Oct. 17, 1944 R. E. JOHNSON ET AL 2,360,423

APPARATUS FOR APPLYING CLOSURES

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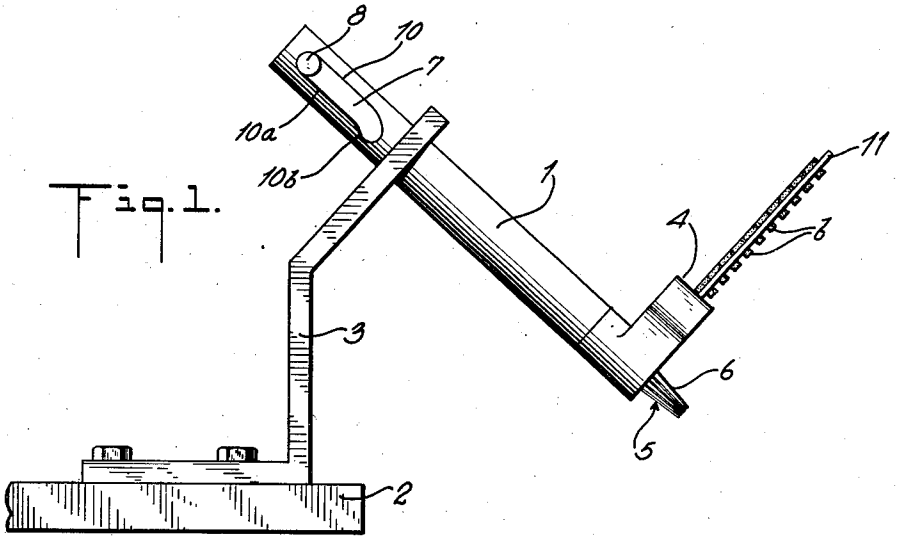


Fig. 1.

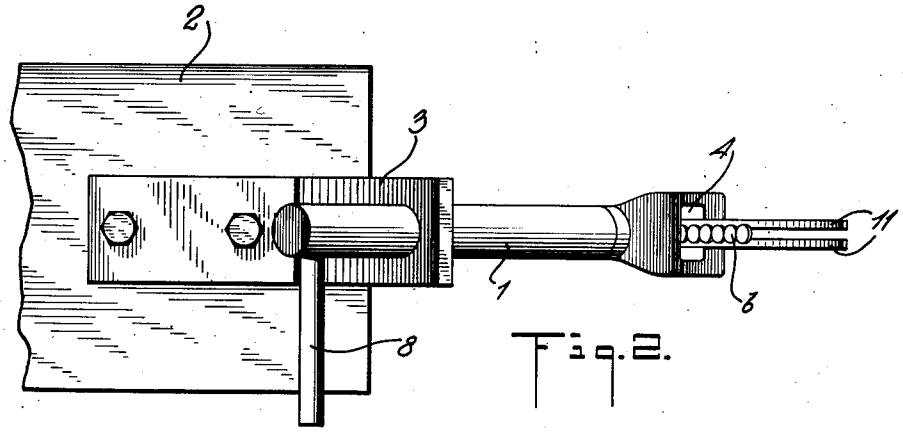


Fig. 2.

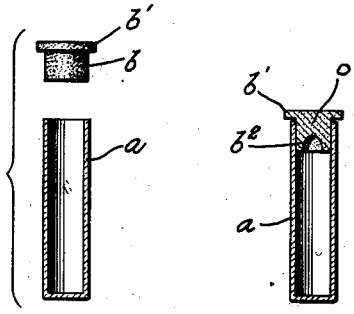


Fig. 3.

Fig. 4.

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Fig. 5.

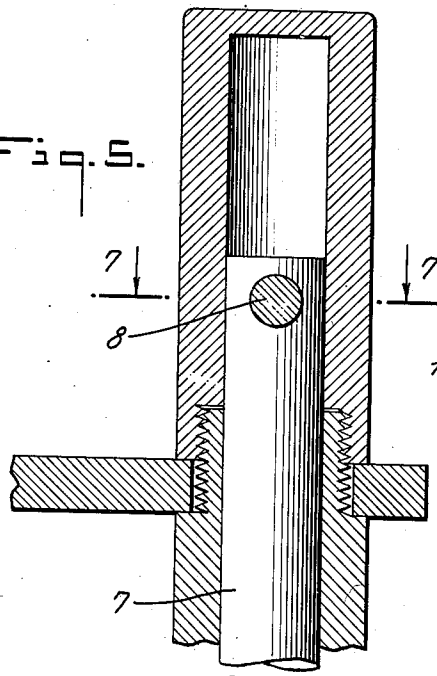
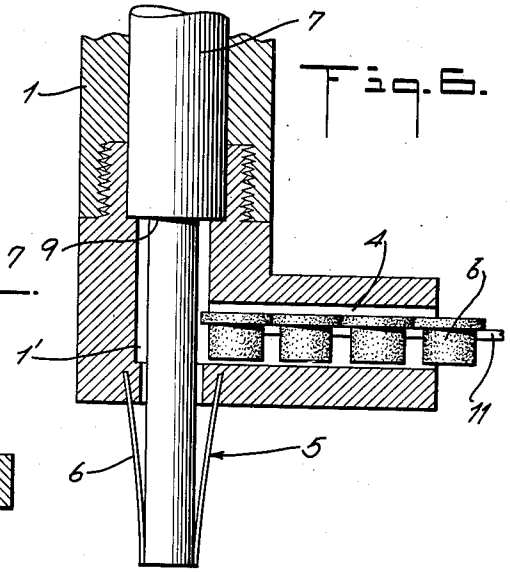


Fig. 6.



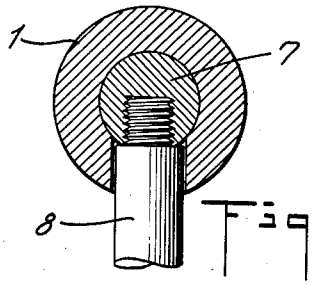


Fig. 2.

Fig. 8.

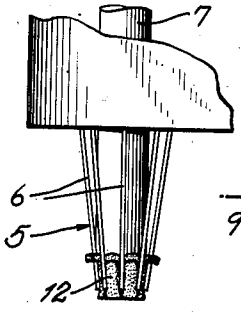


Fig. 9.

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APPARATUS FOR APPLYING CLOSURES

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Application March 24, 1943, Serial No. 480,272

2 Claims. (Cl. 226—91)

Our invention relates to apparatus for applying closures to containers and more particularly to apparatus for applying resilient stoppers of rubber or like material to cylindrical vials. Such stoppers are commonly made of larger diameter than the inside of the mouth of the vial and are difficult to insert into the vial.

It is an object of our improvement to provide apparatus whereby such closures may be easily applied to the vials.

Other objects, features and advantages of our invention will appear more fully from the following specification and appended drawings.

In the drawings:

Fig. 1 is a side elevation of one embodiment of our invention;

Fig. 2 is a plan view thereof;

Fig. 3 is an longitudinal sectional view of the vial and a side elevation of the stopper before the same is applied to the vial;

Fig. 4 is a longitudinal sectional view of the vial with the stopper applied thereto;

Fig. 5 is a view partially in section and partly in elevation of the apparatus shown in Fig. 1;

Fig. 6 is a similar view of the lower part of the apparatus shown in Fig. 5 with some of the parts in different positions;

Fig. 7 is a cross sectional view on line 7—7 of Fig. 5;

Fig. 8 is a view in elevation of the lower part of the apparatus shown in Fig. 5; and

Fig. 9 is a sectional view on line 9—9 of Fig. 5.

Referring to Fig. 4, the container is shown as a glass vial *a* having a cylindrical side wall. The stopper *b*, which may be made of rubber or other resilient material, has a cylindrical body portion and a head *b'* providing a flange extending at right angles to the body portion. Formed in the lower portion of the body of the stopper is a recess b^2. To insure a tight grip of the stopper within the vial, the body portion of the stopper is made of slightly larger diameter than the inside of the vial. This is particularly important when the contents of the vial emits gas so as to form a gas pressure inside the vial.

Referring to Figs. 1, 2 and 5, the apparatus shown therein includes a cylindrical casing 1 which is supported from a base 2 by a bracket 3. The casing 1 is provided near its lower portion with a lateral opening or passage 4 through which the closures are fed. At the bottom of the casing is a tapered cage 5 which, as more clearly shown in Figs. 5, 6 and 8, is formed of longitudinally arranged resilient rods or prongs 6 of steel or other suitable material. The rods or prongs are embedded in the casing 1 at the upper end and are free at their lower ends to move outwardly with respect to each other. The taper of the cage is such that the stoppers or closures *b* are adapted to drop into the upper part of the cage until they are contacted around their peripheries by the rods or prongs.

Within the casing 1 is a plunger 7 which is movable longitudinally by suitable means such as the handle 8. The lower end of the plunger is adapted to engage the top of a closure to force the closure into the lower portion of the cage and thereafter to eject the closure from the cage and apply the same to a container. The plunger is preferably provided with a shoulder 9 which engages a shoulder in the case 1 as shown in Fig. 6 to limit the downward movement of the plunger to a position corresponding with the proper extent of insertion of the closure within the container.

In shifting the closure, it is desirable first to move the same rapidly downward to a position protruding slightly from the cage whereby the extreme end of the closure is held in a position for easy insertion into the mouth of the container preliminary to the full insertion of the closure. For the latter operation of closure should be moved at a slower rate. To achieve this end, we provide means whereby the plunger may be conveniently shifted first relatively rapidly and then more slowly. To this end, the casing 1 is formed with a guide slot 10 for handle 8. The slot is provided with an upper portion 10*a* arranged parallel to the axis of the plunger and a lower portion 10*b* arranged at an angle to the axis of the plunger. The wall of portion 10*b* of the guide slot tends to arrest the handle 8 at the end of the portion 10*a* of the slot and thereby provides means for retarding the plunger and controlling the movement of the plunger so that the operator may readily shift from the faster to the slower speed referred to during the movement of the handle through the portion 10*b* of the guide slot, the plunger rotates about its axis.

The closures are fed to the passage 4 by suitable means which, as shown, comprise a pair of parallel spaced tracks 11, inclined at an angle to the horizontal. These tracks are arranged to be contacted by the undersides of the flanges at the heads of the closures, while the bodies of the closures are arranged between the tracks. This construction permits the closures to slide easily by gravity into the opening or passage 4 in casing 1.

In operation, the closures are fed by gravity

along tracks 11 into the opening 4 of casing 1. When the plunger 7 is retracted to its uppermost position, one of the closures enters the cylindrical inner portion 1' of the casing and drops from there by gravity into the cage 5 with the rods or prongs of the cage engaging the periphery of the closure. The handle 8 is now moved through the portion 10*a* of the guide so that the plunger engages the upper surface of the closure and forces the latter to the position shown in Fig. 5 with its lower end protruding slightly from the lower end of the cage. In the latter portion of this movement of the plunger and closure, the closure forces the rods or prongs of the cage apart at their lower ends and the rods or prongs compress the closure to reduce the size of the lower end thereof so that it may be readily inserted into the container.

The closure is fixedly held, as by jaws, by the rods or prongs. Also, the spaced rods or prongs permit portions of the closure between them to extend outwardly slightly between the rods or prongs, as shown at 12 in Figs. 8 and 9, whereby rotation of the closure within the cage is prevented. This facilitates relative rotary movement between the closure and the container, thereby assisting insertion of the closure into the container. With the closure in the position shown in Fig. 5, a container *a* is applied to the closure and the tip portion of the closure is inserted into the mouth of the container. The handle 8 is then moved slowly along the inclined lower portion 10*b* of the guide groove to force the closure home into the container, which is rotated to facilitate the insertion of the closure.

While we have shown one embodiment of our invention, it is to be understood that changes within the appended claims may be made without departing from the spirit and scope of the invention.

We claim:

1. Closure applying apparatus comprising a tapered cage for supporting a closure, comprising spaced resilient rods free to move outwardly at the smaller end of the cage, a plunger for advancing a closure in the holder, means for shifting the plunger, and means for guiding the movement of said shifting means first in a direction longitudinally of the plunger and then at an angle to the axis of the plunger.

2. Apparatus for applying headed closures to containers comprising a tapered cage for supporting a closure comprising spaced resilient rods arranged to engage the periphery of a closure but free to move outwardly at the smaller end of the cage, means for feeding the closures successively to the cage, said means comprising spaced tracks arranged to support the heads of the closures with the bodies of the closures between the tracks, a plunger for advancing the closure in the holder, means for shifting the plunger, and means for confining the movement of said shifting means first to a direction longitudinally of the plunger and then at an angle to the axis of the plunger, the plunger being provided with means to limit the advance thereof.

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