July 27, 1943. H. G. VORE 2,325,168

BOTTLE CAP

Filed April 30, 1941

Fig. 1

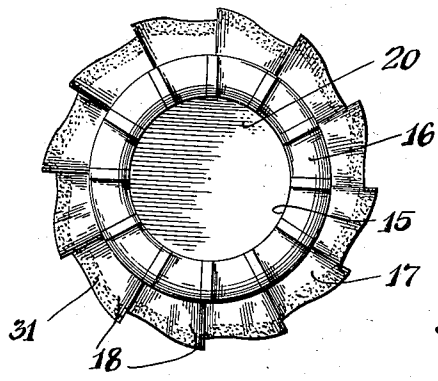


Fig. 3

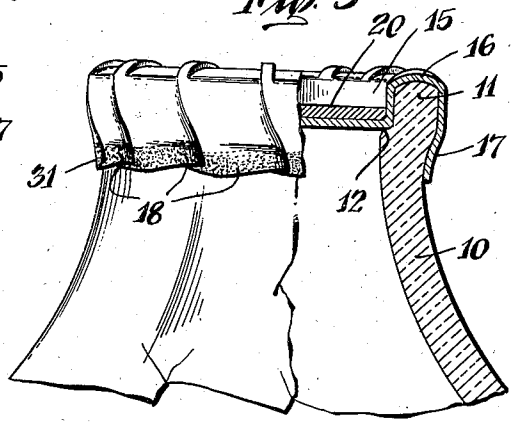


Fig. 2

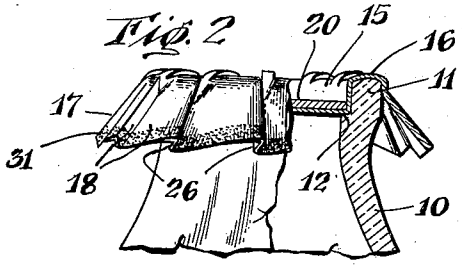
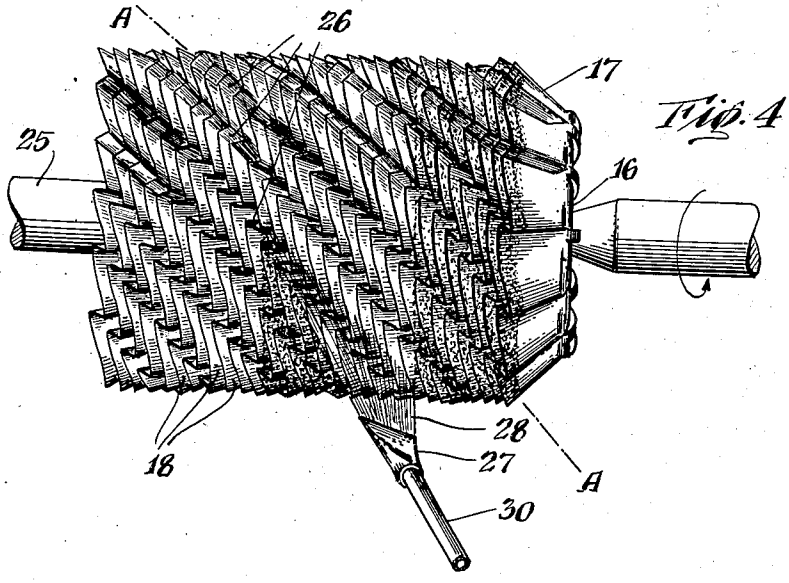


Fig. 4



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BOTTLE CAP

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Application April 30, 1941, Serial No. 391,125

1 Claim. (Cl. 215—38)

This invention relates to bottle caps and more particularly to a partially preformed hood cap for milk bottles or the like.

An object of the invention is to provide a cap of the above type having novel and improved characteristics.

Another object is to provide a hood cap of the above type having a pleated skirt, the folds of which are sealed by a thermoplastic adhesive having novel and improved characteristics.

Another object is to provide a hood cap of the type above indicated having a portion of its skirt coated with a thermoplastic adhesive.

Another object is to provide a cap of the above type having a thermoplastic adhesive coating which is sealable at a comparatively low sealing temperature.

Various other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

Although the novel features which are believed to be characteristic of this invention are pointed out more particularly in the claim appended hereto, the invention itself may be better understood by referring to the following description, taken in connection with the accompanying drawing in which a specific embodiment thereof has been set forth for purposes of illustration.

In the drawing,

Fig. 1 is a top plan view of a cap embodying the present invention;

Fig. 2 is a side elevation of the cap in position on a milk bottle prior to the sealing operation;

Fig. 3 is a side elevation showing the finished cap in position on the milk bottle with the pleats sealed together; and

Fig. 4 is a diagrammatic view showing the method of applying the adhesive to a stack of caps.

In the following description and in the claim certain specific terms have been used for convenience in referring to various details of the invention. These terms, however, are to be given as broad an interpretation as the state of the art will permit.

Referring to the drawing more in detail, the invention is shown as applied to a cap for a standard milk bottle having a neck 10, a pouring lip 11 and an internal ledge 12 adapted to receive a closure disc or the like.

In accordance with the present invention, the cap is made from a water resistant paper or other fibrous material which is sufficiently stiff and rigid to be self-supporting and moldable for preforming. The paper blank may be first conditioned and waterproofed by treatment in a wax bath, such, for example, as a bath of paraffin wax having a suitable anti-oxidant to prevent the bath from oxidizing after long continued use. The blank may be first moistened and then immersed in the wax bath at a temperature suited to drive off the moisture and cause the wax to be absorbed into the fibres. After a suitable treatment of the above type, the blanks may be removed from the wax bath, cooled and stored for a sufficient period of time to cause the wax to set or to be uniformly distributed through the fibres. The blank as thus formed is water-resistant and is sufficiently pliable for the forming operation to be described. It is to be understood, however, that the conditioning of the blank above mentioned forms no part of the present invention and that the blank may be conditioned by other suitable processes.

The conditioned blanks are then partially preformed in a suitable forming press to provide a central bore closing portion 15 adapted to seat within the pouring lip 11 of the bottle cap on the internal ledge 12 thereof, a U-shaped pouring lip housing 16 joined to the central bore-closing portion 15 and adapted to cover the pouring lip of the bottle 11, and an outer flared depending skirt 17.

The skirt 17 is formed with a plurality of folds or pleats 18 which extend outwardly beyond the pouring lip housing 16 and are adapted to be folded downwardly around the outer surface of the bottle neck and sealed after the cap has been positioned thereon. A disc 20 may be seated within the bore closing portion 15 of the cap to impart additional strength and rigidity thereto and to facilitate the seating of the central bore closing portion of the cap on the ledge 12 of the bottle.

In order to secure the folds or pleats 18 to each other, I provide a thermoplastic adhesive coating of the type hereinafter specified. This coating may be applied to the entire cap or to the blank if desired. I prefer, however, to apply the coating only to a portion of the outer surface of the cap skirt, for example, as an annular band around the lower portion of said skirt.

The coating is preferably of the type which will only adhere to another surface having the same coating so that the pleats, when folded over, will adhere together but will not adhere to the glass of the bottle or to an uncoated surface such as the skirt of another cap. By thus

coating the outer surfaces of the skirts only, the caps may be stacked, as shown in Fig. 4, without danger of sticking together because the adhesive on the outer surface of the skirt of one cap will not adhere to the uncoated inner surface of the skirt of the next adjacent cap.

The entire surface of the skirt 17 may, of course, be coated. I prefer, however, to apply the coating only in the form of a band around the exposed edge thereof. This facilitates the handling of the cap and also reduces the quantity of adhesive which is required.

In accordance with my invention, I propose to apply the adhesive in the form of a spray to the exposed portions of the skirts of the stack of caps as shown in Fig. 4. For this purpose, the caps are stacked and nested with the pleats in substantial registration and with the line of nested pleats extending helically around the stack of caps, as indicated by the line A—A of Fig. 4. I then support the stack of caps by suitable means shown as pins 25 and rotate the same rapidly about their axis in the direction of the exposed fold 26 between adjacent pleats, as indicated by the arrow in Fig. 4.

While the stack of caps is thus rotating, I apply the adhesive thereto in the form of a spray as, for example, from a nozzle 27. The nozzle 27 is preferably so designed that the spray 28 fans out in the shape of a thin extended layer.

In coating the skirt the nozzle 27 may be moved longitudinally of the rotating stack of caps either manually or by suitable mechanical means not shown. During this movement the nozzle should be maintained in a position such that the spray is applied in a direction about normal to the face of skirts 17 as, for example, an angle indicated by the inclination of the pipe 30 of Fig. 4. At the same time the spray should be positioned to enter into the folds 26 between adjacent pleats 18 of the skirt and with the plane of the spray 28 extending substantially parallel to the line A—A of the nested pleats. In this way the spray is driven into the folds as the stack of caps is rotated and is caused to adhere particularly to the portions of the cap which are to be folded over for securing the same. The spray also forms a band 31 of adhesive extending completely around the lower portion of the outer surface of the skirt of the cap.

The nozzle should be held normal to the surface of the pleats so as to prevent the spray from being driven up between the stacked skirts and thereby tending to cause adjoining caps to stick together and in order to prevent the liquid from running from one skirt to the next and forming an adhesive film therebetween. It is to be understood, however, that the angle of the spray and the direction of rotation of the caps may be varied in accordance with the particular adhesive used and with the particular requirements of any specific case.

In order to facilitate the subsequent heat sealing of the caps, I prefer to use a thermoplastic adhesive having a low sealing temperature so that it can be readily softened by the application of a slight amount of heat and is permanently sealed by heat and pressure. I have found that isomerized rubber (Pliolite) or Pliolite and rubber are particularly suited for the above purpose. Various other adhesives having similar properties, such as chlorinated rubber and polybutenes may also be employed.

The adhesive may be dissolved in a suitable solvent and may, if desired, have a dye incorporated therewith so as to form a colored band around the cap skirt. I have found that the sealing temperature of the isomerized rubber or the like may be controlled or reduced as desired by the addition of a plasticizer which is soluble in the isomerized rubber. Such a plasticizer may comprise various mixtures of paraffin wax, ceresin or an amorphous petroleum and hydrogenated rosin, a terpene polymer resin or other resin which is soluble in the Pliolite.

As a specific example, I have used a composition consisting of Pliolite 100 parts, paraffin wax 12½ parts and hydrogenated rosin (staybelite) 25 parts. This mixture is completely stable and has the property of softening at a low temperature, yet it is sufficiently hard at room temperature to prevent the caps from becoming sticky and thereby interfering with the handling or shipping thereof.

This composition may be dissolved in a suitable solvent, which is also a solvent for paraffin wax so that when applied to the wax treated caps the solvent dissolves away a sufficient portion of the paraffin wax coating from the surface of the cap to permit the adhesive to become firmly bonded thereto.

I have found that a petroleum distillate boiling between 150° F. and 200° F. possesses these characteristics. Such a distillate may comprise principally hexane together with various other constituents. Various other solvents may be used, however, such, for example, as benzene, carbon tetrachloride, toluene and the like.

A suitable anti-oxidant should be added to the above composition to prevent the composition from losing its heat sealing properties as the result of oxidation. Such an anti-oxidant may comprise, for example, tannic acid, hydroquinone, aniline, acetaldehyde or other well known rubber anti-oxidant.

If a colored dye is desired various non-toxic dyes may be added to the composition. Examples of such dyes are the following:

Sudanyellow—aniline azo-B-naphthol
Sudanred—aminoazobenzeneazo-B-naphthol
Aniline black—nigrosine
Tartrazine—a yellow pyrazolone dye

The solution should be sufficiently thin to prevent formation of webs or strings between the various folds or pleats on the caps and should be thick enough so as not to run on the skirt. Obviously, it should be made homogeneous and suited to use with a standard spray nozzle.

After a stack of caps has been treated as above indicated, to spray a film of adhesive to the lower portions of the overlapped skirts, the material may be allowed to set and then, if desired, the stack of caps may be squeezed together endwise so as to reduce the over-all dimension of the stack and also to break any bond which may have been formed between adjacent caps. In this way the caps in the stack are completely separated and adapted to be fed to a suitable capping head. The caps may be shipped in this form and in the dairy may be applied to the bottles and heat sealed to form a finished cap of the type shown in Fig. 3.

Although a specific embodiment of the invention has been set forth for purposes of illustration, it is to be understood that various changes and alterations may be made therein as will be apparent to a person skilled in the art. The in-

vention is only to be limited in accordance with the following claim.

What is claimed is:

A milk bottle cap formed from a paper blank, said cap comprising a bore closing portion and a pleated skirt extending downwardly around the outer surface of the pouring lip of the bottle, at least the skirt portion of said cap having a coating comprising isomerized rubber, paraffin and a hydrogenated rosin having thermoplastic properties, in about the following proportion:

	Parts
Isomerized rubber	100
Paraffin wax	12½
Hydrogenated rosin	25

HERBERT G. VORE.