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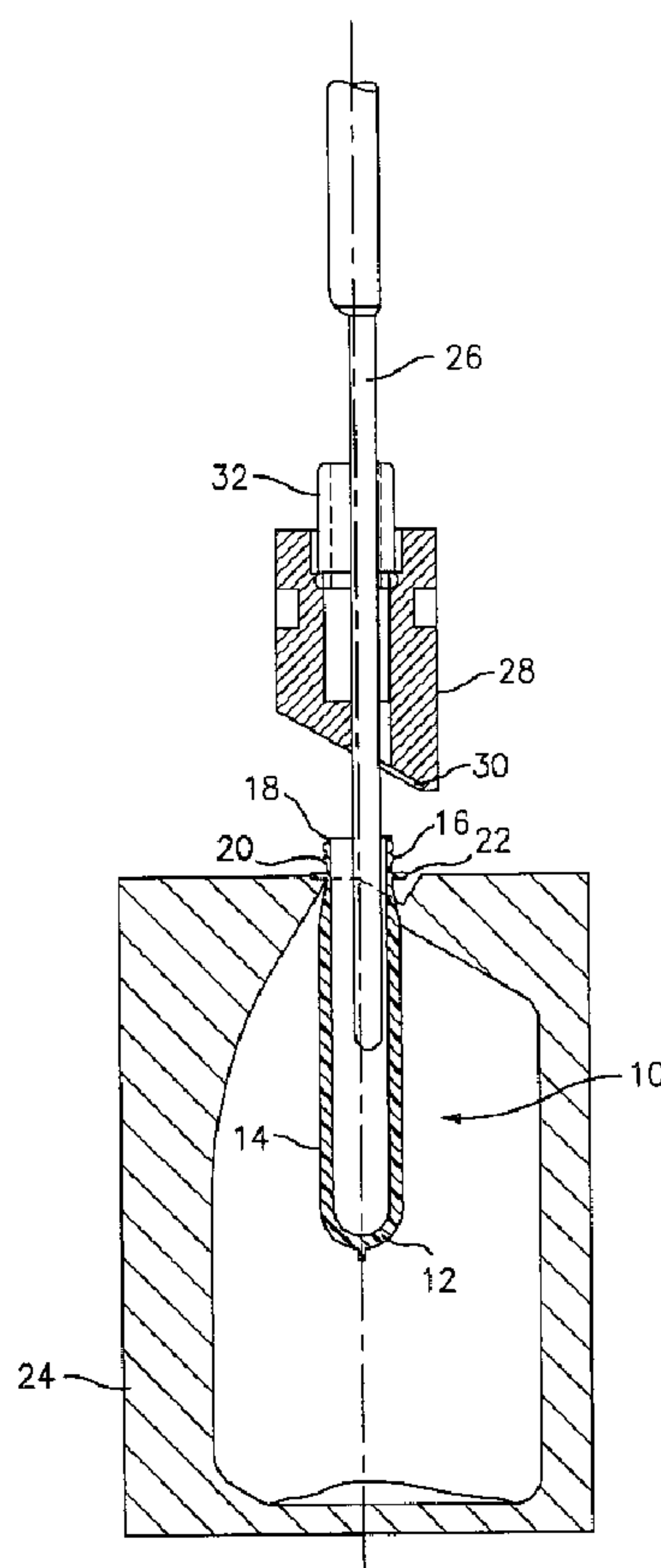
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(54) Titre : CONTENANT EN PLASTIQUE MOULE PAR SOUFFLAGE AVEC OUVERTURE INCLINEE, ET METHODE ET APPAREIL DE FABRICATION

(54) Title: BLOW MOLDED PLASTIC CONTAINER WITH INCLINED MOUTH AND METHOD AND APPARATUS FOR OBTAINING SAME



(57) Abrégé/Abstract:

Method and apparatus for blow molding a plastic container with a mouth and neck portion thereof which is inclined or angled with respect to the body portion of the container, plus a plastic container having an inclined or angled mouth and neck portion.



ABSTRACT OF THE DISCLOSURE

Method and apparatus for blow molding a plastic container with a mouth and neck portion thereof which is inclined or angled with respect to the body portion of the container, plus a plastic container having an inclined or angled mouth and neck portion.

BLOW MOLDED PLASTIC CONTAINER WITH INCLINED MOUTH AND METHOD AND APPARATUS FOR OBTAINING SAME

BACKGROUND OF THE INVENTION

This application is a Divisional of Application Ser. No. 2,416,077, filed January 13, 2003.

The present invention relates to a blow molded, plastic container having an inclined or angled mouth and neck portion, and a method and apparatus for preparing same.

Blow molded plastic containers, such as those made from polyethylene terephthalate, are widely used for many applications, such as, for example, as containers for drinks and cleaning products. These containers customarily have a straight mouth and neck portion, that is, a mouth and neck portion that are coaxial with the body portion of the container.

The preparation of these containers generally involves preparing a preform or parison with a mouth and neck portion that are coaxial with the preform body portion, holding the preform in a blow mold with the preform mouth and neck portion held coaxial with the preform body portion, and forming the desired container in the shape of the blow mold by stretching and blow molding.

For many applications it is desirable to prepare such a container with a mouth and neck portion at an angle to the body portion of the container. However, it is difficult to prepare such an angled mouth and neck portion container by conventional blow molding techniques. For example, such techniques may involve expensive and inconvenient multistage operations where an injected preform is clamped, stretched and blown in the mold at one station and a blow pin is inserted into the mold for blowing and/or compression molding at another station and the neck is bent at a subsequent station or in a subsequent stage of operation. Techniques such as this increase the cost of the container and complicate processing.

Alternatively, a conventional type apparatus cannot be satisfactorily used to mold a container with an angled mouth and neck portion since to do so would require the mold cavity to be

aligned so that the desired angular neck is appropriately aligned with the blow pin. Significant processing problems result thereby, as well as problems with the resultant container.

In addition, it is difficult to fill an angled mouth plastic container with contents using conventional equipment.

Accordingly, it is a principal objective of the present invention to provide a new and improved method and apparatus for obtaining a blow molded, plastic container with an angled or inclined neck and mouth portion.

It is a still further objective of the present invention to provide an improved blow molded, plastic container with an angled or inclined neck and mouth portion.

It is an additional objective of the present invention to provide a method and apparatus as aforesaid which is easy and expeditious to use on a commercial scale, and which simply and conveniently provides improved containers as aforesaid.

Further objects and advantages of the present invention will appear hereinbelow.

SUMMARY OF THE INVENTION

In accordance with the present invention it has now been found that the foregoing objects and advantages are readily obtained.

The present invention provides a method of forming a blow molded plastic container, preferably polyethylene terephthalate although other plastic materials can be readily used, said container having a mouth and neck portion thereof which are inclined or angled with respect to the body portion of the container. The method comprises:

providing a straight, cylindrical plastic parison or preform having a closed base, straight body portion extending therefrom, straight neck portion extending from the body portion, and an open mouth;

placing said preform in a blow mold having the desired container configuration and clamping or holding the preform in place in the blow mold;

introducing a stretch rod into the preform and extending said preform substantially to the base of the blow mold with said stretch rod to provide an extended preform;

providing a blow nozzle with an angled face corresponding to the desired angle of the mouth and neck portion of the container, generally less than 45° with respect to the longitudinal axis of the container;

engaging said angled face of the blow nozzle with the open mouth of the preform and bending the open mouth and neck portion of the preform by the angled face of the blow nozzle to correspond to the angle of the face of the blow nozzle; and

introducing high pressure air into the extended bent neck preform from the blow nozzle to stretch the extended bent neck preform into conformity with the shape of the blow mold and to provide a biaxially oriented container having an angled mouth and neck portion.

The apparatus of the present invention comprises:

a blow mold having the desired container configuration for holding in place therein a straight, cylindrical plastic parison or preform having a closed base, straight body portion extending from the base, straight neck portion extending from the body portion, and open mouth;

a stretch rod associated with the blow mold for introduction into the preform operative to extend the preform substantially to the base of the blow mold and provide an extended preform;

a blow nozzle associated with the blow mold having an angled face corresponding to the desired angle of the mouth and neck portion of the container, generally less than 45° with respect to the longitudinal axis of the container;

wherein said angled face of the blow nozzle is operative to engage the open mouth of the preform and bend the open mouth and

neck portion of the preform to correspond to the angle of the face of the blow nozzle, and wherein said blow nozzle is operative to introduce high pressure air into the angled mouth and neck of the extended preform to stretch the extended preform into conformity with the shape of the blow mold and to provide a biaxially oriented container having an angled mouth and neck portion.

The container of the present invention comprises:

a biaxially oriented, blow molded container prepared from a straight, cylindrical preform or parison, said container having a closed base, a body portion extending from the closed base, a neck portion extending from the body portion, an open mouth, and a longitudinal axis; wherein said body portion has an upper portion and a lower portion, and in cross section one side of the upper body portion includes a gradual, continuous, curved configuration extending to the angled neck, and the opposed side of the upper portion has a stepped configuration extending to the angled neck.

The container of the present invention is desirably polyethylene terephthalate and may if desired include an amount of post consumer resin (PCR), for example, up to about 75%. Also, if desired the container may be of a multilayer construction. Desirably, the container may have a threaded neck and an outwardly extending flange in the neck portion beneath the threaded portion.

In addition, the present invention provides a method of forming a blow molded plastic container, preferably polyethylene terephthalate although other plastic materials can be readily used, said container having a mouth and neck portion thereof which are inclined or angled with respect to the body portion of the container. The method comprises:

providing a blow molded plastic container having a closed base, a body portion extending from the base, a neck portion extending from the body portion and an open mouth above the neck portion; and

heating the neck of the container and bending the heated neck of the container with a holding means that holds and bends the neck of the container to provide a mouth and neck portion oriented at an angle with respect to the body of the container.

Desirably, the blow molded plastic container is prepared from a parison or preform, with the resultant blow molded container having a mouth and neck portion that are straight or coaxial with the container body portion. The blow molded container with straight mouth and neck portion is then filled with contents, and the heating and bending desirably performed on the filled container. Each operation can be performed at a separate station, wherein the stations may be in-line for an efficient commercial operation. That is the blow molding operation may be performed at a first station, the filling operation performed at a second station, the heating operation performed at a third station, and the bending operation performed at a fourth station.

In addition, the apparatus of the present invention forms a blow molded plastic container with a mouth and neck portion thereof which is inclined or angled with respect to the body portion of the container, and comprises:

providing a blow molded plastic container having a closed base, a body portion extending from the base, a neck portion extending from the body portion and an open mouth above the neck portion;

heating means for heating the neck of the container; and

a holding means for holding and bending the heated neck of the container to provide a mouth and neck portion oriented at an angle with respect to the body of the container.

Other features and advantages of the present invention will appear hereinbelow.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be more readily understandable from a consideration of the following illustrative drawings, wherein:

FIG. 1 is a side view showing the preform positioned in the blow mold, with the stretch rod positioned in the preform and the blow nozzle positioned above the blow mold;

FIG. 2 is a view similar to FIG. 1 in a further stage of operation with the stretch rod extending the preform;

FIG. 3 is a view similar to FIG. 1 in a further stage of operation with the blow nozzle coming into engagement with the preform;

FIG. 4 is a view similar to FIG. 1 in a further stage of operation with the blow nozzle in full engagement with the preform and bending the mouth and neck portion of the preform into the desired angle;

FIG. 5 is a view similar to FIG. 1 in a further stage of operation showing the blow nozzle in full engagement with the bent neck and mouth preform and with an anti-rotation arrangement to prevent rotation of the blow nozzle;

FIG. 6 is a view similar to FIG. 1 in a further stage of operation showing the final blow molded container with stretch rod and blow nozzle retracted therefrom, and FIG. 6A is a modification of FIG. 6;

FIG. 7 is a side view of the container of the present invention prepared in accordance with FIGS. 1-6, and FIGS. 7A & 7B are partial sectional views of the wall structure of the container;

FIG. 8 is a flow sheet showing the separate stations of a further embodiment of the present invention;

FIG. 9 is a side view of the embodiment of FIG. 8 showing a representative blow molded container before filling and neck bending;

FIG. 10 is a side view of a representative blow molded container after filling and neck bending;

FIG. 11 is a side view of the embodiment of FIG. 8 showing a preform positioned in a blow mold with a stretch rod positioned in the preform and a blow nozzle positioned above the blow mold;

FIG. 12 is a side view of the filling station;

FIG. 13 is a side view showing the filled, blow molded bottle at the heating station;

FIG. 14 is a front view of the heating element of FIG. 13;

FIG. 15 is a side view of the bending station; and

FIG. 16 is an alternate embodiment showing a side view of a filled bottle before neck bending, and FIG. 17 is a side view of the filled bottle of FIG. 16 after neck bending.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to the drawings, FIG. 1 shows a straight, cylindrical, plastic preform or parison 10 having a closed base 12, a straight body portion 14 extending therefrom, a straight neck portion 16 extending from the body portion, and an open mouth 18. If desired, the preform has a threaded neck portion 20 and an outwardly extending flange 22, which aids in seating the preform 10 in the blow mold 24. The blow mold 24 is closed on the preform firmly seating the preform in the blow mold.

Stretch rod 26 is positioned within the preform and blow nozzle 28 is spaced above the preform. It is noted from FIG. 1 that blow nozzle 28 has an angled face 30 which faces the preform, rather than the conventional flat face. Locking flange 32 is provided in the upper portion of the blow nozzle to lock the assembly in place.

FIG. 2 shows the stretch rod 26 fully extended in the clamped preform to extend the preform to the base 34 of the blow mold and to provide an extended preform 11, while FIG. 3 shows the angled face 30 of the blow nozzle 28 moving into engagement with the mouth 18 of the preform, commencing the bending of the mouth 18 and neck 16 of the extended preform 11 into the desired angled orientation. In FIG. 3, the angled face 30 of the blow

nozzle 28 just starts to make contact with the open mouth 18 of the extended preform. It is noted that blow mold 24 includes an angled upper portion 25 to engage the outwardly extended flange 22 of the preform at an angle which corresponds to the angle of the face of the blow nozzle and to insure a proper angled open mouth and neck portion. In FIG. 4, the blow nozzle 28 continues downwardly, bending the open mouth 18 and neck portion 16 of the extended preform to an angular orientation which corresponds to the angle of the angled face 30 of the blow nozzle, i.e., less than 45° with respect to the longitudinal axis of the preform.

FIG. 5 shows anti-rotation element 36 to prevent rotation of blow nozzle 28. High pressure air is then introduced into the extended preform through the blow nozzle from a high pressure air source (not shown) to stretch the extended preform into conformity with cavity 38 of blow mold 24 and form container 40 shown in FIGS. 6-7.

FIG. 6A is a variation of FIG. 6 and shows the mold and/or mold cavity placed at an angle of from 1 to 45° in relation to the stretch rod. In accordance with the variation of FIG. 6A, at least a portion of the mold cavity may conveniently be placed at said angle in relation to the stretch rod, and the preform appropriately processed at said angle.

As shown in FIG. 7, container 40 has a closed base 42, a body portion 44 extending from the closed base, a neck portion 46 extending from the body portion, and an open mouth 48. The neck portion and open mouth are at an angle of less than 45° with respect to the longitudinal axis 50 of the container 40. The container body portion 44 has an upper body portion 52 and a lower body portion 54. In cross-section, one side of the upper body portion includes a gradual, continuous curved configuration 56 extending to the curved neck, while the opposed side of the upper portion has a stepped configuration 58 extending to the curved neck. Container 40 also has a threaded neck 60 and outwardly extending flanges 62. In addition, the container is biaxially oriented. The container can have a multi-layer wall

structure as shown in FIG. 7A, or a single layer wall structure as shown in FIG. 7B.

After completion of the blow molding operation, the stretch rod followed by the blow nozzle is retracted from the newly formed container, the blow mold is opened, and the newly formed container is removed.

Referring to the drawings, FIG. 8 is a flow sheet showing the separate stations for preparing the inclined or angled neck container in accordance with a further embodiment of the present invention. Station 110 is the blow molding station wherein a blow molded, plastic container is prepared from a parison or preform, with the resultant blow molded container 120 as shown in FIG. 9 having a straight neck 122. The container 120 has a closed base 124, body portion 126 extending upwardly from the base, neck portion 122 extending upwardly from the body portion, and open mouth 128 above the neck. If desired, the container may have a threaded neck portion 130 and outwardly extending flanges 132 below the threaded portion. As indicated above, the neck portion 122 extends upwardly in a straight direction and is not angled or inclined. Thus, the blow molded container, which is desirably biaxially oriented, may be readily prepared on conventional equipment. The particular configuration shown in FIG. 9 is representative only and naturally any suitable or desired size or shape container may be prepared.

Station 112 is the fill station wherein container 120 with its straight neck is filled with contents. This also readily uses conventional filling equipment and desirably is preformed at a separate station from station 110 and in-line with station 110.

Station 114 is the heating station wherein the neck 122 of the filled container 120 is heated in preparation for the neck bending operation. Desirably and advantageously this may also be preformed at a separate station from stations 110 and 112 and in-line therewith.

Station 116 is the neck bending station wherein the heated neck 122 of the filled container 120 is bent to provide a mouth 128 and neck portion 122 oriented at an angle with respect to the body 126 of container 120. FIG. 10 shows container 120 filled with contents 134, with mouth 128 and neck portion 122 oriented at an angle with body 126 of container 120, preferably at an angle of less than 45° . As clearly shown in FIG. 10, in cross section one side of upper body portion 127 includes a gradual, inclined configuration extending to the angled neck.

FIG. 11 is a side view showing the preparation of blow molded container 120. In accordance with FIG. 11, a straight, cylindrical plastic preform or parison 136 is positioned in blow mold 138. Parison 136 has a closed base 140, a straight body portion 142 extending upwardly therefrom, a straight neck portion 144 extending upwardly from the body portion, and an open mouth 146. If desired, the preform has a threaded neck portion 148 and an outwardly extending flange 150, which aids in seating the preform 136 in the blow mold 138. The blow mold 138 is closed on the preform firmly seating the preform in the blow mold.

Stretch rod 152 is positioned within the preform and blow nozzle 154 is placed above the preform engaging open mouth 146. If desired, the blow nozzle 154 may include downwardly extending flange 156 which is moved into engagement with the outside of neck portion 144. In accordance with conventional procedure, stretch rod 152 is preferably fully extended in the clamped preform to extend the preform to the base of the blow mold to provide an extended preform. High pressure air is then introduced into the extended preform from blow nozzle 154 from a high pressure air source (not shown) to expand or stretch the extended preform into conformity with blow mold cavity 158 and form blow molded container 120 shown in phantom in FIG. 11, desirably biaxially oriented.

FIG. 12 is a side view of the filling station wherein container 120 is filled with contents 134 via filling nozzle 160

which fills container 120 through the mouth 128 and straight, neck 122 in a conventional manner. Filling nozzle 160 is connected to a source of filling material (not shown) and may hold the container by the neck to firmly retain the container thereon. The base may also be retained on a moving platform (not shown) which may aid in moving the container from station to station.

FIG. 13 is a side view of the heating station which desirably can be in line with and downstream of the filling station as shown in FIGS. 8 and 12, wherein the neck portion 122 of the filled container 120 is heated. In accordance with FIG. 13, the filled container 120 is firmly held at the neck portion 122 by holding means 162, which may if desired inject air into the filled container and which desirably rotates the filled container during the heating operation. Heating element 164 is positioned adjacent reflector 166 with shield 168 preferably below the reflector-heating element assembly, and the filled container 120 rotated in front of the heating element by holder 162. If desired, heating elements can be positioned on two sides and the container base held on a moving platform (not shown) or the like, as with the other stations. FIG. 14 shows a front view of heating element 164, reflector 166 and shield 168. This station properly heats and conditions the neck portion for the bending operation, which is the next station in line, without adversely affecting the contents of the container.

FIG. 15 is a side view of the neck bending station wherein the filled container 120 with heated neck 122 is held in mold 170 which is closed around the filled container. The heated neck portion 122 is engaged internally by holding means 172, which can be the same holding element used in the heating station, and externally by bending element 174 which engages the outside of neck portion 122, and the combination of holding means 164 and bending element 166 bends the heated neck portion 122 into the angled configuration shown in FIG. 15 and FIG. 10. The filled container with bent neck is then removed from the

mold, the bent neck portion cooled and allowed to set, which may be done by ambient air or a separate air stream directed at the neck portion.

FIGS. 16 and 17 show an alternate embodiment wherein blow molded container 180 with straight neck portion 182 includes at least one fold portion 184 on the neck to facilitate the bending operation. Desirably, the fold portion only partly circumscribes the neck portion and the folds are at the site of the bending operation. The filled container 180 passes through the stations as with the previous embodiment, and the heated folded portion 184 is bent to engage the folds on each other to provide engaged folds 186 and the bent neck 188 as shown in FIG. 17.

Preferably, the plastic is polyethylene terephthalate; however, other suitable thermoplastic plastics may be readily used alone or in combination or in a multilayered configuration. For example, polyolefins, polyethylene naphthalate, polyvinyl chloride, and others.

It is to be understood that the invention is not limited to the illustrations described and shown herein, which are deemed to be merely illustrative of the best modes of carrying out the invention, and which are susceptible of modification of form, size, arrangement of parts and details of operation. The invention rather is intended to encompass all such modifications which are within its spirit and scope as defined by the claims.

Claims:

1. Method of forming a blow molded plastic container with a mouth and neck portion thereof which is inclined or angled with respect to the body portion of the container, which comprises:

providing a blow molded plastic container having a closed base, a body portion extending from the base, a neck portion extending from the body portion and an open mouth above the neck portion, wherein the mouth and neck portions are coaxial with the body portion; and

heating the neck of the container and bending the heated neck of the container with a holding means that holds and bends the neck of the container to provide a mouth and neck portion oriented at an angle with respect to the body of the container.

2. Method according to claim 1, including the step of bending the open mouth and neck portion of the container to an angle of less than 45°, wherein in cross section one side of the upper body portion includes a gradual, inclined configuration extending to the angled neck.

3. Method according to claim 1, including providing a blow molded container of polyethylene terephthalate.

4. Method according to claim 1, including providing a blow molded container with a threaded neck portion and an outwardly extending flange beneath the threaded neck portion.

5. Method according to claim 1, including the step of filling the container with contents prior to the heating and bending steps.

6. Method according to claim 5, wherein the filling, heating and bending steps are at separate, in-line stations.

7. Method according to claim 6, wherein the filled container is rotated at the heating station.

8. Method according to claim 6, wherein the neck portion of the filled container is held internally and externally during the bending step.

9. Method according to claim 6, wherein the neck portion of the blow molded container includes at least one folded portion.

10. Method according to claim 6, wherein the folded portion partly circumscribes the neck portion.

11. Apparatus for forming a blow molded plastic container with a mouth and neck portion thereof which is inclined or angled with respect to the body portion of the container, which comprises:

providing a blow molded plastic container having a closed base, a body portion extending from the base, a neck portion extending from the body portion and an open mouth above the neck portion, wherein the mouth and neck portions are coaxial with the body portion;

heating means for heating the neck of the container; and

a holding means for holding and bending the heated neck of the container to provide a mouth and neck portion oriented at an angle with respect to the body of the container.

12. Apparatus according to claim 11, wherein said holding means contacts the open mouth of the container and is operative to bend the open mouth and neck portion to an angle of less than 45°.

13. Apparatus according to claim 11, wherein the blow molded container is polyethylene terephthalate.

14. Apparatus according to claim 11, wherein the blow molded container includes a threaded neck portion and an outwardly extending flange portion beneath the threaded neck portion.

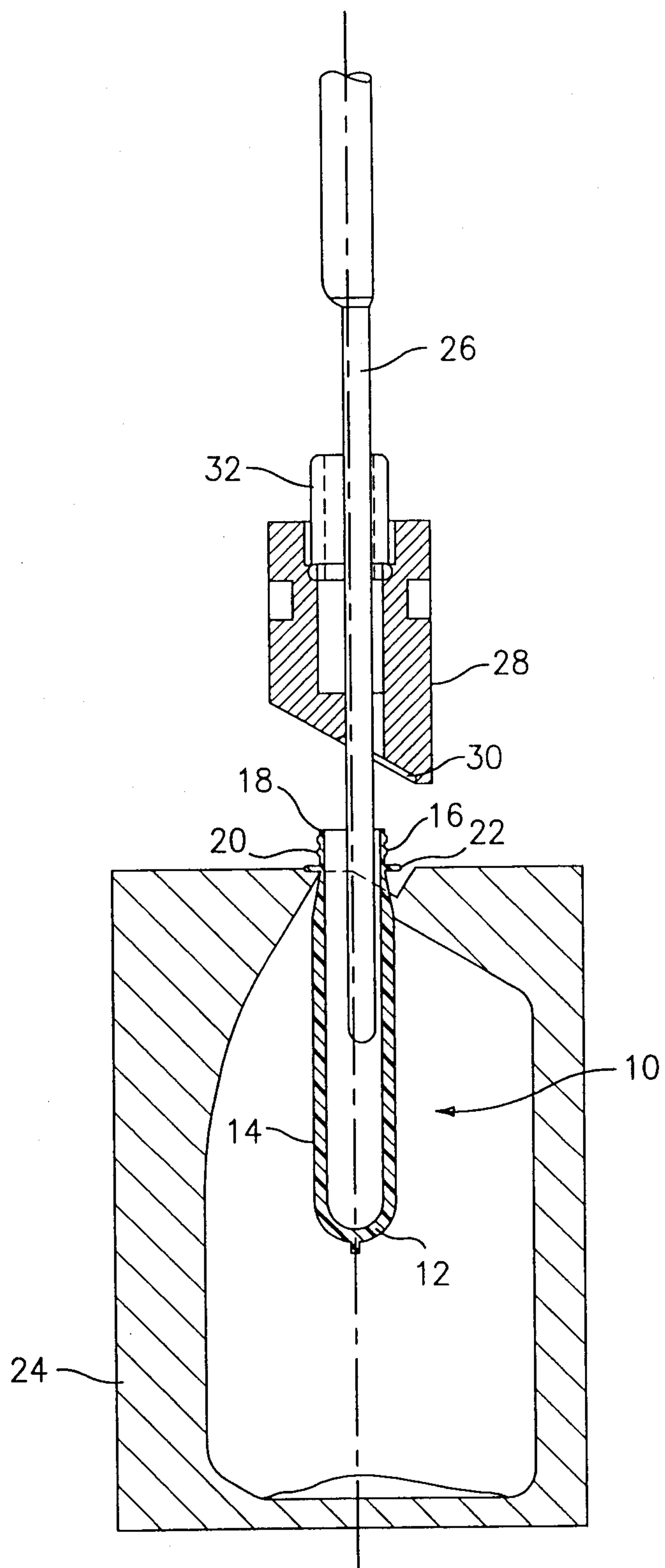
15. Apparatus according to claim 11, including filling means for filling the container with contents prior to application of said heating means and holding means.

16. Apparatus according to claim 15, including separate in-line stations for said filling means, heating means and holding means.

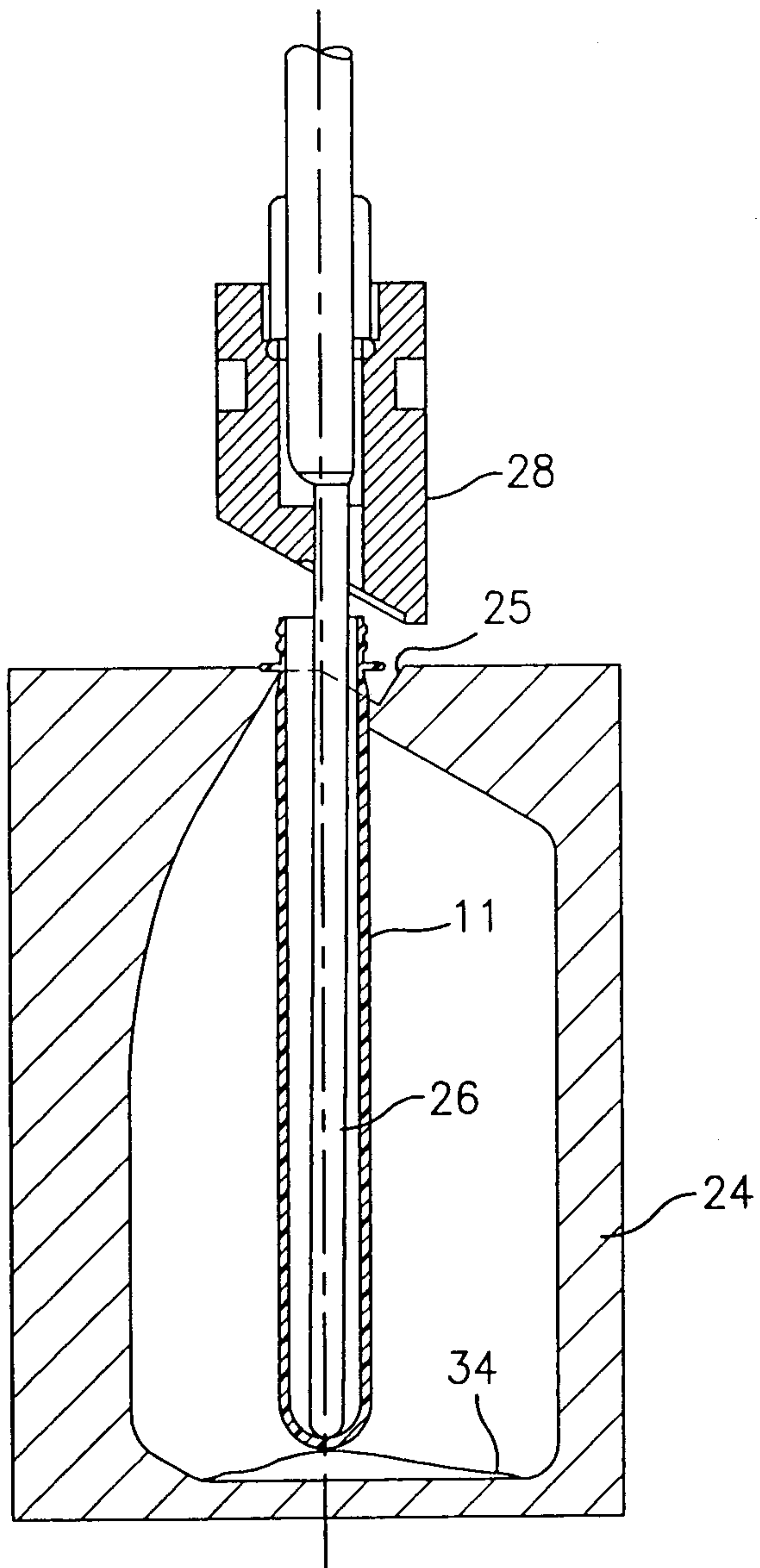
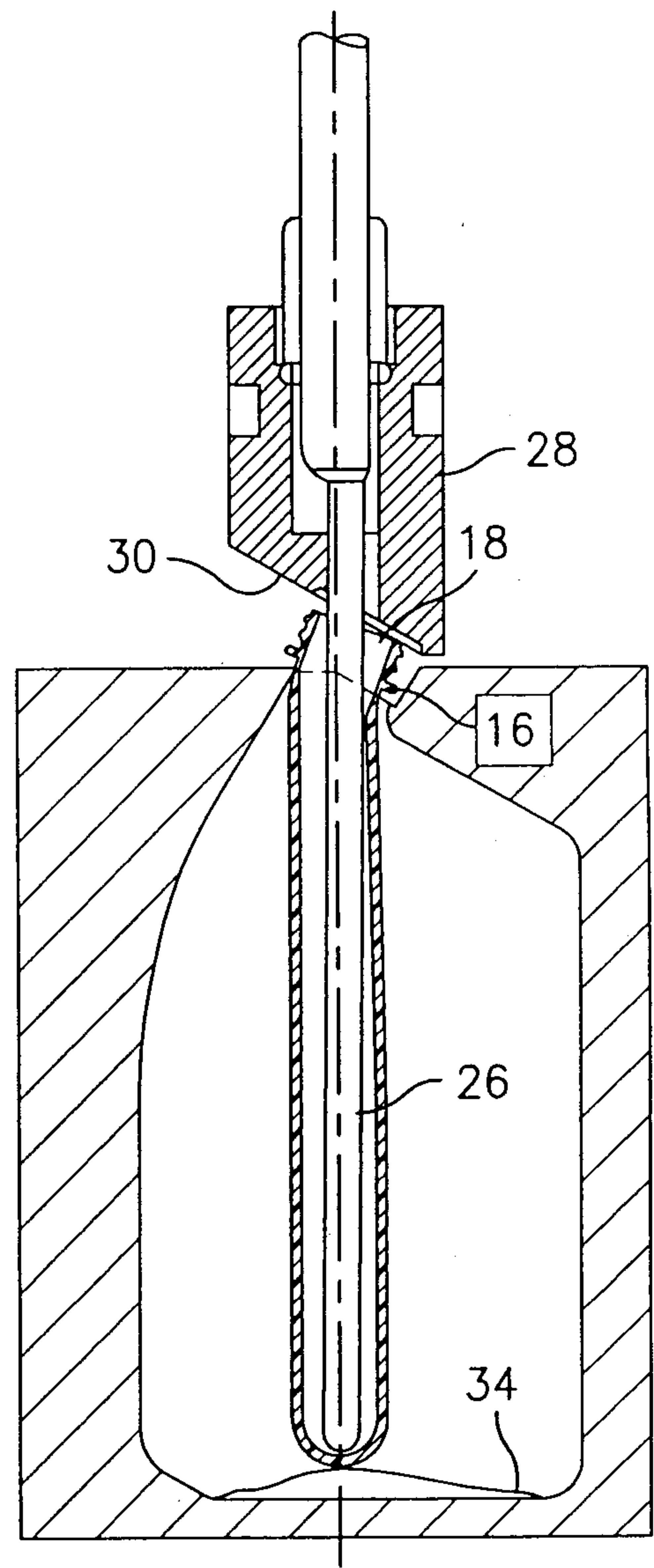
17. Apparatus according to claim 16, including means for rotating the filled container at the heating station.

18. Apparatus according to claim 16, including holding means internally holding the neck portion during the bending step and bending means externally holding the neck portion during the bending step.

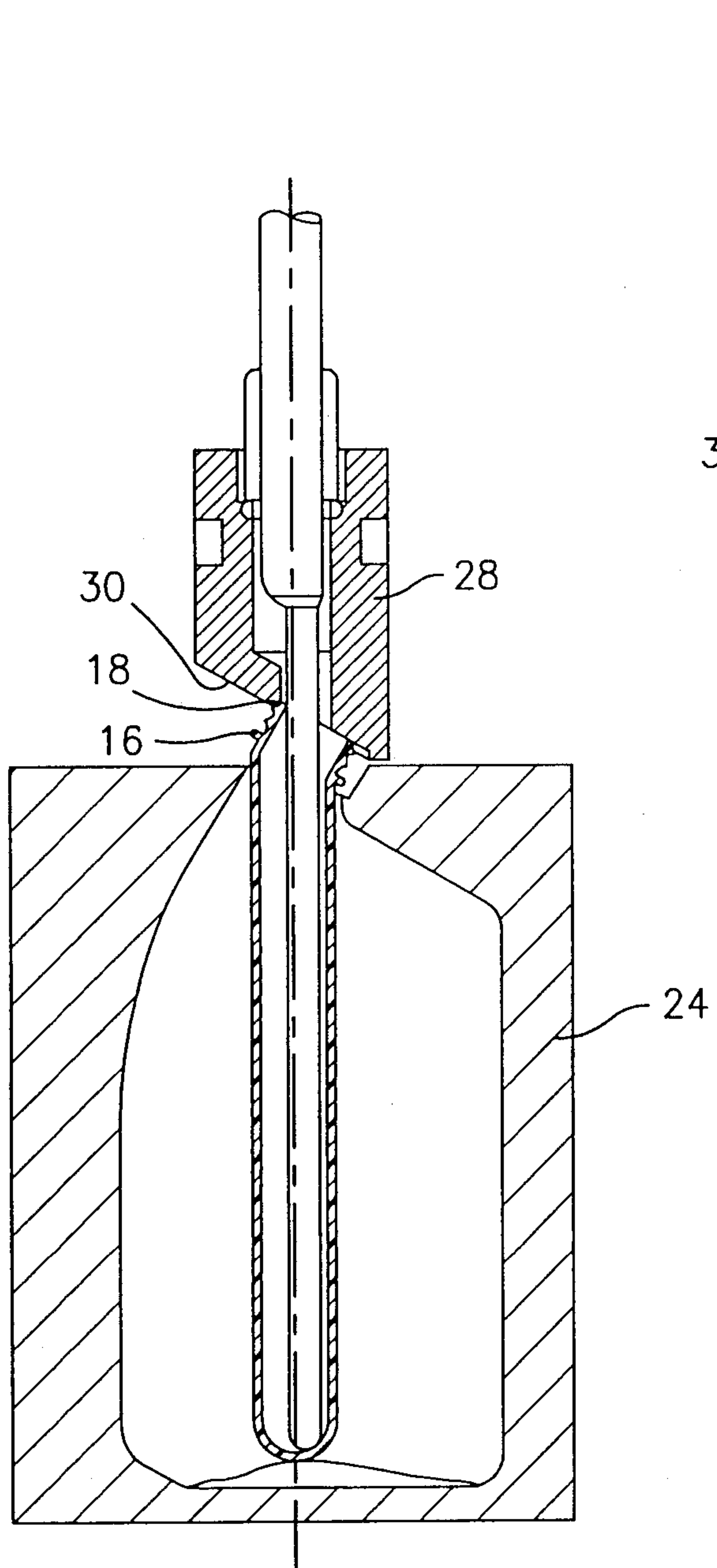
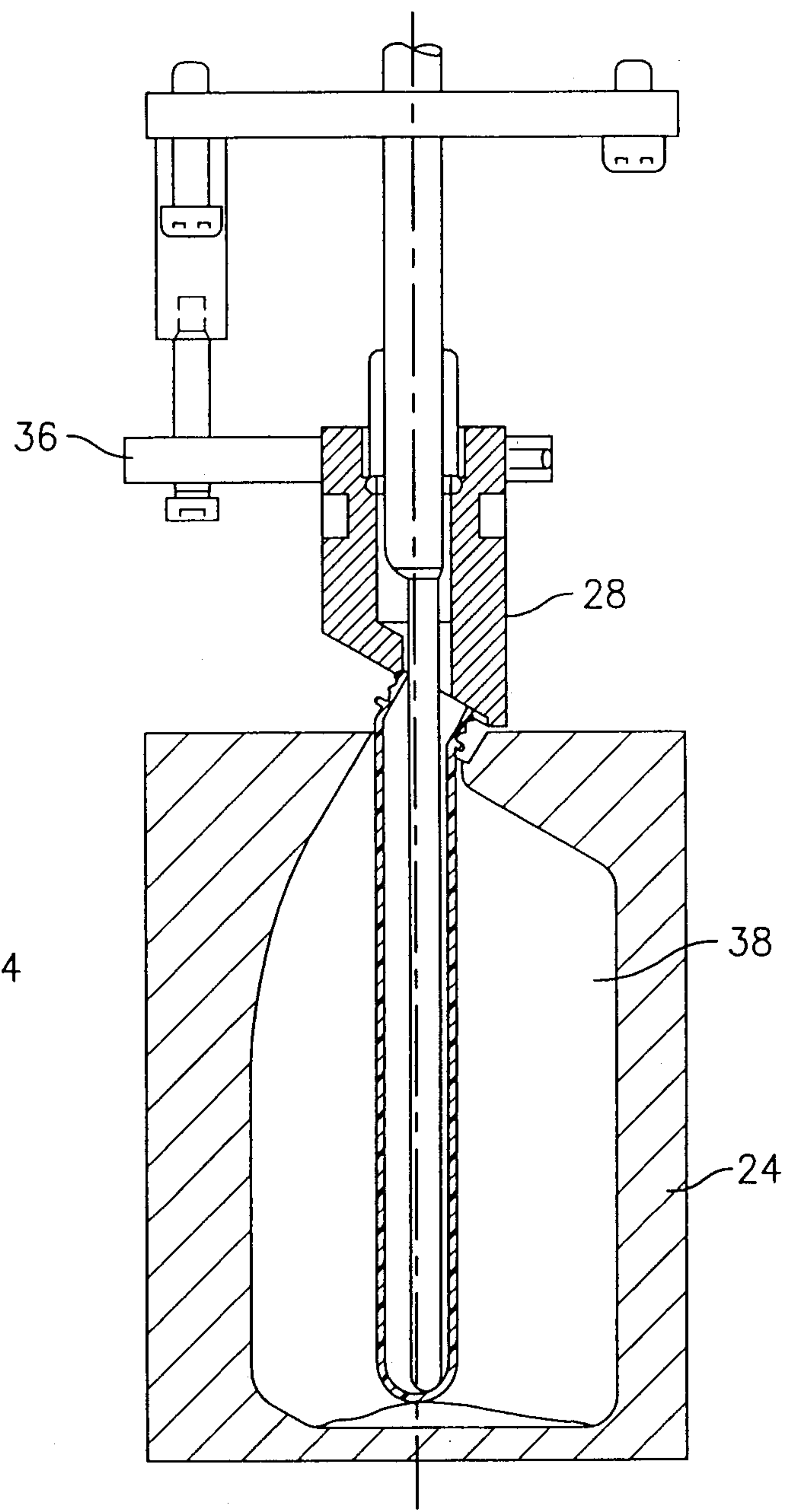
1/11

*FIG. 1*

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*FIG. 2**FIG. 3*

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*FIG. 4**FIG. 5*

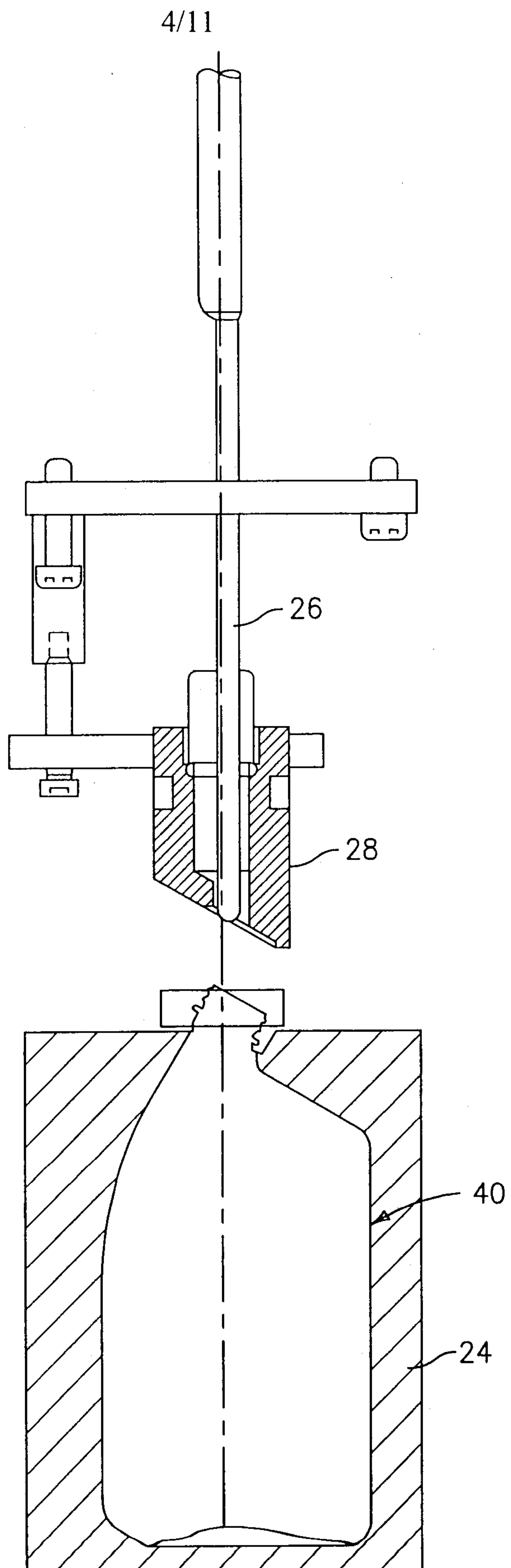


FIG. 6

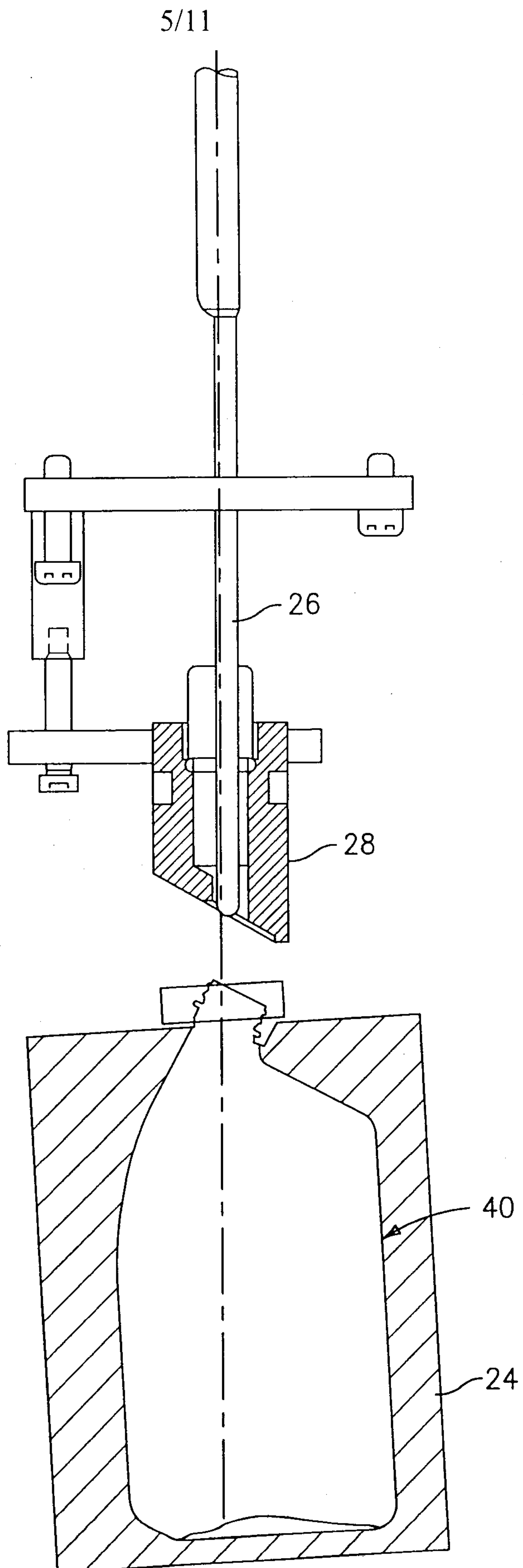


FIG. 6A

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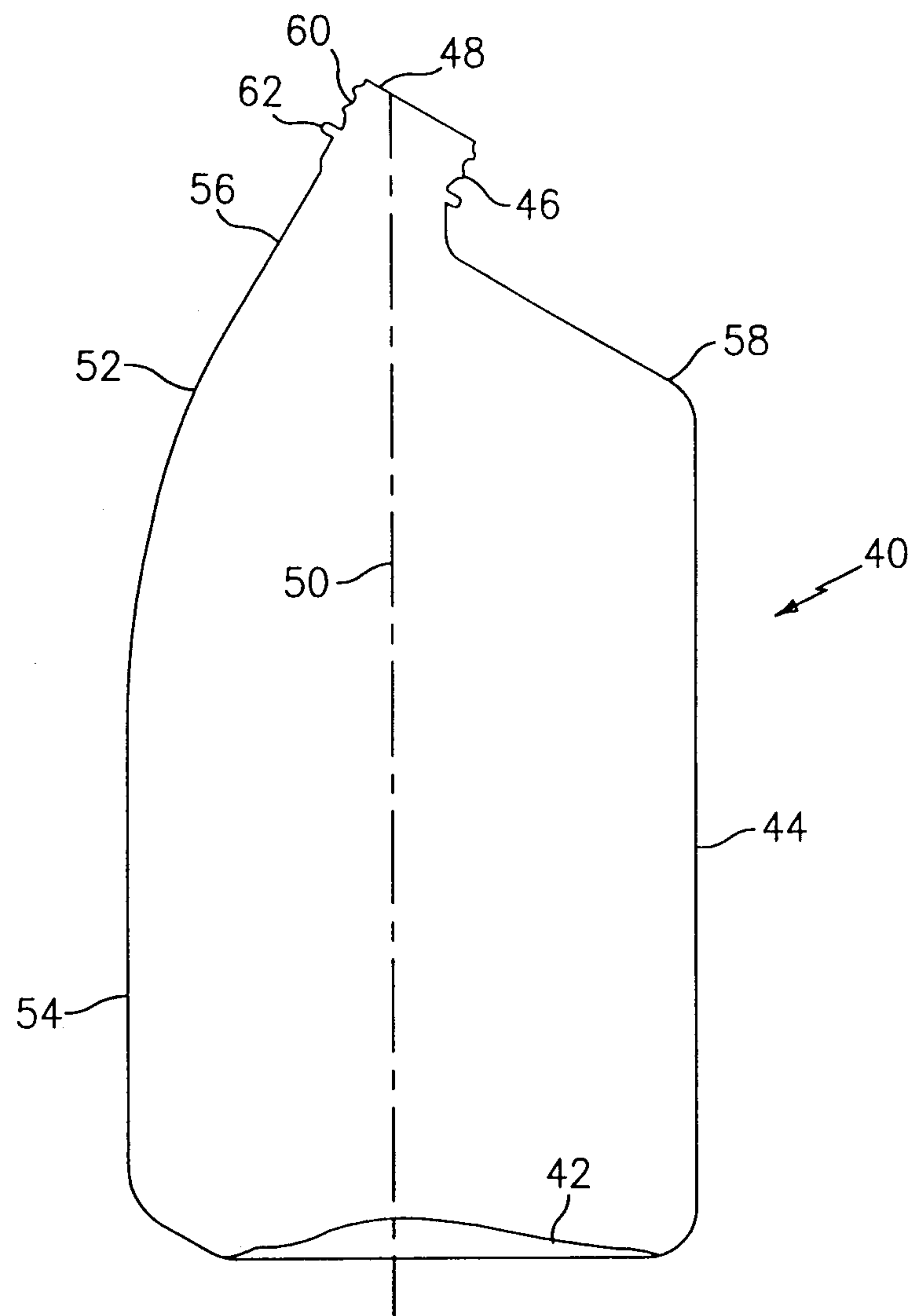


FIG. 7

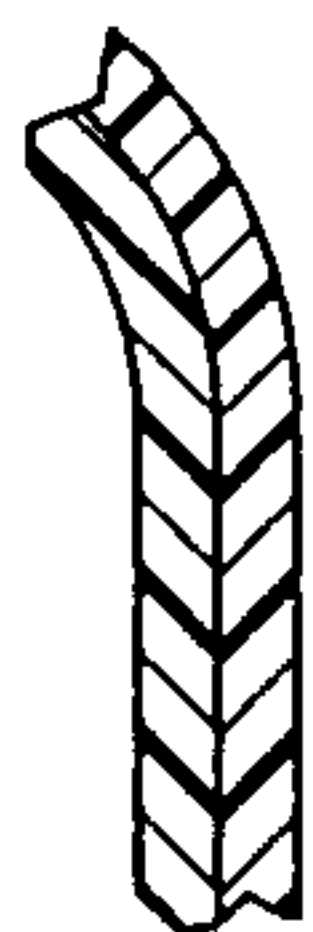


FIG. 7A

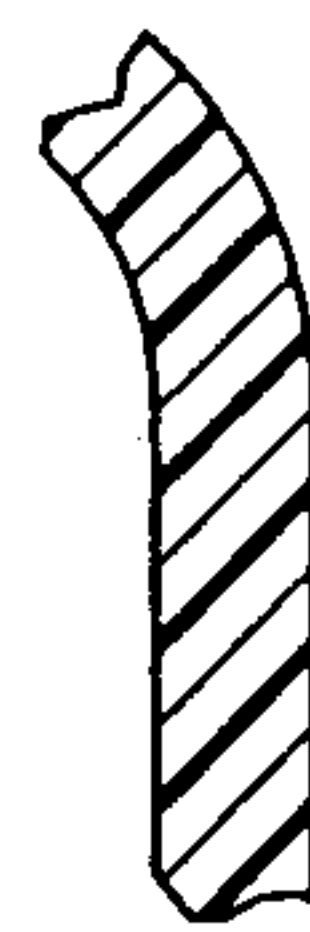
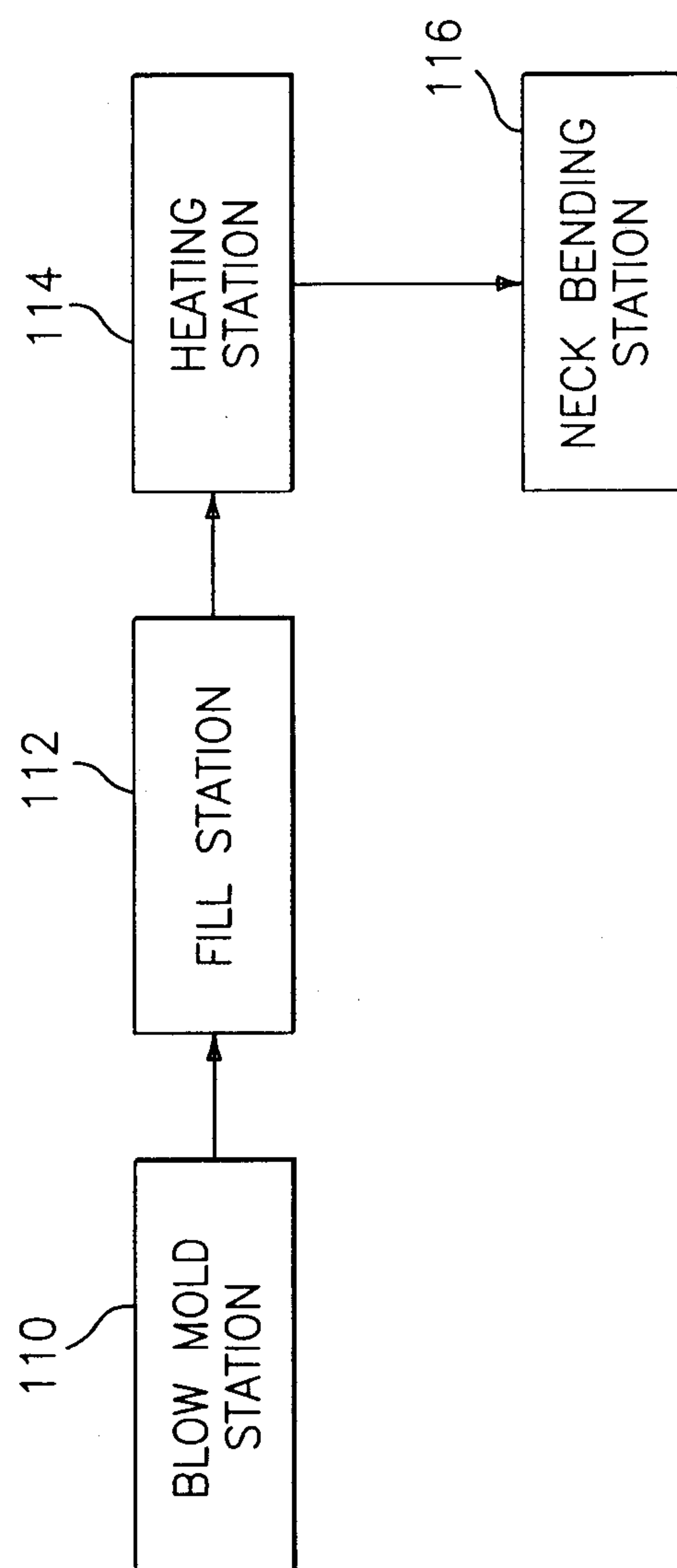


FIG. 7B

7/11

*FIG. 8*

8/11

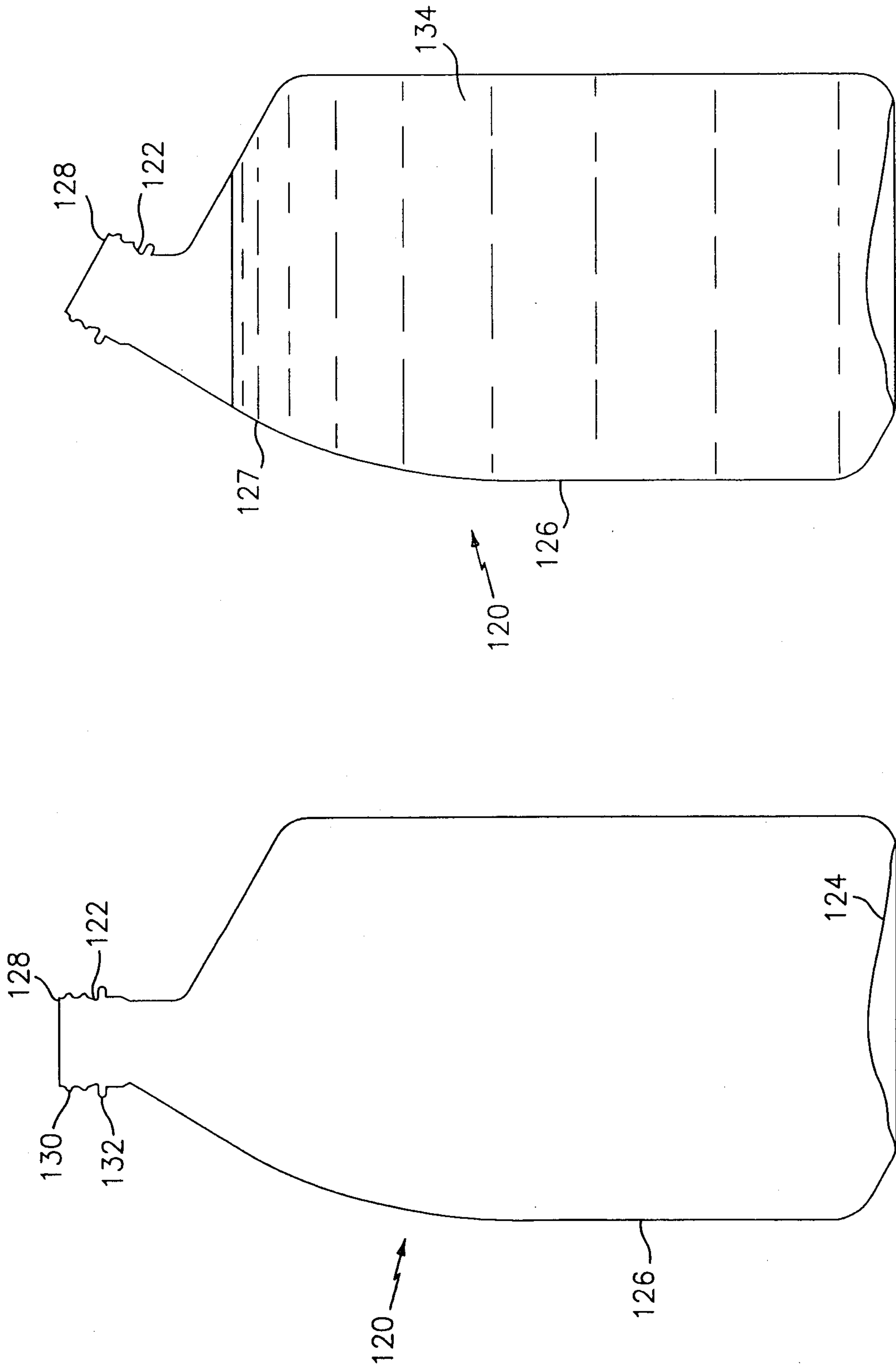
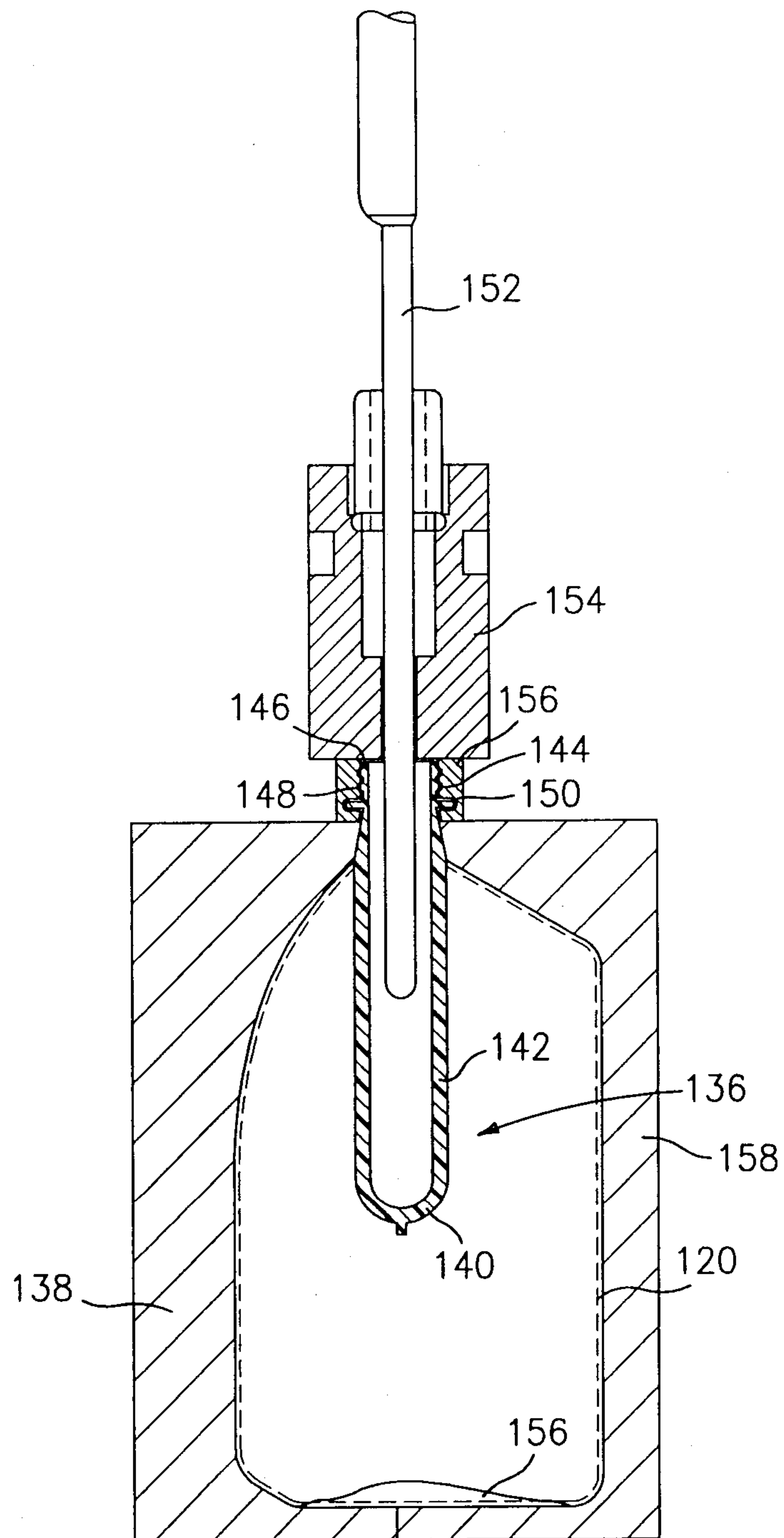


FIG. 10

FIG. 9

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*FIG. 11*

10/11

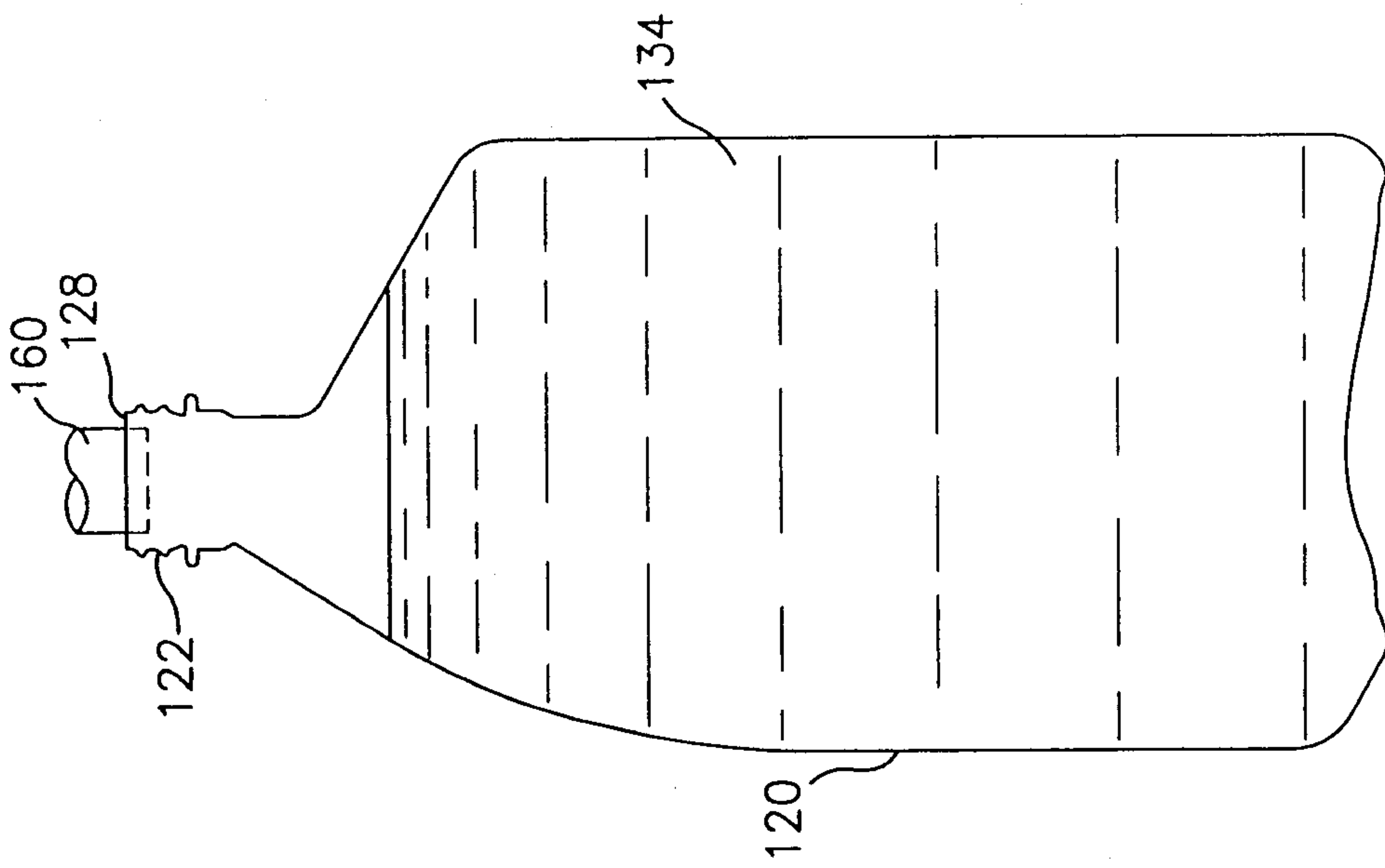


FIG. 12

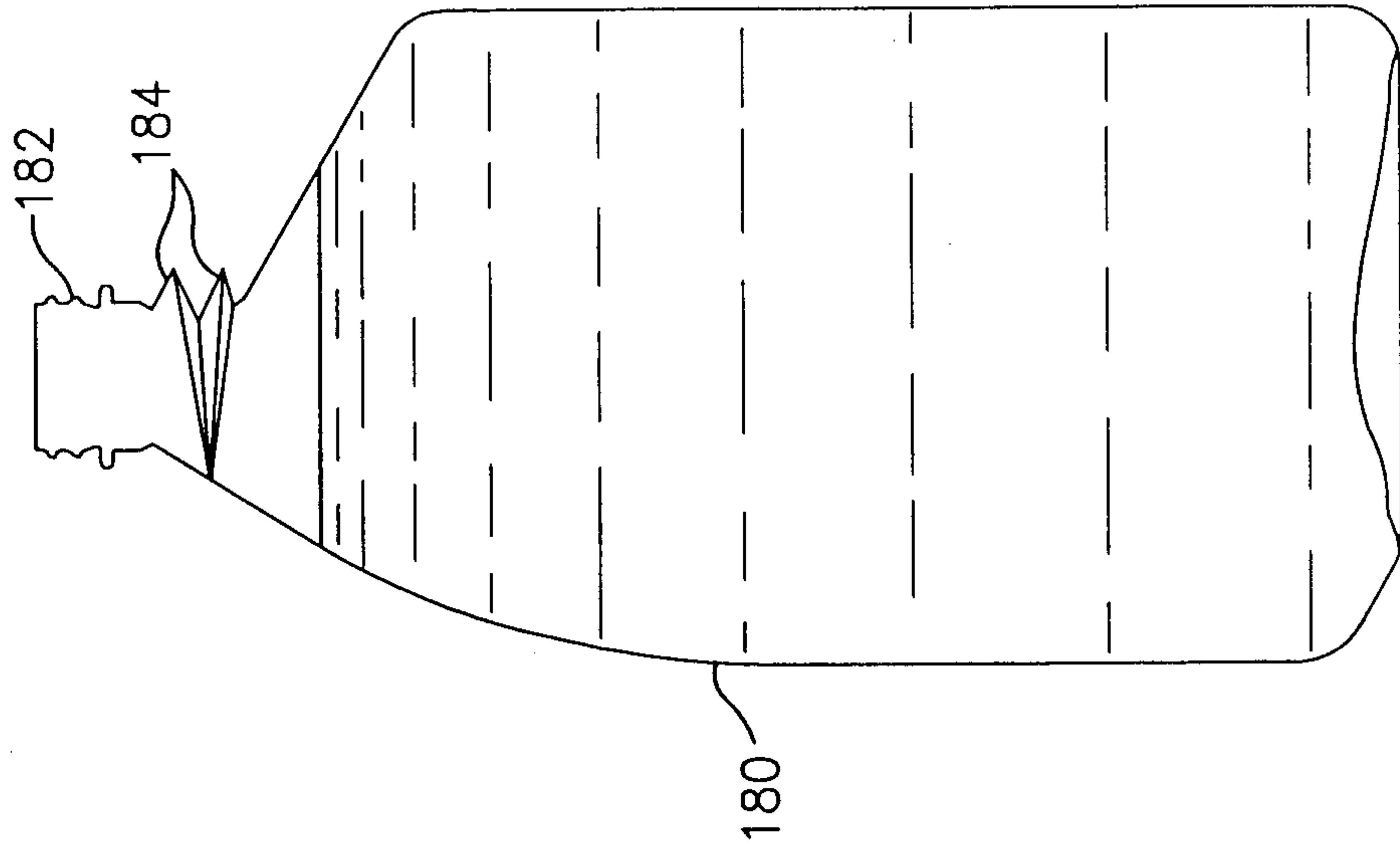


FIG. 16

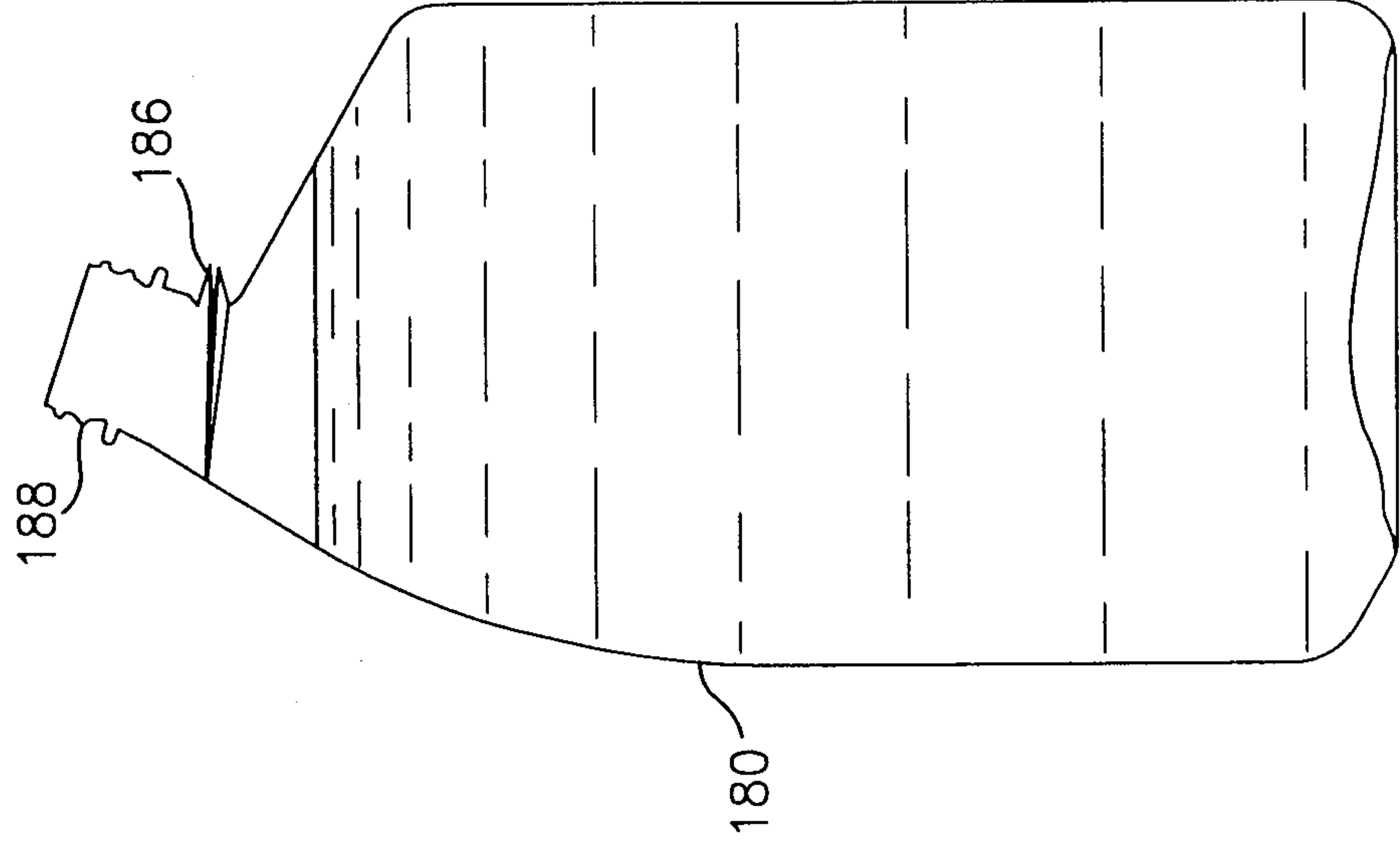
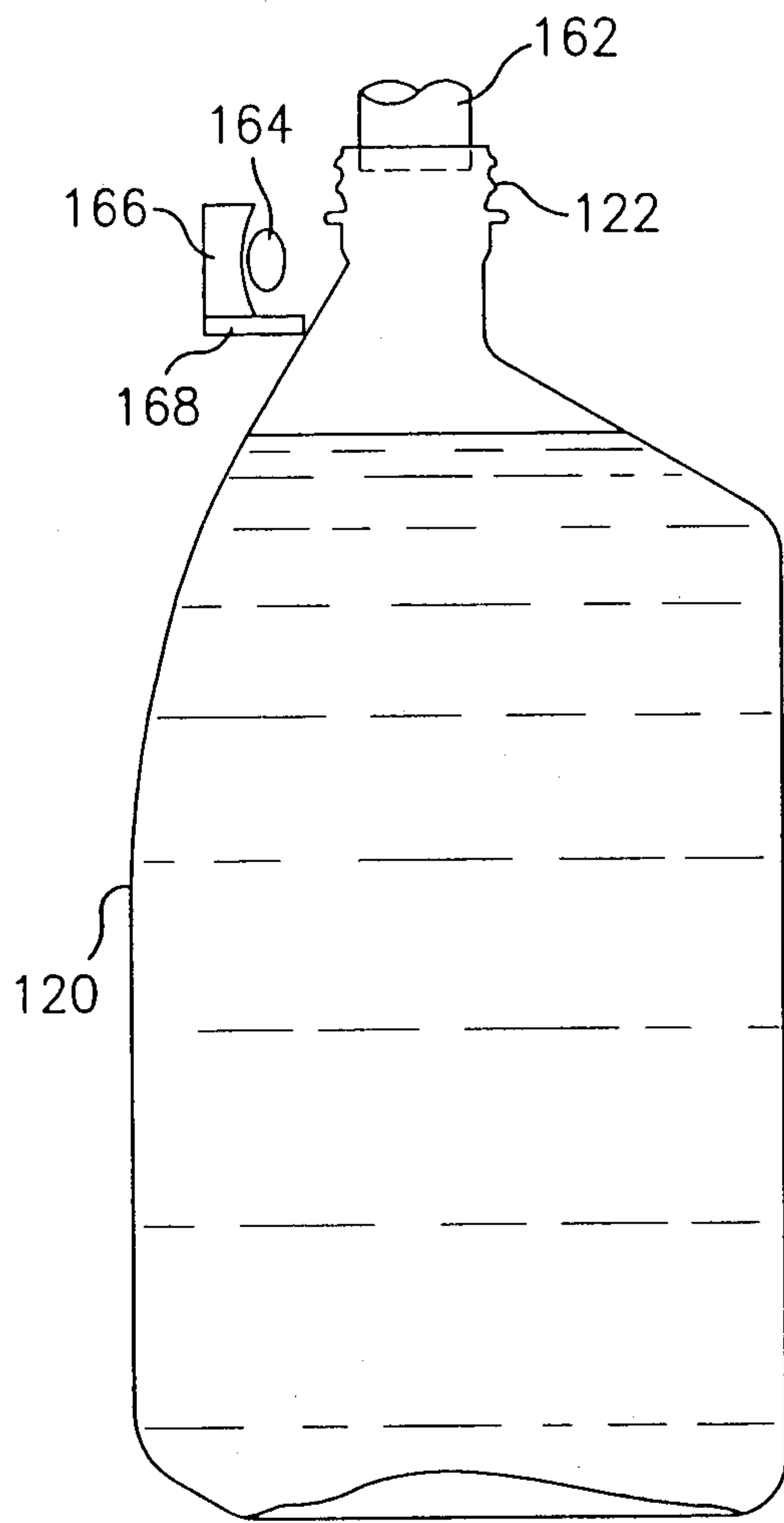
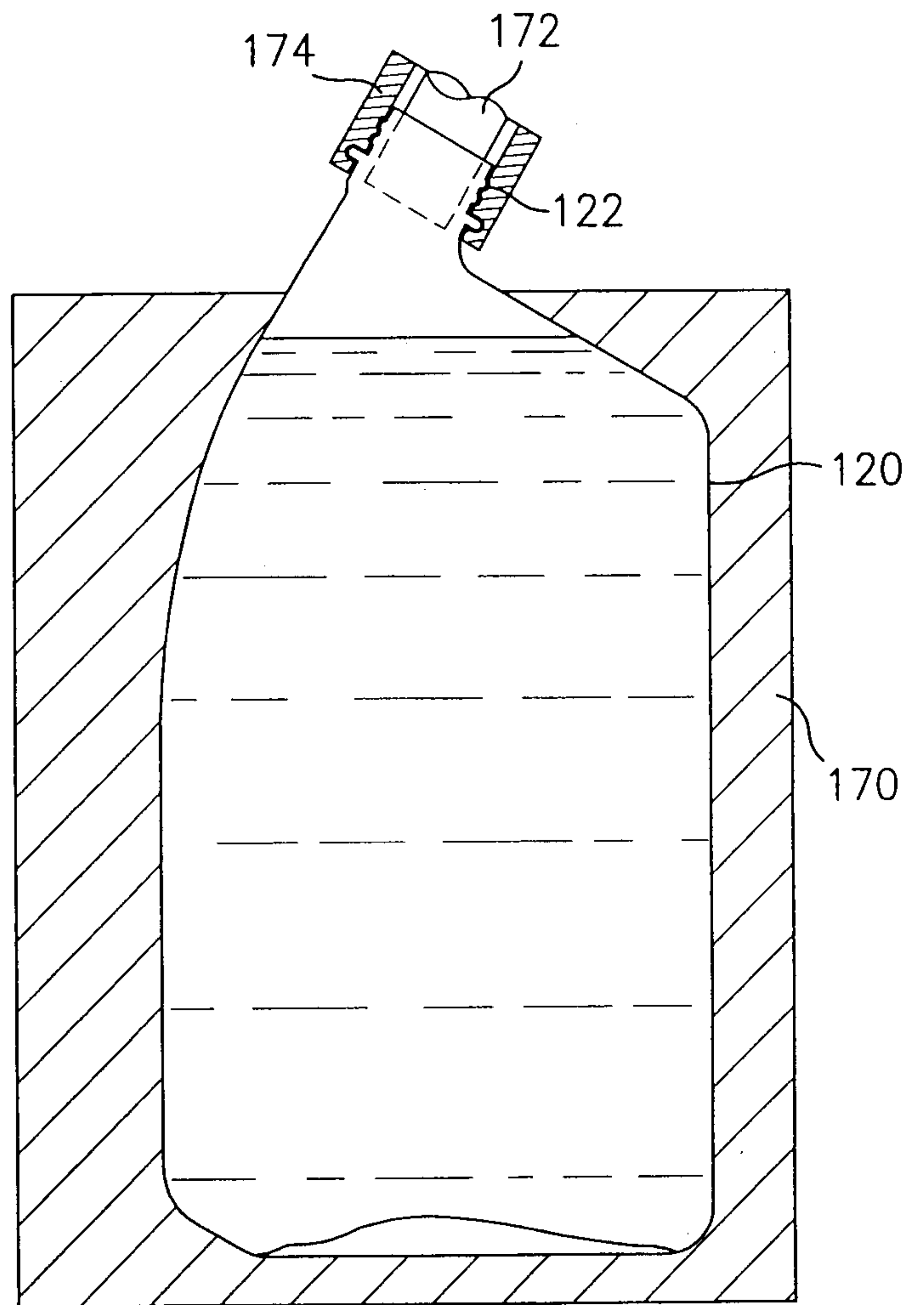
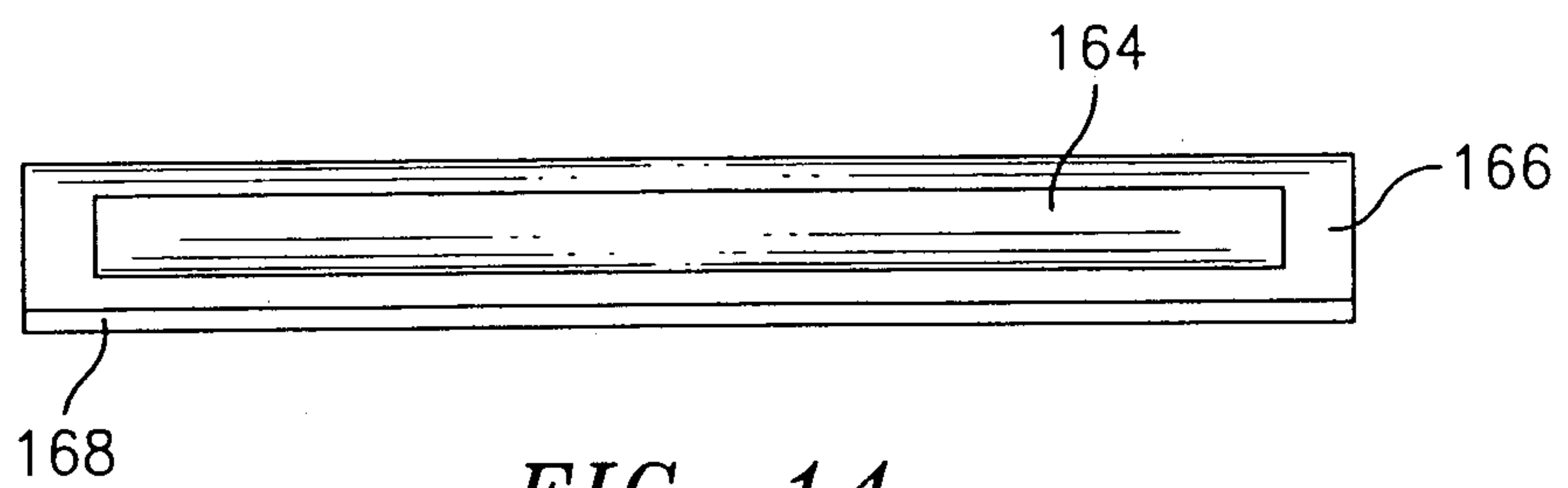


FIG. 17

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*FIG. 13**FIG. 15**FIG. 14*

