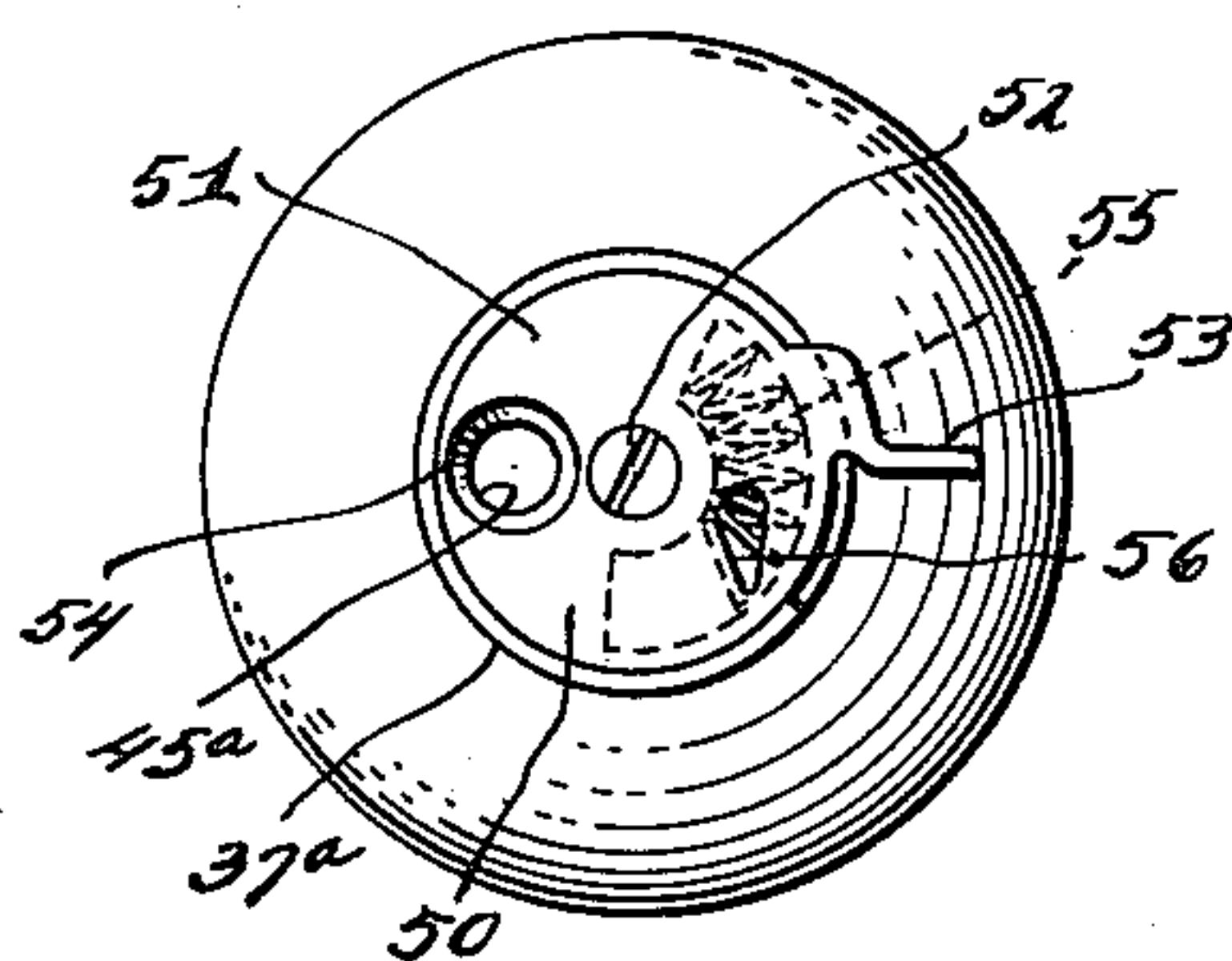
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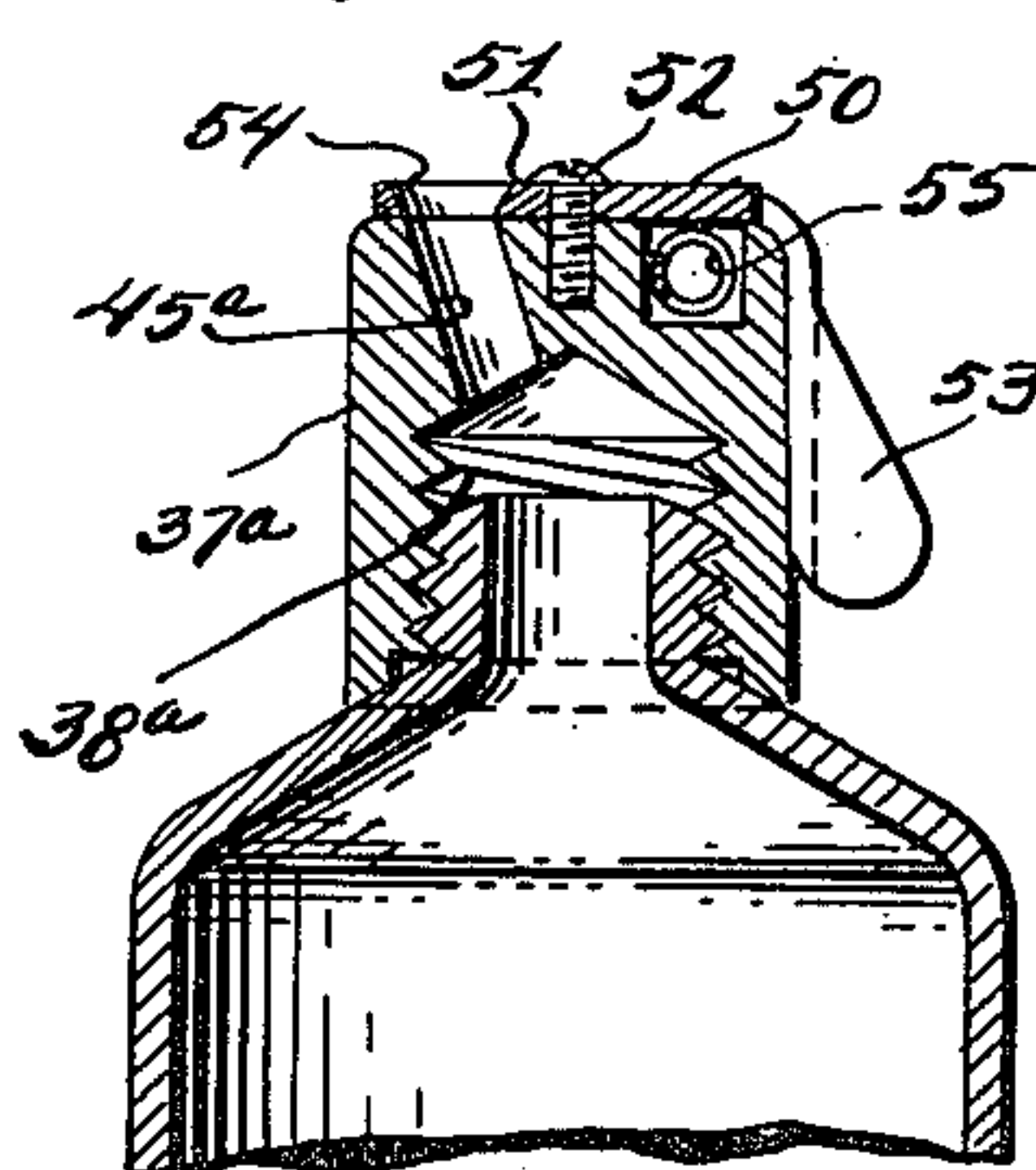
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2 Sheets-Sheet 2

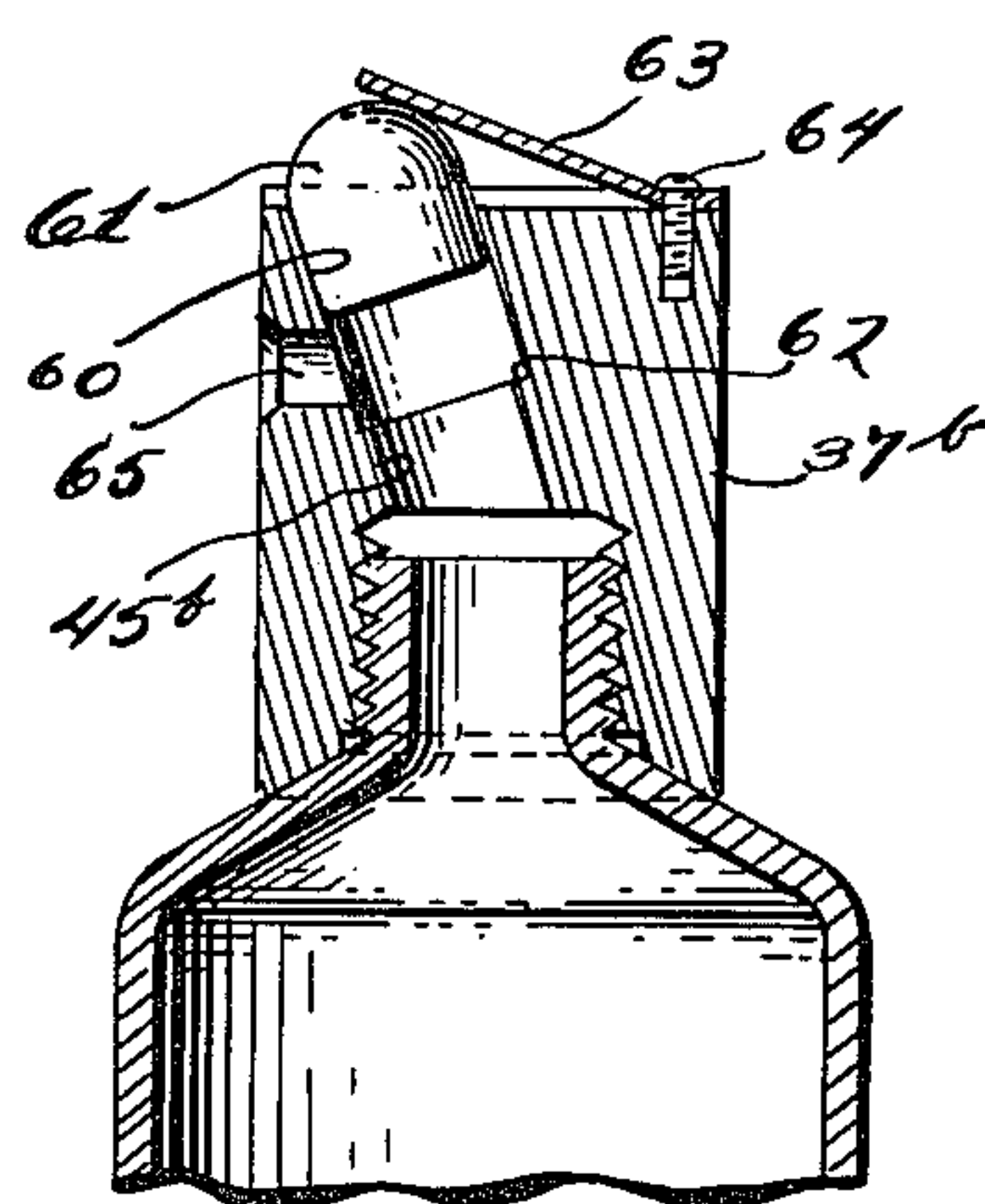
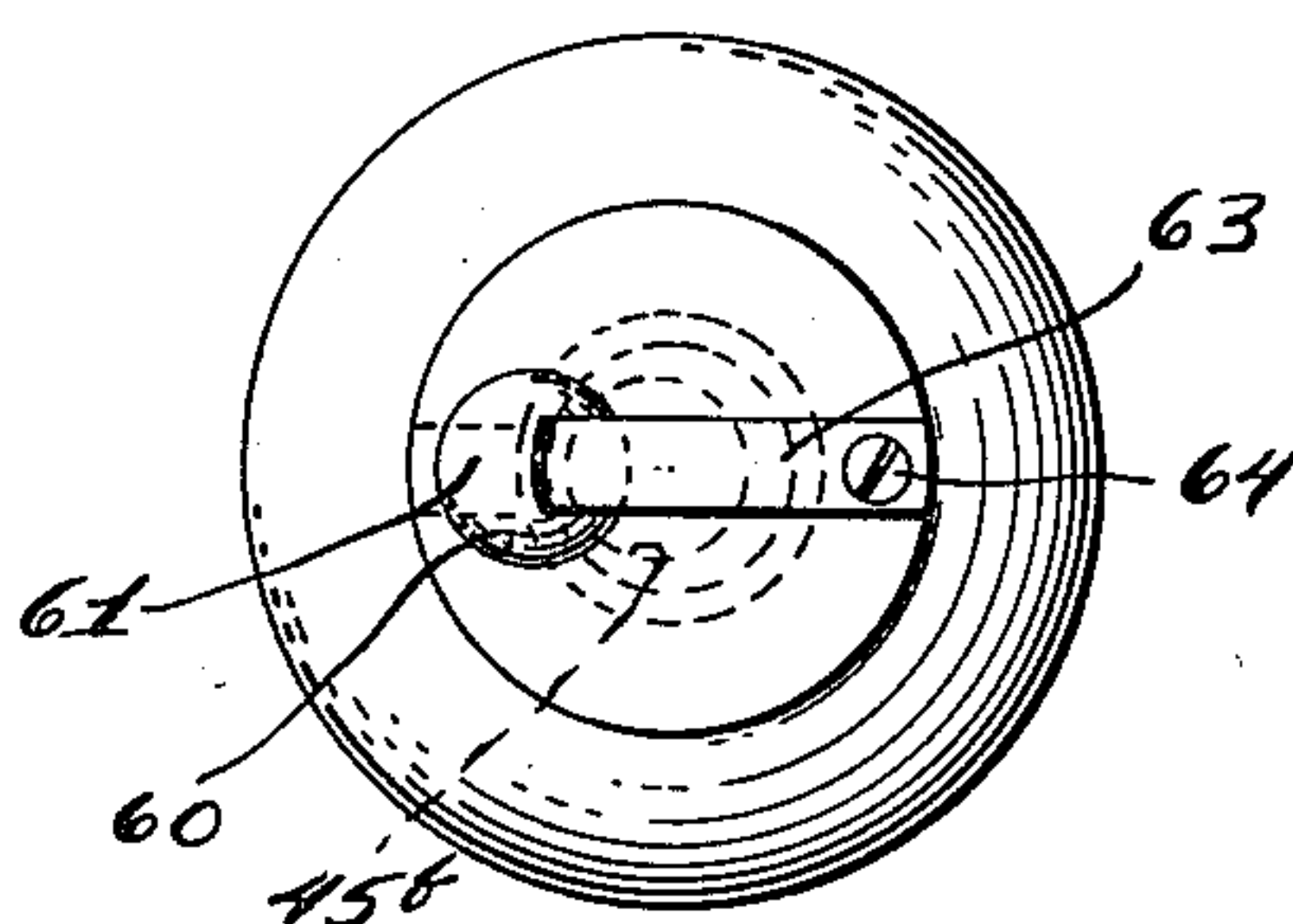
*Fig. 8.*



*Fig. 7.*

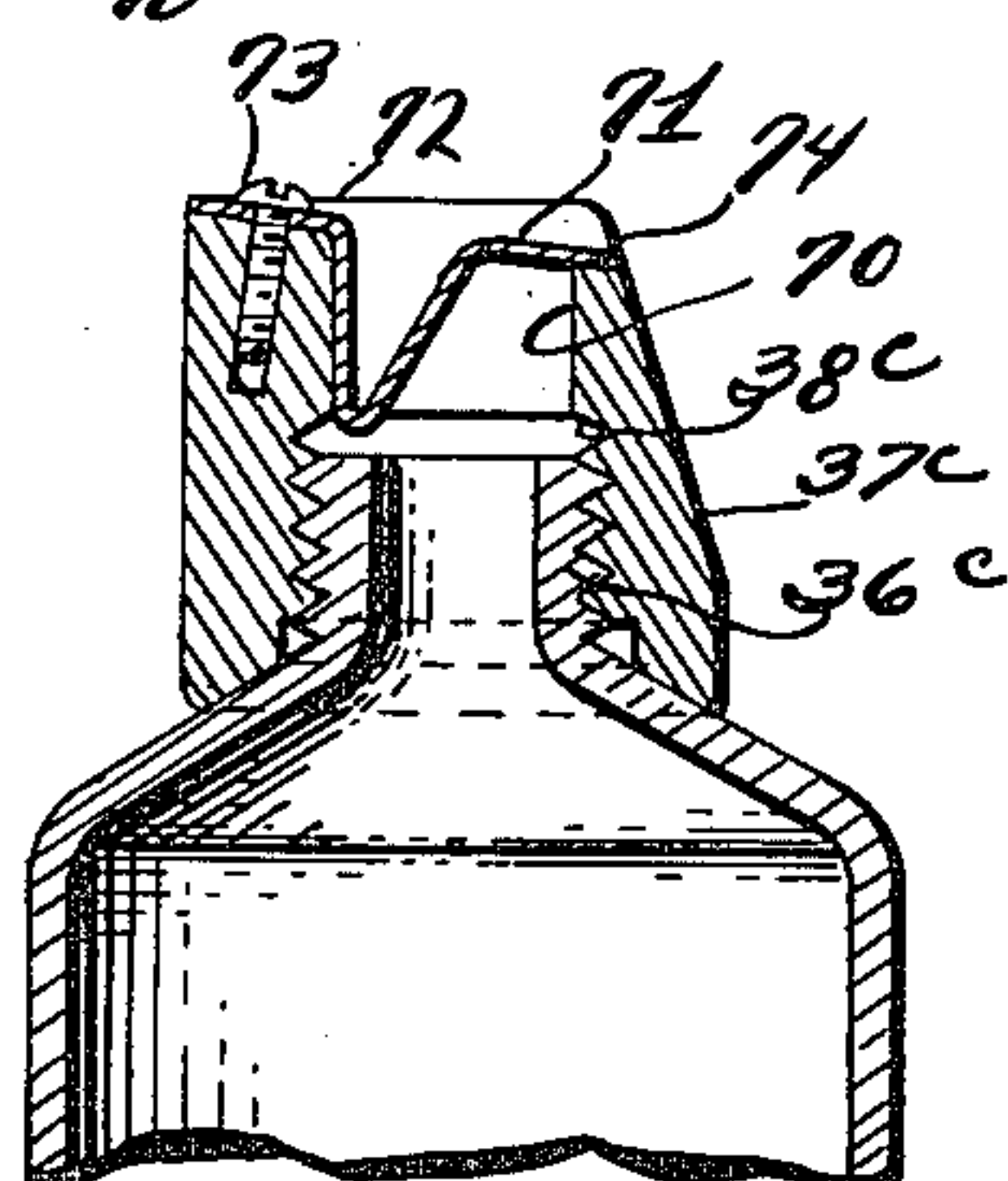
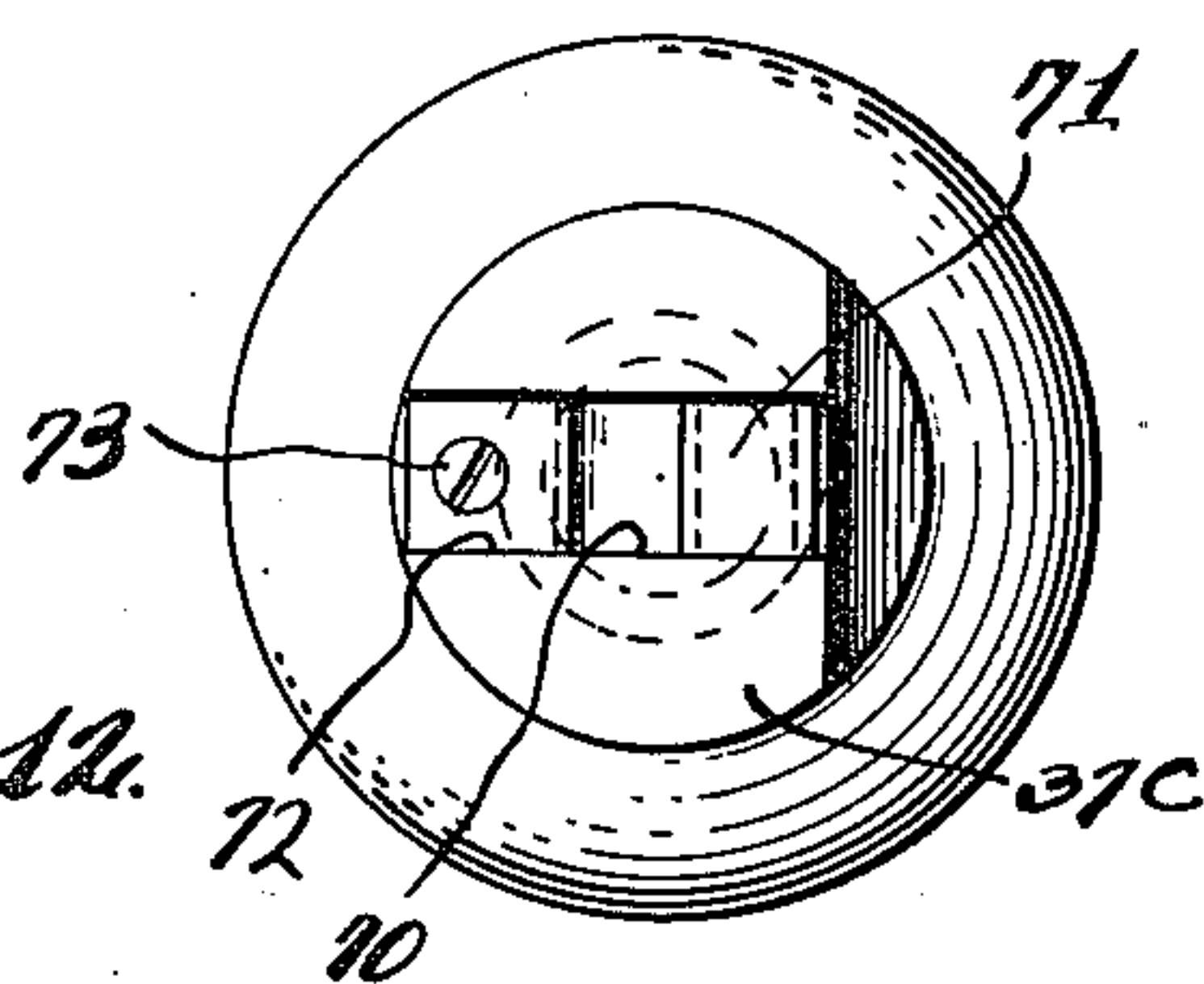


*Fig. 10.*



*Fig. 9.*

*Fig. 12.*



*Fig. 11.*

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## UNITED STATES PATENT OFFICE

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## CLOSURE FOR CONTAINERS

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Application May 15, 1933, Serial No. 671,243

3 Claims. (Cl. 221—60)

This invention relates generally to dispensing equipment and refers more particularly to closures for containers of the type wherein the contents thereof are displaced by applying pressure thereto.

One of the principal objects of this invention is to simplify, render more efficient and improve generally the construction as well as the operation of closures for containers of the foregoing type. In accordance with this invention, expedient removal of the desired amount of the contents in the container is insured by providing a closure having a discharge opening therein and having a valve controlling the opening operable to permit the passage of the material in the container through said opening without the necessity of disengaging the closure from the container.

Another advantageous feature of this invention which contributes materially to facilitating dispensing of the material in the container resides in the provision of a closure of the foregoing character wherein the valve is responsive to the application of pressure upon the contents of the container to automatically open the discharge opening therein and permit the escape of the material in the container through the opening.

A further object of the present invention resides in the provision of a closure having a valve controlled discharge passage therein wherein provision is made for automatically closing the valve upon relieving the pressure on the contents of the container.

A still further object of this invention consists in the provision of a closure of the type previously set forth wherein the valve and associated parts form a self-contained unit with the closure or, in other words, are permanently fixed to the latter in proper assembled relationship independent of the container. Much of the commercial value of the closure is attributed to the above feature since it permits interchangeably mounting the closures upon containers having neck portions of standard size or, in other words, offers the possibility of manufacturing and purchasing the closures separately from the containers.

The foregoing as well as other objects of this invention will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawings, wherein:

Figure 1 is a side elevational view, partly in section, of a container equipped with a closure constructed in accordance with this invention;

Figure 2 is a view similar to Figure 1 showing a modified form of closure member;

Figure 3 is a view similar to Figure 1 showing another modified form of closure construction;

Figure 4 is a similar view showing a further modified form of closure;

Figure 5 is an enlarged sectional view through a closure construction illustrating still another modification of this invention;

Figure 6 is a sectional view taken on the line 6—6 of Figure 5;

Figure 7 is a view similar to Figure 5 showing another embodiment of the invention;

Figure 8 is a plan view of the closure shown in Figure 7;

Figure 9 is an enlarged sectional view showing a further embodiment of the invention;

Figure 10 is a plan view of the construction shown in Figure 9;

Figure 11 is a view similar to Figure 9 showing a further embodiment of this invention;

Figure 12 is a plan view of the closure shown in Figure 11.

Although the several embodiments of the invention about to be described may be advantageously employed in association with numerous different types of containers, nevertheless, they find particular utility when utilized in connection with collapsible containers of the type more or less universally employed for dispensing tooth paste, creams or any one of the other numerous substances.

Referring now more in detail to the specific embodiment of the invention illustrated in Figure 1, it will be noted that I have shown in this figure a collapsible tube 15 of conventional design having a reduced neck portion 16 at the upper end thereof and having a closure 17 permanently secured within the reduced neck portion 16 by contracting the latter around the lower end of the closure. In this connection, the lower end of the closure may be provided with an annular shoulder 18 at the lower end thereof for engaging the inner surface of the container wall surrounding the reduced neck portion to prevent any possibility of accidentally disengaging the closure from the container.

Although in the specific embodiment of the invention shown in Figure 1, the closure is preferably permanently secured to the collapsible container 15, nevertheless, the closure is a self-contained construction capable of being manufactured independent of the container and assembled therewith as a unit. In detail, the closure 17 comprises a tubular body portion 19 secured



within the neck 16 of the container in the manner specified above and having an opening 20 establishing communication with the interior of the collapsible tube 15. Formed on the tubular body 19 within the latter is an annular seat 21 encircling the opening 20 for engaging a suitable valve member 22 located within the body 19 above the seat 21. The valve member 22 is substantially cup-shaped in cross section and is mounted for vertical sliding movement in the body 19. The valve member 22 is normally maintained in engagement with the annular seat 21 by means of a spring 23 having the lower end engaging the valve as shown in Figure 1 and having the upper end in engagement with an abutment 24 detachably secured to the upper end of the tubular body to form a closure therefor. The construction is such that as soon as the pressure applied to the container tending to collapse the same exceeds the force exerted by the spring 23 on the valve 22, the latter will be moved upwardly against the action of the spring by the substance escaping through the opening 20. In order to provide for the discharge of the contents of the collapsible container from the closure member in the uppermost position of the valve 22, I provide a discharge opening 25 in the side wall of the closure body 19 above the seat 21 a sufficient distance to prevent any possibility of the substance in the container from escaping out of the opening 25 when the valve member is in its closed position shown in Figure 1. Although the spring is not of sufficient strength to require the application of abnormal pressure to the tube 15 in order to lift the valve, nevertheless, it is sufficiently strong to immediately and effectively return the valve to its closed position upon relieving the pressure on the collapsible container.

It will be apparent from the foregoing that the valve means in the closure 17 not only functions in dependence upon the application of pressure on the container 15 to automatically dispense the contents of the latter, but also operates to automatically close the container when the pressure on the latter is relieved. In addition, it will be observed that the valve member, associated spring and cap 24 form a unit in the closure 17 independent of the collapsible container 15, with the result that the closure may be completely assembled separately from the container.

If desired, the necessary pressure upon the collapsible container to provide for dispensing the contents thereof may be applied through the medium of a key 27 fashioned to slip over the bottom of the container in the manner shown in Figure 1. In detail, the key is provided with a channel-shaped portion 28 of sufficient dimension to receive the lower end of the container and is further provided with a handle portion 29 extending laterally from the container in a position to be conveniently grasped by the user. With this construction, the contents of the container are dispensed from the latter through the closure member by manipulating the attachment 27 to twist the lower portion of the container relative to the upper portion thereof.

The embodiment of the invention shown in Figure 2 differs essentially from the construction shown in Figure 1 in that the closure, instead of being attachable to the neck of the container, is formed integral therewith. In other words, the neck 16<sup>a</sup> of the container 15<sup>a</sup> is extended to form the tubular body portion 19<sup>a</sup> of the closure, and the annular seat 21<sup>a</sup> for the

valve member 22<sup>a</sup> is formed integral with the neck 16<sup>a</sup>. As in the first described form of the invention, the valve member 22<sup>a</sup> is normally maintained in engagement with the seat by means of a spring 23<sup>a</sup> held in assembled relation within the neck by a cap 24<sup>a</sup> detachably secured to the open upper end of the body portion 19<sup>a</sup>. With the exception of the fact that the several parts of the valve unit are held in assembled relation by the container, and, as a consequence, cannot be formed separately in the manner previously discussed, the construction as well as the operation is the same as described above in connection with Figure 1.

The closure 17<sup>b</sup> shown in Figure 3 of the drawings is identical in construction to the closure 17 with the exception that instead of being permanently secured to the neck 16<sup>b</sup> of the container 15<sup>b</sup>, is detachably secured thereto, and the upper edge of the neck 16<sup>b</sup> cooperates with the closure to form the seat 21<sup>b</sup> for the valve 22<sup>b</sup>. In detail, the body 19<sup>b</sup> of the closure 17<sup>b</sup> is threadedly mounted upon the exterior of the neck 16<sup>b</sup> of the container, and while the upper edge of the neck forms a seat for the valve 22<sup>b</sup>, nevertheless, the latter is permanently secured in assembled relation in the closure independent of the container by an annular shoulder 30 forming an extension of the upper edge of the neck 16<sup>b</sup>. As in the first described embodiment of the invention, the closure 17<sup>b</sup> together with the valve structure therein is a self-contained unit and may be formed separately from the container 15<sup>b</sup>. Moreover, due to the readily detachable connection between the body 19<sup>b</sup> of the closure and container, the former may be interchangeably mounted on containers having standard neck portions. With this arrangement, the closure may be purchased as an individual unit and assembled with containers originally equipped with the usual screw type cap.

The modification shown in Figure 4 merely illustrates the manner in which a cap of the type shown in Figure 3 may be applied in instances where the neck of the container is internally threaded instead of externally threaded. In other words, the cap 17<sup>c</sup> shown in Figure 4 is provided at the lower end with a reduced portion 31 fashioned to threadedly engage the inner surface of the neck 16<sup>c</sup> on the container 15<sup>c</sup>. In this instance, the valve 22<sup>c</sup> does not seat upon the upper edge of the neck as in the embodiment of the invention shown in Figure 3, but, on the other hand, engages a seat formed integral with the body 19<sup>c</sup> similar to the first described form of the invention.

The embodiment of the invention shown in Figure 5 illustrates a collapsible container 35 identical in construction to the container 15<sup>b</sup> shown in Figure 3 in that the neck portion 36 thereof is externally threaded. In the present instance, however, the cap 37 for the container 35 is countersunk as at 38 with the side walls of the countersunk portion threaded for attachment to the neck 36 of the container 35. In the assembled relation of the closure member with the container 35, the lower end of the former encircling the counterbored opening 38 seats upon the inwardly flared wall 39 of the container as clearly indicated in Figure 5. As in each of the above described forms of the invention, dispensing of the contents of the container is automatically controlled by a valve normally maintained in a closed position and operable in dependence upon application of pressure on the container to move



to its open position. This is accomplished in the present embodiment of the invention by forming a transversely extending bore or passage 40 in the closure member 37 above the countersunk portion 38 of sufficient dimension to slidably receive a valve member 41 substantially cup-shaped in cross section and normally urged in a position to close the discharge opening 42 in the closure member by means of a spring 43 located within the passage 40. In detail, the spring 43 is arranged in the cup-shaped valve 41 with the inner end engaging the base of the valve and the outer end engaging a suitable cap 44 fashioned to sleeve over the upper end of the closure 37. In this connection, it is to be noted that the cap 44 merely serves to close the outer end of the passage 40 and does not obstruct the discharge opening 42.

In order to establish communication between the countersunk portion 38 in the closure or interior of the container 35 and discharge opening 42, I provide a passage 45 in the closure communicating with the passage 40 at the extreme inner end of the same. As shown in Figure 6, the passage 45 extends beyond the aforesaid end of the passage 40 so as to provide for the discharge of the contents of the receptacle in front of the valve member 41 when the latter is in its closed position across the discharge opening 42 and thereby permit moving the valve member against the action of the spring 43 to its open position. With the construction as described, it will be noted that application of pressure on the container 35 tending to collapse the same will force the contents thereof into the passage 45 beyond the valve 40 and continued application of pressure on the contents will serve to move the valve 41 to its full line position shown in Figure 5 wherein the discharge opening 42 is exposed so as to permit the unobstructed passage of the contents out of the closure.

In the embodiment of the invention shown in Figure 7, I have illustrated a closure having a valve controlled discharge passage wherein the valve is manually operated to open communication with the container and automatically operated to close the container. The closure member 37<sup>a</sup> shown in Figure 7 differs from the closure 37 structurally in that the passage 45<sup>a</sup> establishes communication between the counterbored portion 38<sup>a</sup> and atmosphere through the upper wall of the closure. The valve in the present modification, instead of being of the piston type shown in the previous embodiments of the invention, is of the rotary character and is designated herein by the reference character 50. In detail, the valve comprises a disk portion 51 rotatably secured to the top wall of the closure 37<sup>a</sup> as at 52 and having a finger engaging portion 53 extending to a position adjacent one side of the closure 37<sup>a</sup>. The disk portion 51 of the valve 50 is formed with an opening 54 therethrough normally urged out of registration with the passage 45<sup>a</sup> through the medium of a spring 55 located within a recess in the top wall of the closure 37<sup>a</sup> and normally concealed by the disk portion 51 of the valve. As will be observed from Figure 8, one end of the spring engages one end wall of the recess, while the opposite end of the spring engages a suitable depending projection 56 on the disk portion 51 of the rotary valve 50 in such a manner as to normally maintain the valve in a position wherein the opening 54 through the disk portion thereof is out of registration with the passage 45<sup>a</sup>. Rotary movement of the valve under the action of the spring is restricted by engagement of the

projection 56 with the wall 57 of the recess within which the spring is disposed and movement of the valve in the opposite direction to register the opening therethrough with the passage 45<sup>a</sup> is determined by the extent the spring 55 is capable of being compressed. With the above construction, it will be apparent that when it is desired to dispense the contents of the container, the rotary valve is merely moved against the action of the spring to register the opening 54 with the passage 45<sup>a</sup> and thereafter exerting the necessary pressure upon the collapsible container to force the contents thereof out of the passage 45<sup>a</sup>. After the desired quantity of contents has been extracted from the container, the user merely relieves the pressure on the finger engaging portion 53 necessary to hold the valve in its open position, and the latter immediately closes the opening 45<sup>a</sup> by the action of the spring 55.

In the construction shown in Figure 9, the closure 37<sup>b</sup> differs from the closure 37<sup>a</sup> in that the passage 45<sup>b</sup> is provided with an enlarged upper end portion 60 for slidably engaging a suitable plunger or valve member 61 having the upper end projecting beyond the upper end of the closure member 37<sup>b</sup>. The valve member 61 is normally yieldably maintained in engagement with the shoulder 62 formed by the enlarged upper end portion of the passage 45<sup>b</sup> by means of a spring strip 63 suitably secured at one end to the closure member as at 64 and having the opposite end bearing upon the upper end of the valve member 61. In this construction, the discharge opening 65 is formed in the side of the closure member 37<sup>b</sup> in a position wherein the same is closed by the plunger when the latter is in engagement with the shoulder 62. In so far as the operation is concerned, this embodiment of the invention simulates the one shown in Figure 5 in that the valve member automatically moves to its open position against the action of the spring member 63 upon application of sufficient pressure on the container to overcome the force of the spring member and is automatically closed upon relieving this pressure.

The embodiment of the invention shown in Figure 11 illustrates a closure 37<sup>c</sup> having a counterbored portion 38<sup>c</sup> threaded for attachment to the neck 36<sup>c</sup> of the container in the same manner as the construction shown in Figure 5. The present construction, however, differs from the foregoing modifications in that communication between the counterbored portion 38<sup>c</sup> and atmosphere is effected through the upper end of the closure by means of a substantially rectangular-shaped opening 70 and the passage of the contents of the container through the opening 70 is controlled by a valve member in the form of a spring strip 71. As shown in Figure 11, the spring strip is located within a slot 72 formed in the upper end of the closure member so as to extend across the rectangular opening 70. One end of the strip is secured as at 73 to the closure member at one side of the opening 70, while the intermediate portion of the strip is return-bent in a direction to extend into the opening 70, and the opposite end of the strip seats upon the ledge 74 between the side walls of the slot 72. This construction also operates to automatically control communication through the closure member for the container in the same manner as the embodiment of the invention defined in Figure 5.

Although a number of different embodiments of the invention are shown and described herein, nevertheless, it is to be noted that each modifica-



tion contemplates a closure having valve means in association therewith for controlling the discharge of the contents of the container. It will also be apparent that in the majority of constructions described, the valve means in the closure member automatically moves to open position upon exerting a normal pressure on the contents in the container, and in addition are automatically returned to their closed positions as the pressure on the contents is relieved. It will further be apparent that each of the constructions shown in Figures 3 to 11, inclusive, contemplates a closure member embodying valve means wherein the latter is held in assembled relation in the closure member independent of the container so that the same may be manufactured as well as assembled separately from the container if desired.

What I claim as my invention is:

1. A closure for a container having an outlet opening therein, comprising a cap for said opening having a discharge opening arranged to communicate with the opening aforesaid in the container, a valve member in the cap normally closing communication between said openings and operable in dependence upon application of pressure to the contents of the container to move to a position wherein communication between the openings is established, means on said cap for normally holding said valve member in closing relation therewith, and a closure member fitting over the top of said cap and readily removable to permit access to said valve member.

2. A closure for a container having an outlet opening therein, comprising a cap for said open-

ing having a discharge opening arranged to communicate with the opening aforesaid in the container and having an open upper end, a valve member insertable into the upper end of the cap for sliding movement therein to control communication between the aforesaid openings, yieldable means above the valve member normally urging the latter in a position wherein communication between the openings is closed, means on said cap for restricting movement of the valve member under the action of said yieldable means, and a removable plug for the open upper end of the cap forming an abutment for said yieldable means.

3. A closure for a container having an outlet opening therein, comprising a cap for said opening having a discharge opening through one wall thereof and having a passage therein opening out of another wall of the cap and communicating with the outlet openings aforesaid, means normally closing communication between the outlet openings and operable in dependence upon application of pressure to the contents of the container to establish communication between said openings, said means including a valve member insertable into the passage through the open end thereof, a spring also insertable into the passage for engaging the valve member and a sleeve slidably mounted on the end of the cap and having a portion closing the open end of the passage and acting as an abutment for the spring to maintain the latter as well as the valve member in assembled relation with the cap.

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