(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 684 183 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **95104649.9**

(51) Int. Cl.[6] : **B65D 1/00**

(22) Date of filing : **29.03.95**

A request for correction of the description, claims and drawings has been filed pursuant to Rule 88 EPC. A decision on the request will be taken during the proceedings before the Examining Division (Guidelines for Examination in the EPO, A-V, 3.).

(30) Priority : **30.03.94 DE 4411337**
06.07.94 DE 4423864

(43) Date of publication of application :
29.11.95 Bulletin 95/48

(84) Designated Contracting States :
AT BE CH DE DK ES FR GB GR IE IT LI NL PT SE

(71) Applicant : **Jahn, Eberhard**
Lorickstrasse 31
D-41464 Neuss (DE)

(72) Inventor : **Jahn, Eberhard**
Lorickstrasse 31
D-41464 Neuss (DE)

(54) Method of forming a slim package.

(57) The invention is a methodology to form a slim package, especially a body panel, a shoulder, a neck and a forehead resulting in a consumer liquid package, made one sheet metal or sheet steel (A) and as a result of the requirement for extended material area in the shoulder (4) area of film (6) extended in area (62) by forming a structure (63) ; (B) following stamping at least a forehead (11) , (C) simultaneously or in a following deep drawing stroke at least a section of a neck (5) and particularly one section of a shoulder (4), (D) in a second deep drawing stroke the at least not already formed section of shoulder (4) from first deep drawing stroke and at least one section of the body (3) ; (E) particularly further at least the shoulder (4) in a further compression station, particularly a coning process of deep drawing steps (8) The deep drawing invention produces a particularly, very price efficient and commercial manufacturing of the slim package with very low weight and quality material requirements.

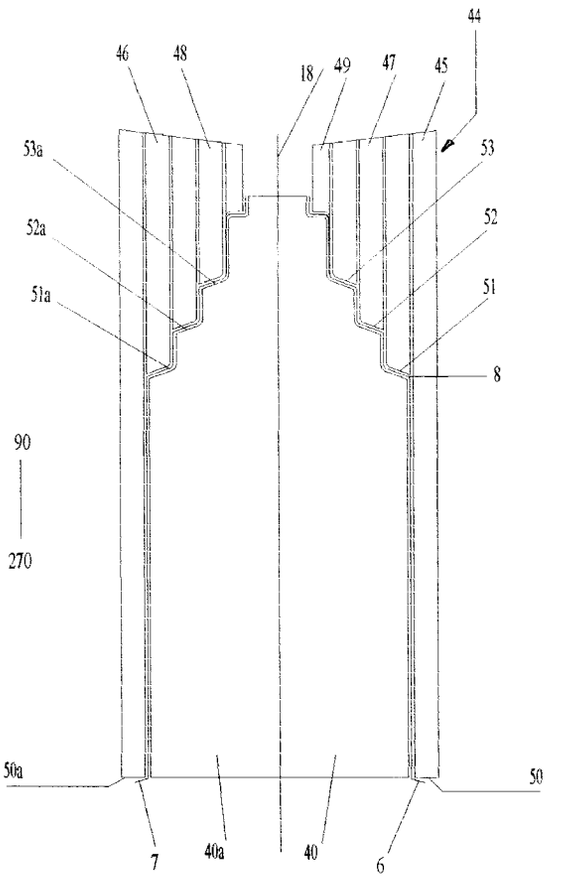


Figure 6

EP 0 684 183 A2

The invention is a method of forming a slim container, especially a body, a shoulder, a neck and a forehead from a sheet of metal or steel, especially aluminum film or sheet steel. The invention includes a slim container, a body, a shoulder, a neck with a forehead shown, as well as a deep drawing tool, and a tool for contour forming a disk.

The new product is a consumer package for beverages and liquid food products, especially for carbonated beverages, characterized particularly through a deep drawing method, preferred, with a cylinder formed side wall panel, which body is made of one and same material sheet, preferably of aluminum film or sheet steel connected with a conical package shoulder which same sheet material wall exceeds into a package forehead/pouring area. For a screw cap version, a circular separate end bottom lid is flanged onto the cylindrical package body's panel wall circle edge, forming a tight package bottom, before filling the packages. For an alternative version, a pull-tab version, with a complete package body, bottom up filling is required, before the bottom end is flanged on.

Known deep drawing methods used for manufacturing the traditional cylinder formed can is not feasible for deep drawing the new package. The traditional cylinder formed can consisting of one entire and complete cylinder body, forming the package cylindrical wall panel which exceeds into one end of the package, made from the same sheet material, forming the package bottom.
Know deep drawing technology for drawing the traditional can, is not feasible for drawing a slim package, a wall, a shoulder, a neck with a forehead as required for the new package.

The most common slim container, made of sheet material, is spray cans. A spray cans top consist of a separate forehead flanged onto a cylinder wall panel. The forehead/end is definitively not manufactured in a deep drawing process. The difference is more exposed in the spray cans cylindrical complete panel walls body, which has an overlap/end seem parallel to the length axis. Compared with deep drawing, an overlap/end seam is a weak area of a package wall, which produces fractions of the package inside coating lacquer during the different manufacturing processes, resulting in a rich environment for microorganisms to develop.

The objective with the new segmented deep drawing methodology is to be able to manufacture a package containing a cylindrical side panel wall, a shoulder, a neck and a forehead, as well as other slim containers in a practical, economical and commercial way with a deep drawing method for deep drawing one sheet metal or sheet steel, particularly aluminum film or sheet steel with low area weight with traditional drawing quality.

A further objective for proposing a new deep drawing methodology, with a particular, high production speed, simple technology, is that the new proposed methodology produces the option for commercial preferences.

A possible method for solving the task is comprised in Claim 1. It is acknowledged, that

- in a first tool station, contour forming a film disk by stamping the film against a form with a compression tool,
  alternatively a station which drawing tools gradually are drawing the film to a contour on a rotating disk,
- in a second tool station, deep drawing a first stroke forming at least a forehead of the package by stamping a film against a form with a compressing tool, eventually with circle line imprint, alternatively in a prior stroke, punching out a circle in the forehead.
- simultaneously or in a first deep drawing stroke at least one segment of the package neck and eventually one segment of the package shoulder by deep drawing the film over a drawing form with a deep drawing tool,
- in a second deep drawing stroke at least eventually the in the first deep drawing stroke not drawn section of the shoulder and at least one section of the panel wall,
  eventually at least a section of the shoulder in a third different tool station by compressing the cylinder step formed shoulder between a male and a female cone,
  alternatively in a spin neck coning process to form the shoulder smooth.

The proposed new methodology according to Claim 1 produces the option for industrialized production of the new consumer liquid packaging. The new deep drawing method eliminates the spray cans body's panel overlap seam. Particularly for food packaging, including beverages this has substantial practical and commercial value as, these seam areas generally collect microorganisms, which germs over time in contact with some food types can have hazardous consequences for the consumers.

According to Claim 1 the conical neck part of the package can be manufactured without braeakage of the film material. Aluminum film or sheet steel cannot be punched out to a cone with an angle required for a bottle shape the traditional way without material breakage. The traditional deep drawing method is only feasible in a vertical package axis direction with same drawing shape along the entire drawing axis. Deep drawing into a cone is impossible.

In Claim 1 proposed contour forming a sheet steel or a plane aluminum film, preferabl according to tests, for extending the material area in the package shoulder area to prevent material breakage during deep drawing

in a next second tool station.

The in Claim 1 proposed methodologies, deep drawing from a prior formed contour disk with at least two segment deep drawing tool with a separate final coning process of the cylindrical formed shoulder with steps, eliminates these problems and produces an option for a feasible solution.

It is according to Claim 1 preferred that the drawing form is a positive form in which the film is deep drawn over by the deep drawing tool.

Preferable in Claim 1 is that the different deep drawing strokes are worked out over one and the same deep drawing form which eliminates high costs and technical problems with multiple deep drawing tool stations.

It is therefor necessary to fulfill the method in which the new invention is based on to take advantage of the new segmented deep drawing tools which separate concentric segments are overlapping the prior segment as well as moving along the same axis as separate drawing tools. It is also preferable that at least one of the segmented drawing tools have a ring formed square view. The rings cylindrical form is characteristic for the package wall square view. The new deep drawing tool have advantages, according to following description, incorporated in the new proposed methodology. The new method can also generally be used in deep drawing.

The different deep drawing segments are gradually moved one after each other in the drawing direction, until all drawing tools have reached their end position. The drawing tools foreheads does not produce an even level in their end positions, and the body with the drawing tools in their end position exposes at least one shoulder section.

Prior to the segmented deep drawing process a contour disk with a concentric formed ring-structure are stamped out from a plane circular aluminum film or particularly a sheet steel disk between a female and a male contour form, alternatively for material i.e. aluminum film with low degree of ductility, a second version, a circular twin head drawing process are preferred which gradually and more gently forms the material to the proposed contour with extended area. The purpose is to extend the material area of the disk.

After the segmented deep drawing process, in a new separate station, at least one section of the stepped formed cylinder shoulder are compressed between a male and female cone in at least one station, or in a spin necker, with a rotating wheel, to a smooth shoulder cone.

It is applied patent for a slim package with a package wall panel, a shoulder, a neck, and forehead, and a new proposed methodology in which the container body is formed. It is also a possibility to form the package without a cone shoulder with the shoulder exceeding direct in to the forehead.

Particularly preferable is that the package forehead is formed out of one piece material sheet including a neck, a shoulder, and a panel wall. A circle can alternatively be locked out in the center of the forehead for later to pour the liquid out of the package. The new in one piece version package body makes the traditional two piece version with a separate package top mounted to a cylindrical package wall with an end seem redundant.

It is furthermore, fundamentally preferable, that the package panel wall and the neck are cylindrical formed, and that the shoulder has a cone form. This development produces a number of advantages: First, compared with i.e. a square view rectangular package walls, the traditional can, for the new invention, have a substantial lower material consumption, for several reasons. Second, a cylindrical deep drawn wall has a considerably lower degree of a contamination than a package with an end seam. Third, this version has the same practicality and hygiene in use as traditional glass bottle, preferable for consumer acceptance.

Furthermore patent is applied for a new segmented deep drawing method, comprised as prior mentioned, multiple concentric deep drawing tools overlapping each other as well as separately operating/deep drawing along the same axis.

Furthermore patent is applied for a new contour disk punching method, comprised as prior mentioned, with two contour formed tools, male and female, with both tools consisting of two segments.

Furthermore patent is applied for a new circular contour disk drawing method, comprising prior mentioned, with two drawing tools gradually operating 45 degrees on a rotating disk.

As follows, several examples versions of drawings, describing the actual invention:

Figure 1 Vertical view of a drawing tools.
Horizontal view of a circular drawing disk plate with twin drawing tools.
Vertical view of a circular drawn contour formed disk.

Figure 2 Vertical view of circular drawing tools in operation:
- Before start circular drawing.
- Ongoing circular drawing.
- Circular drawing finished.

Figure 3 Vertical view of a contour stamped disk.
Vertical view of a male and female contour stamping tools with disk.

Figure 4 Vertical view of a contour stamped disk.

Vertical view of segmented drawing tools with disk evolvement, (screw cap version)

Figure 5 Vertical view of a drawing form, drawing tools in end position, and package body (pull-tab version)

Figure 6 Vertical view of a drawing form, drawing tools in end position, and package body (screw cap version)

Figure 7 Vertical view of package body, segment deep drawn.

Figure 8 Vertical view of spin top end flanger (screw cap version)

Perspective view of spin neck imprint wheel, in moving positions.

Perspective view of spin neck mandrel with bottom neck flanger.

Figure 9 Vertical view of male, female coning tools with package body (pull-tab version)

Figure 10 Vertical view of package body, segment deep drawn and spin flange/necked.

Figure 11 Vertical view of package body, end spin flanging (screw cap version)

Figure 12 A final package (screw cap version)

Figure 1 explaining a circular drawing process in vertical and horizontal view. Two drawing tools 15, for each circular ring, oriented over a circular rotating contour formed disk 17, in which one of the tools 15, is moving parallel to the plan (21) axis, and the other tool (15) is moving parallel to the plane (20) axis, and gradually/gently forming a circular V form as the the disk (17) are rotating. This method is particular actual for sheet materials with low ductility properties, i.e. aluminum.

Figure 2 exposes a vertical view of the drawing section, operating in three different situations during the circular drawing. First, a film 6 between two drawing tools 15, in upper position, and a circular drawing tool 17, in which one of the two tools 15, drawn with a dotted line, is simulated into the drawing, as this tool is operating 180 degrees seen from the disk(17) center. Second, tools 15 during drawing film (6) against rotating disk planes (20) and (21). Third, the drawing process is finalized as the two drawing tools 15 have reached its final drawing position (24) with and extended film 6 material area of about 40%.

Figure 3 is explaining the contour stamping process in a vertical view. A forming tool consisting of six separate tools 58, 58a, 59, 59a, 60, 60a, all tools are moving after the same axis. Tool 58 is a center tool overlapped by middle tool 59 which again is overlapped by outer tool 60. All tools have an over tool, a. A plane circular material disk sheet 6 is placed between tools 58, 59, 60 and 58a, 59a, 60a. Tools 58 and 58a are stamping together simultaneously with tool 60 and 60a in a first stroke which continues in holding position until second stamping stroke with tools 59 and 59a have been worked out. The Objective with this two stroke punching method, is to prevent the center disk area 58 to stretch and firmly holding the disk circle edge in area 60 in a second stroke during stretching the material in area 59 to a contour structure. Different other structures can be stretched in the tool 59 area. This method is actual for sheet material with medium ductility properties, particularly sheet steel.

Figure 4 is explaining a schematic development of the prior formed film disk 6 in the different drawing tools; 45, 46, 47, 48, 49. According to fig. 6a-6f, the film disk 6 is moving with each drawing segment until the drawing process is finalized with drawing tool 44.

Figure 5 is an example of the deep drawing process according to Claim 1. The deep drawing form 40 is a cylindrical positive form, over which the deep drawing tool 44 is drawing the film 6. The segments 45, 46, 47, 48, are moved in drawing direction 270, in a first stroke until the center tool 48 reaches its final stroke, simultaneously the forehead of the drawing segments 50, 51, 52, 53, are leveled and forehead 53 reaches the center tool 48. The drawing tools 45, 46, 47, reaches their respective corresponding foreheads 50, 51, 52 in continuing strokes. The mandrel 40 forehead has a form 43, imprinting the package forehead 9 and tool 48 center has incorporated a circle imprinting scoring tool, with the result that not only the neck 5 and a part of the shoulder 4 of the package 2 will be drawn in the first stroke, but also a form 9 with an outside score are stamped out in the first stroke.

In a second stroke, in which the center tool 48 is not moved, the drawing tools 45, 46, 47, are moved in operation direction 270 until its final position 52a were the forehead of drawing tool 47 is forming a second segment of the package body. The foreheads 50, 51, 52, of the three drawing tools 45, 46, 47 is again leveled.

Analog in a third stroke, a third segment of shoulder 4 is formed, and in a fourth and last deep drawing stroke the panel wall 3 of the package 1 is formed. Finally the deep drawing segment 45, 46, 47, 48, are moved in direction 90 and the prior formed segment formed package body 1 are released from the deep drawing form 40.

Figure 6 is another variation of the method explained under figure 5. Prior to a first stroke with a center tool 49, a so called 0 stroke is punching out a circle area in the forehead 43 for pouring the liquid out of the final package, a screw cap version.

Figure 8 is a principle drawing of a coning process to shrink a segment formed package body. A package body 6 is compressed between a coning tool 54 and coning mandrel 55 along the same axis to cone the prior formed steps produced in the segmented deep drawing process. The coning process may bee fulfilled after

the same principle with different cone grades in different tool stations, alternatively compressed air can replace the mandrel 55.

Figure 9 is a principle drawing of a circular spin neck and flanging operation. The segment formed package body 6 are pushed onto a mandrel 80 which starts rotating after the package body 6 have entered onto the mandrel and are rotating around its own axis on a carousel. Simultaneously a spin neck wheel 81 with an imprint contour negative corresponding with the final package body and a circumference 4, 6, 8 or 10 times larger the package neck 5 in the corresponding neck (5) area, are moving gradually from point 180 to point 0 and producing the final shoulder (4) and neck (5), and an end neck flanger 82 are gradually moving from point 90 to 270 to flange the top and the bottom of the package. Several tools 80, 81, 82, are turning around its own axis's around a carousel. The package body are released from the carousel by reversing tool 80, 81, 82 before the carousel have reach one 360 degrees turn on the carousel and the process is finalized.

Claims

1. Method of forming a slim package, especially a body, a shoulder, a neck, and a forehead, a liquid package, with bottle like design made of metal or steel sheet material, compreising of,
   - in a first tool station, contour forming a film disk by stamping the film against a form with a compression tool, or an alternatively station which drawing tools gradually are drawing the film to a contour on a rotating disk,
   - in a second tool station, in a first stroke forming at least a forehead of the package by stamping the film on a form with a compressing tool eventually with a scoring circle imprint line in the film, alternatively in a prior stroke, punching out a circle in the forehead,
   - simultaneously or in a first deep drawing stroke at least one segment of the package neck, eventually one segment of the package shoulder by deep drawing the film over a deep drawing form with a deep drawing tool,
   - in a second deep drawing stroke at least eventually the in the first deep drawing stroke not drawn section of the shoulder and at least one section of the panel wall,
   eventually at least one section of the shoulder in a third different tool station by compring the cylinder step formed shoulder between a male and a female cone, alternatively in a spin neck coning process to form the shoulder smooth.

2. Method according to Claim 1, comprising, that the first stamping and first deep drawing stroke are worked out in, and over a combined deep drawing and stamping form (40) and or with a combined deep drawing and stamping tool (44).

3. Method according to Claim 1 and Claim 2, comprising, that the deep drawing form (40) is a positive form, over which the film (6) are drawn with a deep drawing tool (44).

4. Method according to one or more Claims 1 - 3, comprising, that the deep drawing strokes are worked out on the same deep drawing form (40).

5. Method according to one ore more Claims 1 - 4 in connection with a deep drawing Claim 12 - 14, comprising, that first the deep drawing tool's (44) center segment tool (48) are moved at least over the neck (5) part of the package (1) in drawing direction (270) to it's end position (53a) in the deep drawing form (40),
   simultaneously moved or there after, the next tool (47) and eventually further tools (46, 45) of deep drawing tool (44) in drawing direction (270) to their foreheads (52, 51, 50) until leveled with the forehead (53) of tool (48),
   and move following in a further stroke the next tool (47) for deep drawing at least one part of shoulder (4) in its end position (52a) on the deep drawing form (40) and eventually simultaneously or there after one or more tools (46, 45) in drawing direction (270) until the foreheads (52, 51, 50) next to tool (47) an further tools (46, 45) are building a level.

6. Method according to Claim 5, comprising, that all segments of the deep drawing tools (44) are moved in steps in the drawing direction 270 on the deep drawing form (40) until all segments (48, 47, 46, 45) of the deep drawing tool (44) are in their position (53a, 52a, 51a, 50a).

7. Method according to Claim 6, comprising that the drawing tools (48, 47, 46, 45) foreheads (53, 52, 51, 50) in their respective end position (53a, 52a, 51a, 50a) not are leveled, and that the package (1) in the deep drawing form (40) one shoulder (4) section exposed when the drawing tools (48, 47, 46,45) are in their respective end positions (53a, 52a, 51a, 50a) (Figure. 5)

8. Method according to one or more Claims 1 to 7, comprising, that the deep drawn package (1) are compressed in a connecting separate coning process between a male (55) and female (54) cone, for pressing out at least one section of the shoulder (4) especially deep drawing step (8) and that the coning tool (55) and (54) at least in one area have the same form as the final package (1).

9. Slim package, containing a body, a shoulder, a neck and a forehead, comprising, that the package (1) formed according to one or more of the Claims 1-9.

10. Package according to Claim 9, comprising, a package (1) a forehead (11) in one piece with a neck (5), a shoulder (4) and a panel body wall (3)

11. Package according to Claim 9, comprising, that the package have a cylinder formed panel body (1), and neck (5) with a conical formed shoulder (4) (Figure 12)

12. Deep drawing tool, comprising, that the deep drawing tool (44) have multiple segmented tools (48, 47, 46, 45) concentric overlapping each other moving separately along the same axis (18) and separately driven.

13. Deep drawing tool according to Claim 12, comprising, that at least one drawing tool (48, 47, 46) have a corresponding forehead form to (53, 52, 51)

14. Deep drawing tool according to Claim 12 or 13, comprising, that at least one of the tools (48, 47, 46, 45) have a essential ring formed queer view.

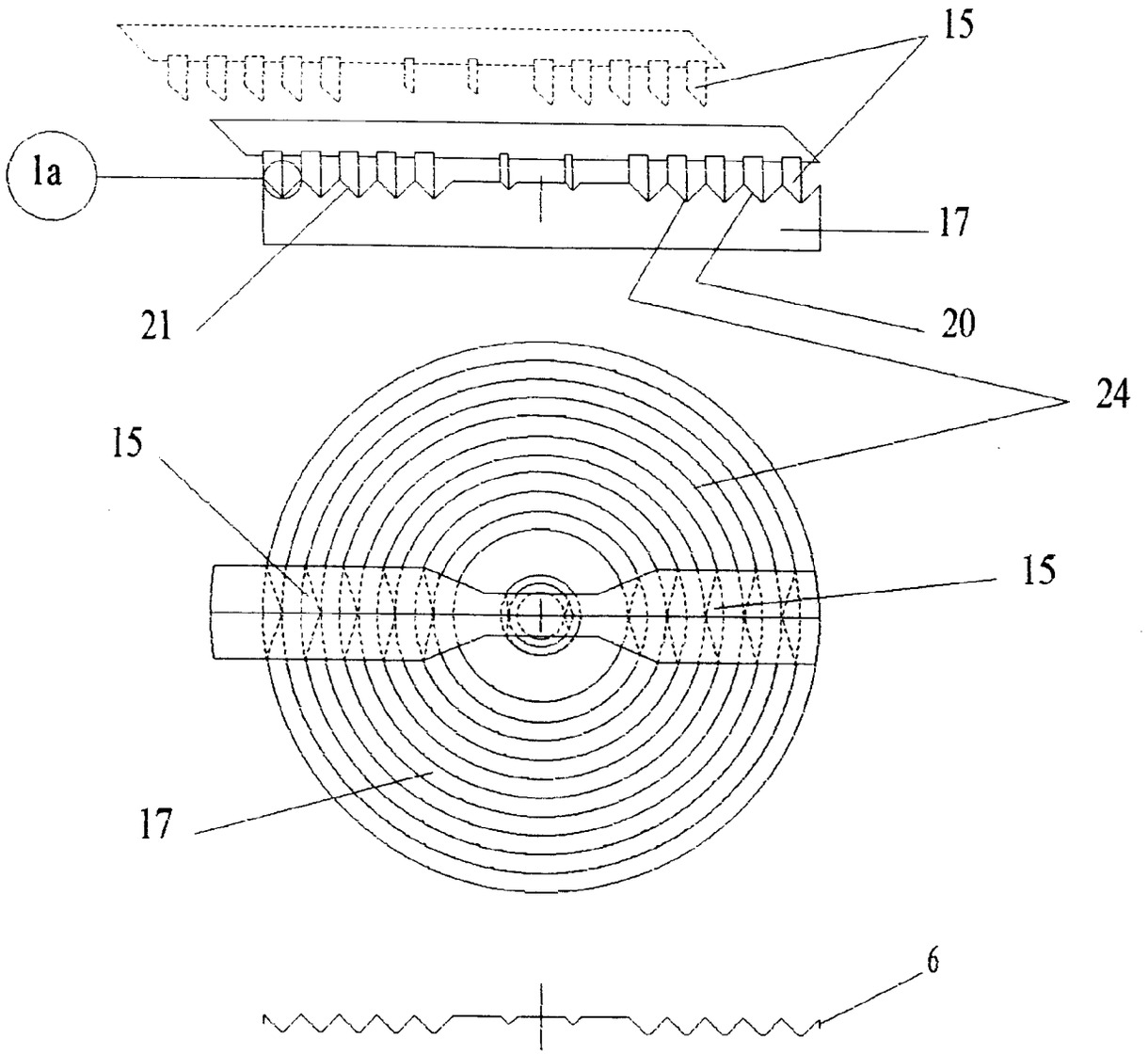
15. Imprinting method according to Claim 1, comprising, that the imprinted form have a structure (63), (64) in which the material is consecutive exposed to both sides of a center line (65)

16. Deep drawing method according to Claim 1, comprising that one drawing tool (15) is moving parallel to the left V plane (21) axis, and the other tool (15) is moving parallel to the right V plane (20) axis.

17. Spin neck method according to Claim 1, comprising, that a spin neck wheel neck (81) having a corresponding negative form to a finished package shoulder (4) and neck (5) (9 figure)

18. Spin neck drawing method according to Claim 1 and Claim 17, comprising, that a spin neck wheel have a negative corresponding form to neck (5) with at least a section of one thread (23) unimprinted.

19. Punching tool according to claim 1, comprising, that in a stroke prior to tool (48) a punching tool (49) are punching out a circle in forehead (11) with a diameter smaller than the neck (5) diameter.



1:2

Figure 1

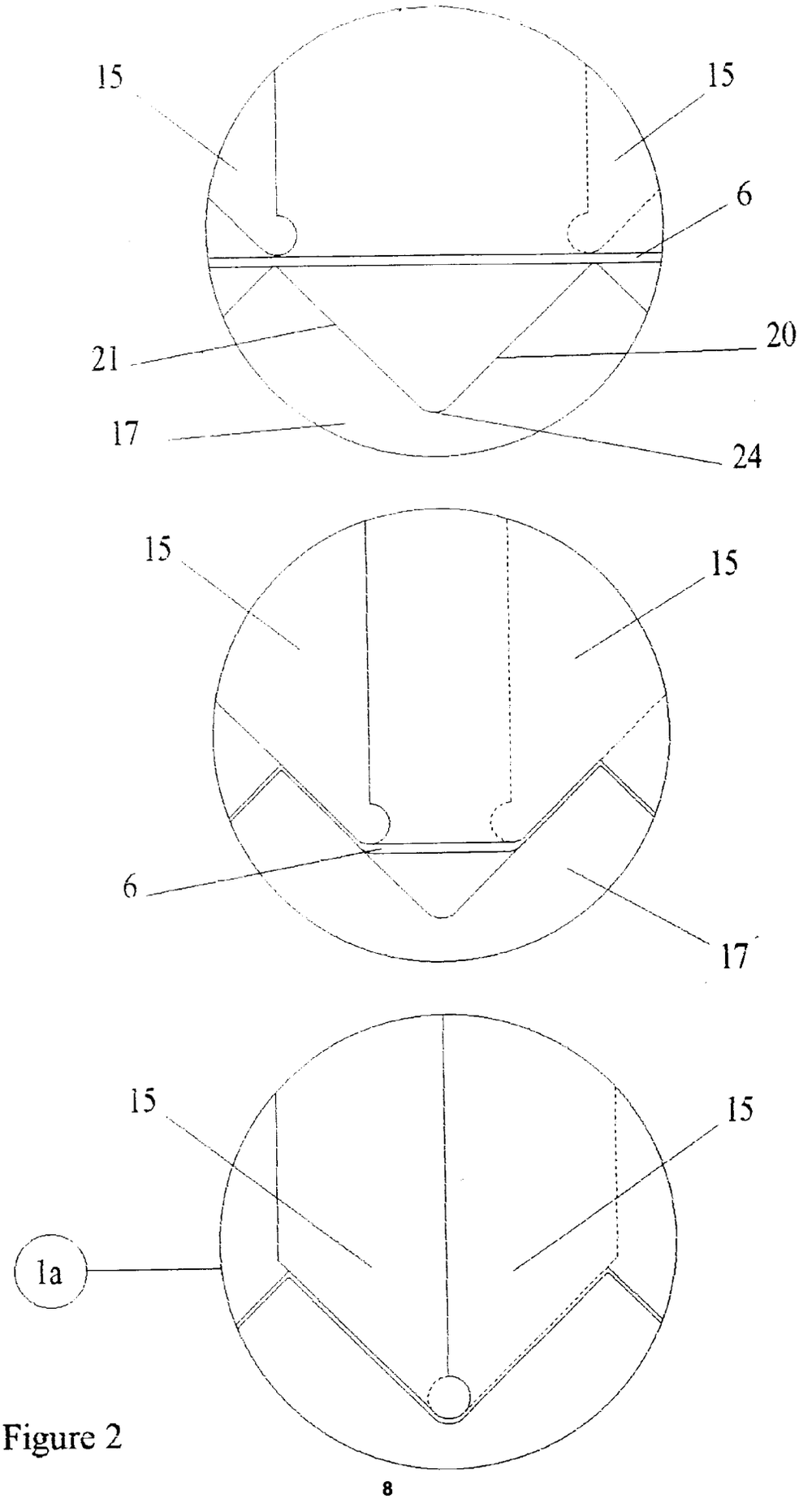


Figure 2

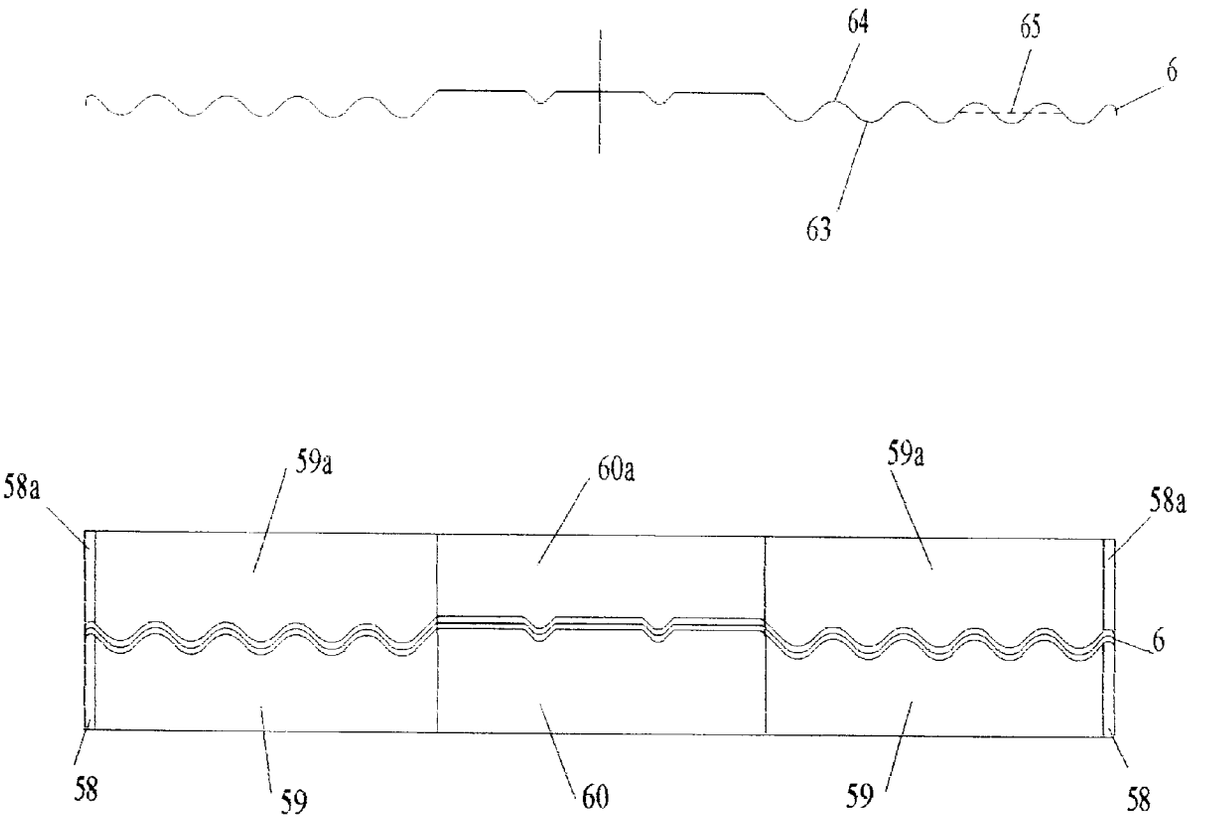


Figure 3

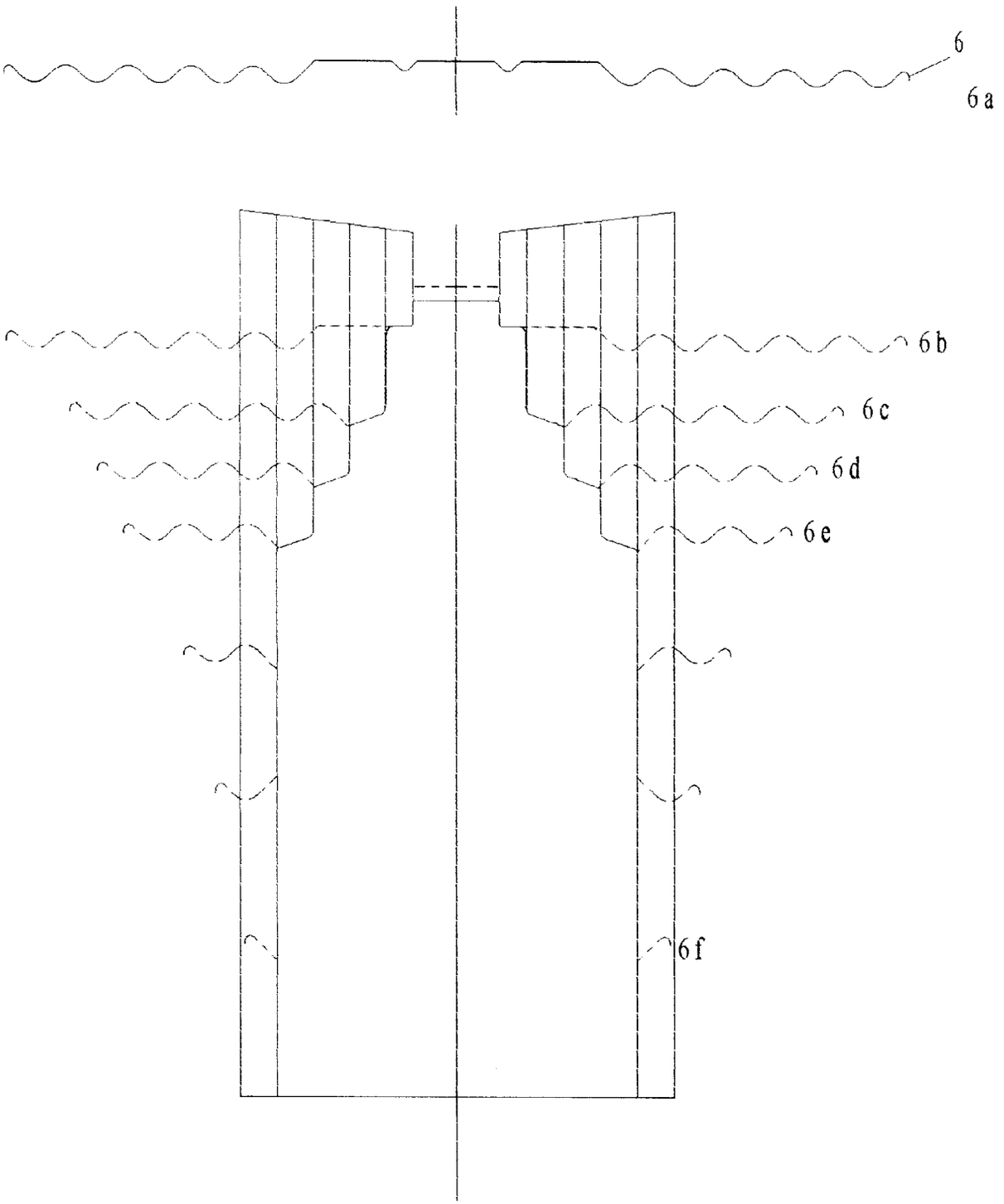


Figure 4

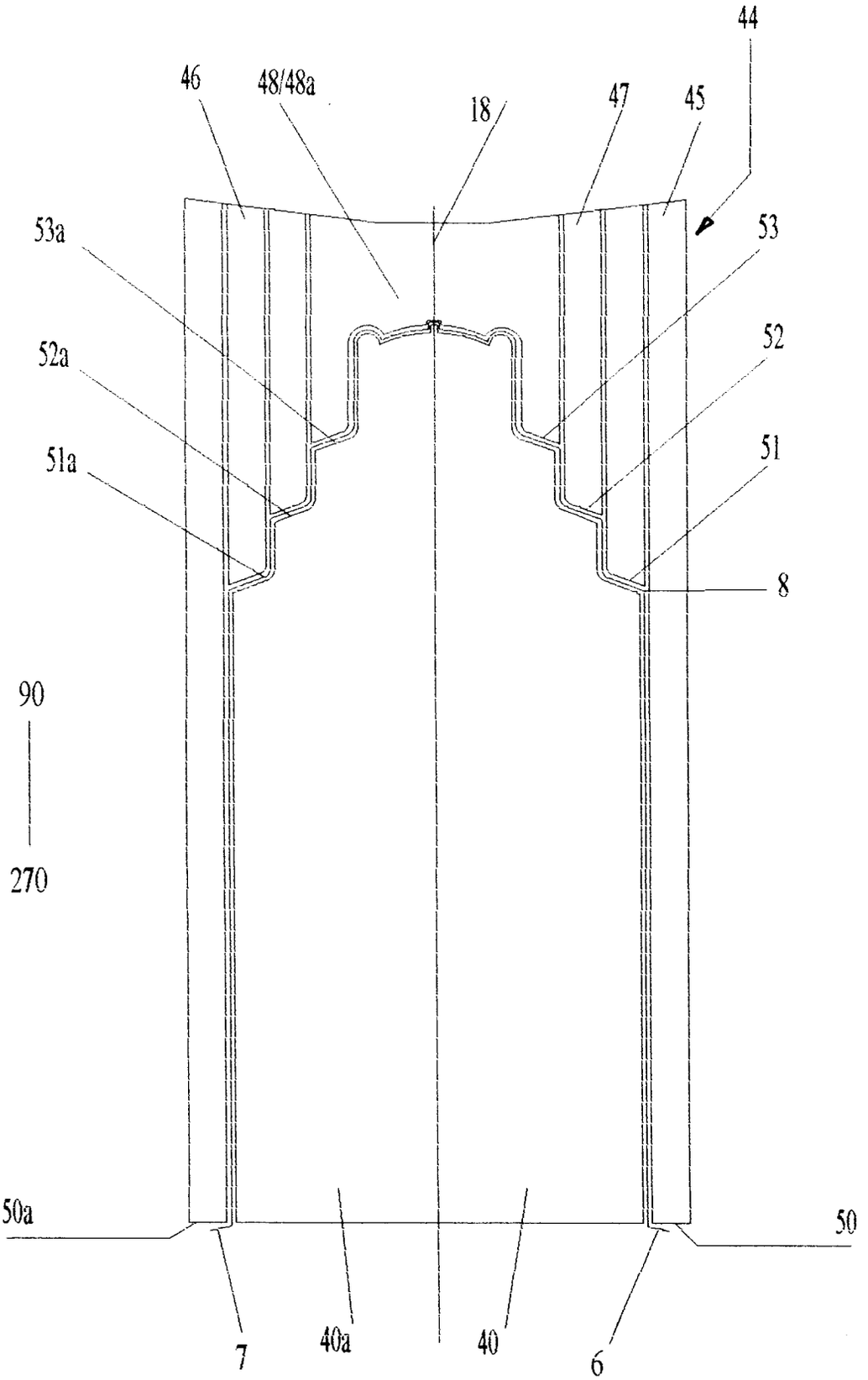


Figure 5

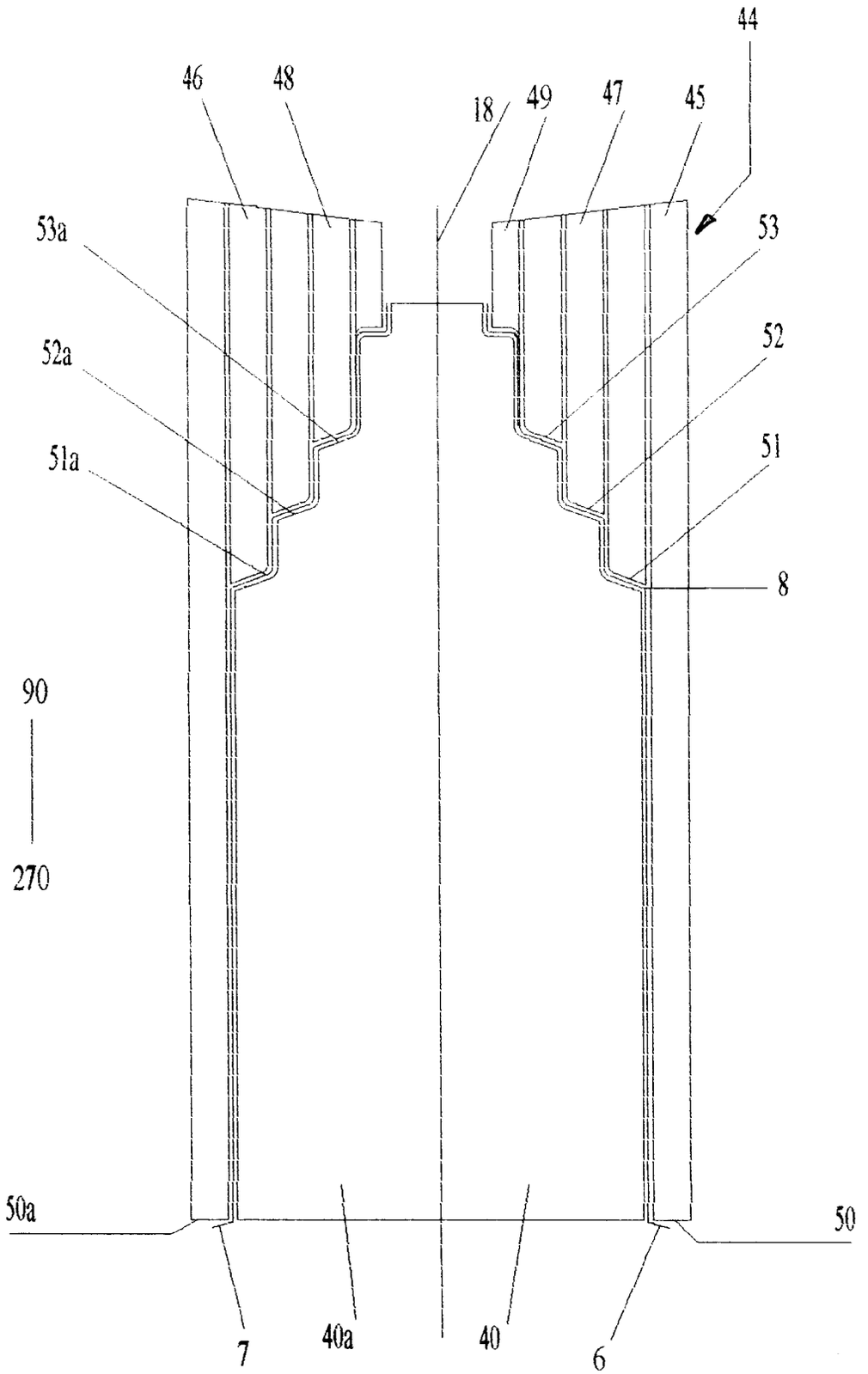


Figure 6

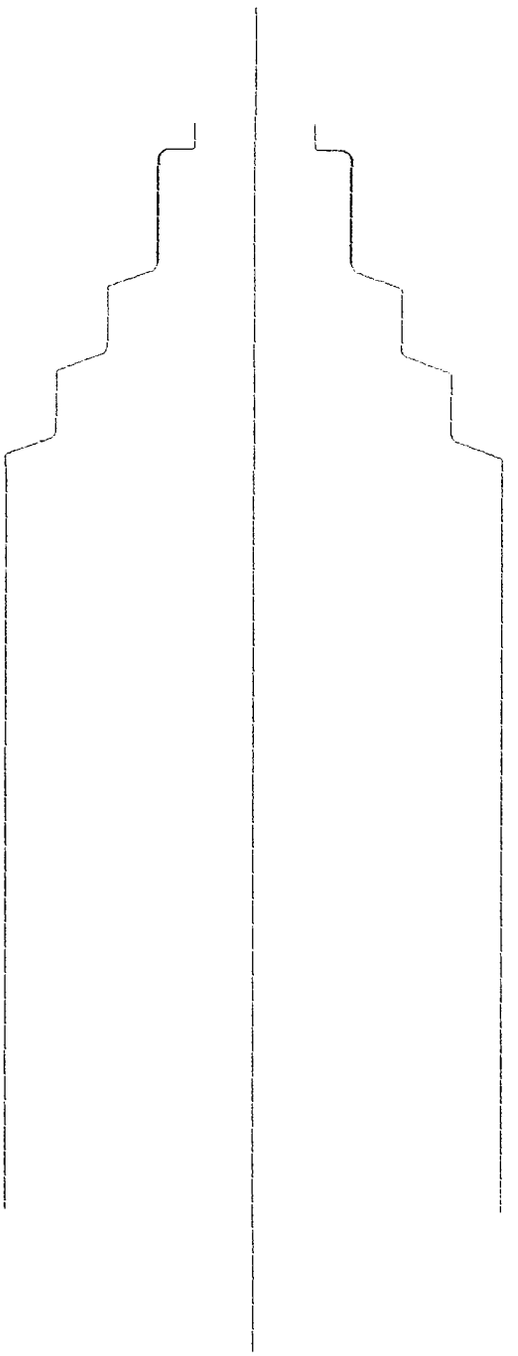


Figure 7

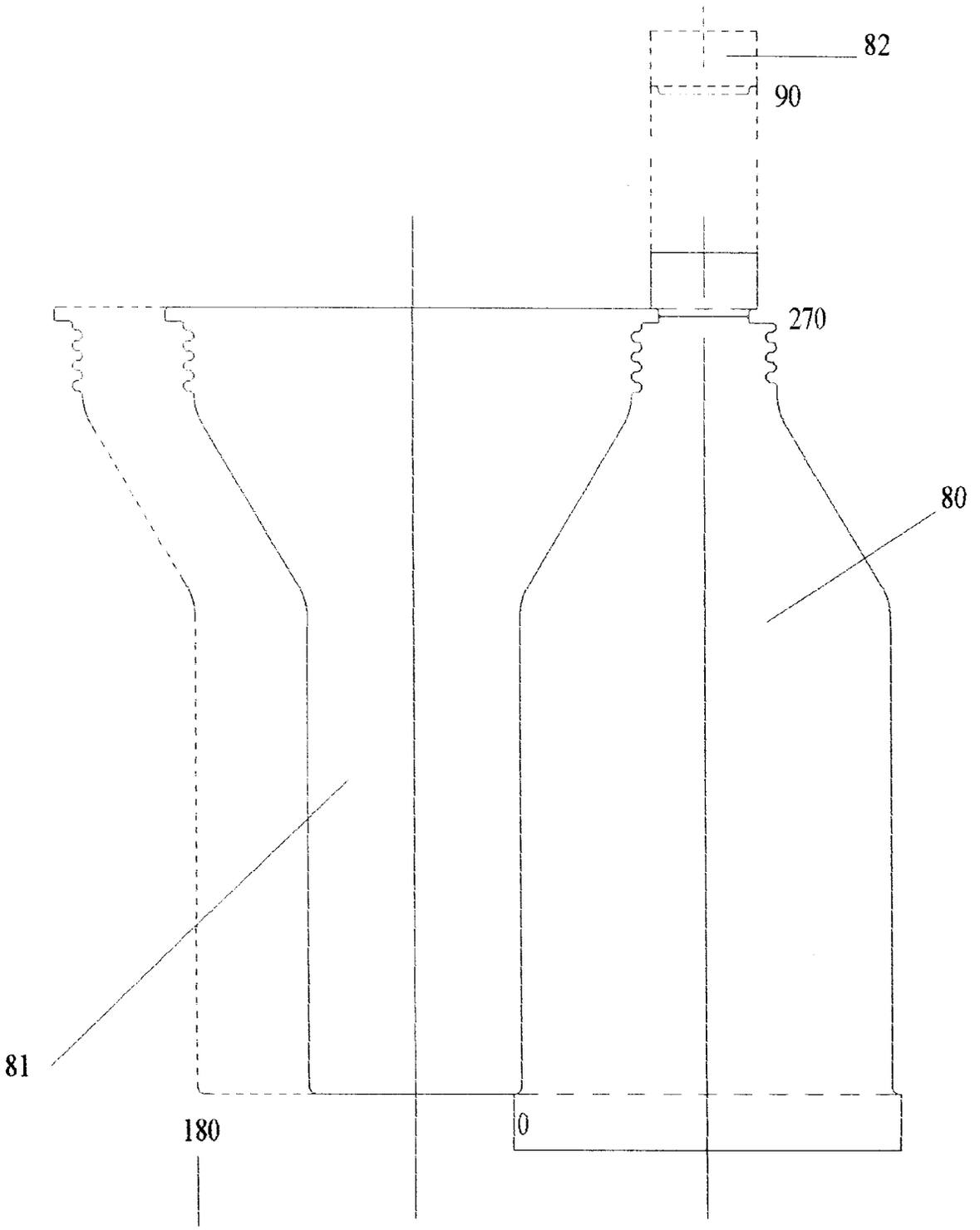


Figure 8

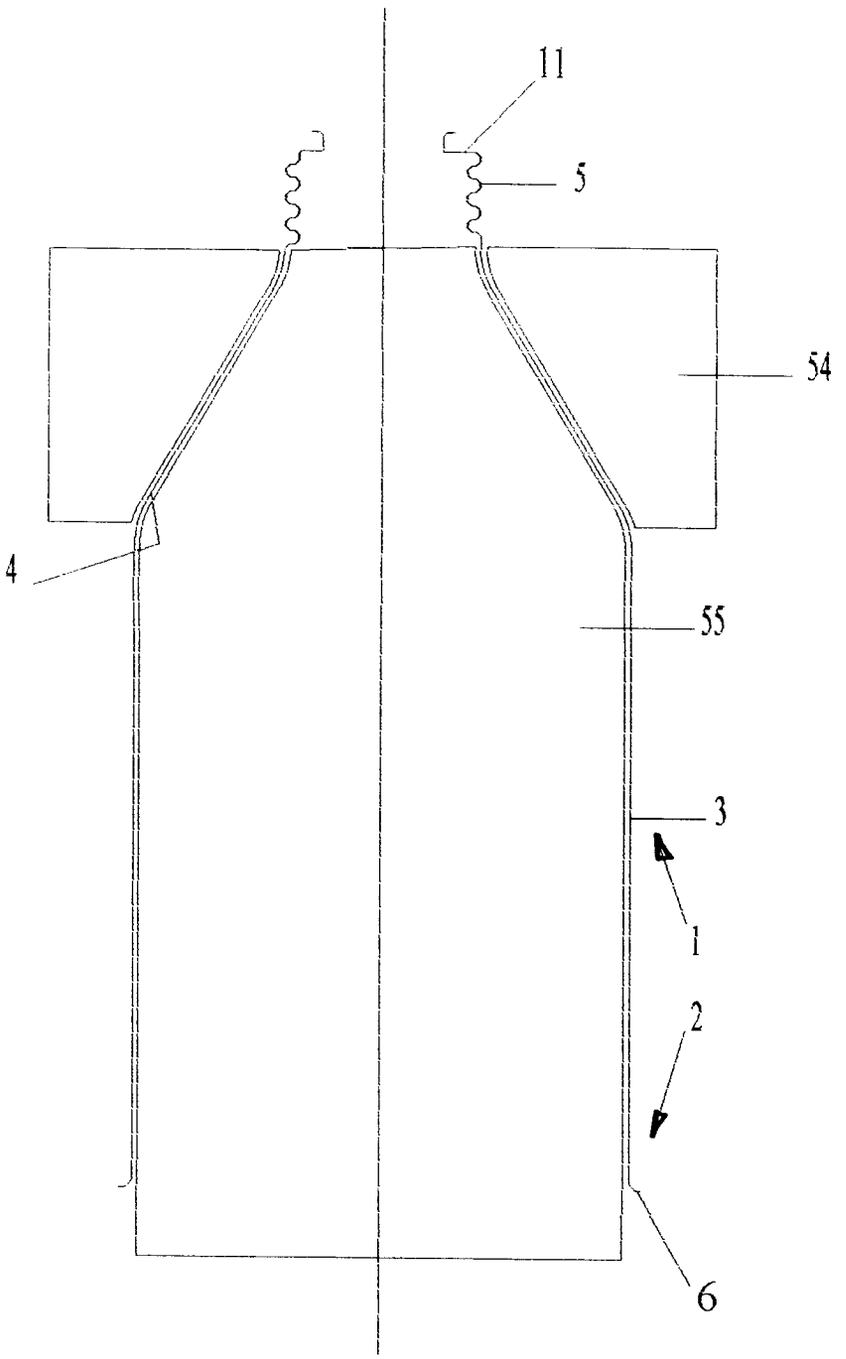


Figure 9

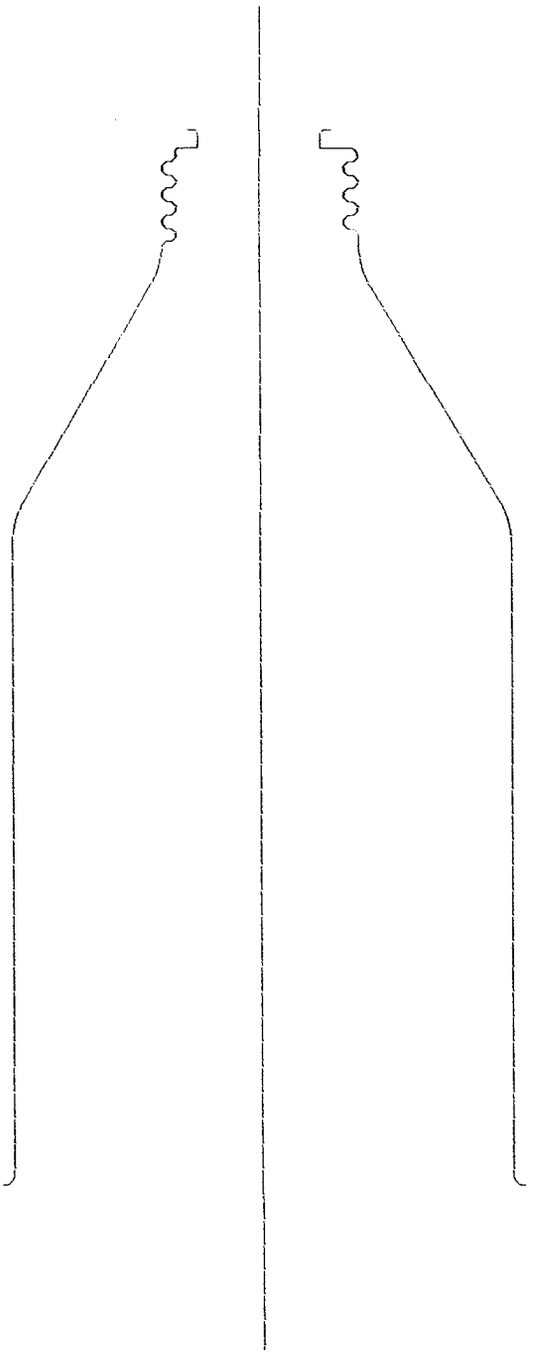


Figure 10

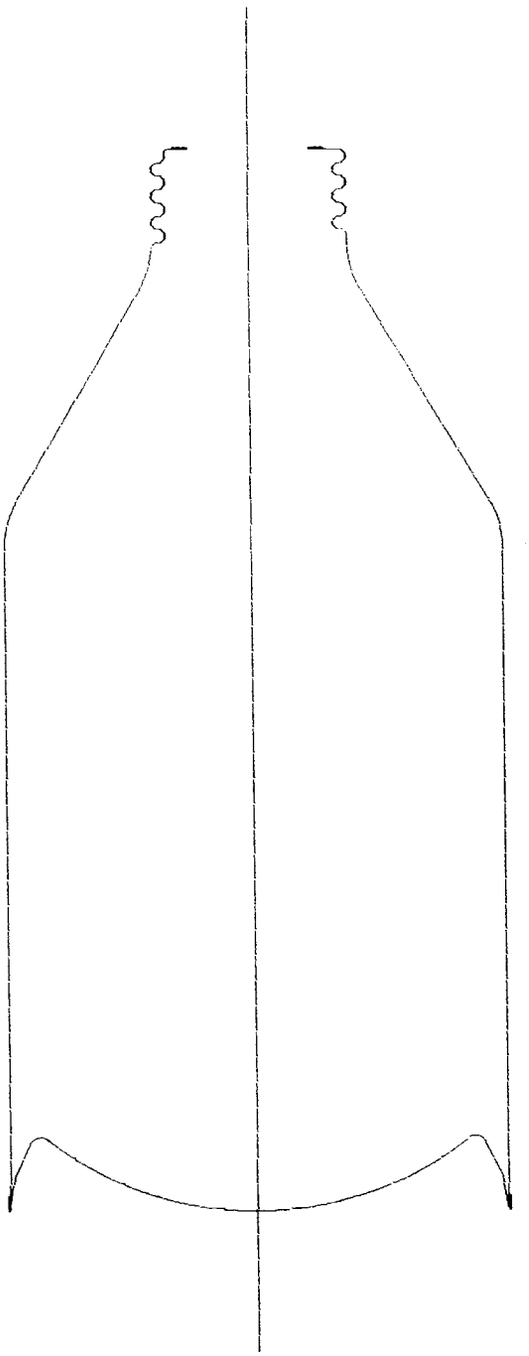


Figure 11

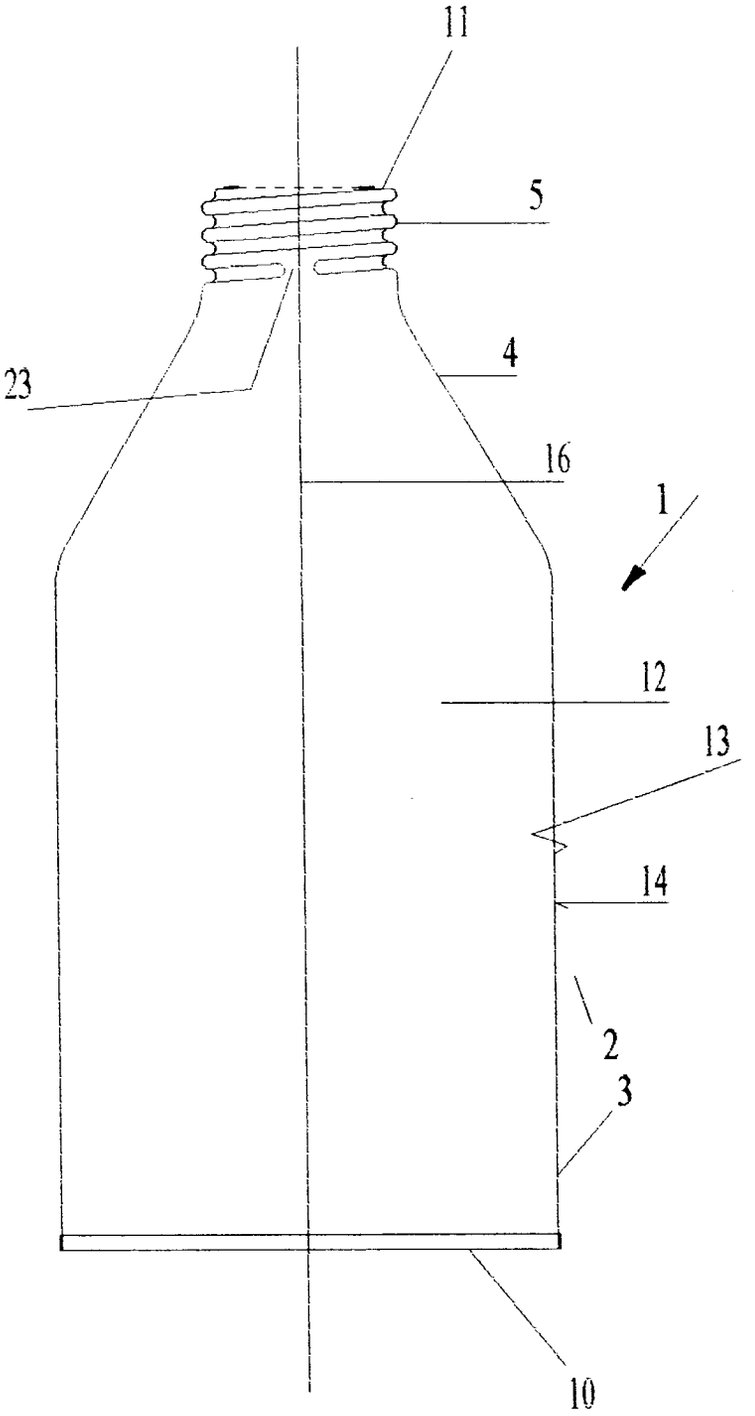


Figure 12