Nov. 14, 1939. H. F. KNIESCHE 2,180,243

METHOD OF MAKING A BOTTLE SEALING CAP

Original Filed Oct. 11, 1932

Fig. 1.

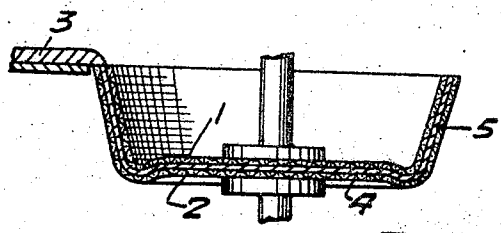


Fig. 2.

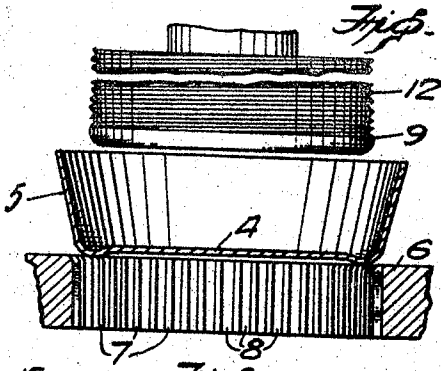


Fig. 3.

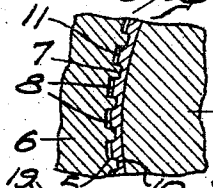


Fig. 9.

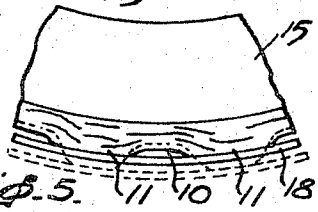


Fig. 4.

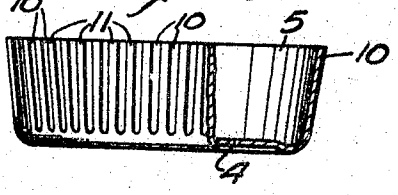


Fig. 5.

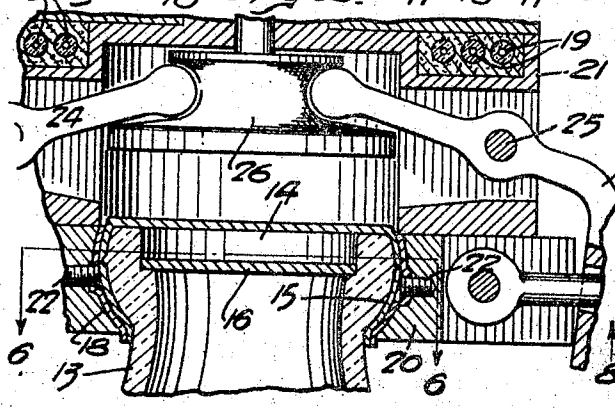


Fig. 7.

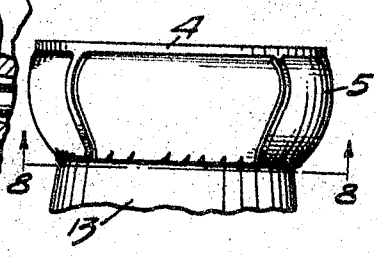


Fig. 6.

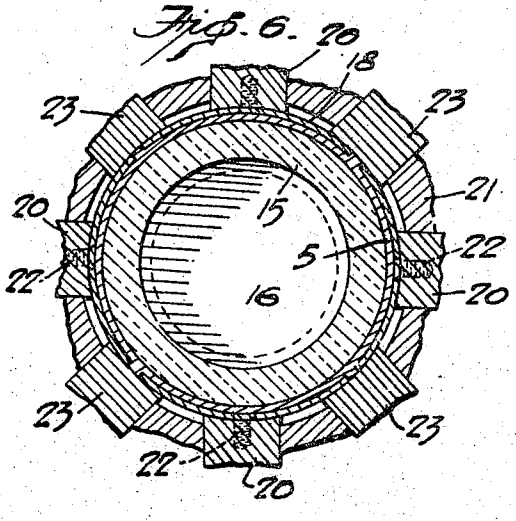
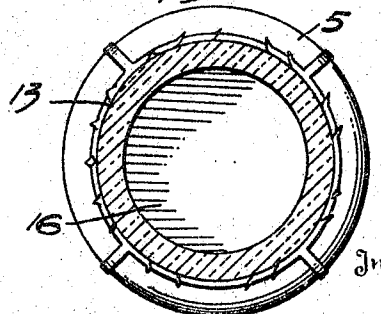


Fig. 8.



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METHOD OF MAKING A BOTTLE SEALING CAP

Harry F. Kniesche, Baltimore, Md.

Original application October 11, 1932, Serial No. 637,308. Divided and this application January 9, 1939, Serial No. 250,070

2 Claims. (Cl. 93—48)

The present invention relates to a method of making a bottle sealing cap and more especially a sealing cap for the mouth of a milk bottle and composed of paper or similar fibrous material, the present application being a division of my prior application Serial No. 637,308 filed October 11, 1932.

The primary object of the present invention is to provide a method of making a cap of this character which is so formed that it may be placed on the lip of the bottle mouth and molded so that it will fit smoothly and intimately against and around such lip and will be locked thereon by the inherent properties of the material composing the cap, thereby precluding the presence of crevices or other spaces between it and the lip which might admit or permit the lodgment of bacteria or other unsanitary matter, so that the sealing cap will maintain the bottle mouth and lip in a clean and sanitary condition.

A further object of the invention is to provide a method of making a cap of this character whereby the cap can be manufactured inexpensively and can be affixed rapidly and with facility to the bottle mouth by a relatively simple means.

To these and other ends, the invention consists of certain features which will be hereinafter more fully described and claimed.

In the accompanying drawing:

Fig. 1 is a diagrammatic view showing the preferred manner of molding a sealing cap according to the present invention;

Fig. 2 is a diagrammatic view showing dies suitable for compressing the flange of the molded cap at intervals around its circumference;

Fig. 3 is a fragmentary sectional view, on an enlarged scale, taken through portions of the dies shown in Fig. 2, showing the manner in which the flange of the cap is compressed thereby at intervals around its circumference;

Fig. 4 is a view of the cap, partly in section, showing its condition after being acted upon by the dies shown in Fig. 2;

Fig. 5 is a vertical section through the mouth of a milk bottle and means for remolding or affixing the sealing cap upon the bottle;

Fig. 6 is a section taken on the line 6—6 in Fig. 5;

Fig. 7 is an elevation of the neck or upper end of a bottle, showing the sealing cap molded and locked thereon;

Fig. 8 is a section taken on the line 8—8 in Fig. 7; and

Fig. 9 is a diagrammatic view, on an enlarged scale, showing the manner in which the fibrous structure of the flange of the sealing cap is altered during the molding thereof upon the lip of the bottle.

Similar parts are designated by the same reference characters in the several figures.

The method of making a bottle sealing cap, according to the present invention, preferably comprises molding the cap to approximately its finished form from paper pulp such for example as that commonly used for making seamless paper articles, or from similar fibrous material. As shown for example in Fig. 1, a pair of wire mesh or other foraminous mold members 1 and 2 having approximately the form of the cap to be molded may be pressed together upon a body or layer 3 of wet or moist and relatively loose paper pulp which may be produced in any well known manner, the portion of the pulp between the mold members being squeezed to press therefrom the excess water or moisture and to reduce the same to the desired thickness of the cap, the cap thus formed having a disc-like portion 4 and a surrounding annular flange 5 of a diameter to fit over the lip of the bottle mouth, this flange being conical or flaring toward its free edge to facilitate manufacture of the cap and enable nesting of the caps for shipment to the point of application.

The cap, molded in the manner described, after partial or complete drying thereof, is subjected to an action which compresses portions of its flange spaced circumferentially thereof, leaving the intervening portions of the flange uncompressed. This action is preferably performed by the means shown in Fig. 2 wherein 6 is a female die the opening in which is fluted to form ribs 7 which extend parallel to the axis of the opening and are spaced around its circumference, forming grooves 8 between them, and 9 represents a male die or plunger which operates through the opening in the die 6. The die 9 is of such a diameter that the clearance between it and the inner surfaces of the ribs 7 is less than the thickness of the flange of the cap so that when the cap is placed between the dies as shown in Fig. 2 and the die 9 is forced through the die 6, the flange 5 of the cap will be compressed between the inwardly projecting ribs 7 in the die 6 and the periphery of the die 9, thereby causing the flange of the cap to be compressed or reduced in thickness on the lines 10 which are spaced circumferentially around the flange, leaving intervening uncompressed areas 11 in the portions of the flange which were accommodated by the grooves 8 in the die 6 as shown in Fig. 3, these alter-

nately compressed and uncompressed areas thus formed in the flange extending transversely of its circumference or approximately parallel to the axis of the cap. In order to avoid breakage of the cap while it is being forced through the die 6, the die or plunger 9 is preferably formed with a circumferentially extending screw thread 12 to bear against the inner side of the flange of the cap and thereby grip it substantially throughout its area, thereby assisting the end of the plunger in forcing the cap through the die. Fig. 4 shows the form of the cap after it has been thus acted upon by the dies 6 and 9, the alternately arranged compressed and uncompressed portions 10 and 11 in its flange forming flutes therein.

The fluted cap, made by the method provided by the present invention, is capable of being affixed to the bottle by molding the flange of the cap upon the lip surrounding the mouth of the bottle, and such molding of the cap upon the bottle may be accomplished by relatively simple means such for example as that disclosed in my prior Patent No. 1,965,550 granted July 3, 1934, and a portion of which means is herein shown. In the present instance, 13 represents the upper end or neck of an ordinary milk bottle the mouth 14 of which is surrounded as usual by an annular lip 15 which is convexed outwardly in vertical section so that the lower portion of this lip where it joins the bottle neck will be of reduced diameter relatively to the upper portion of this lip. The bottle, which is filled at the time the sealing cap is applied, may be closed by the usual closing disk 16 which may be pressed as usual in the recessed mouth of the bottle. After the cap, in the form shown in Fig. 4, is placed over the the bottle mouth so that its disc-like portion rests upon the top edge of the bottle and its flange extends downwardly around the lip 15, an annularly arranged set of pressure applying springs 18 are simultaneously forced inwardly against the flange of the cap, the cap having been moistened with water either before or after being placed on the bottle so as to soften somewhat the pulp or fibrous material composing it, and while the pressure is applied to the flange of the cap by the springs 18, heat is also applied to expel moisture from the pulp or fibrous material composing the flange and thus assist in imparting a permanent set to the flange. The springs 18 are each segmental in form so that they collectively form a substantially complete circle around the flange of the cap and the lip of the bottle, and each of these springs is concave on its inner surface in a plane transverse to its circumferential length to conform with the outwardly convexed contour of the bottle lip 15. Therefore, forcing of the springs 18 simultaneously inwardly against and entirely around the flange of the cap applied over the lip 15 of the bottle will cause the flange of the cap to be molded upon and around the lip 15 and to assume a contour which conforms with that of the lip, the lower edge of the flange of the cap being pressed inwardly so that it underlies the outwardly projecting portion of the bottle lip and thereby becomes locked thereon. The diameter or circumferential extent of the lower portion of the flange of the cap is reduced to enable it to thus underlie or lock beneath the lip 15 of the bottle, and such reduction in the diameter or circumferential extent of the flange of the cap is facilitated or made possible by the previous formation of the alternately arranged compressed and uncompressed portions 10 and 11 spaced in the direction of the circumference of the flange. The simultaneouss inward pressure exerted on the flange of the cap by the surrounding pressure-applying springs or members 18 causes radially inward pressure to be applied to the projecting uncompressed portions 11 of the flange and also imposes a circumferential compression upon the flange tending to contract its diameter or circumferential extent, and these forces thus set up in the pulp or fibrous material composing the flange cause the fibers from the relatively thicker uncompressed portions 11 to slide or shift into interlapping positions between the fibers in the adjacent compressed portions 10 of the flange, thus increasing the thickness of such compressed portions, as will be seen from the diagram, Fig. 9, which represents the condition of the flange of the cap at an intermediate point in the molding thereof upon the bottle lip, this relative shifting of the fibers composing the flange of the cap reducing its diameter or circumferential extent so that it contracts toward or against the lip 15 of the bottle, and upon completion of this molding action, the flange of the cap will be molded intimately against the bottle lip 15 so that it conforms exactly with the shape thereof and extends under the outwardly convexed portion thereof so that the sealing cap will be firmly locked upon the lip. Since the lip 15 of the bottle is smooth, the inner surface of the flange of the cap will be molded smoothly against it, and since the inner or flange engaging faces of the springs or pressure applying members 18 are smooth, the outer surface of the flange of the cap, when the molding thereof upon the bottle has been completed, will be smooth and will have substantially the appearance shown in Fig. 7, the compressed and uncompressed portions 10 and 11 of the flange being brought by the molding operation to the same thickness so that the wall of the flange of the cap, after being molded on the bottle, will be of substantially uniform thickness.

The rearranging of the fibers composing the flange of the cap, during the molding thereof upon the bottle lip, is factilitated by the moist condition of the pulp or fibrous material composing the flange and during the molding of the flange of the cap upon the bottle, heat is applied thereto, as by an electrical heating coil 19 which may be placed in a head 21 containing the pressure applying members 18 so as to maintain them in a heated condition, the heat thus applied serving to expel moisture from the flange of the cap and to thereby impart a permanent set to the flange molded on the bottle lip.

The springs or pressure applying members 18 may be simultaneously forced radially inwardly by the means shown in my prior patent herein- before referred to, comprising a set of plungers 20 slidable radially in the hear 21 and each having the middle of one of the springs 18 attached thereto as by a screw 22, and another set of plungers 23 slidable radially in the head 21 between the plungers 20 and slidably bearing against and overlapping the adjacent ends of the respective springs or pressure applying members 18, all of the plungers 20 and 23 being simultaneously forced inwardly by a set of levers 24 pivoted to the head 21 at 25 and all engaging an actuator 26 which is held stationary while the head 21 is lowered over the bottle mouth as in said prior paeent, so that the members 18 will be pressed inwardly evenly or with equal pressure

around the flange of the cap and the bottle lip. Spaces left between the ends of adjacent springs 18 compensate for the reduction in diameter or circumferential extent of the flange of the cap under the molding action thereon produced by these springs.

The bottle sealing cap provided by the method according to the present invention is capable of being applied or affixed to the bottle so that it effectively seals the bottle from malicious tampering with its contents since the cap may be permanently molded on the bottle lip and securely locked thereon by the flange of the cap which extends beneath the outwardly convexed portion of the bottle lip. Removal of the seal from the bottle by the user may be accomplished easily by a twisting and lifting force applied thereto by the hand, but removal of the sealing cap causes splitting or breaking of the flange of the cap in order that the lower portion of the flange of the cap may pass over the upper portion of the lip which is of relatively greater diameter. Therefore, removal of the cap for the purpose of tampering with the contents of the bottle would lead to immediate detection, the consequent splitting or mutilation of the flange of the cap being plainly apparent. Since the flange of the cap covers the entire lip of the bottle and extends to its junction with the neck of the bottle, the flange of the cap serves as a covering for the bottle lip so that bacteria or other unsanitary matter cannot reach or lodge upon the bottle lip and hence milk or other contents poured from the bottle will not be contaminated. Furthermore, the sealing cap molded on the bottle is locked thereon by the inherent properties of the pulp or fibrous material composing the flange of the cap, thus rendering it unnecessary to use binding wire or other fastening means which is difficult to apply and remove and is otherwise objectionable. The improved sealing caps made according to the method provided by the present invention may, if desired, be made waterproof by mixing or otherwise incorporating paraffin or other suitable waterproofing material with the pulp or fibrous material, and when paraffin is so used, it will preclude adhering of the pressure applying members to the flange of the cap incident to the molding thereof upon the bottle lip.

The herein described method of making sealing caps according to the present invention enables such caps to be produced inexpensively and with facility, and the molding of the caps upon the bottle lips may be accomplished readily and inexpensively by relatively simple means.

The cap made or prepared according to the method hereindescribed is claimed in my copending application Ser. No. 250,069 filed Jan. 9, 1939.

The method of applying or affixing the cap to a bottle or other container and the cap so applied are claimed in my prior application Ser. No. 637,308 now Patent No. 2,169,804, granted Aug. 15, 1939, of which this application is a division.

I claim as my invention:

1. The method of preparing a fibrous bottle sealing cap having a flange adapted for application to the rim of a bottle mouth, which comprises compressing the flange of the cap at intervals spaced circumferentially thereof, leaving intervening uncompressed portions of the flange of greater thickness than the compressed portions thereof.

2. The method of preparing a fibrous cap for application to the mouth of a bottle, which comprises forcing the cap having a flange portion thereon, through a die having ridges thereon parallel to the direction of motion of the cap through the die, thus compressing the flange portion of the cap at intervals spaced circumferentially thereof, leaving intervening uncompressed sections of the flange portion of greater thickness than the compressed sections thereof.

HARRY F. KNIESCHE.