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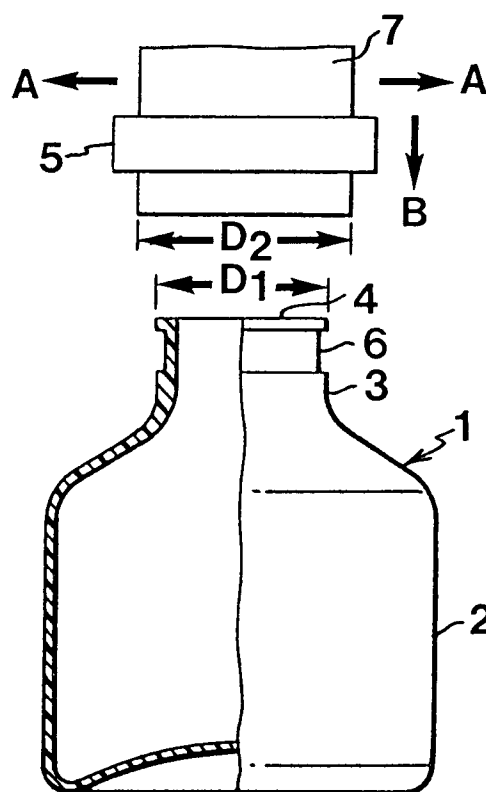
(54) **Method and device for producing a tubular article having a circumferential accumulation of material, and an article produced according to the method.**

(57) In a method for producing a tubular article (1) having a circumferential accumulation of material, the tubular article (1) is formed with first engagement means (6) for engaging corresponding second engagement means on a separate ring (5), which is pushed over the article (1) to the position where the accumulation of material is to be provided until the engagement means are brought into permanent engagement with each other, so that axial displacement of the ring (5) is prevented and the accumulation of material is formed.

The method is especially well suited for producing such bottles as are to have a circumferential thick flange at the opening (4).

A device for carrying out the method comprises a tool having means (7) for expanding the ring (5) and applying it on the article (1) in the position where the accumulation of material is to be provided, thus establishing the engagement between the cooperating engagement means.

FIG.2



The present invention relates to a method and a device for producing a tubular article having a circumferential accumulation of material. The invention also relates to an article produced according to the method.

In the production of tubular plastic articles having a relatively thin wall, it is often desired to arrange a circumferential accumulation of material on some part of the article. One example of this is an injection liquid container or vial which at its opening should have a substantial accumulation of material to form a circumferential flange on which a closure means in the form of a cap or a cork is to be applied. In many cases, the accumulation of material should be 3-10 times the wall thickness of the container.

Plastic articles of this type are generally produced by conventional techniques, such as extrusion blowing, starting from an extruded hose which is finally shaped in a special tool. Providing, in connection with such shaping, accumulations of material of the aforementioned type is very difficult, since the wall thickness of the extruded hose must be varied. The hose should be thick where a large wall thickness, i.e. accumulation of material, is desired, but thin where a small wall thickness is desired.

There are certainly various techniques for automatic hose control during operation, but these techniques are both complex and costly because the hose sections having a large wall thickness must be cooled before the final shaping of the article.

According to an alternative method, which has been put into practice, a thin-walled blank is produced in a first step, and is moved on to another moulding machine where, in a second step, an accumulation of material is applied by injection-moulding in the desired place on the thin-walled blank. This method has been applied e.g. in the making of infusion liquid containers whose filling neck should have a connecting portion with accumulated material, into which a rubber stopper is pressed and which is sealed by an aluminium cap.

This method is however slow and costly, in that it comprises several operations which must be performed in different machines. Besides, narrow tolerance requirements are placed on the extruded blank, which are difficult to comply with and which sometimes lead to considerable scrapping.

There is thus a need for a simpler and cheaper method for providing accumulation of material on such thin-walled, tubular plastic articles.

One object of the present invention therefore is, while overcoming the above-mentioned drawbacks, to provide a new method by means of which a tubular, thin-walled article is provided with a circumferential accumulation of material in a less complicated and less expensive way than has hitherto been possible with existing methods.

Another object of the invention is to provide a de-

vice for carrying out the method.

A further object of the invention is to provide a tubular, thin-walled article which, in a more expedient manner than has hitherto been possible, has been provided with a circumferential accumulation of material.

A specific object is to apply the aimed-at accumulation of material purely mechanically on a preformed, tubular blank having a thin wall.

These and other objects, which will appear from the following description, have now been achieved by means of a method comprising the steps recited in appended claim 1.

The objects of the invention are also achieved by means of a device as recited in appended claim 6 and by means of an article as recited in appended claim 8.

Preferred variants and embodiments of the invention are recited in the appended subclaims.

In the method according to the invention for producing a tubular article with an accumulation of material, the tubular article is thus formed with first engagement means for engaging corresponding second engagement means on a separate ring, which is passed over or into the article to the position where the accumulation of material is to be provided until the engagement means are brought into permanent engagement with each other, so that axial displacement of the ring is prevented and the accumulation of material is formed.

The invention will be described in more detail hereinbelow with reference to the accompanying drawings which schematically show some embodiments of the invention.

Fig. 1 is a part-sectional view showing a container having an accumulation of material according to the invention.

Fig. 2 shows equipment used for providing the accumulation of material on the container of Fig. 1.

Figs 3-5 are part-sectional views showing different variants of the engagement between an external ring and a neck portion of a container, on which the accumulation of material is to be provided.

Fig. 6, which is similar to Fig. 1, shows a container where the accumulation of material is formed with an external thread.

Fig. 7 is a cross-section taken along line VII-VII in Fig. 6.

Figs 8-9 are part-sectional views showing two variants of the engagement between an internal ring and a neck portion of a container, on which the accumulation of material is to be provided.

Fig. 10 is a part-sectional view showing a bellows which is provided at each end with an accumulation of material according to the invention.

In Fig. 1, there is shown a tubular article according to a first embodiment of the invention, which is in the form of an injection liquid container or vial of plas-

tics, generally designated 1. The container 1 has a cylindrical body 2, a tubular neck portion 3 and an opening 4. A separate ring 5, which will be described in more detail hereinbelow, is applied on the neck portion 3. A circumferential accumulation of material is formed at the opening 4 by the ring 5 and the section of the wall of the neck portion 3 where the ring 5 is applied.

For example, the accumulation of material should form a strong stiffening flange for receiving a snap-action cover or the like.

The method and the device according to the invention appear from Fig. 2. The thin-walled container 1 is manufactured in known manner by some conventional method, e.g. extrusion blowing, a circumferential groove 6 being formed in the neck portion 3. At the opening 4, the neck portion 3 has the diameter D_1 .

The ring 5, here being of an elastic plastics material, is placed on a schematically illustrated, tubular expanding mandrel 7, which is first expanded radially in the direction of the arrows A and then moved axially downwards in the direction of the arrow B. Before this axial displacement, the expanding mandrel 7 has been expanded to such an extent that its internal diameter D_2 exceeds the external diameter D_1 of the neck portion 3.

When the expanding mandrel 7 has been moved so far downwards that the ring 5 is on a level with the groove 6 of the neck portion 3, the expanding mandrel 7 is compressed and withdrawn upwards, the ring 5, optionally with the aid of a retaining means (not shown), being brought into permanent engagement with the groove 6 (see Fig. 1).

The inner portion 8 of the ring 5 (Fig. 1) thus forms first engagement means for cooperatively engaging corresponding second engagement means in the form of the groove 6 in the neck portion 3. These cooperating engagement means 6, 8 are thus brought into permanent engagement with each other, so that axial displacement of the ring 5 is prevented and so that an accumulation of material is formed by the ring 5 and the adjoining wall section of the neck portion 3 at the groove 6.

Thus, the container 1 is produced in known manner, but is formed with the groove 6, in which the ring 5 is subsequently brought into engagement by a simple operation and by simple equipment.

Figs 3-5 show different alternatives of the engagement between the ring and the groove in the neck portion 3.

In Fig. 3, the external ring 5a has square cross-section, like the groove 6a in the neck portion 3. Other polygonal cross-sections are of course conceivable.

In the variant shown in Fig. 4, the ring 5b has on its inside a circumferential bead 9 for engaging a mating external groove 6b in the neck portion 3.

According to the variant in Fig. 5, the ring 5c has a circumferential groove 10 for engaging a mating ex-

ternal bead 6c in the neck portion 3.

In Fig. 6, there is shown a container 11 which is similar to the container in Fig. 1 with the exception of the ring 5d having an external engagement means, here shown as a screw fitting or thread 12, for a closure device, for instance a cap, a cover or the like (not shown). The engagement means may also be of the snap-action type.

As shown in Fig. 7, the container 11 has in its neck portion external engagement means, here in the form of axial ridges 13, to prevent rotation of the ring 5d applied on the neck portion. The ridges 13 engage mating recesses in the ring 5d. As further seen in Fig. 7, the neck portion has a wall thickness which is considerably smaller than the thickness of the ring 5d in the central plane thereof. The thickness ratio preferably is from 1:10 up to 1:3.

Figs 8 and 9 show variants in which the ring 5e and 5f, respectively is applied on the inside of the neck portion 3, here being in the form of a collar. The accumulation of material is provided as before by means of the ring 5e or 5f and the adjoining wall section of the neck portion 3. The outside of the ring 5e or 5f forms engagement means for engaging corresponding engagement means in the form of a circumferential groove in the neck portion 3 in a manner similar to that described above. The rings 5e and 5f are brought into their positions of engagement either by compressing the ring or by slightly expanding the neck portion in the area of the opening.

If required, the rings 5e and 5f can be provided with internal engagement means, e.g. a thread for a screw plug or similar closure device (not shown). Moreover, cooperating engagement means (not shown) can be arranged on the outside of the ring 5e or 5f and the inside of the neck portion 3 to prevent rotation of the ring.

By suitably bevelling the inwardly directed edge portion 14 or 15 of the neck portion 3, and by also bevelling the portion 16 or 17 of the ring 5e or 5f, respectively, which comes into engagement therewith, the rings 5e and 5f can advantageously be pressed into engagement in the groove by the exertion of a relatively small force. The neck portion 3 is then slightly expanded and the ring 5e or 5f is snapped into locking engagement. This is a very simple and quick method which is of course also well suited for automatic mounting.

Generally speaking, the desired locking engagement for providing the accumulation of material can be brought about, for example in the following way.

In the case of an external ring, this is expanded while the neck portion remains undeformed (Fig. 2). Alternatively, the neck portion is compressed while the ring is not deformed (not shown).

In the case of an internal ring, this is compressed while the neck portion is not deformed (not shown). Alternatively, the neck portion is expanded while the

ring is not deformed (Figs 8 and 9).

It is understood that the above-mentioned methods of deformation can of course be combined, e.g. by compressing the ring when disposed internally while at the same time expanding the neck portion.

In those cases where the ring is to be expanded or compressed, it consists of an elastic plastics material, e.g. polyolefin. When the ring is not to be deformed, it preferably consists of a relatively hard plastics material, e.g. polystyrene. The ring is suitably injection-moulded in a multiple tool.

The invention is generally applicable and highly versatile. Fig. 10 shows an article in the form of a thin-walled bellows 18 which is provided at each end with an accumulation of material 19 and 20 according to the invention. In this case, the accumulations of material 19, 20 form connections for pipe conduits, hoses or the like (not shown).

It is understood that the article to which the invention is applied may consist of different materials. The container shown in Fig. 2 might for example have a body of metal and a neck portion of plastics and vice versa.

Finally, it should be pointed out that the invention is by no means restricted to the embodiments described in the foregoing, but several modifications thereof are conceivable within the scope of the inventive concept as defined in the appended claims. As mentioned above, the invention can be used in many different instances where it is desirable to provide an accumulation of material on a tubular plastic article. The purpose of the accumulation of material itself, whose thickness preferably is about 3-10 times the wall thickness of the article, is not decisive of the invention.

Claims

1. A method for producing a tubular article (1) having a circumferential accumulation of material, in relation to which the article has a thin wall, **characterised** in
 - a) that the tubular article (1) is formed with engagement means (6) for cooperatively engaging corresponding engagement means (8) formed on a separate, annular element (5),
 - b) that the annular element (5) is passed over or into the tubular article (1) to the position where the accumulation of material is to be provided, and
 - c) that the cooperating engagement means (6, 8) in said position are brought into permanent engagement with each other so as to prevent axial displacement of the annular element (5) and so as to provide the accumulation of material from the annular element (5) applied to the tubular article (1) and from the

adjoining wall of the tubular article (1).

2. A method as claimed in claim 1, wherein the annular element (5) is first expanded and then passed over the tubular article (1).
3. A method as claimed in claim 1, wherein the tubular article (1) is compressed before passing the annular element (5) over it.
4. A method as claimed in claim 1, wherein the annular element (5e; 5f) is first compressed and then inserted in the tubular article (1).
5. A method as claimed in claim 1, wherein the tubular article (1) is expanded before inserting the annular element (5e; 5f) therein.
6. A device for carrying out the method as claimed in any one of claims 1-5, **characterised** by a tool for applying the annular element (5) outside or inside the tubular article (1), said tool having means (7) for expanding either the annular element (5) or the tubular article (1), or for compressing either the annular element or the tubular article, and for applying the annular element (5) on the article (1) in the position where the accumulation of material is to be provided, thus establishing the engagement between the two cooperating engagement means (6, 8).
7. A device as claimed in claim 6, wherein said means is an expanding mandrel (7).
8. A tubular article having a thin wall, especially a container or a bottle, produced according to the method as claimed in claim 1 and comprising a body (2) and a tubular neck portion (3) with an opening (4), **characterised** in that the neck portion (3) in the area of said opening (4) has a circumferential accumulation of material in the form of an annular element (5) applied on the outside or the inside of the neck portion (3), said annular element (5) having engagement means (8) for cooperatively engaging corresponding engagement means (6) on the neck portion (3), said engagement means (6, 8) preventing axial displacement of the annular element (5) applied on the neck portion (3).
9. An article as claimed in claim 8, wherein the annular element (5a; 5b; 5c; 5d) is applied on the outside of the neck portion (3).
10. An article as claimed in claim 8, wherein the annular element (5e; 5f) is applied on the inside of the neck portion (3).

11. An article as claimed in claim 9 or 10, wherein the annular element (5a; 5d; 5e; 5f) in its engagement portion has polygonal cross-section and, when applied, engages a corresponding cross-sectionally polygonal groove (6; 6a) in the neck portion (3). 5
12. An article as claimed in claim 9, wherein the annular element (5b) on its inside has a circumferential bead (9) for engaging a corresponding external groove (6b) in the neck portion (3). 10
13. An article as claimed in claim 9, wherein the annular element (5c) on its inside has a circumferential groove (10) for engaging a corresponding external bead (6c) on the neck portion (3). 15
14. An article as claimed in claim 9, wherein the annular element (5d) on its outside has an engagement means (12) for engaging a closure device or the like. 20
15. An article as claimed in claim 10, wherein the annular element (5e; 5f) on its inside has an engagement means for engaging a closure device or the like. 25
16. An article as claimed in any one of claims 8-15, wherein cooperating engagement means (13) are disposed between the ring (5d) and the neck portion to prevent rotation of the annular element (5d) applied on the neck portion. 30
17. An article as claimed in any one of claims 8-16, wherein the annular element (5) and the neck portion (3) consist of plastics. 35
18. An article as claimed in any one of claims 8-17, wherein at least the part of the neck portion (3) where the annular element (5) is applied has a wall thickness which is considerably smaller than the thickness of the annular element (5) in the central plane thereof. 40
19. An article as claimed in claim 18, wherein the thickness of the annular element (5) in the central plane thereof is about 3-10 times greater than the wall thickness of said part of the neck portion. 45

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FIG.1

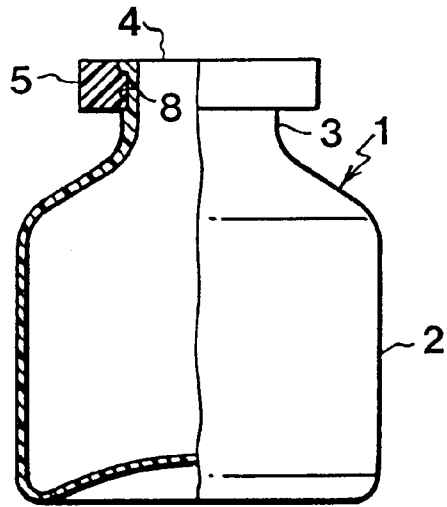


FIG.3

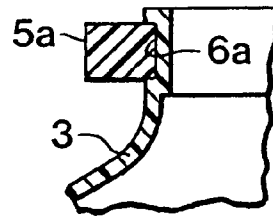


FIG.4

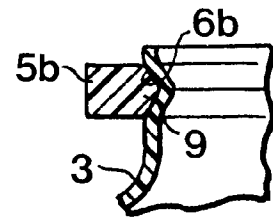


FIG.2

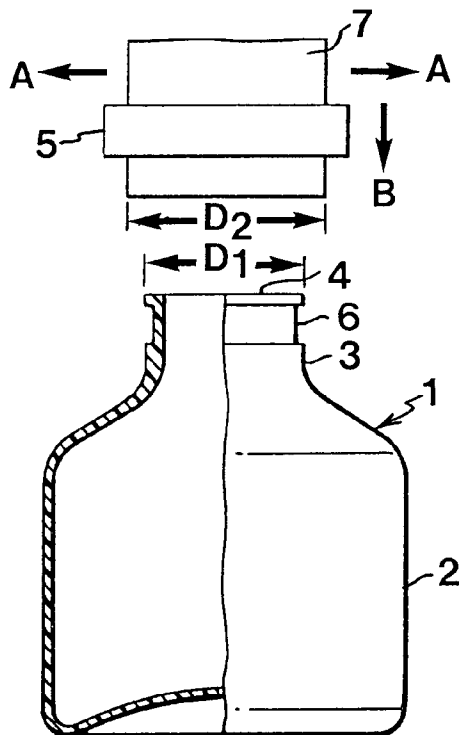


FIG.5

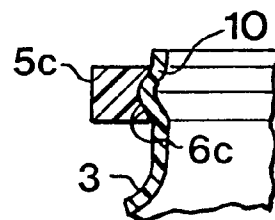


FIG.6

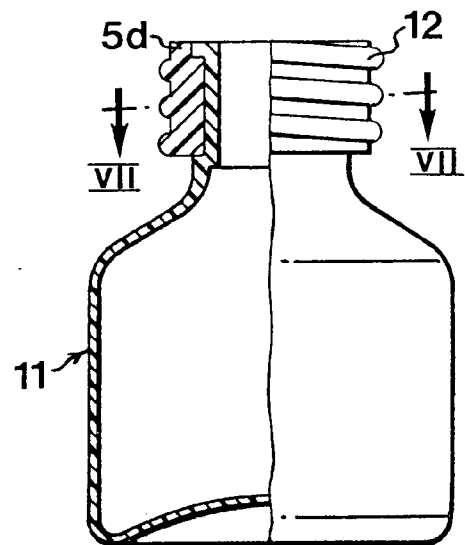


FIG.7

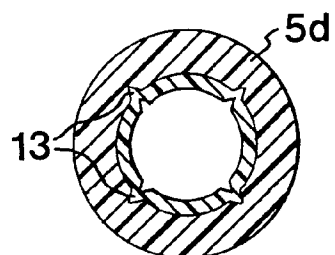


FIG.8

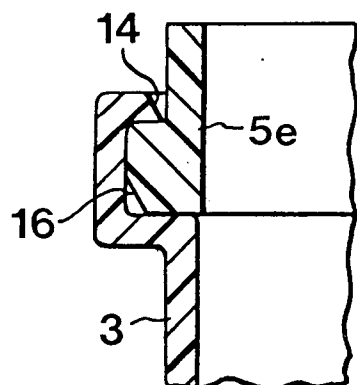


FIG.9

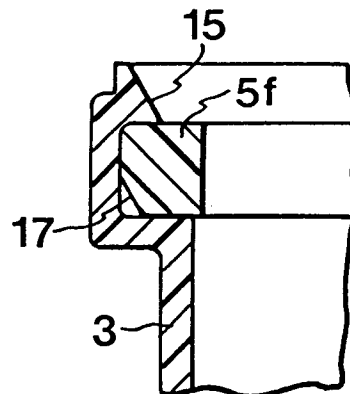
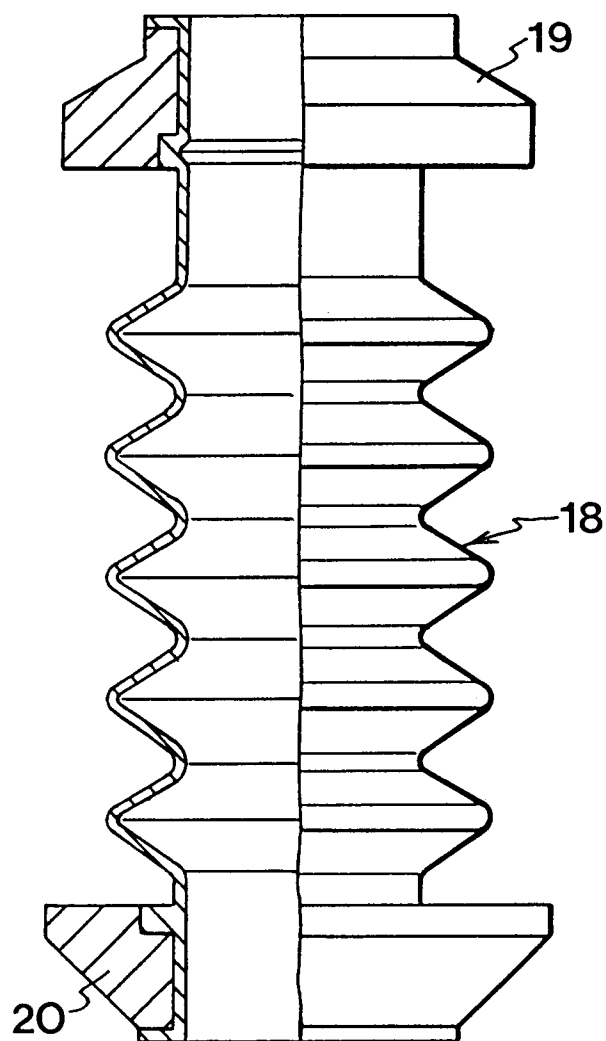


FIG.10





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 94 85 0148.1
Page 1

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	EP, A1, 0549987 (TUBEX GMBH TUBEN-UND METALLWARENFABRIK), 7 July 1993 (07.07.93) * column 4, line 40 - column 5, line 12, figures 12,13 *	1,8,9, 11-14, 16-19	B65D 1/02 B65D 1/46 B65D 6/02
Y	* see above *	2-7,10, 15	
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Y	US, A, 1304193 (WILLIAM GEORGE NICHOLLS), 20 May 1919 (20.05.19) * page 1, line 66 - line 80, figures 1,2 *	2,3,6,7	
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Y	DE, A1, 2353894 (AMERICAN FLANGE & MANUFACTURING CO. INC.), 22 May 1974 (22.05.74) * figures 1-3 *	4,5,10, 15	TECHNICAL FIELDS SEARCHED (Int. Cl.5) B65D
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A	FR, A, 1319686 (SOCIETE BRAHER S.A.), 21 January 1963 (21.01.63) * claims 1,2 *	1,8	

The present search report has been drawn up for all claims			
Place of search STOCKHOLM		Date of completion of the search 29 November 1994	Examiner PETER THOMASSON
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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