Nov. 16, 1937. E. T. FERNGREN 2,099,057

TWO PART CONTAINER CONSTRUCTION

Original Filed Dec. 3, 1930

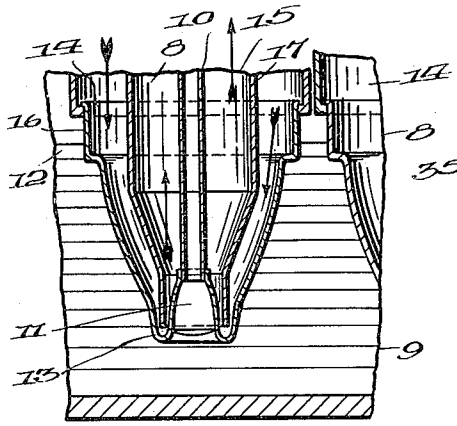


FIG. 1.

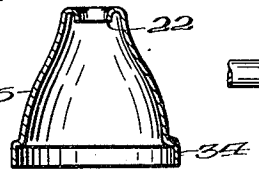


FIG. 3.

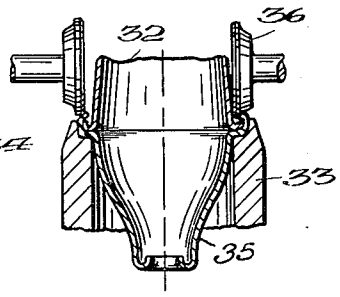


FIG. 5.

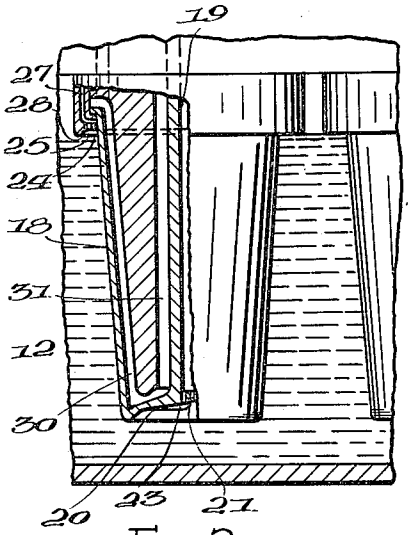


FIG. 2.

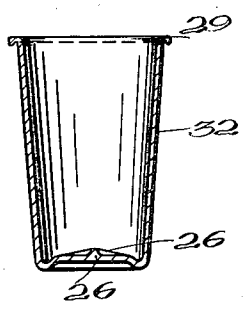


FIG. 4.

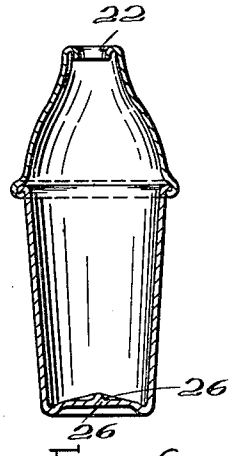


FIG. 6.

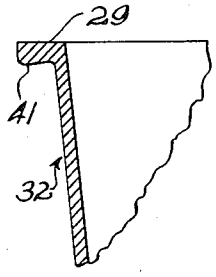


FIG. 8.

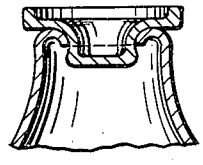


FIG. 7.

INVENTOR

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TWO PART CONTAINER CONSTRUCTION

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Original application December 3, 1930, Serial No. 499,771. Divided and this application August 20, 1932, Serial No. 629,695. Renewed April 8, 1937

16 Claims. (Cl. 229—4.5)

This invention relates to improvements in containers usable for many purposes and of the kind which are formed in separate parts, then shipped preferably in nested packages and assembled at the point of use.

The invention also relates to containers produced from transparent plastic materials, which are reinforced by ribbings and formed complete with finished brim edge.

The invention more specifically relates to improvements in two-part bottles of the kind which may have walls of soft, collapsible nature and be readily collapsed or destroyed after using, but which are still strong enough for use as serviceable containers for carbonated water and like beverages. However, many other types and shapes of two-part bottles and jars, receptacles and other containers may be constructed of the same material or in the same way as the bottle herein disclosed. This invention principally relates to the dip-forming of the above mentioned containers from liquid plastic materials such as solutions of cellulose acetate, nitro-cellulose and other cellulose derivatives. Other plastic compounds may be formed by the addition of different condensation products to cellulose derivatives. Such compounds may be rendered fluid by heat or by heat and solvents in combination. The main requirement is that the material selected be capable of forming clear, transparent films, or in some cases translucent and opaque films on dipping tools or within molding elements, which when solidified by removal of volatile ingredients or by other suitable treatment, will leave a hollow shell of the receptacle structure as herein shown, which may then be removed from the forming implement. Even paper and fibre may enter into the construction of these containers for certain purposes, in which case the fibre structure is intimately embedded and held by the plastic material. Among the objects of the present invention are to provide a relatively soft or collapsible bottle having a desired degree of rigidity in its upper portion. For this purpose, the upper portion of the bottle may be suitably formed from paper plastics or other types of plastic compositions. When paper plastics are used, this portion of the bottle may be suitably embossed or printed with labels or advertising matter. However, in most instances, sufficient rigidity may be imparted to this portion of the bottle by making it of cellulose plastic materials, which also may be decorated, colored, labeled or embossed at the time of manufacture or thereafter. Such materials may be considered preferable to paper plastics because of their transparency and toughness, although exceptions to this rule may be desired for particular purposes or to satisfy particular users.

One of the objects of the invention is to provide a tough, transparent, light-weight bottle structure preferably having relatively stiff walls, which may be collapsible when exposed to outside pressure, but which will be sufficiently strong when held and supported by the material contained. The bottle herein shown is intended to be used for carbonated beverages, where the internal gas pressure greatly assists in making the container exceedingly rigid when in use.

Another object of the invention is to create and provide a bottle as above outlined, which will be suitable for only one use, or one filling, and which will be so cheap as compared to glass bottles, both from the standpoint of its initial cost and the cost of shipping and handling, that the manufacturers and the users or bottlers will be greatly benefited. In this connection, it is also the intention of providing a bottle which will be inherently sterile and clean, having no disagreeable odor or any odor that will contaminate contained food products, thus eliminating the expenses associated with the handling of glass bottles, their recovery, cleaning and sterilization.

One of the objects of the invention is to provide a bottle of cellulose derivative or other material, which will be less liable to breakage than glass bottles of present day use.

With relation to making up the type of bottle herein shown from two separate parts, which the bottlers or users are to unite, the invention provides a simple method of sealing the parts as will hereinafter be more clearly brought out.

In the handling of plastic material by the process of manufacture herein disclosed it is an object of the invention to so act on a plastic film wall when volatile solvents are present therein as to cause a rapid removal of solvents therefrom.

The invention relates to the forming of bottle bodies or other hollow articles by a single coating of a molding implement by the plastic solution, to thereby form a flexible wall of shell-like appearance, which may be a few thousandths of an inch thick, and which is rendered strong, stiff and serviceable by reinforcements, ribbings or otherwise strengthened or thickened portions.

A specific object of the invention is to form the containers with curved, fluted or ribbed wall portions at top, bottom and median sections so as to avoid unnecessary thickness of wall or the excessive use of plastic material therein.

In this connection with relation to procedure

during the dip-forming of the bottom wall portion of the bottle, vacuum action is communicated from within the dipping tool or molding element to the bottom cavity of the dipping tool upon the surface of which the plastic material is being deposited, such cavity having rib-forming recesses extending therefrom into which the liquid plastic material or dope is impelled by the vacuum action. As the solvents (if such be used) are driven from the plastic material held in these grooves, or such material is otherwise solidified, there will be formed rib walls which are integral with, but extend at right angles from, the bottom film wall of the container which is produced from the coating on the dipping tool. These ribs will act to buttress and strengthen the adjacent wall portion of the bottom of the container and will prevent distending or outward bulging when the bottle is loaded or under internal pressure. This type of ribbing will also be serviceable at other points of the bottle and considerably increase the rigidity factor.

Another object resides in forming a strengthening rib or seam around the widest portion of the bottle, or at a point where the two parts are united, the material being such that the separate parts may be firmly welded together by heat and pressure or by the use of a waterproof adhesive alone or in combination with a rolling and folding over movement, by mechanisms suited therefor.

This strengthening rib is formed by uniting the flanges provided at the adjoining ends of the separate bottle portions, and as located prevents the collapse of the bottle from such pressure as may be incidental to handling or packing, and also provides a ridge by which the bottle can be supported during charging and capping operations. The particular relationships of the tapering portions of the wall, both of the top and bottom portions of the bottle forms an exceedingly strong structural unit able to withstand such pressures as are incidental to filling and capping operations, particularly when the bottle is supported from the strengthening rib.

With relation to the forming of a strong and finished lip wall at the mouth of a bottle by a dip-forming operation, it is an object of this invention to establish local control over the movement of the liquid plastic material used at the point of deepest submersion of a forming tool therein by means of variation in fluid pressure, and thereby to govern the flow of the liquid plastic material to create successive alternate advancing and receding movement in the liquid plastic material for depositing successive coatings at the lip, mouth or neck forming faces of the forming element so as locally to increase the strength and thickness at this point of a container.

This sort of treatment is very useful in the forming of rubber articles from latex as this material may be vulcanized in part while being deposited on the forming tool, each successive coating blending with the preceding one to build up a heavier deposit.

This application is a division of my copending application, Serial No. 499,771, filed Dec. 3, 1930.

Other and more specific objects of the present invention will become apparent from the following specification and appended claims when taken in connection with the accompanying drawing, in which:

Figure 1 is a view in central vertical section of a dipping implement for forming the upper portion of a container, the implement being shown in submerged position;

Fig. 2 is a view in elevation with parts broken away and in vertical section of a dipping implement or forming tool for the lower portion of a container, the implement also being shown in submerged position;

Fig. 3 is a view in vertical section of the finished plastic shell which forms the upper part of a container;

Fig. 4 is a similar view of the cup-like body which may form the lower part of a container;

Fig. 5 is a composite view substantially in vertical section illustrating the method of joining the upper and lower parts of a container, the left half of the figure showing the flanges about to be compacted together and the right half, the flanges substantially completely compacted together;

Fig. 6 is a view in central vertical section of the completed bottle or container after the parts thereof have been joined together;

Fig. 7 is a fragmentary view in central vertical section showing the neck portion of a bottle as of the type herein disclosed and a cap suitable for use therewith; and

Fig. 8 is a fragmentary view on an enlarged scale and in vertical section showing the flange of the cup-like lower portion of the container.

In the operation of making a container by dip-forming operations, a forming tool 8 is submerged in a liquid plastic material 9, as indicated in Fig. 1. It is desirable that a plurality of such tools be provided, which may be dipped simultaneously, all the tools, however, being independent of one another while being moved, dipped, elevated, turned or rotated in a similar fashion.

It is also advantageous that the particular liquid plastic material, dope solution or sol used be so handled that it may be raised and lowered relative to the dipping tools, although other movements may be utilized to simplify the dipping mechanism and its operation. None of the mechanism for operating the tools are shown herein as they are not claimed herein and form no part of the present invention.

The dipping tool 8 is provided with a central tubular passage 10, which communicates with a cavity 11 at the bottom of the tool. This passage 10 serves to conduct air under pressure to the cavity 11 at the time the tool is submerged in the liquid plastic material 12, the purpose being to keep the liquid plastic material or dope from rising above a certain predetermined point inside of the cavity. The pressure of air within the tube 10 and the cavity 11 may be varied to cause the plastic material to rise upwardly therein or to recede outwardly therefrom. If the pressure of the air be alternately varied to cause an alternate rising and falling of the liquid level in the cavity 11, the outer curvature 13 of the tool may be caused to receive several successive coatings during the period of submersion of the molding implement. By this arrangement and procedure the curved wall 22 of the mouth of the bottle may be made slightly increased in thickness and stability as the successive exposures to air operate to release solvents (if such be used) from the plastic material or will tend to coagulate the same if the liquid plastic material be of the heated or thermo-plastic variety.

The shell 8 may be heated or cooled by the movement of air or liquid temperature controlling media through passages 14 and 15, which are formed between an outer shell 16 and an in-

ner shell 17 of the dipping tool, thus enabling accurate control of the heating or the cooling of the plastic material. This arrangement also permits of quick expansion and contraction of the shell 16 during the green period of the film. If the shell be expanded by gradual elevation of temperature during the shrinking period of the film thereon and then quickly contracted by cooling, the film coating thereon may be readily removed.

An implement or dipping tool 18, shown in Fig. 2, is used for forming the lower portion of the bottle and is constructed in a slightly different fashion. This dipping tool is provided with a central passage 19 for exhausting air from a bottom cavity 20 through fine bores 21 and the recesses or grooves 23, the operation being to evacuate substantially all the air in this lower cavity through the passage 19, which communicates with a suitable air exhausting device (not shown), thus causing the plastic material 12 to rise and completely fill the cavity and the recesses extending therefrom into the tool body. The plastic material is of such density as to seal the capillary openings 21 when advancing thereto.

The portion of the liquid plastic material which enters the recesses 23 will form ribs 26 at the bottom portion of the bottle structure as shown in Figures 4 and 6, these ribs extending at right angles to the bottom surface of the bottle, which conforms to the outline of the cavity 20.

The dipping tool 18 is submerged in the liquid plastic material 12, as indicated in Fig. 2, the entire side wall of the tool being in intimate contact with the liquid. The upper brim 29 of the lower bottle portion is formed in an annular cavity 24 at the upper end of the tool 18, which cavity communicates through passages 25 and a passage 27 with an air exhausting device (not shown).

As the dipping tool 18 approaches the surface 28 of the liquid plastic material 12, the vacuum established as aforesaid will cause the liquid plastic material to rise, enter and fill the annular cavity 24, the viscosity of the liquid plastic material promoting a relatively thickened coating at this point, as shown at 41 in Fig. 8.

As the forming tool 18 is withdrawn from the liquid plastic material 12, it is tilted at an angle and rotated until the plastic material is uniformly distributed thereon, during and after which period the film may be solidified by the evaporation of solvents or other treatment appropriate to the particular plastic composition employed.

During and after submersion, the tool 18 may be chilled or heated by the circulation of air or other temperature controlling media through passages 30 and 31 therein, by which procedure the evaporation of the solvents or other solidification of the plastic film on the tool may be aided or retarded, as may be required.

At the time of releasing the film cup 32 from the dipping tool 18, the tool may be chilled while heated air may be introduced between the tool and the film through passages 21 and 25 to the cavities 20 and 24 respectively, thus releasing the entire cup from the forming tool 18.

After the plastic articles thus formed have been properly dried and free from any odors, they may be nested for shipment to the respective consumers, thus occupying a minimum of space for a container of this kind, thereby greatly reducing freight costs.

The part 32 may be used as a drinking cup, the upper brim 29 thereof adding stability to its open end and body structure.

When the upper and lower bottle portions are assembled at point of use, an arrangement such as shown in Figure 5 may be used. A supporting member 33 holds a flange portion 34 of the upper bottle portion 35, while the lower bottle portion 32 is inserted thereinto and rollers 36, which may be heated, are operated along the brim edges to fold the same together into a complete cohesive annular rib or flange.

The angle rim or flange 34 forms a recess into which the flange or brim 29 of the cup-like portion 32 is seated in the joining of the two portions of the bottle. These portions may be joined in any suitable way, if desired, including the use of a sealing dope or adhesive, but I prefer to follow the method shown generally in Fig. 5. In this connection, it may be advantageous to permit one or both of these flanges to retain a degree of "greenness" or a greater proportion of the solvent (if such be used), as this aids in sealing the flanges together. I further contemplate that the rims or flanges may be connected together by fusing, welding or coalescing the parts into an integral or homogeneous body by means of heat and pressure when the plastic material used is of such character as to permit of this action.

The construction formed by uniting two conical wall sections or parts at their wider ends by circumferential flanges makes for a maximum of strength and is of practical value in producing pliant, flexible or thin-walled containers.

The article thus formed will be of exceedingly light weight and is strongly constructed for its intended uses and purposes.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A bottle comprising upper and lower conical shaped portions made of thin flexible organic material, the two parts having their larger ends joined together by overlapping portions having depressions and interlocking parts composed of the thin organic material to stiffen the flexible thin portions and to facilitate handling.

2. A bottle made of two seamless, upper and lower, substantially conical-shaped, thin portions of flexible organic material, the two parts being united by interlocking folds to stiffen the thin flexible organic material near the middle of the bottle, the material of the bottle mouth being turned over to stiffen the mouth of the bottle and the bottom of the bottle having stiffening means, whereby the bottle is flexible except at the bottom, middle and mouth.

3. A bottle in two parts, each part comprising a thin flexible transparent body portion of organic material, the bottom portion having an outwardly extending flange and the top portion a flange abutting the flange on the bottom portion, the two flanges being rolled over to interlock the bottom part to the top part of the bottle and to stiffen the flexible bottle at its middle portion.

4. A narrow neck bottle formed in separately nestable hollow parts, comprising an upper body unit integral with a narrow neck formation, and a lower body unit integral with a concave bottom, each such part having a flange wall extension for coupling of the parts, the flange wall extension of one part having an additional por-

tion constructed and arranged to be folded to include the flange of the other part.

5. A nestable bottle structure, comprising separate upper and lower one piece hollow seamless bottle sections, at least one of which is formed of a material which can be re-shaped under heat and pressure, each bottle section having integral structural braces for reducing flexing during handling and subsequent use, the lower end wall of the upper section being shaped to be structurally united to the upper end wall of the lower section during assembly of the bottle structure by folding it under heat and pressure to enclose and interlock the upper end of the lower section.

6. A bottle produced by uniting an open ended upper bottle portion of flexible wall structure and arched and tapered body shape with a lower substantially frusto-conical bottle portion of flexible wall structure, said portions having outward turned flanges at their larger open ends for attachment to one another, said flanges when united forming a solid girder around the exterior wall from which the bottle may be supported during filling and capping.

7. A container formed in separately nestable upper and separately nestable lower, one-piece, hollow, molded sections, the upper section having a lip wall at its upper end for interlockingly engaging a closure or stopper, the lower section having a bottom with ribs molded integrally therewith, and the adjacent ends of the sections having flanges which abut each other and which may be interlockingly united by heating and overlapping one flange portion against the other.

8. A container structure comprising seamless upper and lower hollow body structures which may be interlockingly united, each of said structures being provided with a marginal flange by which they may be interlocked, the material comprising said flanges being foldable under externally applied heat and pressure to form a fluid-tight joint on the outer side of the container.

9. A receptacle formed of a transparent plastic material and having side walls which are flexible and fabricated in separate upper and lower seamless sections which are joined together, said sections being formed with wall extensions arranged at right angles to one another at their adjoinable ends, said wall extensions being adapted to be interlocked together by a suitable adhesive to form a solid rim, said rim forming a strengthening support on the outside wall of the receptacle to resist flexing and serving as a ledge from which the receptacle and the material placed therein may be supported.

10. A container structure for shipment in knock-down form, comprising separate top and base portions having flanges adapted for interlocking one portion to the other, one of the portions having a flange which may be compressed to envelop the flange of the other portion, the material of the flanges being such that the adjoining faces of said flanges are adhesively merged when heated and pressed during assembling at the point of use.

11. A nestable container made in two parts which are adapted to be joined together, each part being of a relatively non-rigid wall structure and which may be shipped in packages of nested parts to be assembled at the point of use, said container being formed in separate upper and lower seamless hollow body portions of tapering form, the body wall at the larger open end of each hollow portion being shaped into a flange, said flanges serving to impart rigidity to the hollow portions and to facilitate separation of each portion from its nested position, the flanges constituting means on the exterior of the container body for joining the separate portions and for reinforcing the wall structures of both the upper and lower portions.

12. A plural part container structure, the parts of which are constructed and arranged to be assembled into a single container at point of use, formed in separate upper and lower hollow parts having flange walls which project outward of the body walls proper of the hollow parts, one of said flange walls having a side wall at right angle thereto forming a recess into which the flange wall of the other part may be seated, the flange wall of said other part being formed of a material which will coalesce with the material of the recessed flange wall under the influence of heat and pressure.

13. A container structure consisting of a hollow top made in one piece with open ends and a hollow seamless base portion having a bottom integral therewith, the base portion having a lateral flange of increased body thickness and the top body having a recessed flange into which the flange of the base may be seated, the flange of the base portion containing a solvent media for assisting in obtaining coalesence thereof with said recessed flange by means of heat and pressure, both the base and the top being of tapered form and largest at their flanged ends, thereby enabling separate nesting of a plurality of tops and bases respectively and their reception in knocked-down form at point of use.

14. A drinking cup having side walls of thin, flexible and transparent cellulose derivative material, said cup having an integral inverted bottom provided with supplemental web-parts forming a cross-tie of rib walls running at right angles to each other and diametrically of the bottom of the cup, said rib walls being integral with the said bottom.

15. A container having side walls of thin, transparent, flexible and water-proof material, a raised bottom for the container integral with the side walls having a downwardly curving marginal portion joining said side walls, said bottom having radially disposed web-walls integrally joined to the said bottom and with one another to impart structural rigidity.

16. A two part container structure formed from a composition comprising cellulose acetate and a solvent therefor, said parts having cooperating peripheral flanges by which they may be united, at least one of said flanges having a thickness greater than that of the wall structure of the corresponding part and containing a substantial amount of solvent to assist in the uniting and coalescing of said flanges by the application of heat and pressure.

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