Nov. 13, 1934. H. H. WRIGHT 1,980,566

CONTAINER

Filed Aug. 21, 1931 2 Sheets-Sheet 1

Fig. 1.

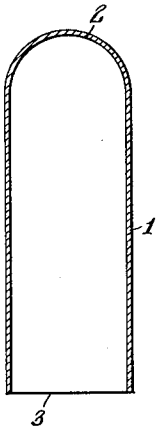


Fig. 2.

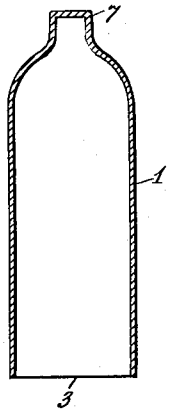


Fig. 3.

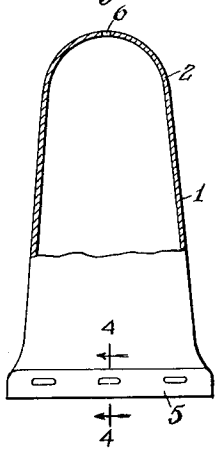


Fig. 5.

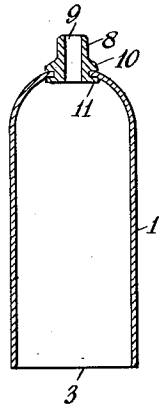
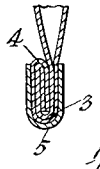


Fig. 4.



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Fig. 6.

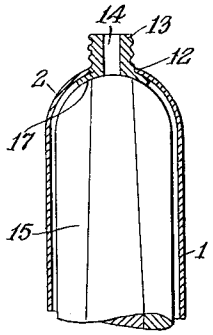


Fig. 9.

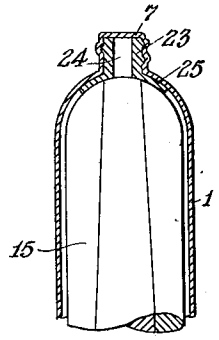


Fig. 7.

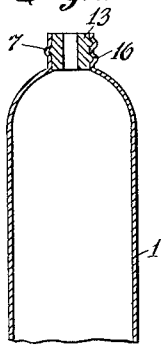


Fig. 10.

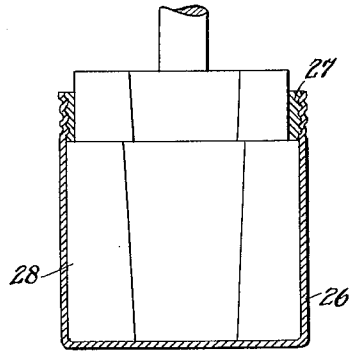


Fig. 8.

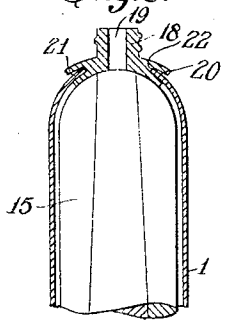
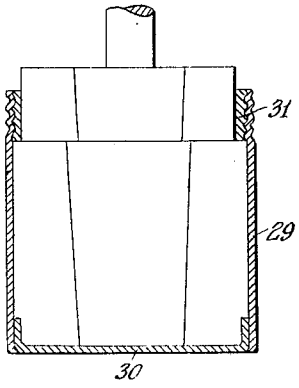


Fig. 11.



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UNITED STATES PATENT OFFICE

1,980,566

CONTAINER

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Application August 21, 1931, Serial No. 558,538

11 Claims. (Cl. 18—57)

This invention relates to containers and more particularly to bottles, jars and collapsible tubes formed of materials which are easily decorated, rugged, tough, flexible and preferably also transparent, and to the method of producing the same.

The objects and nature of the invention will become apparent from the following description wherein several specific exemplifications are set forth, the appended claims, and the accompanying drawings forming a part of this specification and wherein:

Figure 1 designates one form of tube to be processed into a collapsible tube to which this invention relates.

Figure 2 illustrates a modified form of tube which is to be used in the production of another collapsible tube.

Figure 3 is a view partly in section illustrating one form of tube made in accordance with this invention.

Figure 4 is a section taken on lines 4—4 of Figure 3.

Figure 5 illustrates a type of tube wherein the dispensing device is secured in place by a clamping or clipping operation.

Figure 6 illustrates one step in a process wherein the dispensing device is secured in place by shrinkage of material constituting the body of the product.

Figure 7 illustrates the tube formed by a process utilizing the step illustrated in Figure 6.

Figure 8 illustrates another mode of fastening a dispensing device in position.

Figure 9 illustrates a modified form wherein the tube is provided with a temporary closure.

Figures 10 and 11 illustrate sections of jars produced in accordance with this invention.

In accordance with the principles of this invention, a tube of the material constituting the body of the product is formed on a mandrel as by dipping the latter in an appropriate composition. After processing, as hereinafter more fully explained, the tube may be and preferably is provided at one end with means constituting or adapted to cooperate with a closure. The tube is then filled with the substance to be packaged and the open end of the tube is closed or sealed in any appropriate manner.

To more fully explain the invention, the body of the tube will be specifically described as made of regenerated cellulose. It is, however, to be understood that the invention is not restricted to only regenerated cellulose tubes but, as will appear, is also applicable to tubes formed of any other film-forming composition which will produce a material, which shrinks upon transformation from the wet or swollen condition to the dry state, which is tough, flexible, easily decorated and preferably also transparent, such as, for example, cellulose acetate, cellulose nitrate and hardened gelatin.

Referring now to the drawings wherein several modifications are illustrated and like reference numerals designate like parts, the reference numeral 1 designates a tube, preferably having one end 2 thereof rounded and closed. This tube when made of regenerated cellulose is prepared by dipping a suitably shaped mandrel in a cellulosic solution such as a viscose solution prepared in the well-known way. After withdrawal of the mandrel, the viscose adhering thereto is treated so that it is coagulated and/or regenerated as is well known. The latter operation may be effected while the material is on the mandrel or it may be effected after the coagulated material has been removed from the mandrel. The coagulated and regenerated cellulose tube is then subjected to the well-known operations for purifying regenerated cellulose produced from viscose either while it is on the mandrel or removed therefrom. Subsequently, the tube is washed with water and finally treated with a suitable softening agent.

The tube, which at this stage of the operation is in a wet and swollen condition, is disposed on a collapsible mandrel which is in an extended condition and possesses the contour which the product is desired to have. On this mandrel the tube is dried in any suitable manner with or without auxiliary means to accelerate or expedite the operation. During drying the tube shrinks to a considerable extent with the result that it intimately conforms to and assumes the shape of the mandrel. Upon collapsing of the mandrel the tube 1 is removed. The shape or contour of the tube 1 depends on the shape of the mandrel on which it is dried. It is apparent that by choosing and employing any desired shaped mandrel a correspondingly shaped tube will be produced. The tube illustrated in Figure 1 shows one of the many and numerous forms which may be secured.

In accordance with one of the modifications of this invention, the material which is to be packaged is introduced through the open end 3 of the tube, after which it is sealed in any suitable manner, such as, by fusing the ends together by application of a suitable solvent, sewing, stapling or the like. In the preferred form

of this modification, I prefer to bend the end 3 one or more times upon itself, as designated by the reference numeral 4 in Figure 4, and in this condition seal it by means of a clip 5. If desired, the side may be plicated in order to form a straight ended package.

When this type of tube is to be used, all that is necessary is to puncture the end 2 thereof and form a hole 6 through which the contents of the tube may be expelled upon the application of gentle pressure thereto.

If desired, instead of making the end 2 of the tube rounded as described, it may be provided with a projecting tip 7. This may be accomplished by using a similarly shaped dipping instrument and a correspondingly shaped collapsible mandrel on which the tube is dried. This tube may be filled and sealed similarly to that previously described. When it is desired to use the contents thereof, the upper surface of the tip is punctured and the material forced through the aperture upon application of pressure to the tube.

The two forms of tube described above are admirably suited for packaging of substances which are to be used at one time. Where, however, the contents are to be used at intervals over a rather protracted period of time, this invention contemplates the provision of a dispensing device with or without a cooperating closure.

The dispensing device may be of any type and it may be secured in the tube in numerous ways. It may be cemented, clipped or swedged in position. For example, the dispensing device, which may comprise a nipple 8 formed of a suitable material and having a passage 9 extending therethrough and a shoulder 10 intermediate its ends, is inserted in a hole punctured or otherwise formed in the closed end 2 of the product. The portion of the nipple within the tube may then be provided with a washer-like member whereby, upon the application of pressure, it will cooperate with the shoulder 10 and serve to fasten the dispensing device. These operations may be carried out separately or simultaneously. Alternatively, the end of the nipple within the tube may be upset, whereby it forms a flange 11 cooperating with the shoulder 10 to tightly and firmly grip the material adjacent thereto. The dispensing device may be provided with a closure, such as a headed pin or cap not shown. In the event a screw cap is to be used as the closure, the exterior surface of the nipple extending from the tube is threaded.

I prefer, however, to secure and fasten the dispensing device in position during the drying operation and by utilizing one of the characteristics of the material constituting the body of the tube. Stated in other words, I prefer to fasten the dispensing device by shrinking the tube thereon or thereabout. In accordance with this modification, the tube 1, after purification and while in the wet and swollen state and prior to the drying thereof, is punctured in any suitable manner to provide a hole 12 in the closed end 2 thereof. In this hole there is disposed a dispensing device which in the form illustrated comprises an exteriorly threaded nipple 13 having a passage 14 extending therethrough. After positioning of the dispensing device within the hole, the tube is placed on a collapsible mandrel 15 in extended position which maintains the nipple in proper position and on which the assembled tube and nipple are dried in any convenient manner. During the drying operation the regenerated cellulose shrinks and conforms to the contour of the mandrel. After drying, the mandrel is collapsed and the tube removed.

The end 2 of the tube 1, and particularly the portion adjacent the nipple 13, in shrinking firmly grips the exterior of the nipple at its points of contact and securely locks it in place.

When a tube of the type illustrated in Figure 2 is employed, the upper surface of the tip 7 is punctured or severed and the dispensing member 13 disposed therein. In the final product, as shown in Figure 7, the side wall 16 of the tip 7 will extend over a substantial distance on the threaded surface of the nipple. By reason of the fact that the side wall of the tip is in intimate engagement with the threads, the latter are not obliteraed or rendered useless. On the contrary, the intimate relation between the tip and nipple 13 serves to maintain the threads in a well defined condition which does not interfere with a closure, such as an interiorly threaded cap screwed thereon.

The dispensing device may consist of any of the well-known types. As suggested above, the dispenser may consist of a nipple and closure which may be a headed pin or a cap. The dispenser may also be in one piece and of such a nature that it remains ordinarily closed and opens only on application of pressure by the contents within the container or on application of pressure on the outer end of the dispenser. These and other equivalent dispensing devices or outlets will be referred to hereinafter as means adapted to be closed.

It is apparent that in this process it is not essential to start with a tube closed at one end, since a tube open at both ends may be satisfactorily employed.

If desired, the dispensing nipple may, at its lower end, be provided with a flange or shoulder 17 which aids in giving a more positive grip to the locking action.

The shrinking-on method described above may be utilized in combination with other operations to position and secure the dispensing member in place. For example, it may be employed in conjunction with a swedging or other operation as immediately hereafter described.

Referring now to Figure 8, there is illustrated a dispensing device which comprises an exteriorly threaded nipple 18 formed of tin, aluminum, etc., having a passage 19 extending therethrough. On its lower edge, the nipple 18 is formed with a flange 20 having a circumferential recess 21 in its periphery. This nipple is positioned in a tube 1 so that the end 22 thereof is disposed in the recess 21. The assembled tube is then dried on a collapsible mandrel 15 in distended position from which it is removed by collapsing said mandrel. As a result, the tube 1 assumes the shape of the mandrel and the end 22 securely grips the nipple through engagement with the recess 21. The flange 20 is then swedged with the result that the walls of the recess 21 are compressed and a firmer locking in place of the nipple is secured.

In another exemplification of the invention there is provided a temporary closure for the dispensing device. This is achieved by utilizing a tube of the type illustrated in Figure 2.

Referring now to Figure 9, a suitable dispensing device, such as an exteriorly threaded nipple 23 having a passage 24 therethrough, is

disposed in the tip 7 after the tube has been treated as described and while it is in a wet condition. As in the previously described methods, the tube and nipple in the assembled condition are dried on a collapsible mandrel 15 in a distended state. Upon drying, the tip 7 securely conforms and grips the nipple 23. After collapsing of the mandrel the removal of the tube therefrom, it will be found that the dispensing device 23 is firmly secured and rigidly held in the nipple, as illustrated in Figure 9. As in one of the previously described forms, the side walls of the nipple intimately engage and conform with the threads so that they are not rendered useless and on which a closure cap (not shown) may be screwed. This tube, after it has been filled in the manner described and the open end thereof clipped as previously mentioned, is packaged and sold to the trade. To use this type of tube the closure cap is unscrewed and the upper surface of the tip is punctured to form a hole in alignment with the passage of the nipple. Upon application of pressure, the contents of the tube may be expelled. After a sufficient quantity has been removed from the tube the closure cap may be replaced. In this form of tube the dispensing member may also be provided with a flange 25 at the lower end.

The principles of this invention may also be utilized in the production of jar-like containers. When a jar-like container is to be produced, a tube 26 having one end thereof closed is formed in the manner hereinbefore described. After purifying and while in the wet state, a ring 27 which may be exteriorly threaded, or other means adapted to be closed, is disposed in the open end of the tube and the assembled member disposed on a collapsible mandrel 28, where the tube is dried. Upon drying, the tube assumes the shape of the mandrel and the portion of said tube adjacent the ring 27 tightly and securely grips the latter. The product is then removed by collapsing of the mandrel. After filling, a closure may be screwed on the threaded ring 27.

Instead of making the jar from a tube open at one end it may be made from a tube open at both ends. With this in view, a tube 29 open at both ends and having substantially the form illustrated is prepared as described before. A disc 30 of any suitable material, such as cardboard, metal, etc., with or without an upstanding flange, is disposed in the lower end thereof and the tube and disc disposed on a collapsible mandrel in an extended state. In this condition the tube is dried with the result that the tube acquires the shape of the mandrel and securely locks the disc 30 in position. The product is removed upon collapsing of the mandrel. Any suitable cap may be used to close the open end of the jar. If desired, a ring 31 similar to the ring 27 may be secured in position and a threaded closure cap (not shown) may be employed as the closure.

The containers hereinbefore described were specifically mentioned as being formed of cellulose regenerated from viscose. It is, of course, to be understood that cellulosic solutions other than viscose, such as, for example, cuprammonium, zinc chloride and other solutions may be utilized.

Regenerated cellulose is transparent, tough, soft, flexible and relatively inactive chemically, substantially insoluble and grease proof. It may be very readily and easily decorated. When a colored container is desired a coloring agent, such as a pigment or dye, may be incorporated in the cellulosic solution. By virtue of these characteristics containers of regenerated cellulose are admirably suited for packaging pharmaceuticals, toilet compositions, greases, cements, plastic compositions, etc.

If desired, the containers may be rendered moistureproof by coating the bodies thereof with any suitable moistureproofing composition.

As previously mentioned, the invention is not restricted to only regenerated cellulose articles. It is equally applicable to any material which will shrink upon conversion from a wet swollen condition to a dry state and, particularly, to such materials as hardened gelatin, cellulose acetate and cellulose nitrate.

When the container is to be formed of hardened gelatin, a suitable aqueous or non-aqueous gelatin composition containing a softening agent with or without one or more of the well known hardening agents may be employed. When a composition containing a hardening agent is employed, the tube is formed by dipping the mandrel therein and withdrawing it therefrom. The composition adhering to the mandrel may be dried in any convenient manner, after which it is immersed in a suitable swelling agent, such as water, whereby it will swell and in which condition it may very easily be removed from the dipping mandrel. After removal from the mandrel and while in the swollen condition, the tube is provided with the desired means and finally dried on a collapsible mandrel in the distended state similar to that described in connection with the production of tubes of regenerated cellulose.

When the gelatin composition does not contain a hardening agent, after the mandrel has been withdrawn therefrom, the gelatin composition adhering thereto is coagulated by being treated with any suitable hardening agent. The coagulated tube is then removed from the mandrel and washed to remove the excess coagulant. The tube is then provided with the desired means and finally dried on a collapsible mandrel in the manner already described.

Containers of cellulose acetate and cellulose nitrate may be made by processes similar to that employed with gelatin. For example, a tube of cellulose acetate is formed by dipping in and withdrawing a mandrel from a cellulose acetate composition, preferably containing a softener. The solvents are then permitted or caused to evaporate. The mandrels, of course, are maintained in position to produce a tube of substantially uniform thickness. The tube, while on the mandrel, is then immersed in a swelling agent, such as, for example, a 25% solution of ammonium sulphocyanate. The swelling effected by this operation permits the tube to be readily and easily removed from the mandrel. After removal from the mandrel, the tube is washed to remove the swelling solution. The tube, while in the swollen condition, is then provided with the desired means and disposed on a collapsible mandrel in an extended state, where it is dried. The tube is removed by collapsing of the mandrel.

Tubes of cellulose acetate or nitrate may also be produced by immersing the mandrel coated with the composition in a suitable coagulating bath. When the composition has been suitably coagulated, it may be removed from the man-

drel and then subjected to the finishing operations of disposing the desired means therein, as well as drying on a collapsible mandrel in an extended state.

Containers formed of gelatin and cellulose derivatives may also be decorated to embellish them. They are tough, flexible and transparent. Due to their nature and constitution, precaution must be taken so that no materials, which will dissolve or chemically react therewith, are packaged therein. These containers may also be colored by incorporating a coloring agent in the composition from which they are formed. They may also be moistureproofed by being coated with a suitable moistureproofing composition.

Though in the preferred embodiments of the methods constituting one phase of the invention the use of a collapsible mandrel is described, the invention is not restricted thereto. Mandrels of the fixed or non-collapsible type, such as solid or hollow rigid mandrels, may be employed with equal success. When fixed or solid mandrels are utilized, the stripping of the caps or tubes therefrom may be expedited and facilitated by the use of air.

Since it is obvious that various modifications and changes may be made in the specific details described, this invention is not restricted thereto except as set forth in the appended claims.

I claim:

1. In a method of making containers, the steps which comprise forming a wet tube of a material which shrinks upon drying, disposing means constituting or adapted to cooperate with a closure in one end of the wet tube, drying said tube and means on a mandrel whereby the tube conforms to the shape of the mandrel and secures said means in place, and removing the dried tube and its associated means.

2. In a method of making collapsible tubes, the steps which comprise forming a wet tube of a material which shrinks upon drying, positioning a dispensing device in one end of the tube, said dispensing device having a recessed periphery which receives the portion of the tube adjacent thereto, drying said tube with the dispensing device in place, and compressing the walls of the recess.

3. In a method of making collapsible tubes, the steps which comprise forming a wet tube of a material which shrinks upon drying, said tube having a tip at one end thereof, disposing a dispensing device in said tip, and drying the tube whereby the dispensing member is secured in place.

4. In a method of making containers, the steps which comprise forming a wet tube of regenerated cellulose, disposing means constituting or adapted to cooperate with a closure in one end of the wet tube, drying said tube, and means on a mandrel in an extended position whereby the tube conforms to the shape of the mandrel and secures the means in place, and removing the dried tube and its associated means.

5. In a method of making containers, the steps which comprise forming a wet tube of gelatin, disposing means constituting or adapted to cooperate with a closure in one end of the wet tube, drying said tube, and means on a mandrel in an extended position, whereby the tube conforms to the shape of the mandrel and secures the means in place, and removing the dried tube and its associated means.

6. In a method of making containers, the steps which comprise forming a wet tube of cellulose acetate, disposing means constituting or adapted to cooperate with a closure in one end of the wet tube, drying said tube, and means on a mandrel in an extended position whereby the tube conforms to the shape of the mandrel and secures the means in place, and removing the dried tube and its associated means.

7. A container comprising a body member formed of a material which shrinks upon conversion from the wet to the dry state having means secured and fastened in position in an end at least by the force produced when the material is converted from the wet to the dry state, said means being adapted to be closed.

8. A collapsible tube comprising a body member formed of a material which shrinks upon conversion from the wet to the dry state, said body member having a tip and a dispensing member fastened in said tip by the force produced when the material is converted from the wet to the dry state.

9. A container comprising a body member formed of regenerated cellulose having means adapted to be closed in at least one end thereof and secured therein at least by the shrinkage of the regenerated cellulose when converted from the wet to the dry state.

10. A container comprising a body member formed of gelatin having means adapted to be closed in at least one end thereof and secured therein at least by the shrinkage of the gelatin when converted from the wet to the dry state.

11. A container comprising a body member formed of cellulose acetate having means adapted to be closed in at least one end thereof and secured therein at least by the shrinkage of the cellulose acetate when converted from the wet to the dry state.

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