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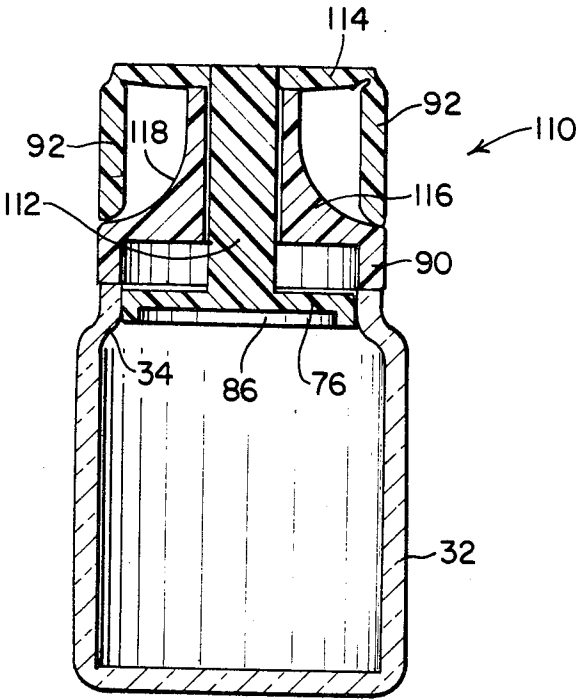
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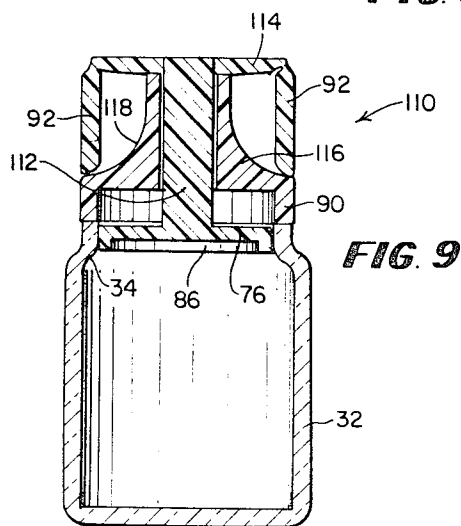
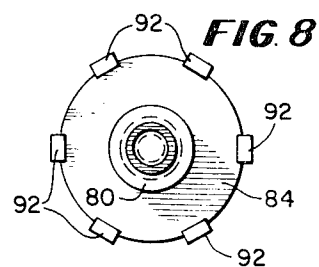
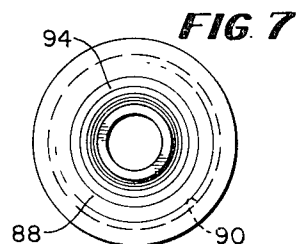
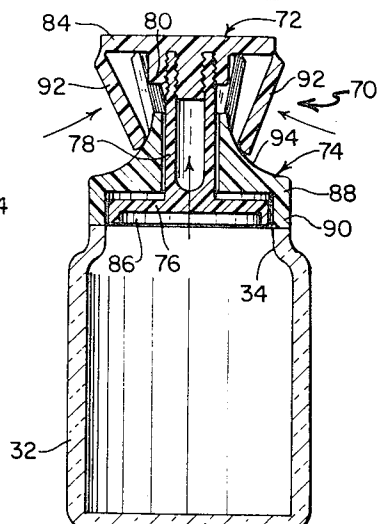
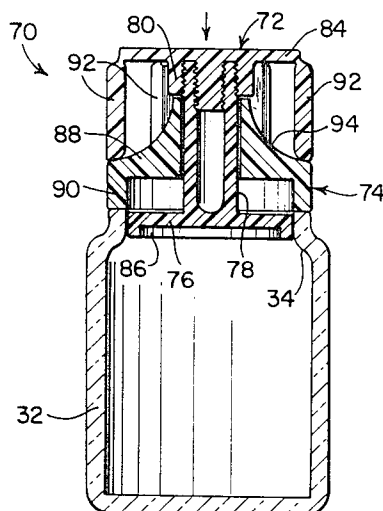
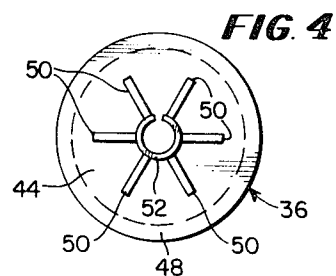
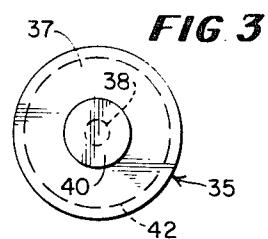
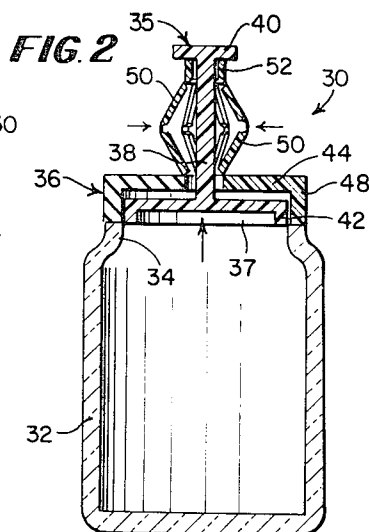
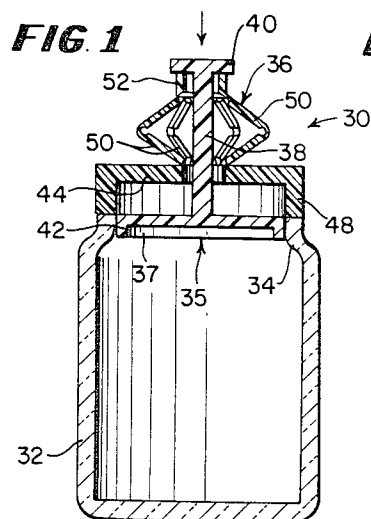
[54] **BOTTLE STOPPER ASSEMBLY**
3 Claims, 18 Drawing Figs.

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[51] Int. Cl..... **B65d 43/02**
[50] Field of Search..... **215/46, 47,**
52, 53, 55, 65

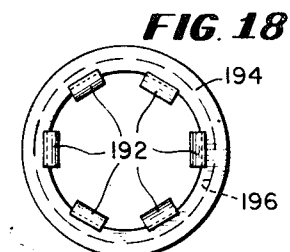
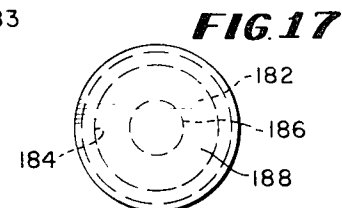
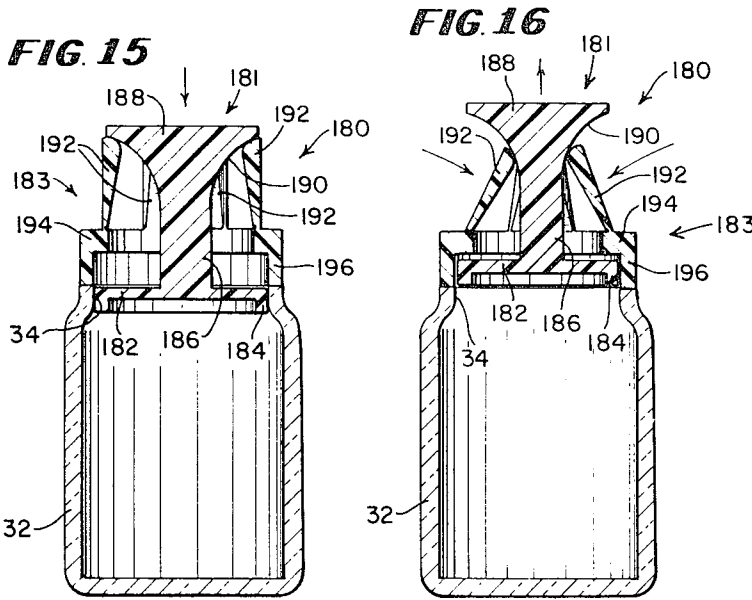
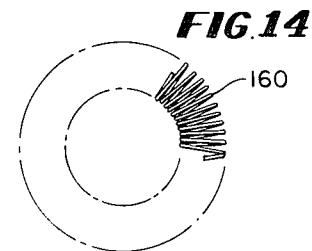
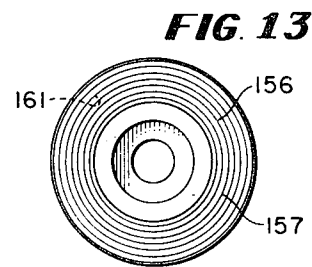
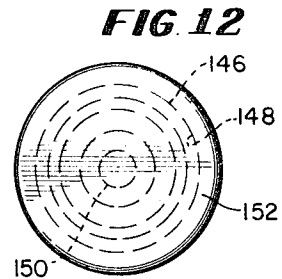
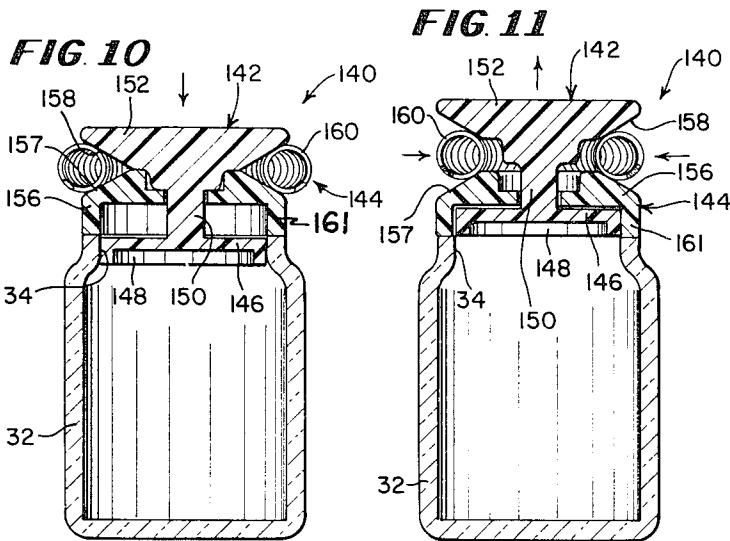
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ABSTRACT: A bottle stopper assembly includes a stopper portion having a closure member and a stem, the closure member being removably engageable in sealing relation in an opening in a bottle. An ejector mechanism is mounted on the stopper and encircles the stem. In response to an externally applied squeezing or pinching force the ejector simultaneously applies to a separating force to the bottle and the stopper to remove the closure member from the bottle opening.





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BOTTLE STOPPER ASSEMBLY

This invention relates to a bottle stopper assembly and, more particularly, to an assembly with a self-contained ejector mechanism.

A variety of bottle stoppers are used in combination with various types of bottles and containers. The simplest form of stopper is the cork or pluglike stopper that can be manually inserted into the opening in a bottle so as to seal the bottle. These stoppers are either manually extracted from the opening or removed with the assistance of a separate tool such as a corkscrew. However, such stoppers are not suitable for use in laboratories or the like wherein large numbers of containers are handled. A technician in such a laboratory or the like may find it difficult and/or inconvenient to use a separate tool or to manually extract the engaged stopper using two hands.

More complex stoppers have been designed wherein a structure is permanently mounted on the bottle so that a stopper placed in sealing relation in an opening of the bottle can be removed while using only one hand. However, this approach is obviously not suitable for ordinary containers such as laboratory vials or the like.

Accordingly, important objects of the present invention are to provide a new and improved bottle stopper assembly; to provide a new and improved bottle stopper assembly that has a self-contained or permanently attached ejector mechanism for the removal of a stopper; and to provide an improved bottle stopper assembly wherein a stopper can be easily removed with only one hand.

In accordance with these and many other objects, an embodiment of the present invention may comprise a stopper assembly having a plug or closure member that is removably engageable in an opening in the top of a bottle to be sealed, and an ejector mechanism that applies a lifting force to the stopper when an external squeezing or pinching force is applied. The stopper assembly includes a stem extending from the plug so that the stopper assembly can be manually inserted into the opening of a bottle. The ejector mechanism operates in response to an externally applied lateral force to apply a lifting force to the stopper.

Many other objects and advantages of the present invention will become apparent from considering the following detailed description in conjunction with the drawings in which:

FIG. 1 is a sectional view of a bottle stopper assembly constructed in accordance with the present invention, shown sealing a bottle;

FIG. 2 is a sectional view of the bottle stopper assembly of FIG. 1 with the stopper assembly in the process of being removed from the bottle;

FIG. 3 is a top view of the stopper portion of the assembly shown in FIG. 1 with the remainder of the assembly omitted for clarity;

FIG. 4 is a top view of the ejector mechanism of the assembly shown in FIG. 1 with the remainder of the assembly omitted for clarity;

FIG. 5 is a sectional view of an alternative embodiment of the invention;

FIG. 6 is a sectional view of the assembly of FIG. 5 shown with the stopper in the process of being disengaged from a bottle;

FIG. 7 is a top view of part of the ejector mechanism of the assembly shown in FIG. 5 with the remaining structure omitted for clarity;

FIG. 8 is a bottom view of the cap member and hinged levers of the assembly shown in FIG. 5;

FIG. 9 is a sectional view of an additional embodiment of the invention;

FIG. 10 is a sectional view of a still further embodiment of the invention;

FIG. 11 is a sectional view of the embodiment shown in FIG. 10 with the stopper in the process of being disengaged from the bottle;

FIG. 12 is a top view of only the stopper portion of the assembly of FIG. 10;

FIG. 13 is a top view of the ejector body of the assembly of FIG. 10;

FIG. 14 is partial top view of the spring of the assembly of FIG. 10;

FIG. 15 is a sectional view of another bottle stopper assembly comprising yet another embodiment of the invention;

FIG. 16 is a sectional view similar to FIG. 15, but shown with the stopper in the process of being disengaged from the bottle;

FIG. 17 is a top view of only the stopper portion of the assembly of FIG. 15; and

FIG. 18 is a top view of only the ejector portion of the embodiment of FIG. 15.

Referring now more specifically to FIGS. 1-4 of the drawings, there is illustrated a bottle stopper assembly which is indicated generally as 30 and which embodies the present invention. The assembly 30 and which embodies the present invention. The assembly 30 can be used in combination with a bottle 32 made of glass or other appropriate material that has an opening 34 in its top end.

In general, the stopper assembly 30 includes a manually insertable stopper portion generally designated as 35, with which is permanently associated an ejector mechanism generally designated as 36. In accordance with important features of the invention the stopper portion 35 and ejector mechanism 36 cooperate to provide a simple, economical and convenient assembly which can readily be applied to and removed from the bottle 32 with one hand.

More specifically, the stopper portion 35, which may be made of polypropylene or other suitable material, includes a plug or stopper member 37 from which a stem 38 extends. When a downward force is placed on a head or disc 40 attached to the upper portion of the stem 38, the stopper or plug 37 is manually engaged into the opening 34 in the bottle 32. A flange 42 around the lower edge of the stopper 37 provides a large sealing area and insures that the stopper 37 properly seals the opening 34. The stopper or plug 37 may be of any desired configuration to mate with any type of bottle, vial or other container.

Referring now to the ejector mechanism 36, an ejector body 44 encircles the stem 38 and has a flange 48 around its lower edge in registry with the rim of the opening 34 in bottle 32. A series of hinged levers or toggles 50 are hinged both to the ejector body 44 and to a ring 52 also encircling the stem 38. The ejector mechanism 36 can also be made of polypropylene or other suitable material capable of providing the desired hinge action.

When it is desired to disengage the stopper 36 from the opening 34, a lateral or horizontal inward pinching or squeezing force is applied to some or all of the hinged levers 50. As the levers 50 are straightened by the force, the ring 52 is forced upwardly against the disc 40, while the flange 48 of the body 44 is forced downwardly onto the top of bottle 32. Consequently, the ring 52 lifts the stopper portion 35 from the bottle and pulls the plug or stopper 37 from the opening 34. The force applied to the hinged levers or toggles 50 is readily applied with one hand and the stopper assembly 30 is thus easy to use. Since the stopper portion 35 and ejector mechanism 36 are permanently associated, the user does not require a separate tool or the like to open the bottle.

Having reference now to FIGS. 5-8 there is illustrated a stopper assembly generally designated as 70 comprising an alternative embodiment of the invention. The stopper assembly 70 generally includes a stopper portion designated as a whole by the numeral 72 manually insertable in sealing relation with the opening 34 of bottle 32. Permanently associated with the stopper portion 72 is an ejector mechanism generally designated as 74 for lifting the stopper assembly 70 from the bottle.

More specifically, the stopper portion 72 includes a stopper or plug 76 engageable in the opening 34, together with an upwardly extending stem 78. The upper portion of the stem 78 is threadably engageable with a central boss 80 of a cap or head member 84. By applying a downward force on the member 84, the stopper 76 may be seated in the opening 34 in the bottle 32 (FIG. 5). A flange 86 is positioned around the outer edge of stopper 76 so that the sealing of the opening 34 is assured.

Surrounding the stem 78 is a body portion 88 of the ejector mechanism 74 having a flange 90 in registration with the rim of the opening 34. The ejector mechanism 74 also includes a series of pivotally mounted or hinged levers 92 supported at their upper ends on the outer periphery of the cap or head member 84. The lower ends of levers 92 slidably engage a curved cam surface 94 of the body 88.

When it is desired to remove the stopper assembly 70 from the opening 34, a lateral or horizontal inward pinching or squeezing force is applied to some or all of the levers 92. As the levers are moved inward and their lower ends slide along the surface 94, the flange 90 of the ejector body 88 engages and bears down on the top of the bottle 32 as shown in FIG. 6. Simultaneously, the hinged levers 92 exert a lifting upward force on the portion 84 of the stopper portion 72. As a result, the stem 78 lifts the stopper 76 and pulls it from the opening 34 in the top of the bottle 32.

Referring now to FIG. 9, there is illustrated a bottle stopper assembly generally designated as 110 that is similar to the assembly 70 shown in FIGS. 5-8. The portions of assembly 110 that are the same as corresponding portions of assembly 70 are designated by the same reference numbers. Assembly 110 differs from assembly 70 in that it includes a stem 112 which is solid and is permanently fixed to or integral with a cap or head portion 114. An ejector body 116 has a cam surface 118, on which the hinged levers 92 move, and is of a longer length than the surface 94. The operation of assembly 110 is similar to the operation of assembly 70 described above.

As shown in FIGS. 10-14 there is illustrated a bottle stopper assembly generally designated as 140 comprising yet another embodiment of the invention. The assembly 140 includes both a manually insertable stopper portion 142, and a permanently associated ejector mechanism 144.

More specifically the stopper portion 142 includes a stopper or plug 146 with a flange 148 around its lower edge. A stem 150 extending from the stopper 146 carries a head portion 152. A downward force applied to the head portion 152 serves to insert the stopper 146 in sealing relation within the opening 34 of the bottle 32.

The ejector mechanism 144 includes a body 156 encircling the stem 150 and the lower part of the head portion 152. The head 152 and body 156 include a pair of cooperating cam or wedge surfaces 157 and 158 essentially forming an annular V-shaped recess, as best shown in FIG. 10. A spring 160 (FIGS. 10, 11 and 14) encircles the assembly 140 and lies in the recess between the surfaces 157 and 158. When a lateral or horizontal pinching or squeezing force is applied to the spring 160 as indicated in FIG. 11 the spring 160 forces the surfaces

157 and 158 apart. A flange 161 around the lower edge of the ejector body 156 bears against the top of the bottle 32. Simultaneously, an upward force is applied by way of the surface 157 to the head portion 152. This force is transmitted by stem 150 to the stopper 146, and the stopper 146 is disengaged from the opening 34 in the bottle 32. The spring 160 enables the lateral force to be evenly and easily applied along the surfaces 157 and 158. However, if desired, assembly 140 could be used without the spring 160. In this case the finger tips of the user would serve to separate the surfaces 157 and 158.

In FIGS. 15-18 there is shown a bottle stopper assembly 180 including a stopper portion generally designated as 181 and a permanently associated ejector mechanism 183. The stopper portion 181 includes a stopper or plug 182 having a flange 184 around its lower edge. A stem 186 projects from the stopper 182 and terminates in a head portion 188. The head portion 188 includes a curved cam surface 190 slidably engageable by end portions of hinged levers 192 hingedly carried by an ejector body 194 having a flange 196. A downward force on the head portion 188 serves to engage the stopper 182 in sealing relation with the opening 34 of the bottle 32.

When a lateral force is applied to the hinged levers 192 as indicated in FIG. 16, the flange 196 engages the top of bottle 32. As the force is maintained on the hinged levers 192, the hinged levers 192 move along the curved surface 190 on the head portion 188 of the stem 186 and a vertical lifting force is applied to the head portion 188 disengaging the stopper or plug 182 from the opening 34 in a bottle 32.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A stopper assembly for use with a bottle having an opening and comprising: a stopper portion manually insertable in sealing relation into the bottle opening; said stopper portion including a plug receivable into the bottle opening, a stem extending from the plug, and a head portion carried on said stem and spaced from said plug; and an ejector mechanism associated with and carried by said stopper portion; said ejecting mechanism including a first portion engageable with said bottle and a second portion engageable with said head portion of said stopper for lifting said stopper portion from said bottle in response to the application of a lateral squeezing force.

2. The assembly of claim 1, said first portion defining a cam surface, and said second portion including a plurality of levers hinged to said head portion and slidably engageable with said cam surface.

3. The assembly of claim 1, said lifting mechanism including structure for applying a separating force simultaneously to said bottle and to said head portion.

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