

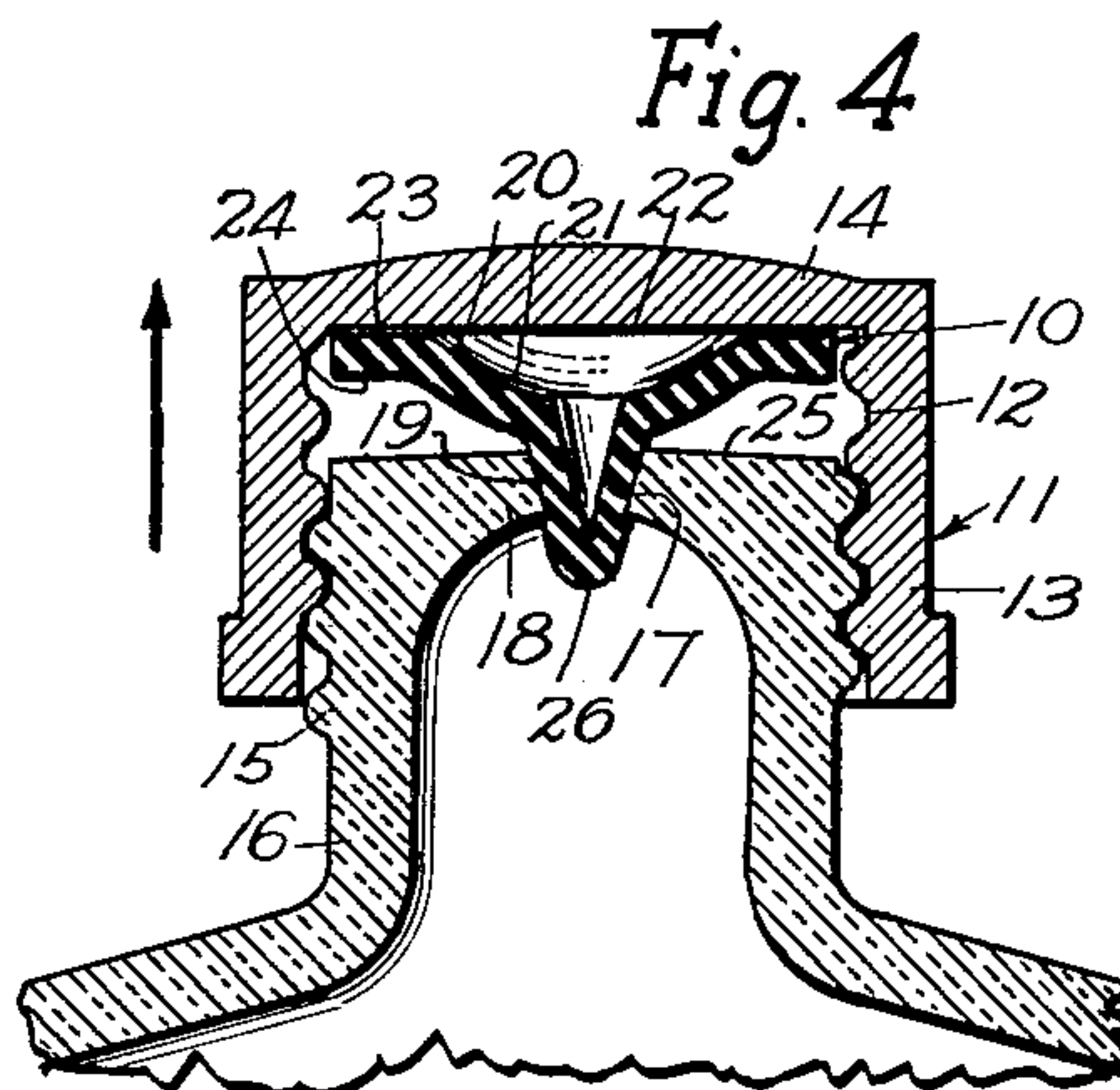
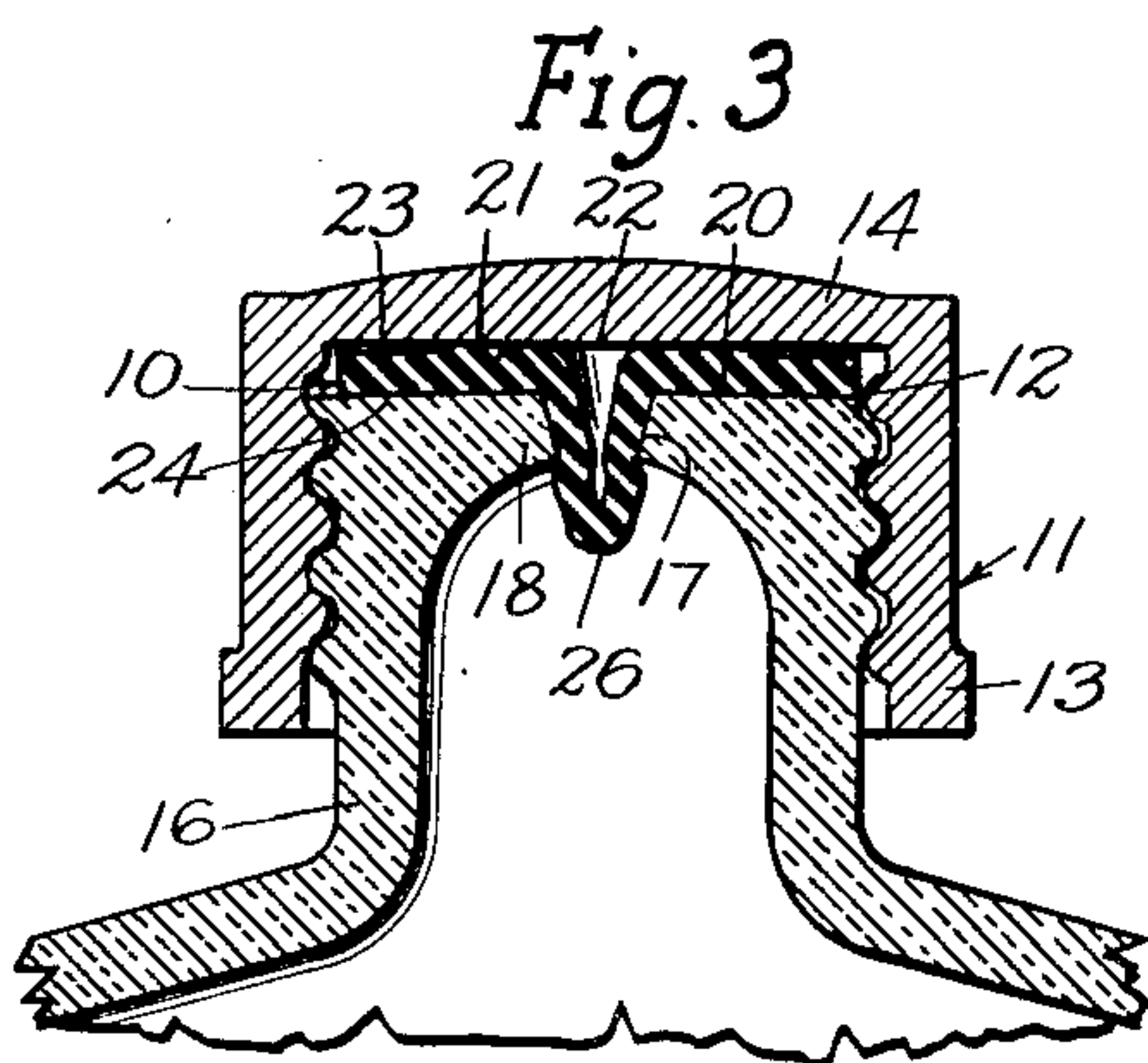
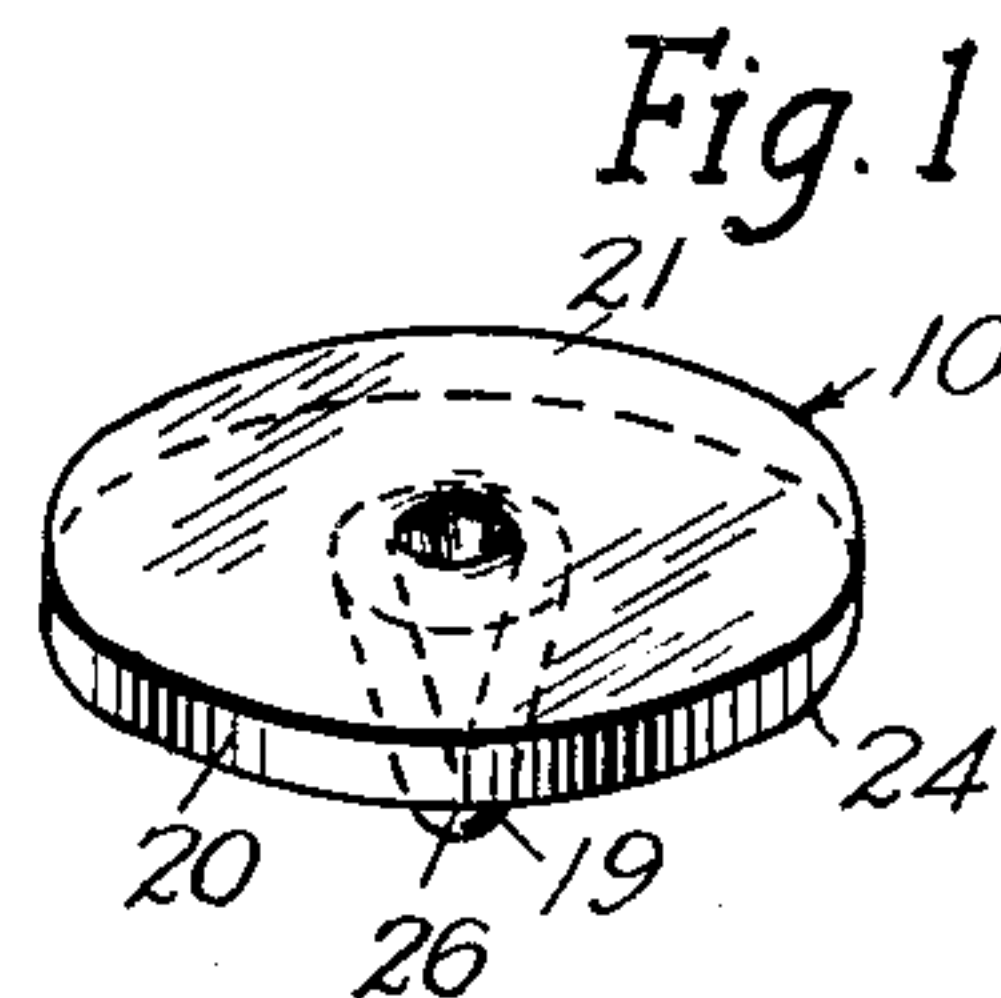
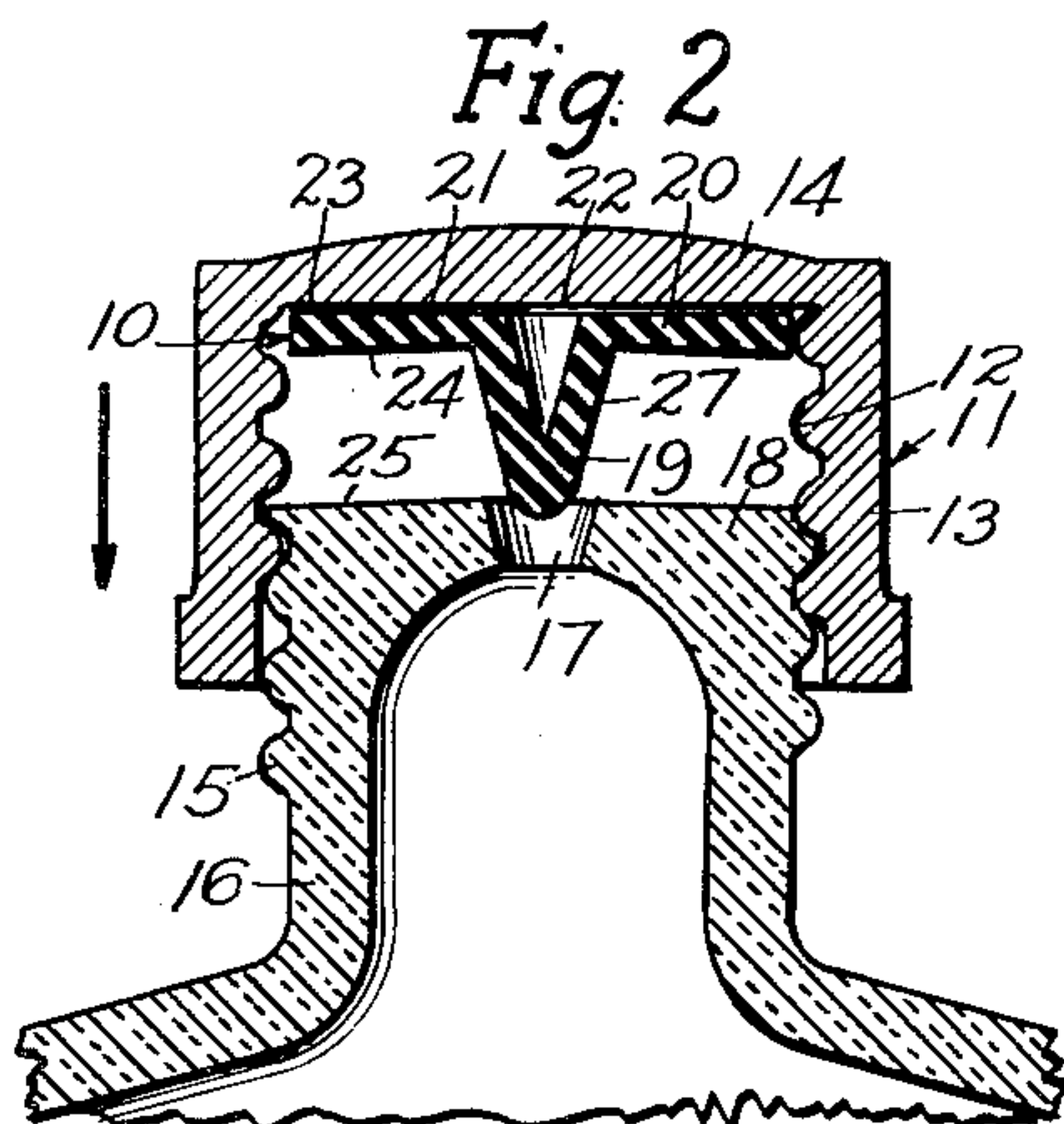
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STOPPER FOR CONTAINER CAPS

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STOPPER FOR CONTAINER CAPS

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2 Claims. (Cl. 215—43)

1

This invention relates to sealing inserts for bottle caps and particularly to combined liners and stoppers.

For dispensing liquids of a highly volatile nature such as shaving lotion, perfumes or the like, the glass container for such liquids has usually been made with a screw cap and with a central dispensing opening of minimum diameter in the top wall of the container or bottle. Customarily, the opening is initially sealed with a covering film of plastic or the like material adhesively secured to the top surface of the bottle. The seal is largely effective to prevent evaporation of the contents until it is broken or removed preparatory to dispensing liquid from the bottle for the first time. Thereafter, the broken seal cannot be replaced by the user and the bottle cap must take the place of the seal, but it has been found heretofore inadequate for that purpose and loss by leakage and evaporation consequently follows.

In my prior copending application Serial No. 125,531 I have disclosed a one-piece bottle cap made throughout of flexible plastic material such as polyethylene and including an integral central stopper to attain adequate sealing after each bottle uncapping operation.

The present invention contemplates the provision of a flexible and resilient stopper in the form of an insert usable with or secured to a relatively rigid stock cap such as any of those now commonly used and molded of any of the usual thermosetting or thermoplastic synthetic resins, whereby the insert accommodates itself to the size and shape of the dispensing opening of a bottle to insure the proper sealing action when the bottle is capped, without the necessity of molding special caps.

The invention further contemplates the provision of a stoppered cap liner molded in one piece of suitable flexible and resilient plastic material such as polyethylene or other rubber-like synthetic plastic, and adapted to be inserted into or secured to the inside of a bottle cap to seal the bottle top removably at the rim thereof as well as the central hole therein.

The invention further contemplates the provision of a flexible moldable one-piece combined liner and stopper adapted to be inserted into any bottle cap and having a yieldable stopper depending therefrom and movable with the cap to seal and unseal the central hole in a bottle top when the cap is respectively screwed down on and removed from the bottle neck.

The various objects of the invention will be

2

clear from the description which follows and from the drawings, in which:

Fig. 1 is a perspective view of the cap insert constituting the combined liner and stopper.

Fig. 2 is a vertical sectional view of the neck of a conventional bottle and a conventional bottle cap, showing the sealing insert inside of the cap, the cap having been screwed partway on to the neck toward the sealing position thereof.

Fig. 3 is a similar view thereof showing the cap screwed down into sealing position on the bottle.

Fig. 4 is a similar view thereof showing the cap partly unscrewed from the bottle neck in the direction of the arrow while the greater part of the stopper remains in and has not yet been withdrawn from the hole in the bottle top.

In the practical embodiment of the invention shown by way of example, the insert 10 constitutes a combined stopper and liner and is intended to replace the well-known somewhat compressible cork, paper or composition cap liner customarily inserted into bottle caps 11 of the usual type to interpose a cushion between the under face of the top wall of the cap and the top of a container. Such bottle cap is usually formed with the internal screw threads 12 on the skirt 13 depending from the top wall 14. The cap is customarily molded of suitable synthetic resin or formed of metal, and is adapted to be screwed down on the external threads 15 of the bottle neck 16 far enough to cause the insert 10 to seal the tapered central hole 17 in the top wall 18 of the bottle neck.

Said insert comprises the central hollow conical part 19 and the disc 20 outstanding from the uppermost end of the conical part or stopper and integral therewith. Preferably, the disc 20 is generally flat, having an upper surface 21 of the same shape but of somewhat smaller diameter than that of the under surface 22 of the top wall 14 of the bottle cap, which surface is usually a plane or flat surface. To secure the insert in place within the cap, the marginal edge portion of the disc is preferably attached permanently to the under face 22 of the cap top in any suitable manner, as for example, by welding the disc thereto under heat and pressure. Such welding may easily be done if the cap is molded of thermoplastic resin. If the cap is made of other material, a layer of suitable cement as 23 is used to secure adhesively the marginal portion of the disc in place. By this construction, a relatively rigid cap with a flexible and distortable insert moving as a unit with the cap is provided.

The insert 10 is preferably molded in one piece

3

of polyethylene or other suitable flexible and resilient material not affected by the liquid contents of the bottle nor affecting such contents, but sufficiently distortable to compensate for inevitable variations in the diameters of the discharge holes 17 in individual bottles produced commercially and for commercially acceptable variations or irregularities in the top surfaces 25 of such bottles. The under surface 24 of the disc 20 may be of any desired shape to fit the upper surface of the bottle, in this case being shown as somewhat concave downwardly to fit the convex surface 25, whereby the thickness of the disc is slightly greater at the rim thereof where the pressure thereon is greatest than at the central part thereof.

The stopper 19 is arranged axially of the disc 20 and projects below said disc a distance preferably less than the height of the skirt 13 of the cap. At its lower end, the stopper terminates in a rounded tip 26, while its normally conical outer surface 27 tapers downwardly and inwardly to conform to the shape of the bottle hole 17. The wall of the stopper is preferably of uniform thickness, said thickness being about the same or slightly less than the average thickness of the disc and small enough to yield under pressure during the sealing operation. By providing an axial recess or conical hole or depression of the proper size in the stopper 19 terminating at the upper surface of the disc, the stopper becomes hollow and readily distortable or compressible under stress thereby to more easily enter and seal a bottle hole smaller than the greatest diameter of the stopper and larger than its least diameter.

In use, the cap 11 with the insert 10 held therein as in Fig. 2, is screwed on to the bottle neck after the bottle has been filled. As the cap is advanced along the threads 15 in the direction of the arrow of Fig. 2 to cap the bottle, the rounded tip 26 of the stopper enters the bottle hole 17 without any initial distortion of the stopper or of the disc of the insert. However, as the capping operation proceeds and the cap is advanced to the final capping position shown in Fig. 3, the stopper is forced further and further into the hole 17 by the twisting or screwing action resulting from the combined rotation and longitudinal advance of the cap and insert as well as of the stopper. As the larger portion of the stopper is twisted into the hole, it is compressed to reduce its diameter to that of the adjacent part of the hole.

The thickness of the disc 20 is such that a sealing action may be attained by the disc between the cap surface 23 and the bottle top 18 if desired, at about the same time that the stopper reaches its final position in the bottle hole and further rotation of the cap is effectively resisted. Preferably, the stopper is long enough to project through the bottle hole in the sealing position, the projecting tip 26 being thereby unconstrained and free to assume its original shape and size as shown in Fig. 3. Whether or not perfect sealing against leakage is attained at the periphery of the insert 10, the stopper effectually seals the bottle opening regardless of how many times the cap is removed from and replaced on the bottle.

When the cap is rotated in the proper direction to remove it from the bottle in the uncapping direction of the arrow of Fig. 4, the secured or cemented marginal portion of the disc 20 rotates and also moves upwardly with the cap off the

4

bottle top 18, but since the stopper is wedged in the bottle hole, said stopper may remain wedged initially without substantial rotation, thereby resisting the upward pull of the adjacent central part of the disc, whereby the insert may take a distorted form such as that shown generally in Fig. 4. When the upward pull of the cap on the insert combined with the twisting of the stopper becomes sufficient to withdraw the stopper from the bottle hole, the insert re-assumes its normal shape as shown in Fig. 2, ready for the repetition of the capping operation.

It will be understood that it is not essential that the insert rotate with the cap so long as said insert moves upwardly and downwardly therewith. Various other suitable means for holding or wedging the disc 20 in place within the cap may therefore be substituted for the welding or cementing described. It will also be seen that the present invention insures the desired repeated sealing action otherwise difficult or impossible to obtain in a practical manner, that the insert may be applied conveniently and inexpensively to any standard bottle cap and that it is well designed to meet commercial needs and for the purposes for which it is intended.

While certain specific forms of the invention have herein been shown and described, various changes may obviously be made therein without departing from the spirit of the invention defined in the appended claims.

I claim:

1. The combination with a bottle having an externally threaded neck and an end closing wall across the top of the neck, the wall having a central opening therein of lesser diameter than the inner diameter of the neck, of a relatively rigid bottle cap having an imperforate top wall and a dependent skirt provided with internal screw threads, a polyethylene insert having a distortable disc-like top and an elongated hollow distortable stopper closed at one end by a rounded solid tip and open at the other end to form a conical depression in the central part of the disc-like top, said tip being freely movable relatively to the top, the stopper tapering downwardly and inwardly and being of greater length than the height of the central opening, the peripheral portion only of the disc-like top of the insert being secured to the top wall of the cap and the remainder of the insert being movable longitudinally of the cap and away from said top wall, the stopper passing completely through the central opening when the cap is screwed down along the bottle threads and becoming wedged and remaining wedged in said opening while the cap is partly unscrewed from the bottle and until the lifting and rotational forces on the stopper exceed the frictional resistance between the stopper and the walls of the opening, the least diameter of the opening being materially less than the diameter of the stopper at a point just below said opening when the bottle is capped by the cap, the central portion of the top of the insert being free to separate from the top wall of the cap during the initial part of the cap unscrewing operation and while the secured peripheral portion of the insert is lifted off the bottle with the cap, the insert thereafter rotating with the cap as a unit to unseal the central opening, and rotating with the cap as a unit during rotation of the cap in a sealing direction.

2. The combination of claim 1, a layer of adhesive securing the peripheral portion only of the top of the insert to the under face of the top

5

wall, the stopper being of sufficient length to project downwardly beyond the central opening and remaining in sealing engagement therewith after unsealing rotation of the cap is begun and after a predetermined amount of rotation of the cap in an unsealing direction has been completed, the thickness of the wall of the stopper being uniform and substantially equal to the thickness of the top, and that portion of the tip of the stopper projecting just below the opening in the sealing position of the cap mushrooming, when released, to the initial diameter thereof, said initial diameter being greater than that of the bottom of said opening.

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