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Reinhard

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[54] **CONTAINER CONSTRUCTION FOR MASCARA AND LIKE SUBSTANCES**

[75] Inventor: **Willy Reinhard,** Buergeln, Germany

[73] Assignee: **Gebruder Seidel KG,** Marburg, Germany

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[52] **U.S. Cl.**..... **220/212,** 132/85, 206/361, 220/356, 215/228, 401/118, 277/DIG. 2, 285/345

[51] **Int. Cl.** .. **A46b 11/00,** A45d 44/18, F16l 21/04

[58] **Field of Search** ..... 206/361, 15.2; 215/73, 215/48, 52, 80; 401/118–130, 225, 226; 285/230, 231, 345, 346; 220/42 B, 24.5; 132/85, 53, 73; 277/DIG. 2

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Primary Examiner—William I. Price
Assistant Examiner—Allan N. Shoap
Attorney, Agent, or Firm—Sandoe, Hopgood & Calimafde

[57] **ABSTRACT**

This invention contemplates a liquid-sealing assembly of a liquid-dispensing fitting to the open tubular end of a container body, and featuring ease of automated assembly, as well as effectiveness of the seal, even when the fitting is a threaded part which is necessarily subjected to reaction torque with respect to the container body, for each opening and closing of the container. A relatively soft yieldable bushing is radially compressed to permanently retain and seal the assembly, and the proportions of fitted parts are such that seal-effectiveness and appearance cannot be impaired in the course of automated assembly.

16 Claims, 5 Drawing Figures

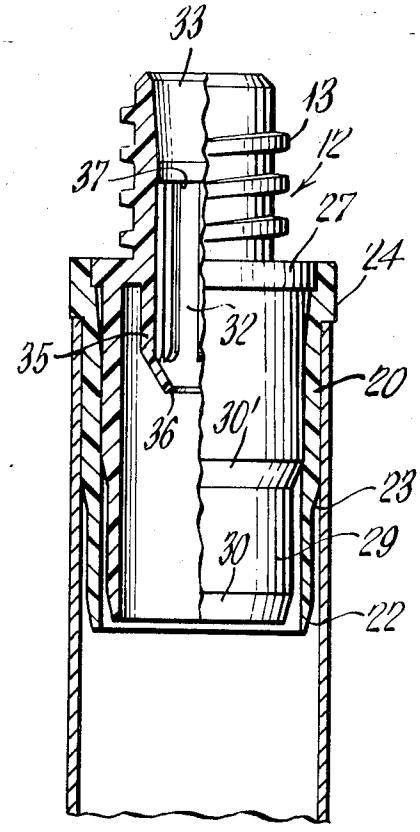


Fig. 1.



Fig. 2.

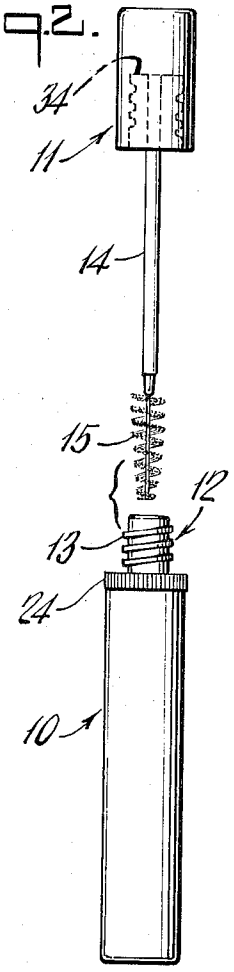


Fig. 4.

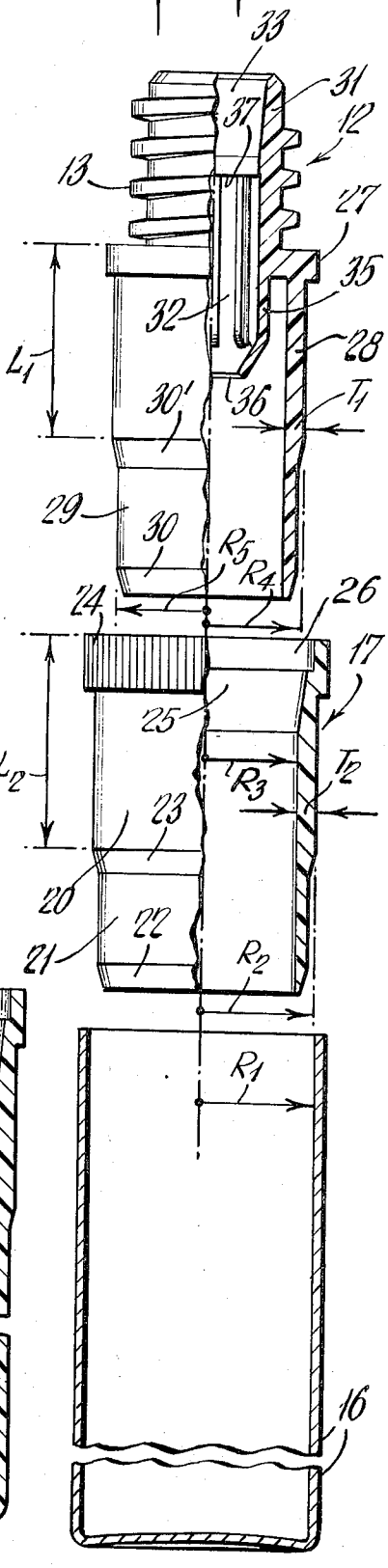


Fig. 3.

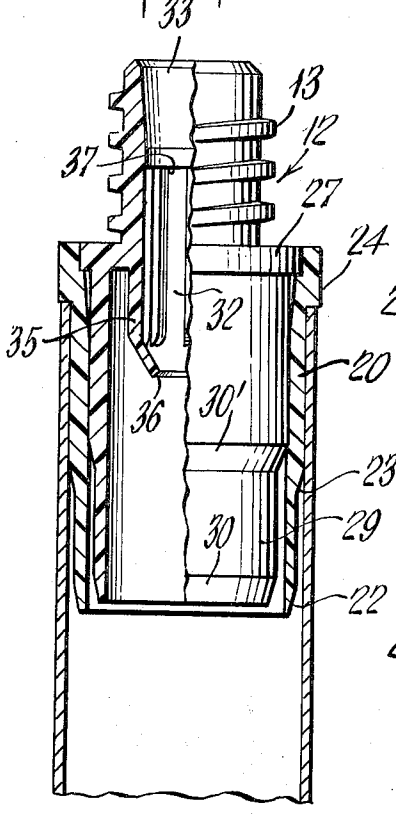
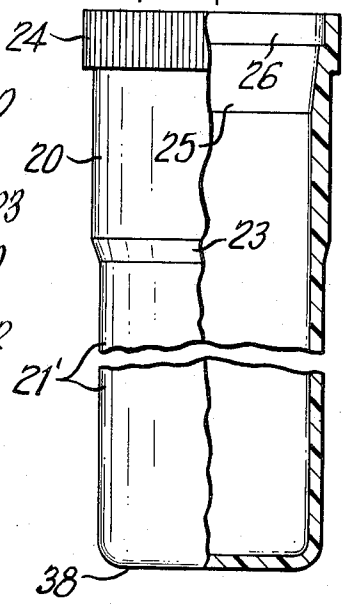


Fig. 5.



CONTAINER CONSTRUCTION FOR MASCARA AND LIKE SUBSTANCES

This invention relates to the construction of a container for liquid cosmetic or the like substance, such as mascara, wherein the container is selectively openable from and returnable to a fully sealed closure of the dispensing end.

Containers of the character indicated generally rely upon a threaded cap-to-container closure, and it is desirable that the threaded parts shall be universally applicable to a variety of body designs, thereby reducing the cost of manufacture to meet demand for a large variety of external appearances. But the constructions previously used have not been particularly adaptable to automated assembly, in that they have been subject to scuffing (and production of offal) in the course of axial assembly, as when the sharp open end of a tubular metal body is to receive the inserted end of a sealing member or fitting.

It is accordingly an object of the invention to provide an improved construction of the character indicated.

A specific object is to provide such a construction which particularly lends itself for use in automated assembly of containers.

Another specific object is to meet the above objects with a superior seal and permanent assembly of a dispensing fitting to the body of such a container.

A general object is to meet the above objects with an inherently simple, trouble-free and low-cost construction.

Other objects and various further features of novelty and invention will be pointed out or will occur to those skilled in the art from a reading of the following specification in conjunction with the accompanying drawings.

In said drawings, which show, for illustrative purposes only, a preferred form of the invention:

FIG. 1 is a view in elevation of a mascara or the like container incorporating the invention, and shown in closed condition;

FIG. 2 is a view similar to FIG. 1, for an opening condition of the container;

FIG. 3 is a longitudinal sectional view of the container of FIG. 1, with closure cap removed;

FIG. 4 is an exploded view in elevation of the parts of FIG. 3, in partial section; and

FIG. 5 is a fragementary view in elevation, partly broken away and in logitudinal section, to show a modification of a part of the combination of FIGS. 1 through 4.

The invention is shown in application to a mascara container, comprising a container-body part **10** and a closure-cap part **11**. An upstanding neck fitting **12** is carried at the upper end of body **10** and includes threads **13** for engagement with the threaded bore of the cap part **11**. An applicator wand **14** carried by the cap part **11** is enterable in the central dispensing-access passage of the neck fitting **12** and, as shown, the projecting end of wand **14** is formed with applicator bristles **14** which are submerged in cosmetic substance when the container is closed.

Referring more particularly to FIGS. **3** and **4**, the body part **10** is an assembly of a base cup or shell **16**, a bushing **17**, and of the neck fitting **12**. Shell **16** may have a cylindrical bore of radius R_1, near its upper open end, being of drawn or otherwise formed metal such as aluminum, variously "brushed," anodized or otherwise

finished, as desired for appearance. Bushing **17** is molded, relatively soft and resiliently yieldable, being of a material having elastomeric properties, as for example low-density polyethylene. And the neck fitting **12** may be injection-molded of a more hard and stiff plastic, such as high-density polyethylene or polypropylene.

Bushing **17** is characterized by a primary outer cylindrical surface **20** for ultimate engagement with the bore of shell **16** but formed in the unstressed condition at a radius R_2 which is slightly less than radius R_1, to permit relatively friction-free axial subassembly of bushing **17** to shell **16.** A reduced lower piloting land **21** facilitates initial entry for such subassembly, and an end chamfer **22** and a tapered connection **23** further facilitate the insertion, the same being limited by an externally ribbed flange **24** which defines a shoulder for location against the axial end of shell **16.** The bore of bushing **17** is cylindrical, of radius R_3, being shown gently flared at **25** to the base end of a counterbore **26** within flange **24**; preferably, the flare **25** is of axial extent which straddles the juncture of flange **24** to the body section **20.** Counterbore **26** is axially and radially dimensioned to fully receive the flange **27** of neck fitting **12.** Beneath flange **27**, fitting **12** includes a cylindrical sleeve **28** with a mounting surface of radius R_4 greater than the unstressed bore radius R_3 of sleeve **17**, and a reduced lower piloting land **29** is of radius R_5 (less than radius R_3) to facilitate driven insertion of fitting sleeve **28** into the bushing bore **17**; an end chamfer **30** and a tapered connection **30'** further facilitate such insertion, the same being limited when flange **27** is fully seated within the counterbore **26.**

To complete the description of parts, the neck fitting **12** includes the upwardly projecting body portion **31** with external threads **13** and with the central dispensing-access passage **32.** The mouth **33** of passage **32** is outwardly flared, to facilitate insertion of applicator **14–15,** and the upwardly projecting end has both concave and convex chamfers to define a circumferentially extensive "line" or edge for axially driven sealing contact against a flat annular bottom **34** (FIG. **2**) of the opening in which the threaded neck body **31** is received in cap **11.** The passage **32** extends a major fraction of the length of fitting **12,** being further defined by an integral secondary sleeve **35,** depending from body **31** in the region beneath flange **27** and in radial clearance with the primary mounting sleeve **28.** A convergent lip **36** at the lower end of sleeve **35** has light "wiping" interference with the diameter of wand **14,** and plural spaced longitudinal groove formations in the wall of passage **32** serve to key the molded part **12,** for threaded disengagement from its mold; each such groove formation terminates at **37,** prior to commencement of the flared mouth of passage **32.**

To assemble the described construction, bushing **17** is first assembled, via piloting land **21,** to the open end of body shell **16.** Such insertion is relatively free due to the unstressed condition of the bushing **17** and due to the clearance between radii R_1–R_2, and the insertion is limited by abutment at the shoulder of flange **24.** In view of this clearance and in view of the preferred employment of an inherently low-friction material such as polyethylene for the bushing **17,** any tendency to scuff and otherwise disturb the molded contour of bushing **17** is reduced to a minimum for this insertion step. The subassembly of bushing **17** to shell **16** thus presents a

low-friction liner for the subsequent assembly of the neck fitting **12** at sleeve portion **28** thereof. Such insertion is initially free on the piloting land **29**, in view of the clearance between radii R_3 and R_5. However, the tapered connection **30'** serves as an outward displacing wedge acting on the bore of bushing **17** as the fitting **12** is driven into its home position, with flange **27** seated in the counterbore **26**. The radially outward displacement of bushing body material in the course of this assembly is inherently self-adapting to minor irregularities in the bore of body shell **16**, thus assuring a perfect sealing relationship which retains its permanence.

The described structure is seen to have met all stated objects and is assembled with relative ease in steps which may be readily automated. Any minor misalignment in the course of automated handling is self-correcting, by reason of the various chamfered and otherwise tapered transitions to and between cylindrical surfaces. The relatively large bore (radius R_3) of the bushing **17** permits rapid and easy container-filling, the fitting **12** being assembled only after filling; in such case, the bushing also protects the shell **16** and its finish during the filling operation.

In a particular advantageous employment of the invention, for a shell **16** of 14-mm diameter and 0.35-mm thickness, the sleeve thickness T_1 at **28** exceeds body thickness T_2 of bushing **17** to the extent of roughly 50 percent, and the interference at R_4–R_3 exceeds the clearance at R_1–R_2 to the extent of approximately 3:1. Also, the effective cylindrical mounting length L_1 of the sleeve **28** exceeds the effective cylindrical body length L_2 of the bushing **17**, as shown in the assembly of FIG. **3**, whereby clamping stresses are fully accommodated well within both axial limits of the length L_2 of deformable surface **20**, and stress concentrations are avoided in the relatively embrittled (and, therefore, otherwise rupturable) upper axial end of shell **16**.

While the invention has been described in detail for the preferred form shown, it will be understood that modifications may be made without departure from the scope of the invention. For example, the bushing described at **17** may be the open end or skirt of an elongate cup, the remaining skirt wall of which is suggested at **21'** FIG. **5** (i.e., as a continuation of wall surface **21**) extending to a closed bottom wall **38**, in which case the inner cup **21'** is itself the reservoir for cosmetic substance to the dispensed. Such a construction lends itself to the provision of various different cosmetic-reservoir volumes (for any given outer shell **16**) to suit customer requirements, and with assurance that even though less cosmetic substance is accommodated, there is an ability to employ applicator **14–15** to extract and use a greater fraction of the available cosmetic substance. Also, since such a modified construction avoids the need to establish a liquid seal between the bushing **17–21'** and shell **16**, lesser differences in relative softness between the two plastic parts (**17–21'**, and **12**) can be tolerated, without impairing the ability to establish the described remaining seal engagements, as long as care is taken that bushing deformation (upon assembly of part **12**) establishes permanent retention to the shell **16**.

I claim:

1. In a container for liquid cosmetic or the like substance, a body having a tubular open end, a flanged cylindrical tubular bushing of relatively yieldable material received in said open end to an extent axially limited by the flanged portion of said bushing, and a flanged relatively stiff dispensing fitting including an upwardly extending threaded neck with an internal passage open at both axial ends, said fitting having a tubular sleeve received in said bushing to an extent axially limited by the flanged portion of said fitting, said bushing having an unstressed external cylindrical diameter less than the bore diameter of the tubular open end in which it is received, whereby bushing sub-assembly to said body is essentially frictionless, and said sleeve having an external cylindrical diameter greater than the unstressed bore diameter of said bushing and being chamfered at the lower end, whereby assembly of said fitting to the sub-assembled bushing and body is a force-fit in which said bushing is radially expanded, the extent of sleeve-to-bushing interference being such in relation to the unstressed clearance of the subassembled parts that said bushing is radially compressionally loaded in circumferentially continuous engagement with the body bore upon assembly of said fitting.

2. The container of claim **1**, in which said body is of metal.

3. The container of claim **2**, in which said body is of anodized aluminum.

4. The container of claim **1**, in which said bushing is of elastomeric material.

5. The container of claim **1**, in which said fitting is of injection-molded plastic.

6. The container of claim **1**, in which the flanged portions of said bushing and fitting are circumferentially continuous, the bushing flange being larger than the fitting flange, and the bushing bore having a counterbore of size substantially fully accommodating said fitting flange.

7. The container of claim **1**, in which said fitting includes an integral secondary sleeve portion concentric within and radially spaced from said sleeve, said secondary sleeve portion communicating with said passage and having a radially inward wiper lip at its lower end.

8. The container of claim **7**, in which said secondary sleeve portion is located only in the region beneath the axial location of the flanged portion of said fitting.

9. The container of claim **1**, in which the bushing bore is chamfered at the end location of initial assembled engagement to the chamfered end of said sleeve.

10. The container of claim **1**, in which said bushing has a piloting lower end of diameter reduced from said cylindrical diameter.

11. The container of claim **1**, in which said sleeve has a piloting lower end of diameter less than the unstressed bore diameter of said bushing.

12. The container of claim **1**, in which said passage is longitudinally grooved.

13. The container of claim **12**, in which plural angularly spaced longitudinal grooves characterize a substantial fraction of the length of said passage.

14. The container of claim **1**, in which said bushing is axially elongate and includes a closed bottom end wall, whereby the bushing constitutes the reservoir for cosmetic or the like substance.

15. In a container of the character indicated, a body shell having a tubular cylindrical open end, a relatively soft deformable flanged tubular cylindrical bushing having a clampable length of unstressed outer diameter which clears the bore diameter of said open end with the flanged portion axially located by said open end, the bore of said bushing being predominantly cylindri-

cal within said clampable length and flaring outwardly in a region of approach to and extending within the flanged portion, and a relatively stiff dispensing fitting including a cylindrical sleeve portion of diameter exceeding the unstressed bore diameter of said bushing, said fitting sleeve lining the bore of said bushing and compressionally radially outwardly displacing bushing material into compressionally loaded circumferentially continuous and axially extensive contact with the bore of the open end of said body shell, the cylindrical surface of said sleeve axially overlapping the flared region of the bushing bore, whereby clamping stress is relatively relieved at the axial-end region of said shell.

16. The container of claim **15,** in which the clampable axial length of said bushing exceeds the effective axial extent of said cylindrical sleeve portion, whereby circumferentially continuous regions of reduced compressionally loaded bushing material exist at both axial ends of the clamped region thereof.

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