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S. T. MALTBY ET AL

2,269,593

PROCESS OF MAKING TELESCOPING DRINKING TUBES

Filed May 20, 1940

Fig. 1.



Fig. 2.

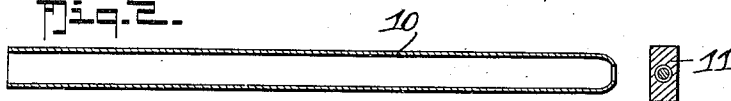


Fig. 3.

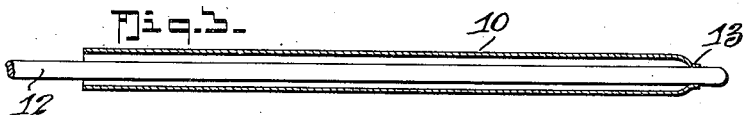


Fig. 4.

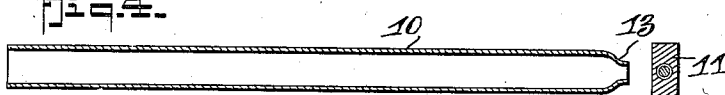


Fig. 5.



Fig. 6.

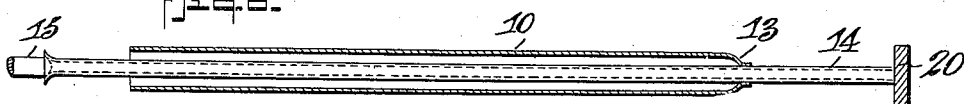


Fig. 7.

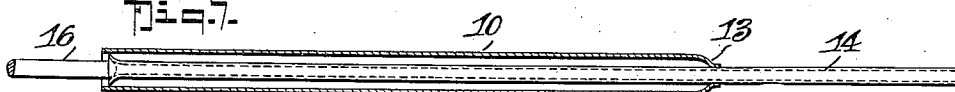


Fig. 8.

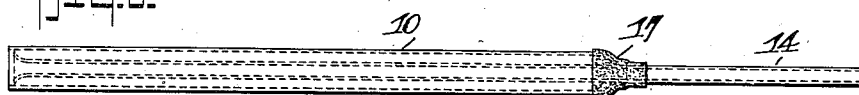


Fig. 9.

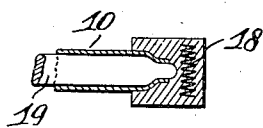
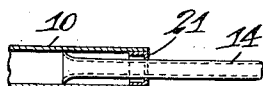


Fig. 10.



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PROCESS OF MAKING TELESCOPING
DRINKING TUBES

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Application May 20, 1940, Serial No. 336,259

3 Claims. (Cl. 18—56)

This invention relates to processes of making telescoping drinking tubes.

More particularly, the processes of our invention produce an extensible drinking tube from either heat softened, or solvent softened amorphous cellulose material, as for example, cellulose acetate, or of other plasticized substance, formed as sections of tube which, in telescoped condition, are sufficiently short to be contained wholly within a capped bottle, but which, when the cap of the bottle is removed and the tube projected a short distance by the buoyancy of air trapped between its sections, may be extended to a convenient length for reception into the mouth of the user, and also to reach to the bottom of the bottle.

It is an object which is achieved by our invention to form interengaging shoulders on the respective tubes whereby when they are extended from telescoped condition the engaged shoulder portions prevent accidental separation of one section from the other, and at the same time assist in maintaining a sufficiently tight joint between the sections to obviate air leakage, thereby permitting the beverage to be more readily imbibed.

A further object of the invention is to provide a process where in a tubular sheath which constitutes the larger diameter section of the telescoping tube sections is softened at one end and is constricted, then in inserting an inner, smaller diameter tube section into the sheath to extend through the constricted end thereof while the latter is in softened condition, whereby it will fit the inner tube closely and adapt its fit to variations in the diameter of the inner tube section while hardening, in softening and flaring the end of said inner tube section which is remote from the constricted end of the sheath, and in applying a frangible seal to the joint between the inner tube section and the constricted end of the sheath.

Other and further objects will be apparent from the following description and drawing, wherein

Figure 1 is a side view of the outer sheath or section preparatory to forming its end.

Figure 2 shows the sheath in cross section, in position to have its end softened by an adjacent heater.

Figure 3 is a similar view showing the manner of inserting a neck forming mandrel while the end of the sheath is soft.

Figure 4 shows the formed sheath with mandrel withdrawn, in position with its constricted end

adjacent a heater to re-soften the same slightly.

Figure 5 shows an inner, smaller diameter tube section inserted by a plunger through the softened and restricted end of the sheath.

Figure 6 shows the sheath with the smaller diameter inner tubular section in place and in process of being flared by a heated forming plunger.

Figure 7 shows the inner tubular section thrust into assembled position within the sheath by a second, unheated plunger.

Figure 8 shows the completed tube in telescoped condition, with a frangible seal applied.

Figure 9 shows, in cross section, a heated forming die, as an alternative to the steps illustrated in Figures 2 and 3.

Figure 10 shows another alternative process of forming a restricted end in the sheath, by application of a cap thereto, having a restricted central opening to receive the inner tubular section.

Referring more particularly to the drawing, and first to the preferred form of process:

A tubular sheath 10, which is ultimately to be the larger of a pair of telescoping sections of heat softened material such as cellulose acetate, is first passed with its end in proximity to a heater 11, here shown as an electric resistance heater, whereupon its end softens and becomes constricted.

Next, the sheath 10 is removed from the vicinity of the heater, and a sizing plunger 12 is advanced through it, pushing the partly closed end outwardly to form a reduced neck 13. The diameter of the sizing plunger is approximately that of the inner tube section which is to be assembled in the sheath.

Following this, the sizing plunger is withdrawn and the sheath end again heated to soften it slightly, whereupon an inner tube section 14 is inserted by plunger 22 into the sheath 10 and through the constricted neck which, being in softened condition, adapts itself to fit closely about the inner tube regardless of possible variations in the diameter or cross sectional shape of different tube sections. This insures an accurate telescoping fit between the inner and outer tube sections in the assembly.

Next, a heated end-flaring plunger 15 is brought to bear against the projecting end of tube 14, remote from the end which extends through the neck of the sheath, to soften and flare it outwardly. In this step the tube is supported against endwise movement by an abutment member 20.

The assembly of the smaller tube within the

larger is completed by a second, unheated plunger 16 which forces the belled or flared end of the inner tube 14 into the unrestricted end of the sheath. In this last step it is preferable to employ an unheated plunger, since otherwise the softened tube material is likely to adhere to the inner wall of the sheath in the final step of assembly, and render it difficult to break the sections apart to extend them for use.

Finally, a frangible seal 17 is applied to the joint between the telescoping tube sections, which seal causes air, or the gas released from a carbonated beverage to be trapped between the tube sections, thereby making the tube sufficiently buoyant to be projected out of the bottle a short distance when the latter is uncapped. The user may then conveniently rupture the seal 17, and extend the tube sections until their respective interturned and outwardly flared shoulders abut.

A modification of our process consists in following the series of steps above described, but in employing tubes of solvent softened material. In such process, a solvent is applied to one end of a sheath, an inner tube section is run through the softened end of the sheath to project therefrom and the sheath is necked to closely surround the inner tube. The opposite end of the inner tube is then flared or belled by being softened by solvent and formed, and is then assembled with its belled end within the confines of the end of the sheath.

A further modification of our process consists in die-forming the restricted neck in the sheath section 10, in the manner shown in Figure 9, and thereafter assembling the sheath and inner tube in the manner above described. Here a female die member is heated, as indicated at 18, and receives the end of sheath 10 which thereupon softens and is formed by a plunger 19. After the neck is so formed it is reheated to be slightly softened and the inner tube section is inserted. It is accommodated by the softened neck which then hardens to surround it closely.

A still further modification consists in spinning down one end of the sheath 10 to form a neck of reduced diameter. This neck is then preferably softened by heat or solvent, and the inner tube assembled within it in the manner previously described.

Another modification consists in eliminating the sizing plunger 12 and in inserting the inner tube 14 directly into and through the softened end of sheath 10 to form the neck 13, by shrinkage of the sheath end thereon, either by its being softened under heat, or by a solvent. In the case of heat softened material, the process is effected by the elimination of steps illustrated in Figures 3 and 4 of the drawing. In any one of the above described processes, however, the insertion of the inner tube section through the sheath when the neck of the latter is soft, permits the neck to accommodate itself to irregularities in the shape or diameter of the inner tube, for close fit.

The neck 13, according to the foregoing processes, may be either short or of considerably greater length than is shown in the drawing. Although a longer neck affords increased bearing surface of the sheath upon the inner tube, and would therefore appear to make the extended tube more rigid, it is preferable to make the neck quite short, not only because the interengaging shoulders prevent excessive lateral play between the sections and undue bending at the joint, but also because the sealing material 17

between the walls of the inner and outer tubes has a tendency to creep therealong by capillary attraction before it hardens, and where the surface is extended, as in the long neck construction, the sealing material is likely to gather in spots and thereby leave portions unsealed and susceptible to leakage which would permit liquid to rise in the space between the inner and outer telescoped tubes, and would thereby destroy the buoyancy which projects the tube from the bottle for use.

On the other hand, if sufficient sealing material is applied to the joint to obviate its uneven creeping by capillarity, the seal will not be readily ruptured by the user, and his efforts to extend the sections may result in destruction of the tube. A shorter neck is therefore desirable, not only because the seal applied to it can easily be broken, but also because with the assistance of the interengaging shoulders, it affords adequate support for the tube in its extended condition.

It is to be understood that our invention is not limited to the formation of a short neck on the sheath section, but with the adhesives presently known and used for sealing the joint between the tube sections, it has been ascertained that a short neck affords adequate support and permits the application of a readily broken seal, while at the same time the joint can be sealed against leakage for periods of months as tests have shown, and possibly for years in the event the bottled goods in which the tubes are packaged are held for sale that long.

In still another modification of our process, as illustrated in Figure 10, the sheath end is provided with a cap or closure 21, here shown as a flanged cap which has a central aperture through which the inner tube section 14 extends in the assembled tube. This closure may be of any desired material, adhesively secured to the sheath end, but preferably is of the same kind of material as the sheath, usually transparent cellulose. After the cap or closure is applied to the sheath, the inner tube is assembled and flared as above described, either with or without preliminary softening of the sheath end and closure.

From the foregoing it will be understood that our invention provides simple and efficient processes of making telescoping tubes or sippers for imbibing beverages from the bottle, which sippers are of a sufficient length when extended to reach to the bottom of the bottle, and also to be conveniently received in the mouth of the user.

What we claim as our invention, and desire to secure by Letters Patent, is:

1. The process of making telescoping drinking tubes of thin, cellulose material which comprises heating and softening one end of a tube to constrict and shrink the same, forming such softened end into a collar of reduced diameter, advancing an inner, smaller diameter tube through such collar while the same is in softened condition, engaging the remote end of said inner tube by a heated forming plunger to flare the same outwardly, and continuing to advance said inner tube until its flared end is received within the outer tube.

2. The process of making telescoping drinking tubes of thin, cellulose material which comprises heating and softening one end of a tube to constrict and shrink the same, projecting an inner, smaller diameter tube through such softened, constricted end to form thereon a collar of re-

duced diameter closely conforming to the size of the inner tube, engaging the remote end of said inner tube with a heated forming plunger to flare the same outwardly, and, after cooling and setting of said flared end, advancing the same 5 to a position within the outer tube.

3. The process of making telescoping drinking tubes of thin, cellulose material which comprises, heating and softening one end of a tube to constrict and shrink the same, projecting a smaller diameter sizing plunger through such softened, constricted end to form a collar portion of reduced diameter thereon, reheating said tube end 10

to soften it without collapse, projecting an inner, smaller diameter tube through such softened end and against a stop by means of a heated plunger which softens and flares the end of said inner tube remote from its telescoping joint with the outer tube, advancing the inner tube to final assembly with its flared portion within the confines of said first-named tube, and applying a frangible seal to the joint between said tubes in the region of the reduced collar portion.

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