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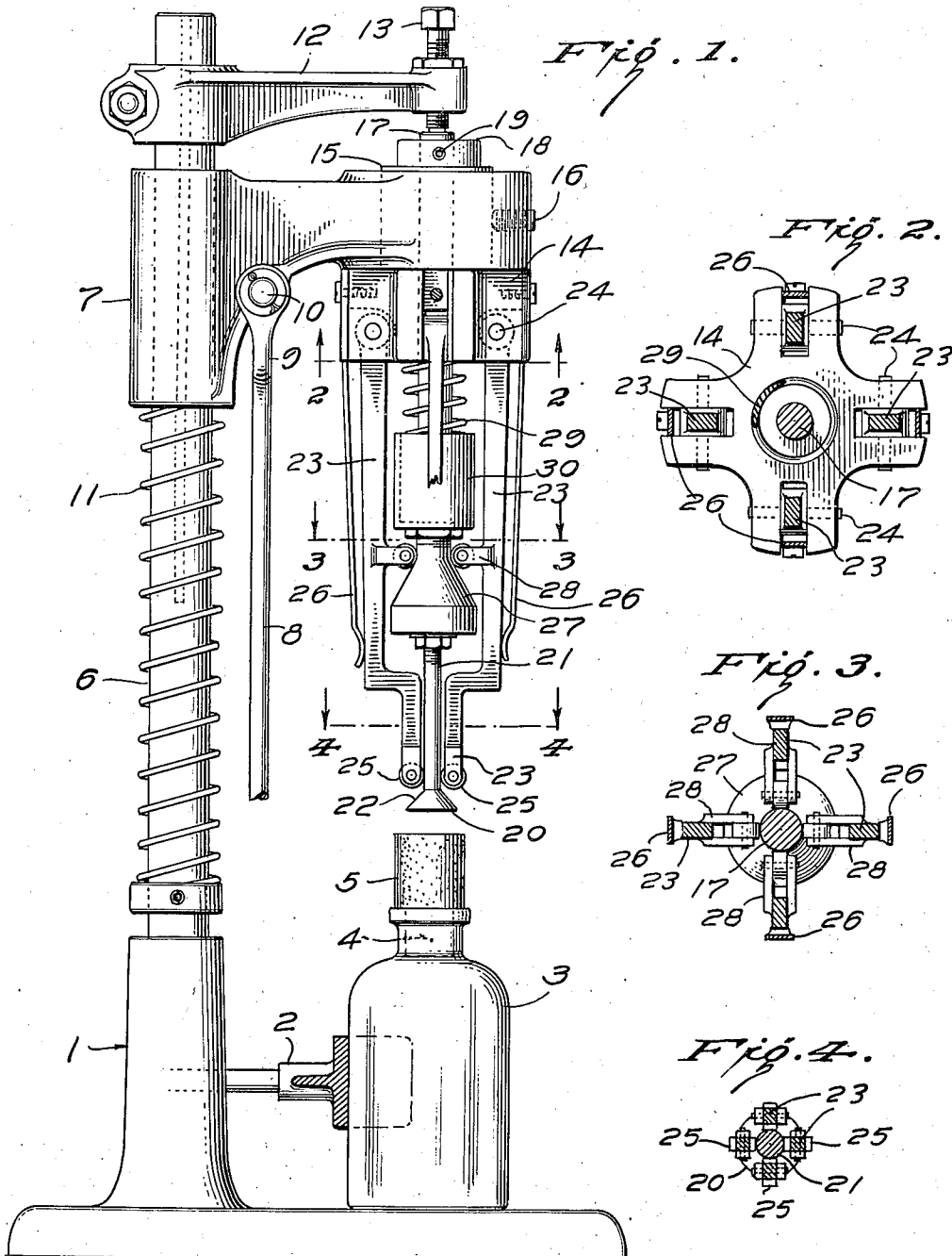
F. R. YEO

2,475,732

STOPPERING DEVICE

Filed Aug. 23, 1946

2 Sheets-Sheet 1



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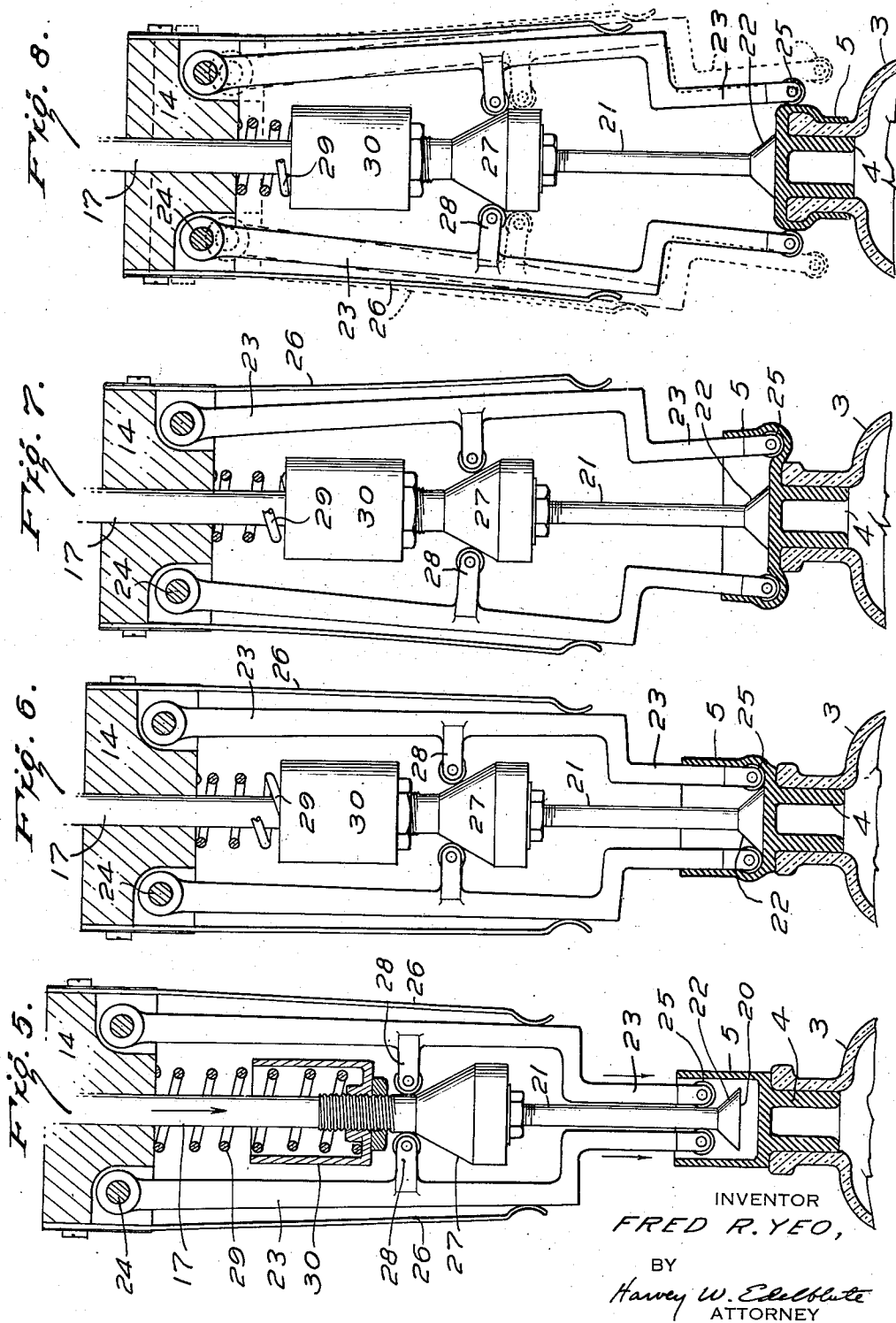
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UNITED STATES PATENT OFFICE

2,475,732

STOPPERING DEVICE

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The present invention relates to apparatus useful in stoppering bottles.

In the biological arts, in particular, it is common practice to stopper bottles and other containers with rubber stoppers having a protective sleeve that surrounds the outer lip of the bottle. The protecting sleeve performs the useful function of keeping the pouring edge of the bottle in clean and sanitary condition until the contents are ready for use. It also performs the additional function of helping to hold the stopper tightly in position. Unfortunately, the insertion of such stoppers and placing of the protective sleeve around the lip of the bottle has been a difficult and tiring hand operation.

One of the objects of the present invention is to provide an apparatus which performs the most difficult part of the stoppering operation mechanically. This apparatus also makes it possible to complete the stoppering of more bottles in less time with less skilled labor. The use of the new apparatus of the present invention also has the additional advantage of making the stoppering operation a more sanitary procedure.

These objects, and others which will be apparent hereinafter as the description proceeds, are attained by the stopper sleeve turnover device of the present invention which comprises, essentially, means for spreading outwardly and downwardly over the bottle lip the upwardly extending annular sleeve of an elastic stopper of the type described while holding the bottle and stopper in an operating position.

In order that the nature of the new stoppering apparatus be more fully understood reference is made to the drawings in which:

Fig. 1 is a side elevation showing a profile of the apparatus with a bottle and stopper in place.

Figs. 2, 3 and 4 are, respectively, horizontal sections taken on lines 2—2, 3—3, and 4—4 of Fig. 1 in the directions indicated by the arrows.

Figs. 5, 6, 7 and 8 are successive views of the essential working parts of the apparatus showing operation thereof during a single cycle of operation.

As will be seen from Fig. 1, a preferred embodiment of the new apparatus comprises a stand 1 having an adjustable support 2 to hold the bottle to be stoppered 3 in a predetermined operating location. In the usual operation of the apparatus the bottles are placed in position with the stopper 4 inserted but with the annular sleeve 5 extending upwardly.

Mounted on the stand is a slide rod 6 carrying a member 7 which acts as a power head for im-

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parting movement to the working parts of the apparatus. Downward movement of the head may be brought about by various devices, such as rod 8, carrying at its end a clevis 9 connected to the head by means of a pin 10 or in other suitable manner. Rod 8 may be actuated by a foot pedal (not shown) or any of several different mechanical movements. A coiled compression spring 11, normally holds the head at the top of its stroke as shown. In order that the apparatus will remain in alignment the head 7 may be keyed into the shaft 6 or, if desired, the shaft may be square or have some other irregular shape.

Although not absolutely necessary, it is desirable that a stop device 12 be mounted on the shaft so that the upward rise of the mechanism can be stopped and regulated by the adjusting screw 13.

Attached to the head, or as an integral part of it, as desired, is a collar 14. In the construction shown an extension of the collar 15 is recessed into the head and held in place with set screw 16. This permits easy removal of the mechanism and rapid replacement by another collar carrying turnover mechanism for different size stoppers.

Slidably mounted co-axially through the collar 14 is a shaft 17 having a stop collar 18 held with set screw 19. The shaft extends downwardly through the mechanism and terminates at 20. This shaft carries certain parts of the apparatus which will be mentioned later and also serves as a hold-down means to hold the stopper and bottle in place while the turn-over operation is performed. As the lower part of the shaft must enter the interior of the upwardly extending annular sleeve of the stopper, it is generally reduced as at 21. The lower portion contacting the rubber stopper may be flared 22 to assist in spreading the turn-over members 23 and also to provide a broader surface to prevent marring the soft top of the stopper.

The turnover members comprise a plurality of arms, four being shown in the figure. These arms are pivoted as shown at 24 in the collar, and are so constructed that the lower ends lie close to the hold-down shaft so that the whole assembly may be introduced into the annular sleeve of the stopper. For smoothest operation small rollers 25 may be attached at the lower end of the turn-over members. To keep the turn-over members close to the shaft saber springs 26 are provided. These springs allow the turn-over members to expand outwardly during the operation but return the members to the position shown in the drawing when free to do so.

Other essential parts of the apparatus include

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a downwardly flared cam 27 mounted on the hold-down shaft. Engaging this cam are cam followers 28 which are integral with each of the turn-over members, giving them a radial displacement from the shaft as the followers pass downwardly over the cam surface. A coiled compression spring 29 and spring stop or keeper 30 holds the hold-down shaft with its cam in the relative position shown in Fig. 1 but permits outward movement of the turn-over members during the turn-over operation as shown in the successive drawings in Figs. 6, 7 and 8.

To operate the device a bottle with an inserted stopper having its sleeve extending upwardly is placed in position as shown in Fig. 1. The axis of the annular sleeve coincides with the axis of the hold-down member. A downward force applied to rod 8 causes head 7 to move downward, carrying the turn-over mechanism. The hold-down means and lower segments of the turn-over device enter the annular sleeve as shown in Fig. 5. When the lower end of the hold-down means comes against the top of the stopper, further downward movement of shaft 17 and the cam 27 attached thereto stops. This stoppage is permitted by spring 29 which compresses, as downward movement of collar 14 and the turn-over member 23 continues. As the cam followers 28 descend with reference to cam 27, the turn-over members are thrust out radially from the hold-down shaft, as shown in Fig. 6. This outward movement may be assisted by the flared end 22 of the hold-down device, as shown in Fig. 6, if of proper configuration.

As the head assembly with the pivoted turn-down members descends the turn-over members are spread apart by the action of the cam followers on the cam 27 until the lowermost ends of the turn-over device have been extended over the outer lip of the bottle. As this is done, the elastic material of the stopper stretches somewhat in the manner shown in Fig. 7.

At some point in the downward movement just following that illustrated in Fig. 7 the elastic sleeve snaps over into position as shown in Fig. 8. The exact point at which this takes place depends somewhat upon the elasticity and other properties of the stopper material. To assure complete turnover, the downward and outward movement of the turn-over members may continue as shown, first by the solid lines in Fig. 8 and then by the dotted lines. At this point the turn-over operation is complete and release of force on the pull-down rod 8 will allow spring 11 to return the head and turn-over mechanism to the position shown in Fig. 1. The bottle may then be removed and the apparatus is ready for another cycle of operation.

I claim:

1. A device of the character described, comprising means to position a flanged lip bottle carrying a stopper with an upwardly extending annular sleeve in an operative location, a stopper hold-down means including an axially movable shaft having a hold-down element at the end thereof and a spring stop mounted thereupon, a stopper sleeve spreading means including a collar coaxially mounted on the shaft and movable with relation thereto, a spring between the spring stop and the collar whereby downward movement of the collar exerts pressure on the hold-down element through the spring to maintain the stopper carried by the bottle in position, and means to insert the spreading means within the sleeve and

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spread the sleeve outwardly and downwardly over the bottle lip.

2. A device of the character described, comprising means to position a flanged lip bottle carrying a stopper with an upwardly extending annular sleeve in an operative location, a stopper hold-down means including an axially movable shaft having a hold-down element at the end thereof and a spring stop mounted thereupon, a stopper sleeve spreading means including a collar coaxially mounted on the shaft and movable with relation thereto, the collar pivotally carrying a plurality of sleeve spreading arms the ends of which are adapted to engage the inner periphery of the stopper sleeve, a spring between the spring stop and the collar whereby downward movement of the collar exerts pressure on the hold-down element through the spring to maintain the stopper carried by the bottle in position, and means to insert the sleeve spreading arms within the sleeve and spread the sleeve outwardly and downwardly over the bottle lip.

3. A device of the character described, comprising means to position a flanged lip bottle carrying a stopper with an upwardly extending annular sleeve in an operative location, a stopper hold-down means including an axially movable shaft having a hold-down element at the end thereof and a spring stop mounted thereupon, a stopper sleeve spreading means including a collar coaxially mounted on the shaft and movable with relation thereto, the collar pivotally carrying a plurality of sleeve spreading arms the ends of which are adapted to engage the inner periphery of the stopper sleeve, said arms having cam followers engaging a cam surface on the hold-down shaft, a spring between the spring stop and the collar whereby downward movement of the collar exerts pressure on the hold-down element through the spring to maintain the stopper carried by the bottle in position, and means to move the collar downwardly with relation to the shaft, whereby the stopper sleeve is expanded outwardly and downwardly over the bottle lip.

4. A stopper-sleeve turn-over device comprising a hold-down member, a collar slidably mounted on the hold-down member, a spring tending to hold the collar and hold-down member in relative position, a plurality of turn-over members each being pivoted at one end on said collar the other ends of which are constructed so that they may lie in a grouped position close to the stopper end of the hold-down member the group having an over-all diameter smaller than the internal diameter of a stopper sleeve, a downwardly flared cam mounted coaxially on the hold-down member, means in association with the turn-over members between the pivoted end and the sleeve turning end engaging the downwardly flared cam whereby the sleeve turning ends of the turn-over members are thrust radially from the hold-down member as the distance between the slidable collar and the flared cam is decreased.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,955,949	Colton	Apr. 24, 1934