Sept. 14, 1926. 1,600,109

R. A. GLEASON ET AL

BOTTLE CAP

Filed April 19, 1926 2 Sheets-Sheet 1

Fig. 1.

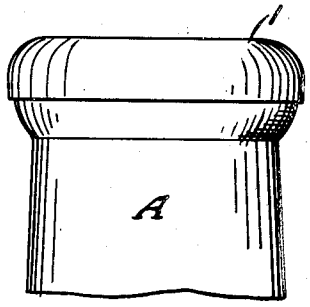


Fig. 2.

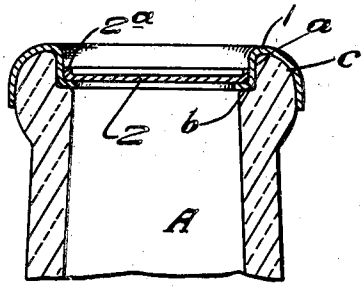


Fig. 4.

Fig. 3.

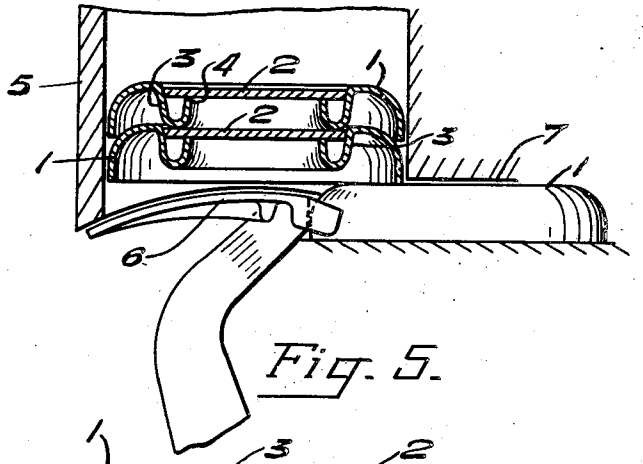


Fig. 5.

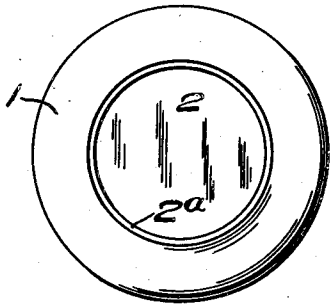
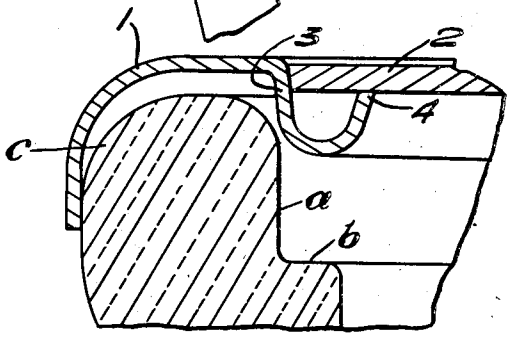
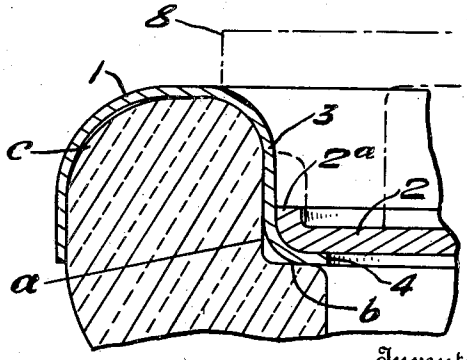


Fig. 6.





Inventor
Ralph A. Gleason
Otto W. Dieffenbach
By Adams L. Norris
Attorney

Sept. 14, 1926. 1,600,109

R. A. GLEASON ET AL

BOTTLE CAP

Filed April 19, 1926 2 Sheets-Sheet 2

Fig. 7.

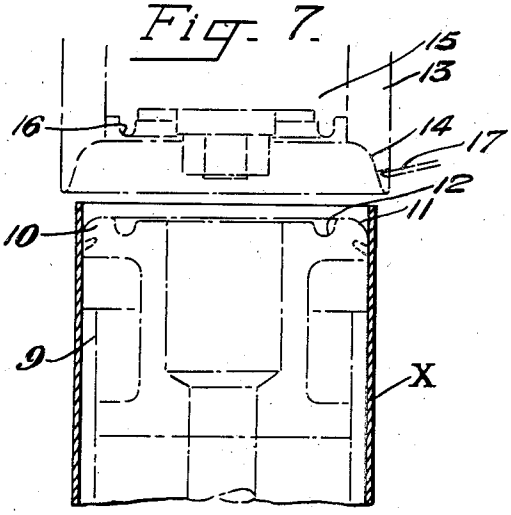


Fig. 10.

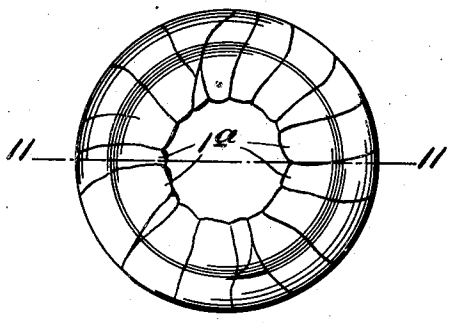


Fig. 8.

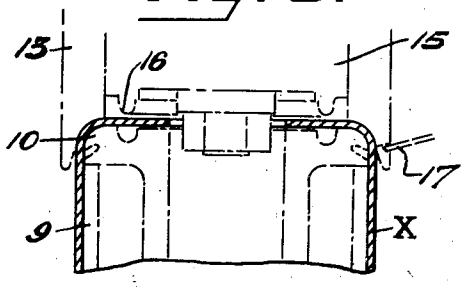


Fig. 11.

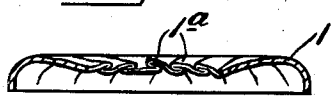


Fig. 9.

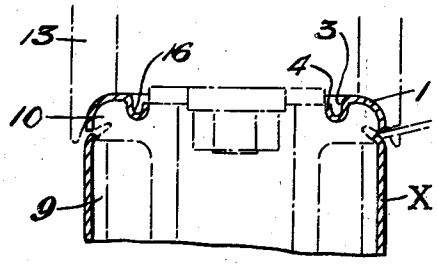
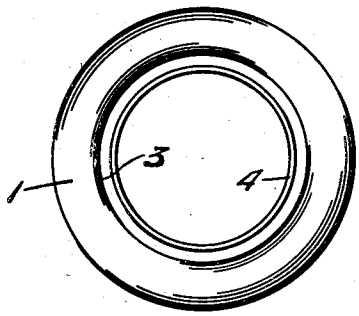


Fig. 12.



Inventor
Ralph A. Gleason
Otto W. Dieffenbach

By Anna L. Norris
Attorney

Patented Sept. 14, 1926. 1,600,109

UNITED STATES PATENT OFFICE.

RALPH A. GLEASON AND OTTO W. DIEFFENBACH, OF BALTIMORE, MARYLAND.

BOTTLE CAP.

Application filed April 19, 1926. Serial No. 103,039.

The present invention relates to improvements in closures for bottles and other receptacles, and more particularly to caps composed of paper or like material and adapted for application to milk bottles having mouths of the usual or conventional form.

An object of the invention is to provide a novel and improved cap or closure of this kind which embodies a central or inner portion of such strength as to enable it to fit securely into the bottle mouth and to effectively withstand forces produced by the action of the liquid in the bottle or by other causes tending to accidentally loosen or dislodge it.

Another object of the invention is to provide a cap or closure of this character which has a marginal or surrounding portion to fit over and thus cover and protect the lip of the bottle mouth, the construction of the cap, however, being such that a large number of caps may be stacked in superposed relation and placed in a cap-feeding device and the lowermost cap will be capable of feeding edgewise from the bottom of the stack without interference from the cap or caps above it, nesting of the caps, one within the other, and which would prevent such feeding of the caps, being avoided. This characteristic of the improved caps enables them to be fed easily and by simple mechanism to a bottle-capping mechanism.

A further object of the invention is to provide a novel and improved cap of this general class which can be manufactured inexpensively and with facility from a relatively small amount of paper or other suitable material, and which will be capable of effectively closing the bottle mouth and of covering and retaining the lip of the bottle mouth in sanitary condition.

To these and other ends, the invention consists of certain improvements which will be hereinafter more fully set forth, the features of novelty being pointed out particularly in the claims at the end of the specification.

In the accompanying drawings:—

Figure 1 is a side elevation of the mouth of a milk bottle having a cap constructed in accordance with the present invention applied thereto;

Figure 2 represents a vertical section taken centrally through the bottle mouth and cap shown in Figure 1;

Figure 3 is a top plan view of the cap as shown in Figures 1 and 2;

Figure 4 is a diagrammatic view illustrating the manner in which caps embodying the present invention may be stacked in superposed relation without nesting and the lowermost cap may be fed edgewise from the stack;

Figure 5 is a fragmentary sectional view on an enlarged scale of a portion of the bottle mouth and the cap showing the form of the cap and its relationship with the bottle mouth at the time the cap is placed on the bottle mouth;

Figure 6 is a view similar to Figure 5, but showing the shape of the cap and its relationship with the bottle mouth after it has been affixed or applied thereto;

Figures 7, 8 and 9 are diagrammatic views showing successive steps in the preferred method of making bottle caps embodying the present invention;

Figure 10 is a top plan view of one of the caps illustrating the manner in which its central or inner portion is laminated at an intermediate stage in its manufacture;

Figure 11 represents a cross-section through the partially completed cap shown in Figure 10, the section being taken on the line 11—11 of Figure 10;

Figure 12 is a top plan view of the completed or finished cap before the closing disk has been applied thereto.

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

Caps or closures embodying the present invention are applicable generally to receptacles where easily applied and quickly removable caps or closures are desired although the invention is particularly applicable to caps for milk bottles of the conventional type having an annular recess and adjacent seat formed in the mouth thereof. Heretofore it has been usual to close such bottles by presssing a flat disk of paper into the annular groove and against the seat at the bottom thereof, but such closures did not cover and thus retain the surrounding lip of the mouth in sanitary condition, they were difficult to remove without splashing milk from the bottle, they were likely to become dislodged and thus allow the contents to escape if the bottle were overturned, and they presented other well-known objections. The preferred embodiment of the present invention, which overcomes all of the objections

to the ordinary disk form of closure and possesses additional advantages thereover, is shown in the accompanying drawings and will be hereinafter described in detail, but it is to be understood that the invention is not restricted to the precise construction shown as equivalent constructions are contemplated, and such will be included within the scope of the claims.

The improved closure, as shown in the present instance, is formed in two parts, that is, it comprises a member 1 adapted to fit the bottle mouth and a cooperative disk or similar closing member 2. The cap is shown in the present instance as adapted for application to a milk bottle A having a mouth of the usual or conventional form, such bottles being usually formed within the mouth with an annular substantially cylindrical recess *a* having a seat or shoulder *b* at the bottom thereof, and the bottle mouth is surrounded by a lip *c*, which is usually rounded substantially as shown.

The cap prior to its application to the bottle has substantially the form shown in Figures 4 and 5. The marginal portion of the member 1 is curved transversely to approximately conform with the curvature of the lip of the bottle mouth while the inner portion of this member is formed with a substantially tubular part 3, the outer diameter of which approximates that of the groove or recess *a* in the bottle mouth. This tubular part may be substantially cylindrical, although it is preferably tapered somewhat as shown in Figure 5 to give it a conical form. This tubular part is of an axial length or depth less than that of the depth of the curve or recess *a* in the bottle mouth, this tubular part being doubled or curved inwardly so that its edge 4 projects upwardly and forms an annular ledge. The disk or closing member 2, prior to the affixing of the cap on the bottle mouth, fits into the upper portion of the tubular part 3 so that its upper surface is substantially flush with the top of the outer member 1, the edge 4 being so positioned with respect to the thickness of the disk 2 that it engages the under side of the disk while the disk is in such position and provides a supporting ledge therefor. The disk 2 is thus retained in the outer member 1 and is held against undue displacement below the top of the member 1 prior to the affixing of the cap to the bottle.

Caps constructed as described are capable of being stacked in superposed relation without nesting or sticking together. As shown in Figure 4, the doubled or re-curved edge of the tubular part 3 of each cap will rest on the upper surface of the disk 2 of the cap below it, and this disk is supported by the ledge 4 so that its upper surface is substantially flush with the top of the outer member 1 of the cap. Consequently, each cap may be removed from the bottom of the stack by an edgewise displacement thereof as the cap above it will be supported in such a position that its marginal edge will occupy a position near the upper curved portion of the part 1 of the lowermost cap and, hence, will not catch upon or otherwise interfere with the edgewise displacement of the lowermost cap incident to its removal from the bottom of the stack. This feature of the present invention enables the caps to be supplied to a bottle capping mechanism by a simple cap feeder which may embody a tubular magazine 5 in which a stack of the caps may be placed, an ejector 6 which may swing across the bottom of the magazine to successively remove the lowermost caps, and a channel 7 through which the ejector advances the caps to the bottle capper. It will be understood that while the caps are in superposed relation in a stack, the disks or closing members of the caps will be retained in proper relation with the respective marginal members of the caps, due to the pressure of the marginal member of each cap upon the disk of the cap next below it.

A cap constructed as described, when fed to the bottle mouth, will rest thereon substantially as shown in Figure 5, the outer periphery edge of the downwardly curved marginal member 1 extending downwardly along the side of the lip of the bottle and centering the cap thereon. The affixing of the cap to the bottle mouth may be effected by any suitable means whereby the marginal member 1 is seated on the lip of the bottle and the disk 2 is forced downwardly in the annular recess *a* in the bottle mouth until seated. This operation may be effected by a plunger of somewhat less diameter than the initial diameter of the disk 2, this plunger being indicated diagrammatically at 8 in Figure 6. As the disk is forced downwardly, it draws the tubular part 3 of the outer member 1 downwardly, thereby exerting a tension on this part which draws it into close fitting relationship with the inner curved surface of the bottle lip, and as the downward displacement of the disk continues, the re-curved or inwardly doubled portion of the tubular part will be unrolled or unfolded while it is pressed firmly outwardly against the surrounding wall of the recess *a*, and when the disk reaches the limit of its downward movement, the inner edge of the tubular portion will be turned inwardly, and it will be gripped between the shoulder or seat *b* and the bottom of the disk 2 forming a liquid-tight joint around the seat. The disk 2 preferably is of a diameter which equals or nearly equals that of the annular recess *a*, so that when the disk is forced into place, its peripheral

edge will be turned up or turned back as indicated at 2^a by reason of the thickness of the tubular part 3 which intervenes the edge of the disk and the surrounding wall of the groove or recess *a*. The consequent pressure imposed upon the tubular part 3 by this turned-up or turned-back edge 2^a of the disk, which has a tendency to resume its original flat form, presses the tubular part 3 firmly against the surrounding wall of the recess *a*, and thereby secures the cap firmly in place, so that it will resist forces tending to displace or dislodge the cap, and, moreover, a liquid-tight joint will be formed around the periphery of the disk. While a cap constructed as described and applied to a bottle in the manner set forth is firmly affixed to the bottle, it can be quickly removed when the contents of the bottle are to be used, by merely gripping the outer peripheral edge of the member 1 with the fingers and pulling the same upwardly.

The improved caps may be formed of different materials, although it is preferable to make them of paraffine-impregnated paper similar to that generally used in making the ordinary closures of disk form, and the present invention provides a cap of the improved construction hereinbefore described wherein the inner or tubular part 3 of the member 1 of increased strength relatively to the remainder or marginal portion of this member, so that the portion of the member 1 which secures the cap to the bottle and forms the liquid-tight joint therewith is of reinforced strength. This result is attained by forming the outer or peripheral portion of the member 1 which serves primarily to cover and thus protect the outer lip of the bottle, of a single thickness of paper or like material and by forming the inner or securing and joint-forming part of the member 1 of laminations 1^a which are produced by superimposing two or more thicknesses of the paper during the formation of the tubular portion 3. This result may be attained in different ways. It is preferable, however, to attain this result by forming each cap from a section of a tube of paper designated X as this mode of production enables the cap to be formed from a minimum amount of paper and with no waste. The section of the paper tube may be manipulated in different ways to form the member 1, as, for example, by pressing or stamping between suitable dies, or by spinning between dies of appropriate form and which have relative rotary movement.

An example of one mode of forming the cap member 1 is illustrated diagrammatically in Figures 7, 8 and 9 wherein 9 represents part of a mandrel over which the paper tube X may be fed, 10 represents a die which is movable axially of the mandrel and has a curved convex edge 11 to conform with the curvature to be given the lip-engaging portion of this member and a groove 12 which conforms with the shape to be given the re-curved or doubled tubular portion 3 of this member. 13 represents a cooperative die having a concave curved portion 14 to cooperate with the similarly curved but convex portion 11 of the lower die, and 15 is an inner die which is movable axially of the die 13 and is formed with a circular rib 16 which conforms with the interior shape of the re-curved tubular portion 3 of the member 1. In using dies of this kind in making the cap member 1, it is preferable to revolve the dies 13 and 15 while they are in operation. The paper tube X is held so that its upper edge projects a suitable distance above the top of the die 10, and the die 13, which descends in advance of the die 15, engages the upper edge of the paper tube at its convex curved surface 14, and as the descent of the die 13 continues, the edge of the paper tube is crowded inwardly, causing it to become corrugated or wrinkled, and as the descent of the die 13 continues, the lower die 10 recedes or lowers within the paper tube and the inwardly crowded corrugations in the paper tube become more or less superposed or folded, so that they or portions of them overlie one another, substantially as shown in Figures 10 and 11 wherein 1^a designates the laminations. This operation continues so that the inturned portion of the paper tube overlies the groove 12 of the lower die to the proper extent. The die 15 then operates to bring its rib 16 into engagement with the corrugated or folded in-turned portion of the paper and to press it into the groove 12 of the lower die with a pressure sufficient to press the overlying corrugations or folds of the paper into laminated form and to give the resulting tubular portion of the member a substantially uniform thickness around its circumference. By revolving the dies 13 and 15 relatively to the die 10 during the formation of this cap member, a spinning action is produced on the paper during formation of this cap member which densifies the laminated portion and insures uniform thickness thereof throughout its extent, and when paraffined paper is used, as is preferred, the spinning action re-distributes the paraffine in the laminated portion of the paper so as to produce a substantially homogeneous structure of great strength and which is liquid-proof. After the dies 13 and 15 have thus operated to finish the cap, the cap is severed from the remainder of the paper tube X in any suitable way, as by a knife or cutter 17, which may revolve with the die 13 and come into action upon completion of the cap-forming operation.

A bottle cap or closure constructed substantially as hereinbefore described may be

readily fed to a suitable capping device by a simple form of cap feeder wherein the caps may be stacked in superposed relation, the structure of the caps being such that nesting or interlocking of the superposed caps is prevented and, hence, they may be fed from the bottom of the stack by a simple edgewise movement. The cap, when applied to the bottle, extends over the lip thereof to an extent sufficient to cover and maintain it in sanitary condition, and the cap is so affixed to the bottle that accidental displacement or dislodgement thereof is avoided. The manner in which the inner portion of the marginal or outer member of the cap is re-shaped and disposed within the annular recess in the bottle mouth, under the force applied to seat the closing disk insures a secure hold of the cap on the bottle and a liquid-tight seal therewith, the stress under which the disk is maintained when seated serving to retain the disk in place within the outer member of the cap and serving to firmly secure the outer member of the cap to the bottle. By forming the secured portion of the outer member so that it is laminated, this portion of the cap is afforded increased strength and it is rendered relatively hard, dense and non-yielding, and, hence, it will insure the turning up of the peripheral edge of the disk when the latter is applied, so that a secure hold and liquid-tight seal of the cap in the bottle mouth are insured, although the peripheral or marginal portion of the outer member of the cap may be relatively thin or of reduced thickness, and consequently sufficiently pliable or flexible to conform with the lip of the receptacle even though the lip may be out-of-round or otherwise not true. Another advantage obtained with the improved cap is that it is capable of accommodating itself to the mouths of milk bottles or other containers which are out-of-round or otherwise imperfect in shape, the cap being capable of effectively sealing such bottles.

We claim as our invention:—

1. A receptacle closure comprising a disk-like closing member, and a lip-engaging member having a mouth-engaging portion to receive the disk-like member and having a ledge within it and above its lower end to support the disk-like member so that its upper surface is substantially flush with the top of the lip-engaging member.

2. A receptacle closure comprising a disk-like closing member having a flat marginal portion, and a lip-covering member having a central depressed portion within which the flat marginal portion of the disk-like member fits, the lower portion of said depressed portion being offset inwardly from the periphery of the disk-like member, said depressed portion containing a ledge above the bottom thereof which supports the disk-like member so that its upper surface is substantially flush with the top of the lip-covering member.

3. A receptacle closure comprising a disk-like closure member, and a lip-covering member having a central depressed portion within which the peripheral edge of the disk-like member fits, the lower portion of said depressed portion being recurved upwardly and the upper edge of said re-curved portion forming a supporting ledge which engages the under side of the disk-like member.

4. A receptacle closure comprising an outer member fitting over the lip of a receptacle and having an inner portion extending into the annular recess in the mouth of the receptacle and seated against the shoulder at the bottom thereof, and a disk-like closing member forced into the inner portion of the outer member, said disk-like member pressing the inner portion of the outer member against the seat in the receptacle mouth and having an upturned peripheral edge which tends to expand and thereby presses said inner portion against the wall of the annular recess in the receptacle mouth.

5. A receptacle closure comprising a disk-like closing member, and a cooperative member formed from a tube of material and having an outer lip covering portion and an inner portion formed of inwardly gathered and laminated portions of the tube, said inner portion being adapted to receive and secure the closing member and to enter the mouth of the receptacle.

6. A receptacle closure comprising an annular member formed from a tube of material and having an outer lip-engaging portion and an inner relatively depressed portion adapted to enter the receptacle mouth, the wall of said depressed portion being formed of laminations of said material which increase its density, hardness and rigidity relatively to the outer lip-engaging portion, and a disk-like closing member adapted to be forced into the depressed portion of said annular member whereby its peripheral edge will be up-turned by the laminated wall of said depressed portion.

In testimony whereof we have hereunto set our hands.

RALPH A. GLEASON.
OTTO W. DIEFFENBACH.