July 18, 1967 H. HAFNER ETAL 3,331,422

AEROSOL CAP AND METHOD FOR ITS PRODUCTION

Filed Feb. 11, 1965 2 Sheets-Sheet 1

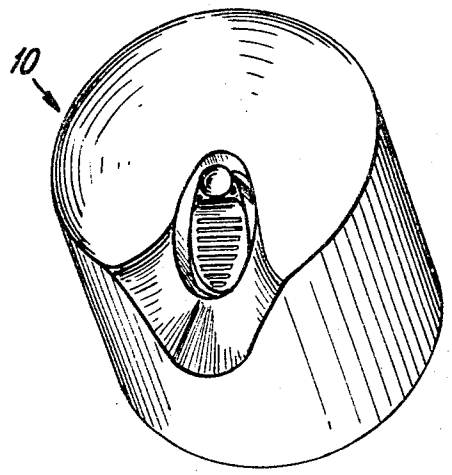


FIG. 1

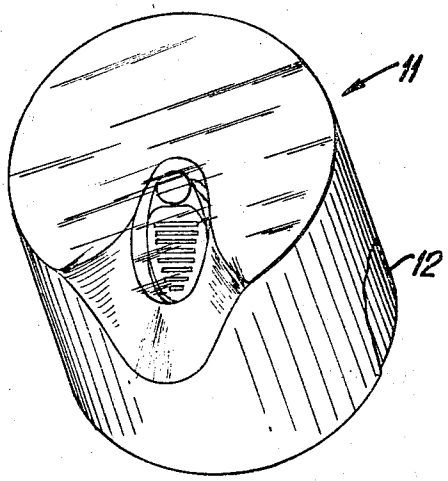


FIG. 2

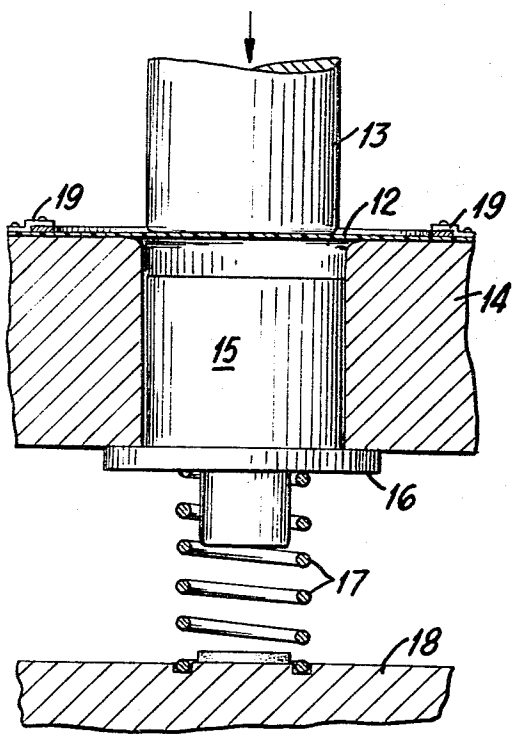


FIG. 3

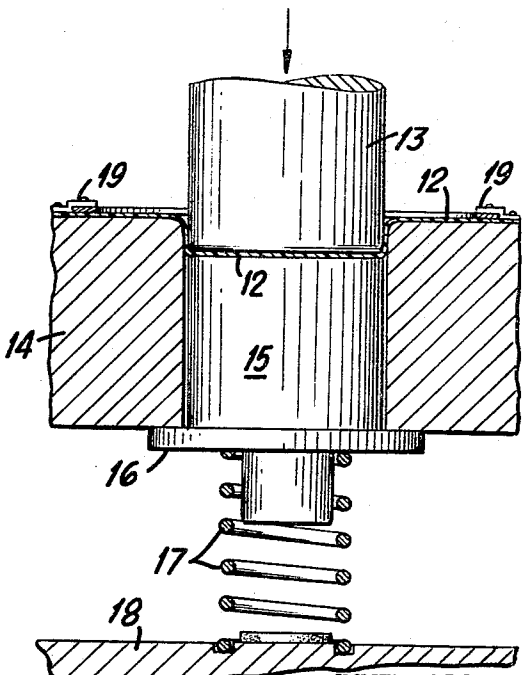


FIG. 4

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AEROSOL CAP AND METHOD FOR ITS PRODUCTION

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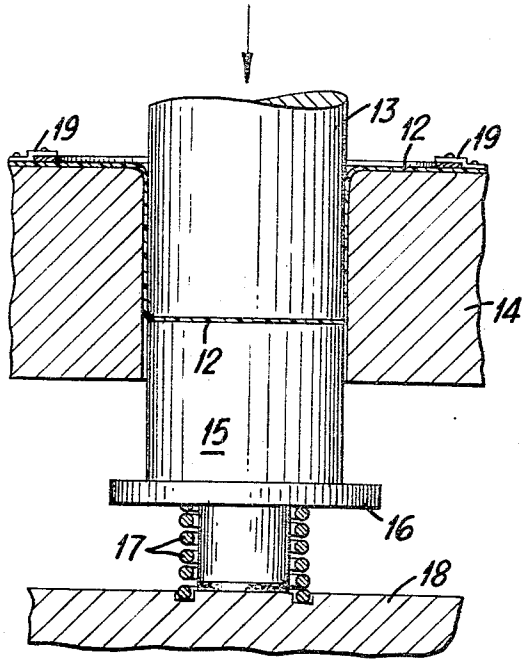


FIG. 5

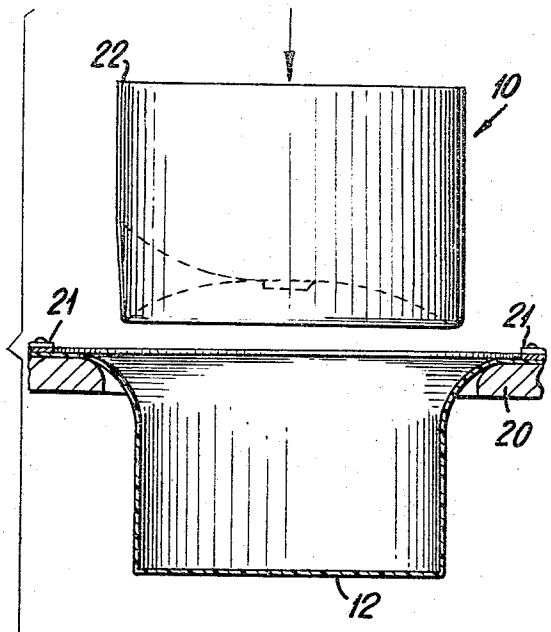


FIG. 6

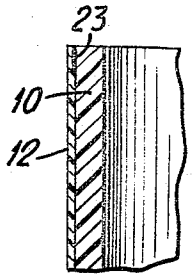


FIG. 7

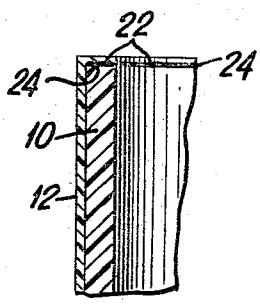


FIG. 8

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AEROSOL CAP AND METHOD FOR ITS PRODUCTION

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6 Claims. (Cl. 150—52)

This invention relates to a removable, protective cover for the dispensing head of a packaging unit and particularly a cover for an aerosol container and to the method for its production. While the invention will be described hereafter in relation to a cover for an aerosol dispensing cap, it should be understood that the invention is equally useful as a protective cover for other objects; those skilled in the art having the benefit of this disclosure seeing the utility of the cover for other than an aerosol cap.

Problems attending the storage of aerosol containers include the accidental or intentional discharge when handled. Moreover, the plastic caps used for such containers collect dirt. This problem is accentuated by the fact that such plastics may carry or develop static charges which will attract dust particles.

We have found that these problems may be eliminated by rendering the cap relatively tamper-proof and dirt-proof by covering the cap with a thin plastic film which is removable prior to the first use of the aerosol container, yet retaining the aesthetic effect created by the peripheral contour of the under cap.

Broadly, the cover of this invention comprises a relatively thin plastic film drawn over the aerosol cap to provide a taut skin therefor, said skin being adhered, preferably heat sealed, at its terminal edge to the cap.

In the figures:

FIG. 1 depicts one form of an aerosol cap **10** having a top located actuator which cap **10** fits on an aerosol container and releases its contents when the actuator is depressed.

FIG. 2 shows such a cap **11** covered with a plastic film **12** in accordance with the present invention.

FIGS. 3–6 depict apparatus for carrying out the method of this invention; and

FIGS. 7 and 8 show the inverted cap **10** with a lower edge **22** and the overlaying film **12** heat-sealed, alternatively, on the side of the cap at **23** or on its upper edge at **24**.

In carrying out this invention, it has been found that polyethylene of varying density grades may be used. For example, polyethylene of a density range .93–.97 is suitable. The preferred film material is biaxially-oriented plastic film compounded from about 70% high density polyethylene and 30% polyisobutylene having a molecular weight of about 80,000 to 120,000. Also a plastic film comprising polyethylene in the range of 40 to 85% and the balance polyisobutylene having a molecular weight in the range of 30,000 to 350,000 are suitable. Other thermoplastic films may be used provided they can be stretched at about room temperature, retain the stretch for a short period, and have adequate tear resistance. For example, polypropylene, ethylene vinyl acetate copolymer, cellulose acetate, cellulose acetate butyrate. In general, thermoplastic film material having a percentage elongation of 350–1000 is suitable, preferably the range is 600–800.

The film may contain other additives to prevent degradation, such as 3,5-tertiary butyl, 4-hydroxy toluene.

Example

In the preferred manner of carrying out our invention

about 70% high density polyethylene and about 30% polyisobutylene having a molecular weight of 100,000 are compounded in a Banbury mixer. A small amount of a compound, such as 3,5-tertiary butyl, 4-hydroxy toluene, is added to prevent premature degradation. This blend of polymers is then extruded in tube form by a conventional method and known as "lay flat" or blown film, and rolled up. During the laying out and rolling up of the tube, the polymer film is stretched and is biaxially oriented, giving it added strength and rendering it more suitable for use in carrying out our invention. It is prefererd to use a polymeric sheet or film which has been biaxially oriented to some degree but a film which has not been so treated may still be used in carrying out the invention. Such a polymer may also be biaxially oriented by other known methods.

A single layer of the polyethylene-polyisobutylene sheeting of a thickness of about 1 to 7 mils is laid across the apparatus of FIG. 3. The apparatus comprises a cylindrical male die **13** and a cavity containing member **14**. Movable in such cavity is a top closed cylinder member **15** having a base shoulder portion **16** and attached springs **17**. Support means **18** are provided for the spring. Not shown are means for supporting the male die **13**, the member **14** and the spring base member **18**. The apparatus shown in FIGS. 3 to 6 may be constructed of metal or other suitable hard material.

In forming the cover, the film **12** is disposed across the top surface of the member **14** and clamped at **19**. The relation of the male die **13**, film **12** and the cylinder **15** just prior to actuation of the male die **13** is as shown in FIG. 3. As shown in FIG. 4, the male die **13** is advanced downwardly stretching the film and clamping it between itself and the top surface of the cylindrical member **15**. The male die **13** is then further advanced as shown in FIG. 5 thereby further stretching the side walls of the film **12** but not to any substantial degree the portion of film **12** engaged between the die **13** and the cylinder member **15**.

After the film has been stretched as shown in FIG. 5, the male die **13** is removed, the cylinder member **15** by spring action, retracts from the cavity until the base portion **16** is in contact with the lower shoulder of the member **14**. The clamps **19** are released, and the apparatus is ready for a repeat of the operation. Means for lowering and raising the die **13** are not shown. The stretching of the film is carried out at about room temperature. Thereafter the film, substantially in its stretched condition, is transferred to a clamping member **20** and held by clamps **21**.

The diameter of the cylindrically indented part of the film **12** as shown in FIG. 6 is slightly less than that of the inverted aerosol cap **10** as shown in FIG. 6. The cap is then lowered and the film stretched over it, usually to an extent that the film is drawn beyond the edge **22** of the cap. The film, by means not shown, is then folded over the edge **22** of the cap. This may be done by a cold knife projecting at an angle down inside the cap and the film is then heat-sealed at or near the end of the cap **24**, FIG. 8, by use of a hot knife or disc (not shown). It may also be heat-sealed near the end of the cap **10**, FIG. 7, by placing a dielectric ring around the film at **23**, FIG. 7, and heating the ring to heat-seal the film on the cap.

The procedure described above, involving a two stage stretch operation, is particularly adaptable to aerosol caps in which the advancing end of the cap has relatively sharp edges. In the instance where the cap has relatively rounded edges, the stretch operation may be performed in a single stage by substituting the cap **10** for the male die **13**, as shown in FIGS. 3–5 and advancing same to the desired extent into the polymeric film.

A further feature of this invention is that advancing the top portion of the cap into the thin polymeric film results in a moderate stretching of the film covering the top portion relative to the stretching of the film covering the side wall and consequently a difference in thickness between said top portion and the side wall. This difference in thickness provides a line of weakness and facilitates the rupture of the film. Moreover, the thicker top portion is of advantage in rendering the cap tamper-proof. Finally it is desirable to have the top portion thicker so that printing thereon will not be distorted.

As shown by FIG. 2, the cap has been rendered tamper-proof; the film is substantially flat across the top of the cap and above the actuator of the aerosol container. The container may then be discharged only by breaking or distending the film covering the cap. If the film is broken it will show the tampering, and if the film is distended to release any contents of the aerosol container, the film will shown the discharge. The film will also serve to keep the cap dirt-free until the film is removed by the user prior to the first use of the aerosol container.

We claim:

1. A tamper-proof aerosol cap comprising a cap having a depressed actuator in the top opening thereof and further having a thin polymeric film drawn tightly over the side and top portions of said cap, and wherein the film across the top portion is elevated above the actuator and is substantially flat.

2. The tamper-proof cap of claim **1**, wherein the polymeric film covering the top portion of the cap is thicker than the portion covering the side walls.

3. The cap of claim **1**, wherein the polymer is a blend of polyethylene and polyisobutylene.

4. The cap of claim **1**, wherein the polymer is 40 to 85% polyethylene and the remainder is substantially polyisobutylene.

5. The product of claim **1**, wherein the polymer is a blend of about 70% high density polyethylene and about 30% polyisobutylene.

6. The cap of claim **2**, wherein the polymer has been biaxially oriented.

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