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2,743,834

STOPPER

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Fig. 1

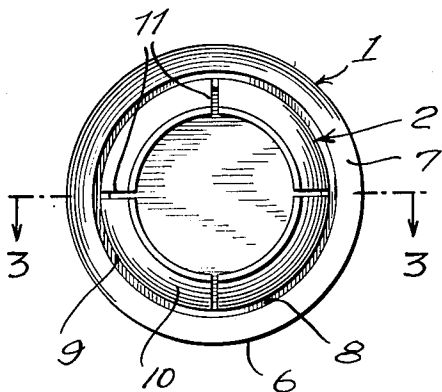


Fig. 2

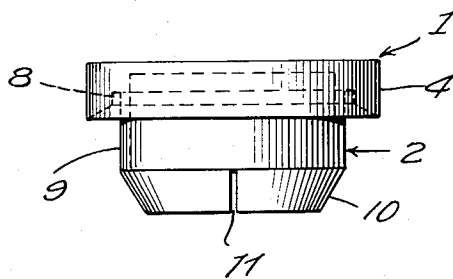
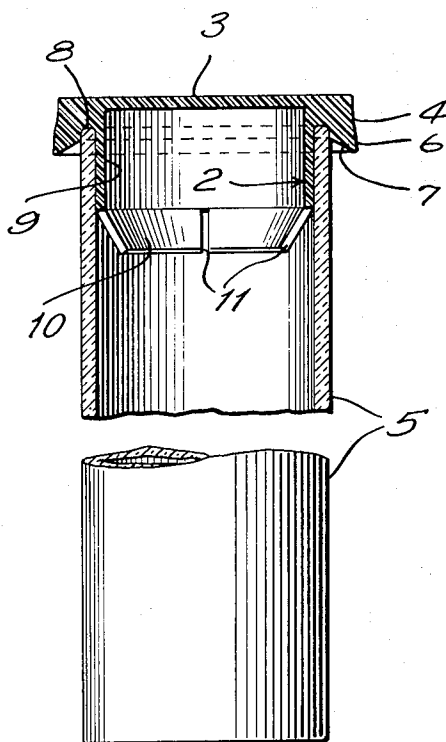


Fig. 3.



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2,743,834

STOPPER

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4 Claims. (Cl. 215—47)

The invention herein disclosed relates to a stopper that is especially suitable for a vial. More particularly, the invention relates to a molded, hollow, thermo-plastic stopper that includes a plug or skirt portion that is open at the end thereof and that has a tapering end section.

Hollow stoppers of the kind mentioned while useful for many containers are especially suitable for vials as the open, hollow plug permits the vial to be completely filled. Heretofore, and prior to the invention herein disclosed, such stoppers have been made with a tapering end section for starting the plug into the end of the vial. However, in all such prior stoppers, the wall thickness of the skirt is diminished in accordance with the taper. And, as the wall of the skirt is comparatively thin, the taper results in a knife edge at the end of the plug, which edge is fragile and readily frayed or split.

The primary object of the invention herein disclosed is to provide a stopper of the kind mentioned in which the plug portion, including the tapered end section is of substantially uniform thickness throughout.

The foregoing object and certain other objects and advantages that will hereinafter appear are realized in the particular embodiment of the invention illustrated in the accompanying drawing and described in detail below, from which description a clear understanding of the invention may be had.

The drawing includes:

Fig. 1 which is a bottom plan of a stopper embodying the invention;

Fig. 2 which is a side elevation of the same; and

Fig. 3 which is a sectional elevation taken on the line 3—3 of Fig. 1 and showing the stopper in connection with a vial.

While the stopper shown in the drawings is especially suitable for a vial, the features of the construction thereof are equally adaptable to other containers. In general, the stopper illustrated is molded from a thermo-plastic material that is pliable and resilient at ordinary temperatures, and includes an end portion 1 and a hollow, open-ended, cylindrical plug or skirt portion 2. The end portion 1 includes an end wall 3 and a circumambient section 4 of materially greater thickness than the thickness of the end wall 3 and wall of the plug portion 2. This section 4 has a thickness sufficient to provide adequate stiffness or rigidity for handling the stopper during insertion and removal of the plug portion in a container, such for example, as the vial 5.

A depending flange 6, having a frusto-conical edge 7, extends axially from the section 4. Vials of a given size have a certain wall thickness, and the flange 6 is spaced from the plug portion 2 a distance approximately equal to, preferably slightly less than, the thickness of the vial with which the plug is used to provide a space 8 in which the edge and a slight portion of the vial is received, the flange 6 engaging the outer surface of the vial. When the stopper is inserted in a vial, the frusto-conical edge 7 of the flange 6 engages the edge of the vial and leads it into

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the space 8 as the flange 6 expands. The flange thus resiliently engages the outer surface of the vial and makes a fluid tight seal therewith.

The plug or skirt portion is hollow and open at the free end. The wall thickness thereof is substantially uniform throughout. This portion includes a cylindrical section 9 and a tapering end section 10, tapering inwardly towards the axis of the plug. The end section 10 is internally as well as externally tapered so that the wall thickness thereof is the same as the wall thickness of the cylindrical section 9; it contains several (four in number in the embodiment shown) slots 11 extending from the end edge thereof to the juncture of the section 10 with the section 9.

While other thermo-plastic materials may be suitable, desirably, the stopper is molded as a unit from polyethylene or like material. Polyethylene is flexible and resilient at ordinary temperatures and has, in the molded state, a smooth surface with a saponaceous-like quality. When compressed, either by surface indentations or as a unit, it tends to return to its original shape. Thus, it is ideally suited for a stopper as it engages the wall of a container in fluid-tight contact, and compensates for any irregularities in the surface of the container.

In molding a hollow article, a core is used which must be withdrawn from the molded article. For a stopper such as that shown, the core must be withdrawn through the tapered section 10 of the plug portion. To provide a tapered section of the same wall thickness as the cylindrical section, the section must have, as in the stopper shown and described, an internal as well as an external taper. Thus, the cylindrical part of the core must be of greater diameter than the taper and withdrawn through the tapered section. In the construction shown, the tapered section is molded with the slots 11. These slots permit the expansion of the tapered section so that the core is readily withdrawn.

In addition, the slots 11 permit the contraction of the tapered section so that the end of the plug is more readily started in the end of the vial. Since the tapered section does not cooperate in effecting a seal with the neck of the bottle, this being the function of the cylindrical section, the efficiency of the stopper is not impaired by the slots 11.

From the foregoing description of the embodiment of the invention disclosed in the drawing and the method of constructing the same, it will be apparent to those skilled in the art that by this invention there is provided a stopper having a hollow, open-end, plug portion with a cylindrical section and a tapering end section of substantially the same wall thickness as the cylindrical section, thereby avoiding a knife edge at the end of the plug; a stopper that effectively engages the edge of a vial both internally and externally; and a method for forming a stopper in which the end section of the plug portion has an internal and external taper.

It will be obvious that various changes may be made by those skilled in the art in the details of the bottle stopper illustrated in the drawing and specifically described above, and in the steps of the method comprehended within the invention, within the principle and scope of the invention as expressed in the appended claims.

I claim:

1. A stopper of the kind described consisting of a single, molded piece of a thermo-plastic material that is pliable at ordinary temperatures, which stopper includes an end portion having an end wall, and a hollow plug portion for insertion in a container, the plug portion having a cylindrical section and a tapering end section and the tapering end section having a substantially uniform wall thickness of substantially the same thickness as the wall of the cylindrical section.

2. A stopper of the kind described consisting of a single,

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molded piece of thermo-plastic material that is pliable at ordinary temperatures, which stopper includes an end portion having an end wall, and a plug portion for insertion in a container having a cylindrical section of substantially uniform wall thickness and a tapering end section of substantially uniform wall thickness substantially equal to the wall thickness of the cylindrical section, the tapering end section having a slot therethrough extending from the free edge thereof to the juncture of the tapering section with the cylindrical section.

3. A stopper of the kind described consisting of a single, molded piece of a thermo-plastic material that is pliable at ordinary temperatures, which stopper includes an end portion having an end wall and an overhanging section with a depending flange for engaging the edge of a container, and a plug portion for insertion in the container having a cylindrical section of substantially uniform wall thickness and a tapering end section of substantially uniform wall thickness substantially equal to the wall thickness of the cylindrical portion.

4. A stopper of the kind described consisting of a single, molded piece of a thermo-plastic material that is pliable at ordinary temperatures, which stopper includes an end

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portion having an end wall and an overhanging section with a depending flange having a frustro-conical edge for engaging the edge of a container as the stopper is inserted in the container, and a plug portion for insertion in the container having a cylindrical section of substantially uniform wall thickness and a tapering end section of substantially uniform wall thickness substantially equal to the wall thickness of the cylindrical portion, the tapering section having a slot therethrough extending from the free edge thereof to the juncture of the tapering section with the cylindrical section.

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