628352

COMMONWEALTH of AUSTRALIA
Patents Act 1952

APPLICATION FOR A STANDARD PATENT

I/We

Idemitsu Petrochemical Co., Ltd.

of

1-1 Marunouchi 3-chome, Chiyoda-ku, Tokyo, Japan

hereby apply for the grant of a Standard Patent for an invention entitled:

Container and method of and apparatus for notching the same

which is described in the accompanying complete specification.

Details of basic application(s):-

Number	Convention Country	Date
63-165580	Japan	1 July 1988
63-245562	Japan	28 September 1988

The address for service is care of DAVIES & COLLISON, Patent Attorneys, of 1 Little Collins Street, Melbourne, in the State of Victoria, Commonwealth of Australia.

DATED this THIRTIETH day of JUNE 1989

To: THE COMMISSIONER OF PATENTS

.....
a member of the firm of
DAVIES & COLLISON for
and on behalf of the
applicant(s)

Davies & Collison, Melbourne

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952

DECLARATION IN SUPPORT OF CONVENTION OR NON-CONVENTION APPLICATION FOR A PATENT

In support of the Application made for a patent for an invention

Insert title of invention

entitled: "Container and method of and apparatus for notching the same"

Insert full name(s) and address(es) of declarant(s) being the applicant(s) or person(s) authorized to sign on behalf of an applicant company.

I/We Kazuto Tominaga of
Idemitsu Petrochemical Co., Ltd.
1-1, Marunouchi 3-chome,
Chiyoda-ku, Tokyo,
Japan

do solemnly and sincerely declare as follows :-

Cross out whichever of paragraphs 1(a) or 1(b) does not apply

1(a) relates to application made by individual(s)

1(b) relates to application made by company; insert name of applicant company.

1. (a) I/We am/are the applicant(s) for the patent

or (b) I am authorized by

IDEMITSU PETROCHEMICAL CO., LTD.

the applicant..... for the patent to make this declaration on its/their behalf.

Cross out whichever of paragraphs 2(a) or 2(b) does not apply

2(a) relates to application made by inventor(s)

2(b) relates to application made by company(s) or person(s) who are not inventor(s), insert full name(s) and address(es) of inventors.

2. (a) I/We am/are the actual inventor of the invention

or (b)

Yukio TAKATA and Takeshi SHINOHARA of c/o. Idemitsu Petrochemical Co., Ltd. 841-3, Kou, Shirahama-cho, Himeji-shi, Hyogo-ken, Japan, respectively

is/are the actual inventor.S..... of the invention and the facts upon which the applicant..... is/are entitled to make the application are as follows :-

State manner in which applicant(s) derive title from inventor(s)

The actual inventors have assigned the invention to the said applicant.

Cross out paragraphs 3 and 4 for non-convention applications. For convention applications, insert basic country(s) followed by date(s) and basic applicant(s).

3. The basic application.S..... as defined by Section 141 of the Act was/were made

in Japan on the 1st July 1988

by INDEMITSU PETROCHEMICAL CO., LTD.

in Japan on the 28th September 1988

by INDEMITSU PETROCHEMICAL CO., LTD.

in on the

by

4 The basic application.S..... referred to in paragraph 3 of this Declaration was/were the first application.S..... made in a Convention country in respect of the invention the subject of the application

Insert place and date of signature.

Declared at Tokyo, Japan this 7th day of June, 1989

Signature of declarant(s) (no attestation required)

IDEMITSU PETROCHEMICAL CO., LTD.

Mr. Kazuto TOMINAGA, Manager of Patent Department

Note Initial all alterations.

DAVIES & COLLISON, MELBOURNE and CANBERRA

(12) PATENT ABRIDGMENT (11) Document No. AU-B-37258/89
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 628352

(54) Title
CONTAINER AND METHOD OF AND APPARATUS FOR NOTCHING THE SAME

International Patent Classification(s)
(51)[4] **B65D 077/20**

(21) Application No. : **37258/89** (22) Application Date : **30.06.89**

(30) Priority Data

(31) Number	(32) Date	(33) Country
63-165580	01.07.88	JP JAPAN
63-245562	28.09.88	JP JAPAN

(43) Publication Date : **04.01.90**

(44) Publication Date of Accepted Application : **17.09.92**

(71) Applicant(s)
IDEMITSU PETROCHEMICAL CO., LTD.

(72) Inventor(s)
YUKIO TAKATA; TAKESHI SHINOHARA

(74) Attorney or Agent
DAVIES COLLISON CAVE , 1 Little Collins Street, MELBOURNE VIC 3000

(56) Prior Art Documents
AU 604151 21985/88 B65D B31B B65B
US 4905838

(57) Claim

1. A container comprising a container body having a flange and a cover welded to the flange for the purpose of sealing the container, thereby defining a sealed region on the flange around the outer periphery of the container body, the container body and/or the cover having more than one layer and comprising:

an inner layer facing the interior of the container and an outer layer bonded to the inner layer, the inner and outer layer being separable from each other, wherein the bonding force between the inner layer and the outer layer is smaller than that between the flange and the cover, and wherein the inner layer has a zone of weakness on each side of the sealed region, the first zone being located between the interior of the container and the sealed region and the second zone being located between the outer periphery of the flange and the sealed region, and wherein the cover and/or the flange has at least one non-sealing area which includes a portion of the second zone of weakness.

628352

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952

COMPLETE SPECIFICATION

NAME & ADDRESS
OF APPLICANT:

Idemitsu Petrochemical Co., Ltd.
1-1 Marunouchi 3-chome
Chiyoda-ku
Tokyo
Japan

NAME(S) OF INVENTOR(S):

Yukio TAKATA
Takeshi SHINOHARA

ADDRESS FOR SERVICE:

DAVIES & COLLISON
Patent Attorneys
1 Little Collins Street, Melbourne, 3000.

COMPLETE SPECIFICATION FOR THE INVENTION ENTITLED:

Container and method of and apparatus for notching the same

The following statement is a full description of this invention, including the best method of performing it known to me/us:-

The present invention relates to a container comprising a body having a flange and a cover bonded to the flange for the purpose of sealing the container.

Hitherto, such containers which comprise a main container body having a flange portion and a cover have been widely used for the packing of food. In order to ensure that these containers are readily opened and have an excellent sealing performance, they are designed such that the adhesive force acting between layers of the container, which is formed as a multilayered structure, is arranged to be smaller than the adhesive force acting between the flange portion and the cover. Furthermore, a non-sealing portion is formed inside this sealing portion and a notch which serves as a zone of weakness is formed in this non-sealing portion so that the layers forming the main container body can be separated from each other at the outer periphery thereof when the container is intended to be opened. Furthermore, in order to improve the rigidity of such containers, there are containers of the type having a flange portion in which a bent portion such as a rib, a skirt, a curl or the like is formed. In the container of the type described above, a cutting line is formed to serve as a zone of weakness on the outer periphery of the seal in order to facilitate opening of the container so that the layers forming the main container body are separated from each other starting from the cutting line.

However, in the case where the cutting line is pre-formed in the flange portion, it is difficult to accurately perform the welding operation for sealing the container. If the outer periphery of the seal does not coincide with the inner or outer edge of the cutting line, opening of the container is difficult.

A container capable of overcoming this problem has been previously proposed in which the container is arranged such that a rib on the flange is cut out such that a portion of the cut surface coincides with the

outer periphery of the seal.

However, in this example, the following problems arise:

(1) since the rib in the flange is cut, the rigidity and the strength of the cut portion of the flange can deteriorate;

(2) edges can be broken on both sides of the cut portion when the container is opened leaving broken pieces inside the container, as well as causing the appearance of the container to deteriorate; and

(3) since the outer periphery of the seal is required to meet the portion of the cut surface of the flange, the sealing operation is made more difficult and the width of the seal cannot be varied.

If a material having an appropriate sealing strength is selected, its sealing performance will inevitably change due to sealing parameters such as temperature, pressure, time and the like, and impurities such as a filler. Therefore, a uniform adhesive force cannot be obtained, and the sealing performance deteriorates. As a result, such a container cannot be used for packing retort foods as the inner pressure of the container is raised due to sterilisation by heating.

The applicant has previously proposed a structure arranged such that the container was designed to be a multilayered structure comprising a cover, an inner layer (a first layer) to be sealed to the cover and an outer layer (a second layer) overlying the inner layer, the inner layer being separable from the outer layer. Furthermore, a notch was formed in the inner layer of a non-sealed portion in a flange of a body of the container so that the container is opened by separating the inner layer from the outer layer starting from this notch.

The container of the type described above needs to be provided with the notch in the inner layer of the flange thereof.

The following method and apparatus can be employed for forming a notch of the type described above:

the notch is formed during manufacture of the container by pressing an annular notching blade against the flange of the container while the flange is received by a receiving member such as a mold; or

the notch is formed by means of applying a notching blade and/or heating means.

However, in the above-described method and apparatus, since the flange of the container needs to be received by a mold or the like for forming the notch, the notch can be formed only in a flat portion of the flange. It is difficult to apply these arts to a flange having a bent portion such as a rib or a curled portion. In addition, the formed notches are non-uniform if the thickness of the flange is not uniform. Furthermore, the cost of manufacturing the annular notching blade is high and the notching operation adds to production costs.

According to one aspect of the present invention there is provided a container comprising a container body having a flange and a cover welded to the flange for the purpose of sealing the container, thereby defining a sealed region on the flange around the outer periphery of the container body, the container body and/or the cover having more than one layer and comprising:

an inner layer facing the interior of the container and an outer layer bonded to the inner layer, the inner and outer layer being separable from each other, wherein the bonding force between the inner layer and the outer layer is smaller than that between the flange and the cover, and wherein the inner layer has a zone of weakness on each side of the sealed region, the first zone being located between the interior of the container and the sealed region and the second zone being located between the outer periphery of the flange and the sealed region, and wherein the cover and/or the flange has at least one non-sealing area which includes a portion of the second

zone of weakness.

According to a second aspect of the present invention there is provided a container comprising a container body having a flange for receiving a cover to be welded to the flange for the purpose of sealing the container, thereby defining a sealing region on the flange around the outer periphery of the container body, the container body having more than one layer and comprising:

an inner layer facing the interior of the container and an outer layer bonded to the inner layer, the inner and outer layer being separable from each other, wherein the bonding force between the inner layer and the outer layer is smaller than that between the flange and the cover, the inner layer having a first zone of weakness between the interior of the container and the sealed region and a second zone of weakness between the sealed region and the outer periphery of the flange and a non-sealing area formed in the flange, the non-sealing area including a portion of the second zone of weakness.

Advantageously, the body and the cover are bonded to each other for sealing the container by means such as heat sealing. Further, the non-sealing area may be formed in the cover, after which the flange portion and the cover are bonded to each other such that the outer periphery of the seal coincides with a portion of the non-sealing area.

When embodiments of the container are opened, the layers of the flange portion, or of the cover, separate at the portion of the second zone of weakness included within the non-sealing area when the cover is pulled from the end thereof towards the central portion of the container.

The invention will now be further described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a plan view which illustrates a first

embodiment of a container according to the present invention;

Figure 2 is a cross-sectional view taken along line II-II of Figure 1;

Figure 3 is a cross-sectional view taken along line III-III of Figure 1;

Figure 4 is a cross-sectional view which illustrates a second embodiment of the present invention;

Figure 5 is a cross-sectional view which illustrates a portion of a third embodiment of the present invention;

Figures 6(A) and 6(B) to 10 are views which illustrate modifications of the above-described embodiments;

Figure 11 is a cross-sectional view which illustrates a fourth embodiment;

Figure 12 is a partial cross-sectional view which illustrates a state in which a cover according to the previous embodiments is heat sealed;

Figure 13 is a cross-sectional view which illustrates a modified example of the fourth embodiment;

Figure 14 is a schematic structural view which illustrates an apparatus for notching method the container of the present invention;

Figures (15A) to (15D) are views which illustrate a method of notching using the apparatus of Figure 14;

Figure 16 is a cross-sectional view which illustrates a container to be notched;

Figure 17 is a schematic structural view which illustrates another embodiment of the apparatus of Figure 14;

Figures (18A) to (18D) are views which illustrate a method utilizing the apparatus of Figure 17;

Figure 19 is a cross-sectional view which illustrates a container to be notched;

Figures 20 and 21 are schematic structural views which illustrate further apparatus for notching the container;

Figure 22 is a cross-sectional view which illustrates a portion of a notch of an embodiment; and

Figure 23 is a cross-sectional view which illustrates a portion of another embodiment prior to cutting.

Embodiments of the present invention will be described, by way of example only, with reference to the drawings. In the following embodiments, the same or similar components are given the same reference numerals.

Figures 1 to 3 are views which illustrate a first embodiment of the present invention. Referring to these drawings, a body 10, referred to hereinafter as the main container body, is formed in a substantially rectangular plate-like shape having a flange 13, referred to hereinafter as the flange portion, at the top thereof. The outer periphery 13B of this flange portion 13 is provided with a depending skirt 14, this skirt 14 serving as a portion to be bent. A cover 15 is welded to the upper surface of the above-described flange portion 13 so that an elongate seal 16 is formed between the cover 15 and the flange portion 13.

The main container body 10 comprises a multilayered structure which includes at least two layers consisting of an inner layer (a first layer) 11 on the inside of the cavity 10B of the main container body 10 and an outer layer 12 (a second layer) which is so polymerized with this inner layer 11 as to be able to be separated from it. The peel strength between the inner layer 11 and the outer layer 12 is 300 to 2000g/15mm (tension speed 300mm/min to be identical hereinafter), preferably 400 to 1500g/15mm, this strength being required to be at least smaller than the sealing strength between the flange portion 13 and the cover 15.

The inner layer 11 of the flange portion 13 has a notch 18 serving as an inner line of weakness formed therein at a position closer to the cavity 10B than the inner periphery 16A of the seal 16, the distance

therebetween being denoted T, while a cutting line 19 serving as an outer line of weakness is formed on the outer periphery of the flange 15, that is, remote from the seal outer periphery 16B. It is preferable that the depth of the notch 18 and of the cutting line 19 is sufficient to extend to the boundary between the inner layer 11 and the outer layer 12. It is necessary for the structure to be arranged such that when the cover 15 is intended to be opened, the inner layer 11 and the outer layer 12 can be separated from each other from the cutting line 19 to the notch 18, causing the container to be opened.

In the portion where the corner of the flange portion 13 and that of the cover 15 correspond to each other, a hole 20 which serves as a non-sealing area is formed. The hole 20 is located such that it corresponds with a portion of the cutting line 19 and such that a portion of the periphery of the hole 20 which is closest to the cavity 10B of the container coincides with the outer periphery 16B of the seal 16. This hole 20 is, as shown in Figure 1, circular. However, the position at which this hole is formed is not particularly limited, and a plurality of holes may be provided.

The material for the main container body 10 is not limited particularly, it being exemplified by:

polyolefin resin, polystyrene resin, polyamide resin, polyester resin, polycarbonate resin, a mixture consisting of the above-described substances, a resin prepared by adding thermoplastic elastomer, various additives, or inorganic fillers in an amount of 5 to 70wt%, and metal foil. In order to satisfy the required peel strength, a suitable material needs to be selected from a combination of the layers each of which is formed by the above-described materials.

An example of the combinations of the materials forming a material (a) of the inner layer 11 and that (b) of the outer layer 12 will be described as follows, the

present invention not being limited to the following materials or combinations.

(a) polyethylene resin such as high density polyethylene or low density polyethylene and (b) mixed resin consisting of polypropylene resin and polyethylene resin;

(a) polypropylene resin and (b) mixed resin consisting of polypropylene resin and polyethylene resin;

(a) low density polyethylene and (b) high density polyethylene resin;

(a) ethylene-vinyl acetate copolymer and (b) mixed resin consisting of polypropylene resin and polyethylene resin;

(a) ethylene-vinyl acetate copolymer and (b) mixed resin consisting of ethylene-propylene random copolymer resin;

(a) mixed resin consisting of polypropylene resin or polypropylene resin and polyethylene resin and (b) mixed resin consisting of polypropylene resin containing inorganic filler and polyethylene resin;

(a) mixed resin consisting of polypropylene resin and polyethylene resin and (b) high density polyethylene containing inorganic filler;

(a) homo- or random polymerized polypropylene resin and (b) high density polypropylene including inorganic filler; and

(a) unsaturated carboxylic acid modified polypropylene resin and (b) aluminum.

The main container body 10, as previously described, is formed as a double-layered structure made of the above-described materials. However, it may be formed as a multilayered structure consisting of three or more layers by laminating layers of other material for the purpose of improving gas-barrier performance or improving the resistance of the formed container to deformation. The layer made of "other material" is exemplified by a layer formed of a material exhibiting excellent gas

barrier performance such as: a resin layer made of ethylene-vinyl alcohol copolymer, polyvinylidene chloride, nylon (polyamide), and polyethylene terephthalate; and a metal layer such as an aluminum evaporated layer or a layer made of aluminum or iron. The above-described layer made of the other material may be a single layer or a multilayered structure consisting of two or more layers. It may, as well, be a resin layer containing an inorganic filler in an amount of 10 to 80wt%.

A suitable structure of the layers forming the main container body 10 is selected dependent on the resin forming the sealant layer of the cover 15. For example, in the case where the cover 15 is formed of polyethylene sealant layers, it is preferable that a structure is selected from the above-described group of combinations of resin layers, this structure being arranged in such a manner that the high density polyethylene layer is employed to form the inner layer 11 of the main container body 10.

The main container body 10 may, if necessary, be provided with another layer such as a sealing layer, a heat resisting layer, or an oil-proof layer which overlies the innermost layer (inner layer 11) of the multilayered container. The main container body 10 can be obtained by means of vacuum molding, compression molding, drawing, multilayer injection molding, multilayer injection blow molding, or multilayer blow molding, using the above-described combination of resin, the laminate resin of the thus-obtained co-extruded multilayered sheet or resin sheet or film and a metal laminate. Alternatively, it can be obtained by heat forming a multilayered film on the inside of a main container body 10 made of paper or the like.

The laminate working method is exemplified by extrusion laminating, hot melt laminating, dry laminating, and a wet laminating. A multilayered

material having a suitable peel strength can be obtained by the above-described laminating if a pressure sensitive agent or an adhesive agent is used.

Although the above-described cover 15 is structured to be a single-layered film, it is not limited to a single layer. For example, it may be structured as a multilayered film consisting of two or more layers. In the case where a multilayered film is employed, a suitable structure may comprise:

a base formed by a plastic single layered film, multilayered film, paper, aluminum foil, or a material manufactured by combining the above-described materials; and a sealant layer made of resin which can be readily heat sealed to the innermost layer (inner layer 11) of the main container body 10 such as polyethylene, polypropylene, ethylene-α-olefin copolymer, ethylene-vinyl acetate copolymer, and the like.

The container of the type described above can be manufactured as follows: first the multilayered sheet is heated, and the above-described body 10 is formed from the heated multilayered sheet by vacuum molding or compression molding. Then, the above-described notch 18 and the cutting line 19 are formed prior to or after the food or other article is placed within the body 10. The notch 18 and the cutting line 19 can be formed by a physical method using a notching blade or cutting edge, a heating method such as heat ray melting (impulse) or melting in which a hot blade is used, a mechanically oscillating method by using ultrasonic wave, or an inner heating method by using high frequency. As described above, the depth of the formed notch 18 and the cutting line 19 needs to extend through the inner layer 11 to the outer layer 12 to assure separation of the inner layer 11 from the outer layer 12.

Then, the flange portion 13 of the main container body 10 and the cover 15 are welded for sealing. The means of sealing may comprise heat sealing or ultrasonic

sealing or the like. After the flange portion 13 and the cover 15 have been sealed, the flange portion 13 and the cover 15 may be punched simultaneously such that the hole 20 is formed. The outer periphery 16B of the seal 16 needs to coincide with the hole 20 but it is not critical that the outer periphery 16B of the seal 16 meets the cutting line 19.

When the container is intended to be opened, it can be readily opened by pulling the outer peripheral edge of the cover 15 towards the central portion of the container, the peeling of the layers of the flange portion 13 starts at the hole 20 which coincides with the seal outer periphery 16B. In addition, it is not necessary to accurately position the seal during the sealing operation since a positional error of the seal with respect to the cutting line 19 is allowed provided the seal outer periphery 16B coincides with the hole 20. As a result, manufacturing efficiency can be improved, and the width of the sealing can be optionally selected. In addition, since the skirt 14 is formed in the flange portion 13 and the skirt portion 14 is not notched, the rigidity of the container is preserved.

A container according to a second embodiment of the present invention is structured as shown in Figure 4, such that: the cover 15 comprises the above-described inner layer 11 and the outer layer 12; the above-described notch 18 is formed closer to the cavity 10B than the seal 16 and the above-described cutting line 19 is formed in inner layer at a position corresponding to the outer periphery of the flange 13; and the hole 20 which serves as the non-sealing area is formed in the cover 15 at a position which corresponds to a portion of this cutting line 19. That is, the main container body 10 is not provided with the notch 18, cutting line 19 and the hole 20. In addition, the material for the main container body 10 is arranged to be the same as that for the inner layer 12 of the cover 15 so as to be tightly

sealed to the latter. The main container body 10 may be formed, as shown in Figure 4, to be a multilayered structure, or a single layered structure. Otherwise, the other aspects of this second embodiment are the same as those of the first embodiment.

The container according to the second embodiment may be manufactured as follows: the above-described notch 18, the cutting line 19, and the hole 20 are formed in the cover 15; and this cover 15 is welded to the flange portion 13 of the main container body 10 in which the contents are enclosed for sealing. As before, the portion of the outer periphery 16B of the seal 16 coincides with the hole 20, but does not need to be extended to the cutting line 19.

This second embodiment operates similarly to the first embodiment.

A third embodiment of the present invention is structured as shown in Figure 5 such that the hole 20 serving as the non-sealing area is also formed in the cover 15 at the position thereof which includes a portion of the above-described cutting line 19. The remainder of the structure is the same as that of the second embodiment.

The container according to the third embodiment is structured as follows: the above-described notch 18 and the cutting line 19 are formed in the cover 14; this cover 15 is welded, for sealing, to the flange 13 of the main container body 10 in which the contents are enclosed; and the flange portion 13 and the cover 15 are punched such that the outer periphery 16B of the seal 16 is also punched when forming the hole portion 20. The seal outer periphery does not need to extend to the cutting line 19. According also to this third embodiment, a similar effect to that obtained in the first and second embodiments can be obtained.

According to the above-described embodiment, although the shape of the hole 20 serving as the non-

sealing area is circular, the present invention is not limited to this. For example, it may, as shown in Figure 6(A), be a segment shaped or the like. As shown in Figure 6(B), a structure may be employed arranged such that the hole 20 may be formed only in the flange portion 13 of the main container body 10.

According to the above-described embodiments, although the bent portion formed in the flange portion 13 of the main container body 10 is arranged as a depending skirt 14, the bent portion according to the present invention is not limited to this. For example, it may be formed to be in the shape of a rib or a curl. In addition, it may be structured such that tabs 17A are extended over the ribs 17 formed in the flange portion 13.

According to the present invention, when the seal 16 is formed by heat sealing, a structure may be employed arranged such that the non-sealing area is, as shown in Figures 8 to 10, formed by a non-heat adhesive resin layer 21 or a heat-resisting label (not shown) made of aluminum foil, paper, or the like is applied to the flange portion 13 on the outer perimeter thereof, including the above-described cutting line 19. In addition, the non-sealing area may be formed by using both the above-described hole 20 and the non-heat adhesive resin layer 21. This non-heat adhesive layer 21 may comprise a high melting point thermoplastic resin layer or a thermosetting resin layer applied to or printed on the surface of the flange 13 and may have a thickness of 1 to 5 μm. This thermosetting resin is exemplified by: polyamide, polyester, polyamide-cellulose nitrate copolymer, cellulose nitrate-silicon resin copolymer, silicon resin, urethane resin, and aminoalkid resin. The container shown in Figures 8 and 9 is arranged such that the hole 20 is formed in the cover 15, while the container shown in Figure 10 is arranged such that the hole 20 is formed in the cover 15 and the

flange portion 13. According to these containers, even if the seal outer periphery 16B was, as designated by an arrow P shown in Figures 8 and 10, positioned towards the cavity 10B with reference to the cutting line 19, the cover 15 can be readily separated from the inner edge of the hole 20. Furthermore, even if the seal outer periphery 16B passed outwardly, as designated by an arrow Q, the cutting line 19 and the hole 20, the cover 15 can be readily separated at the cutting line 19 since the area to which the non-heat adhesive resin layer 21 is not applied is not heat sealed.

According to the present invention, an alternative structure can be arranged such that the inner and the outer lines of weakness comprise the notch 18 and the cutting line 19, respectively. A structure may be employed such that the lines of weakness comprise recessed portions (not shown). These recessed portions can be formed by an edge of a sealing member when the cover 15 is welded to the flange portion 13 for sealing by the sealing member.

A fourth embodiment is shown in Figure 11. This embodiment is characterized in that the outer corners of the flange portion 13 are cut and a boundary surface 23 of the inner layer 11 and the outer layer 12 which are positioned in contact with each other is exposed thereby. Any method may be employed to expose the boundary surface 23 for the purpose of facilitating the separation of the inner layer 11 and the outer layer 12. In many cases, the outer corners of the flange portion 13 are formed by grinding, cutting in, cutting, melting of their periphery thereof. The container having outer corners in the flange portion 13 can be molded by a special method. The above described method in which the boundary surface 23 is exposed in the most preferable method for facilitating separation from the boundary surface 23. However, another structure may be employed, for example, which is arranged such that the boundary surface 23 is allowed to

be partially exposed such that separation can start and the effect of the present invention is substantially achieved.

Figure 12 is a partial cross-sectional view which illustrates a state where the cover 15 is heat sealed to the main container body 10 according to the above-described fourth embodiment. This heat seal 16 is formed in a region A.

Figure 13 is a partial cross-sectional view which illustrates a portion of the container in the vicinity of the flange portion 13 in the case where the cover 15 is heat sealed to a main container body 10 having a curled flange portion 13 according to another example of the fourth embodiment.

Referring to this drawing, the notch 18 is formed in the inner layer 11 at the inner wall of the main container body 10. this notch 18 may be, in the form of a circle, triangle, rectangular of the like, disposed around the main container body 10 in the vicinity of the inner peripheral edge of the flange portion 13. Alternately, it may be provided partially with a portion remaining. In the case where the cover 15 is separated with a portion thereof remaining, the structure needs to be arranged in such a manner that any cutting is not provided at this portion. It is preferable that this heat seal 16 is provided in the region designated by the symbol A shown in Figure 13. The separation can be conducted if the same were provided in the region C. However, in the region B, the separation cannot be performed.

When the cover 15 is heat sealed to the above-described main container body 10, length T from the inner end of the heat sealed portion to the notch is 0.5mm to 10mm in general, preferably 1.5mm to 5mm. If it is difficult to locate the notch within the above-described region when the heat sealing is to be performed, it is preferable that a slanted surface is provided on the

inner periphery of the flange portion as to provide a non-sealing region for notching. Alternatively, the non-sealing area may be formed in a stepped shape, or a portion which cannot be fused by heat may be provided on the inner layer of the main container body so as to be a non-sealing area. In the case where the above-described non-sealing area having a width T is provided, stress is concentrated at a point X when the cover is separated from the body 10. As a result, the separation from the notch 18 becomes more difficult to be performed, causing the peel strength from the inside to become larger than that from the outside. Therefore, its pressure resistance can be raised and the sealing performance can be improved.

The shape of the main body 10 of the multilayered container according to the present invention is not limited specifically. It is preferable that it is formed to be of circular shape, in general, and a polygon such as a rectangular can be employed. Thus, the cover is heat sealed along the flange portion of the shape described above. The shape may be arranged to be in the form of a cup-like shape or a tray-like shape. The notching of the outer periphery of the flange portion 13 of the circular shape of the main body 10 of the multilayered container and the notching of the inner end portion can be readily performed by rotating at least either the container or the notching tool.

The other structure and operation are substantially the same as those of the above-described embodiments.

According to the thus-structured embodiment, an effect can be obtained in which a notch does not need to be formed on the outer periphery 16B of the seal 16.

Examples

The present invention will now be described in detail with reference to the examples. However, the present invention is not limited to the following examples.

Example

A sheet (thickness 0.8mm) formed by six layers made of four types of materials was molded where a : b : c : d : c : b = 50 : 350 : 20 : 30 : 20 : 350 (μm).

a: high density polyethylene (Idemitsu Polyethylene 440M manufactured by Idemitsu Petrochemical Co. Ltd., density: 0.96g/cm^2, MI: 0.9g/10 minutes, molecular weight distribution: restricted)

b: a mixture of 80wt% polypropylene resin (Idemitsu Polypro E-100G manufactured by Idemitsu Petrochemical Co., Ltd., MI: 0.6g/10 minutes) and 20wt% low density polyethylene resin (Berosen 172 manufactured by Toyo Soda Industry Co., Ltd., density: 0.92g/cm^2, MI: 0.3g/10 minutes, molecular weight distribution: restricted)

c: maleic acid anhydride denatured polypropylene (Idemitsu Politac R100 manufactured by Idemitsu Petrochemical Co., Ltd.)

d: ethylene-vinyl acetate copolymer suspension (EVA; EP-F101 manufactured by Kuraray Co., Ltd., rate of ethylene contained: 32mol%, MI: 1.3g/10 minutes)

By heating the thus-prepared multilayered sheet to a temperature at which the molding could be performed, a cup shaped container having a diameter of 60mm and 70mm in height was obtained by vacuum molding. After the flange portion 13 of the container had been curled, the annular notching was formed in the upper portion of the side wall and the outer corners of the flange portion were cut so that a container shown in Figure 13 was obtained, where A = 2mm and T = 1.5mm.

The cover formed of a multilayered film made of [oriented nylon/polyvinylidene/straight-chain low density polyethylene (15μ/20μ/40μ)] was put on this container, and the flange was heat sealed around the container.

The thus-obtained container was able to be separated from the outer end of the sealed portion of the flange portion between the layers of the container similarly to

the separation realized in the flat flange provided container. Furthermore, the container displayed a stable peel strength of 1200g/15 mm and a clear separation surface.

A method of and an apparatus for notching the container of the present invention will now be described.

The same or similar components to those of the above-description are given the same reference numerals.

The body 10 is formed in a cylindrical shape, and the flange 13 to be welded for sealing to the cover 15 is formed to provide a circular opening 10A. The outer periphery 13B of this flange 13 is formed with a rib 14A serving as the bent portion faces the bottom surface of the container. This body 10 is formed in a multilayered structure consisting of at least two layers overlying each other in such a manner that the inner layer 11 can be separated from the outer layer 12. The peel strength between the inner layer 11 and the outer layer 12 is arranged to be substantially the same as that in the above-described embodiments. The notch 18 and the cutting line 19 are formed in the inner layer 11 disposed on each side of the seal 16 of the flange portion 13.

The material, the combination of the layers and the like in the main container body 10 are the same as the above-described embodiments.

Then, an apparatus for notching the main container body 10 will be described with reference to Figures 14 and 15.

Referring to Figure 14 which is a view which illustrates the schematic structure of this apparatus, a notching apparatus 30 comprises: holding means 40 for holding the main container body 10; rotating means 50 for rotating this holding means 40 relative to the center of the opening 10A in the container; first and second notching blades 61 and 62 for forming the above-described notch 18 and the cutting line 19 in the main container body 10.

The above-described holding means 40 comprises: a container retainer 41 having a recessed portion 41A in which the main container body 10 is received; and a pressing member 42 for pressing the inner surface of the main container body 10 received in the above-described container retainer 41. The above-described container retainer 41 and the pressing member 42 are rotatably supported by rotational shafts 43 and 44 fastened coaxially. The pressing member 42 is arranged to be able to move forward and to be retracted in the axial direction. When this pressing member 42 is retracted, the main container body 10 is arranged to be carried into, and drawn out of, the container retainer 41 by means (omitted from illustration). In addition, an air outlet hole 41B is formed in the bottom portion of the container retainer 41 so that the main container body 10 can be smoothly carried into and drawn out of the container retainer 41. Furthermore, by blowing air out through the air outlet hole 41B, the main container body 10 can be taken out from the container retainer 41.

The above-described rotational means 50 comprises: a gear 51 connected to the container retainer 41 with a rotational shaft 43; and a motor 53 with a gear for rotating the gear 51 by using a timing belt 52. This motor 53 is arranged such that it intermittently rotates and stops so that when the container retainer 41 is being rotated, the notch 18 is formed by the rotation of the container retainer 41 at the position which corresponds to at least the portion of the main container body 10 and the cover 15 at which the seal therebetween is to release. The notch 18 may be formed with a part thereof remaining intact as an alternative to extending around the whole of the inner perimeter of the inner wall of the container.

The above-described first notching blade 61 is disposed in such a manner that the front end portion thereof can be brought to the position at which the

cutting line 19 is formed, for example, the same can be brought into contact with the outer periphery 13B of the flange 13. On the other hand, the notching blade 62 is disposed in such a manner that the front end portion thereof can be brought to contact with the position at which the notch 18 is formed, for example, the same can be brought to contact with the inner periphery 13A of the flange 13. The notching blades 61 and 62 are arranged to move forward and retract by a means (omitted from illustration) so that the front end thereof can reach the inner layer 11 of the main container body 10 when the same moves forward. On the other hand, when the notching blades 61 and 62 are retracted, they are arranged to retract diagonally above the container retainer 41 as shown in Figure 14 so as not to interrupt the carrying in and the drawing out of the main container body 10. These notching blades 61 and 62 are secured so as not to be moved due to contact with the main container body 10 when they are moved forward so that the above-described cuts 18 and 19 are assuredly formed in the main container body 10. These notching blades 61 and 62 may, if necessary, be heated so as to readily form the cuts 18 and 19. The shape of these notching blades 61 and 62 may be formed of any shape which can form the cut such as a V-shape providing the cut at the front end portion thereof.

A method of notching the main container body 10 by using the apparatus which is thus-structured will be described with reference to Figure 15. In Figure 15, the rotational means is omitted from the illustration and the main container body 10 is illustrated as a single-layered body to simplify the description.

As shown in Figure 15A, when the pressing member 42 and the notching blades 61 and 62 are respectively at their retracted positions, the pressing member 42 is moved forward after the main container body 10 in which the cuts have not been formed as yet has been received by the recessed portion 41A in the container retainer 41 so

that the main container body 10 is held within the container retainer 41. Then, as shown in Figure 15B, the notching blades 61 and 62 are moved forward, and simultaneously, the rotational means 50 (see Figure 14) is rotated as shown in Figure 15C as to rotate the container retainer 41 by a predetermined angular amount, for example, one full revolution. As a result, the cuts 18 and 19 are simultaneously formed in the body 10. At this time, although the pressing member 42 is simply and rotatably supported by the rotational shaft 44, it, together with the container retainer 41, holds the main container body 10 in position. Therefore, it rotates with the container retainer 41. Furthermore, as shown in Figure 15D, the pressing member 42 is retracted after the notching blades 61 and 62 have been retracted, and the main container body 10 in which the cuts 18 and 19 have been formed is drawn out.

In order to change the position at which the cuts 18 and 19 are formed, the relative positions between the notching blades 61 and 62 needs to be adjusted.

According to the thus-formed embodiment, since the main container body 10 is rotated by the holding means 40 with the notching blades 61 and 62 are positioned in contact with the main container body 10, the cuts 18 and 19 can be assuredly formed in the flange portion 13 regardless of whether or not the thickness of the flange portion 13 is uniform, in particular, regardless of the non-uniform thickness of the outer layer 12 even if the flange portion 13 has the rib 14A thereon. Furthermore, by using a proper type of blades as the notching blades 61 and 62, the cuts 18 and 19 can be formed regardless of the material used for the inner layer 11, that is even if the material is high melting point or high strength resin, or metal such as aluminum, the cuts 18 and 19 can be formed. In addition, by adjusting the relative positions of the notching blades 61 and 62, the above-described cuts 18 and 19 can be formed at any desired

position in the flange portion 13. In particular, by means of forming of the cuts 18 and 19 in the outer periphery 13B and the inner periphery 13A of the flange portion 13, the width to be sealed does not need to be strictly set when the cover 15 is sealed on the flange 13 of the main container body 10. As a result, the sealing operation can be readily conducted. In addition, expensive annular notching blades can be replaced by relatively cheap notching blades 61 and 62 above such that the cost required to form the cuts can be reduced.

Another embodiment for notching will be now described with reference to Figures 17 to 19.

This embodiment is arranged such that the structure of the means for holding the main container body 10 and the notching blade are different from those of the above-described embodiments. However, the relationship of the main container body 10 and of the rotational means 50 are the same as those of the above-described embodiments. The rotational means 50 is omitted from illustration in Figures 17 and 18.

Referring to Figure 17 which is a view which illustrates the structure schematically, the holding means according to this embodiment comprises a vacuum adsorption means 45 for adsorbing, by its negative pressure, the inside of the main container body 10 which has been bought adjacent by a lifting means (omitted from illustration). This vacuum adsorption means 45 is formed in a substantially circular cylinder having a recessed portion at the base portion thereof, this vacuum adsorption means 45 comprising, in the shaft thereof, an inlet/outlet hole 45A which is connected to a pressure reducing system and/or high pressure system (omitted from illustration). This vacuum adsorption (blowing-out attaching/detaching) means 45 is arranged to be rotated with the above-described rotational means 50 (see Figure 14) and the main container body 10.

The notching blade according to this embodiment

comprises: a rotary type notching blade 63 for forming the cut 19 (see Figure 19) by diagonally notching the outer periphery 13B of the flange portion 13; and a notching blade 64 for forming the above-described notch 18 in the inner periphery 13A of the flange portion 13. The above-described notching blade 63 is arranged to be capable of moving forward and retracting so that when the same is moved forward, the cutting line 19 can reach the inner wall 11 of the main container body 10. The above-described notching blade 64 formed in a hook shape and capable of rotating relative to the base end portion thereof, the notching edge formed at the front end thereof being always abutted under a predetermined urging force against the inner periphery 13A of the flange portion 13 by means of a spring (omitted from illustration), while the same being capable of retracting against the above-described urging force when this notching edge does not form the cut. Thanks to the thus-formed method, the cut can be formed in the inner layer 11 by means of a press molding, which is advantageous in that cuts exhibiting a predetermined depth can be formed even if the portion of the main container body 10 at which the cut is formed is not uniform.

A method of forming the cut in the main container body 10 by using the notching apparatus according to this embodiment and structured as described above will be described with reference to Figure 18. In Figure 18, the main container body 10 is formed in a single-layered structure for the purpose of simplifying the description.

As shown in Figure 18A, when the notching blades 63 and 64 are positioned at their retracted positions, the main container body 10 in which the cuts have not as yet been formed is brought to a position adjacent to the vacuum adsorption means 45 by the lifting means (omitted from illustration). Then, this vacuum adsorption means 45 is actuated so that the main container body 10 is held. As shown in Figure 18B, the notching blades 63 and

64 are then moved forward, and the rotational means 50 (see Figure 14) is rotated as shown in Figure 18C for the purpose of rotating the vacuum adsorption means 45 by a predetermined angular amount, in general one revolution. As a result, the cuts 18 and 19 are simultaneously formed in the main container body 10 (see Figure 19). Then, as shown in Figure 18D, the operation of the vacuum adsorption means 45 is stopped after the notching blades 63 and 64 have been retracted so that the main container body 10 is detached, if necessary with an air blast. Then, the thus detached main container bodies 10 are accumulated in a predetermined portion by means of the lifting means (omitted from illustration).

Also according to this embodiment, the cut 18A designated by an imaginary line shown in Figure 19 can be formed by adjusting the relative positions of the notching blades 63 and 64.

According to the thus-structured embodiment, a similar effect to that obtained in the above-described embodiments can be obtained. In addition, the following effects can be obtained: since the holding means is arranged to comprise the vacuum adsorption means 45, the number of necessary parts can be reduced with respect to the above-described embodiments; since the notching blade 63 is arranged to be of a rotary type, the cut 19 can be smoothly and assuredly formed.

Other embodiments of the method and apparatus for notching the container will be described with reference to Figure 20.

This embodiment is structured such that the notching apparatus 30 is included in the container printing apparatus and characterized in that the structure of the rotational means and the position of the notching blade are different from those of the above-described embodiments. However, the structures of the holding means and the container are the same. In order to make the description simple, the notching blade is omitted

from illustration.

The vacuum adsorption means 45 serving as the holding means according to this embodiment is rotatably fitted to the front end of a rod-like shaped support member 71A formed radially over the rotational center of the container floating means 71.

The notching blades 61 to 64 according to this embodiment have a similar shape as that of the above-described embodiments (see Figures 14, 15, 17, and 18), and is fastened to the above-described support member 71A. The notching blades are, similarly to those in the above-described embodiments, arranged such that the front ends thereof can reach the inner layer 11.

The rotary means comprises a printing roll 55 for printing the outer surface of the main container body 10 held by the above-described vacuum adsorption means 45. When this printing roll 55 is rotated, the main container body 10 is also rotated due to friction between it and the printing roll 55. The rotation of the main container body 10 may be arranged to be performed in the other zones such as a blank, or non-printing, portion as an alternative to the printing portion.

With the thus-structured apparatus according to this embodiment, the cut can be, in general, formed in the main container body 10 during the printing process. That is, the main container body 10 held by the vacuum adsorption means 45 is also rotated with the printing roll 55. During this rotation, the cuts can be formed in the main container body 10 by the notching blades fastened to the support member 71A.

Since the cuts can be formed in the main container body 10 during the above-described printing process, an advantage in terms of a reduction in the labor needed in manufacturing the containers can be obtained.

A still further embodiment of the present invention will now be described with reference to Figures 21 and 22.

The difference from the above-described embodiments lies in that the notching blades are moved with respect to the container and in the shape of the bent portion formed in the flange portion 13 of the main container body 10.

The flange portion 13 formed in the main container body 10 to be formed with the cuts is provided with a curl 14B serving as the bent portion in the outer periphery 13B thereof.

The holding means according to this embodiment comprises a recessed portion 46A for accommodating the main container body 10, and this holding means is arranged to be the vacuum adsorption means 46 for adsorbing the main container body 10 by its negative pressure. This vacuum adsorption means 46 is arranged to be capable of moving forward and retracting by a cylinder 47. When the vacuum adsorption means 46 is moved forward, it adsorbs the main container body 10, after which it releases its pressure to enable the main container body to be taken out or inserted by a means (omitted from illustration) when it is retracted.

The notching blade 65 has its notching edge at the side edge of the bent front end portion thereof so that the cut 19 (see Figure 22) is formed diagonally in the outer periphery of the flange portion 13. The notching blade 66 is arranged to have a similar shape to that of the above-described embodiments so that the notch 18 is formed. These notching blades 65 and 66 are fastened to the front end of a plate member 67 having the base end thereof which is connected, with the rotational shaft 44, to the above-described rotational means 50 according to the above-described embodiments. Since the above-described notching blade 65 and 66 are moved in the circumferential direction of the main container body 10 by this rotational means 50, the above-described cuts 18 and 19 can be formed in the main container body 10. According to this embodiment, the above-described plate

member 67 is arranged to be resilient for the purpose of keeping the above-described notching blades 65 and 66 against the main container body 10 with a predetermined urging force when the vacuum adsorption means 46 is moved forward.

According to this embodiment structured as described above, after the main container body 10 has been accommodated in the recessed portion 46A in the retracted vacuum adsorption means 46, the vacuum adsorption means 46 is moved forward. Then, the notching blades 65 and 66 are rotated by the rotational means. As a result, the cuts 18 and 19 (see Figure 22) are formed. After the above-described cuts 18 and 19 have been formed, the vacuum adsorption means 46 is retracted and the main container body 10 is transported.

According to the thus-structured embodiment, the cuts 18 and 19 can be assuredly formed in the flange portion 13 having the curling 14B of the main container body 10. In addition, since the vacuum adsorption means 46 does not need to be rotated, the structure of this vacuum adsorption means 46 is much simplified.

Although the structure is so arranged according to the above-described embodiments that the rib 14A or the curl 14B is formed in the outer peripheral 13B of the flange portion 13 provided for the main container body 10, the shape of the flange portion 13 may be, as shown in Figure 23, formed flat as an alternative to the shape having the rib or the like. In addition, as an alternative to the provision of the two cuts, the number of the same may be, as shown in Figure 23, one or three or more. As an alternative to using two notching blades for the purpose of forming two cuts according to the above-described embodiments, the two cuts may be formed by one notching blade. The cuts may be formed in the main container body 10 by moving both the holding means 40 (vacuum adsorption means 45 and 46) and the notching blade. In addition, the above-described rotational means

comprising the gears, the timing belt and the motor according to the above-described embodiments may be formed of means comprising a pulley, a belt, and a motor, or means comprising a plurality of gears and a motor if the same can rotate at least either of the holding means and the notching blade.

According to embodiments of the present invention described above, a container exhibiting an excellent sealing performance and capable of being readily opened can be provided. In addition, cuts can be formed at any positions in the flange. Furthermore, since the cuts can be readily formed in the inner wall of the container, the overall area of the flange surface which is sealed when the cover of the container is bonded to the main container body can be increased, as well as the forming of the cuts. Consequently, a great advantage can be obtained in the field of packing.

The described embodiments of the present invention provide a container which can be readily and efficiently opened.

The invention has been described by way of example only and modifications are possible within the scope of the invention.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A container comprising a container body having a flange and a cover welded to the flange for the purpose of sealing the container, thereby defining a sealed region on the flange around the outer periphery of the container body, the container body and/or the cover having more than one layer and comprising:

an inner layer facing the interior of the container and an outer layer bonded to the inner layer, the inner and outer layer being separable from each other, wherein the bonding force between the inner layer and the outer layer is smaller than that between the flange and the cover, and wherein the inner layer has a zone of weakness on each side of the sealed region, the first zone being located between the interior of the container and the sealed region and the second zone being located between the outer periphery of the flange and the sealed region, and wherein the cover and/or the flange has at least one non-sealing area which includes a portion of the second zone of weakness.

2. A container according to claim 1, wherein said non-sealing area comprises a hole.

3. A container according to claim 1, wherein the non-sealing area is formed by a non-heat adhesive resin layer.

4. A container according to claim 1, wherein the flange has a bent portion.

5. A container comprising a container body having a flange for receiving a cover to be welded to the flange for the purpose of sealing the container, thereby defining a sealing region on the flange around the outer periphery of the container body, the container body

having more than one layer and comprising:

an inner layer facing the interior of the container and an outer layer bonded to the inner layer, the inner and outer layer being separable from each other, wherein the bonding force between the inner layer and the outer layer is smaller than that between the flange and the cover, the inner layer having a first zone of weakness between the interior of the container and the sealed region and a second zone of weakness between the sealed region and the outer periphery of the flange and a non-sealing area formed in the flange, the non-sealing area including a portion of the second zone of weakness.

6. A container substantially as hereinbefore described with reference to the accompanying drawings and/or examples.

DATED this 19th day of June, 1992.

IDEMITSU PETROCHEMICAL CO., LTD.
By its Patent Attorneys
DAVIES COLLISON CAVE

FIG. 1

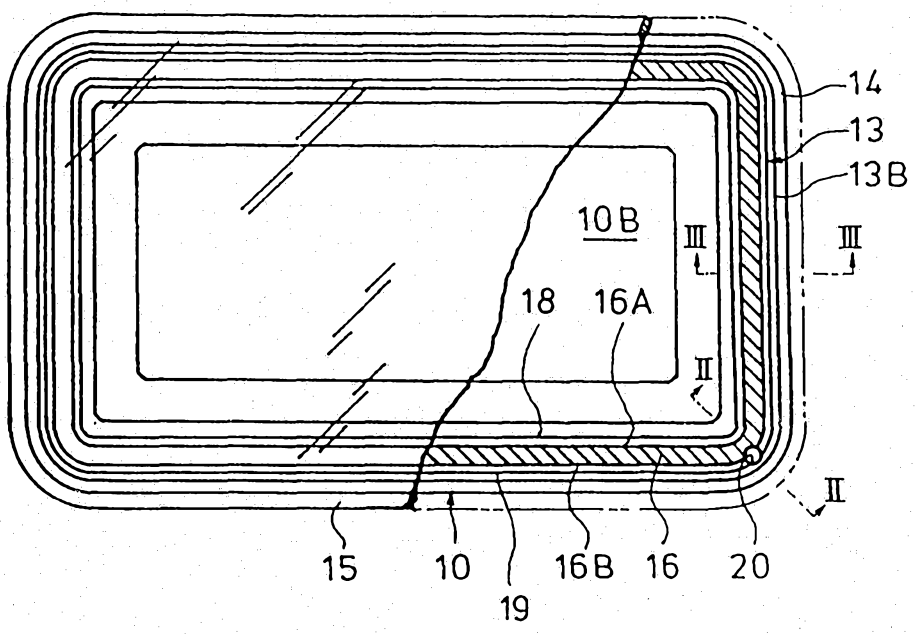

FIG. 2

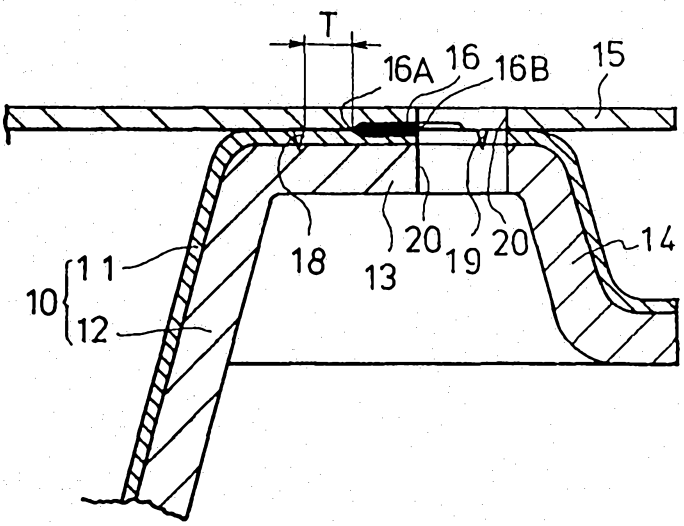
T
16A
16
16B
15
18
13
20
19
20
14
10
11
12

FIG. 4

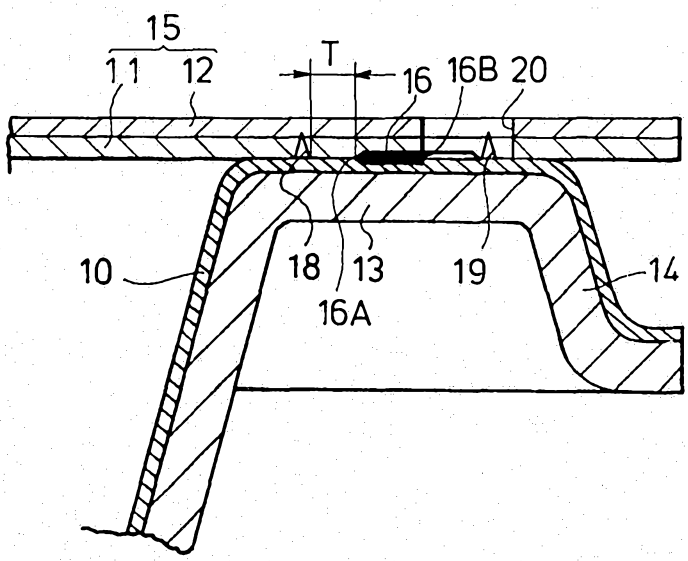
15
11
12
T
16
16B
20
10
18
13
16A
19
14

FIG. 3

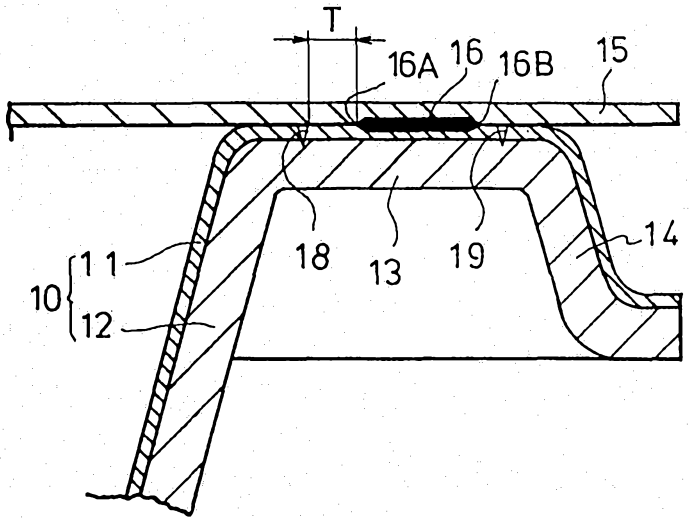
T
16A
16
16B
15
14
18
13
19
10
11
12

FIG. 9

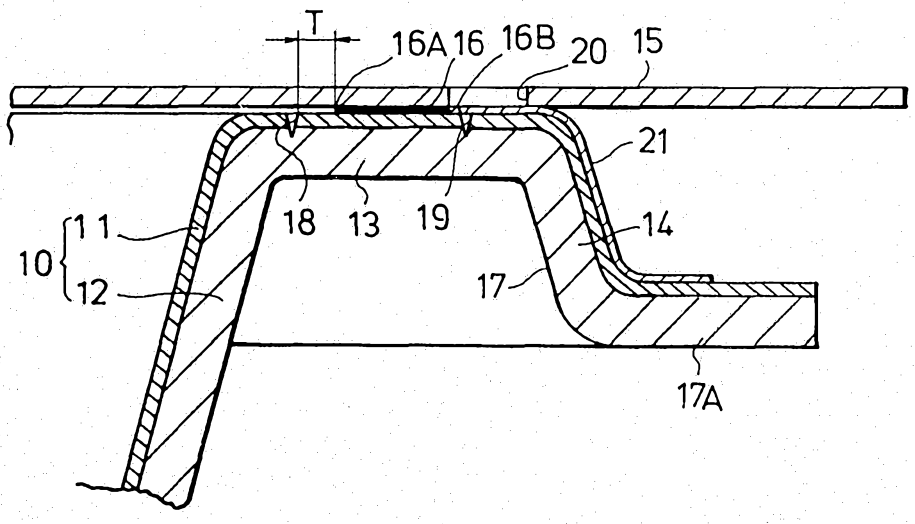
T
16A
16
16B
20
15
21
14
18
13
19
10
11
12
17
17A

FIG. 5

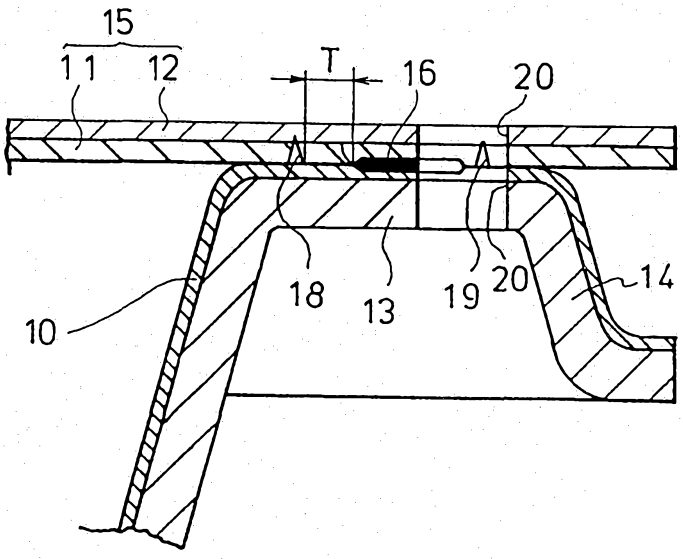

FIG.6(A)

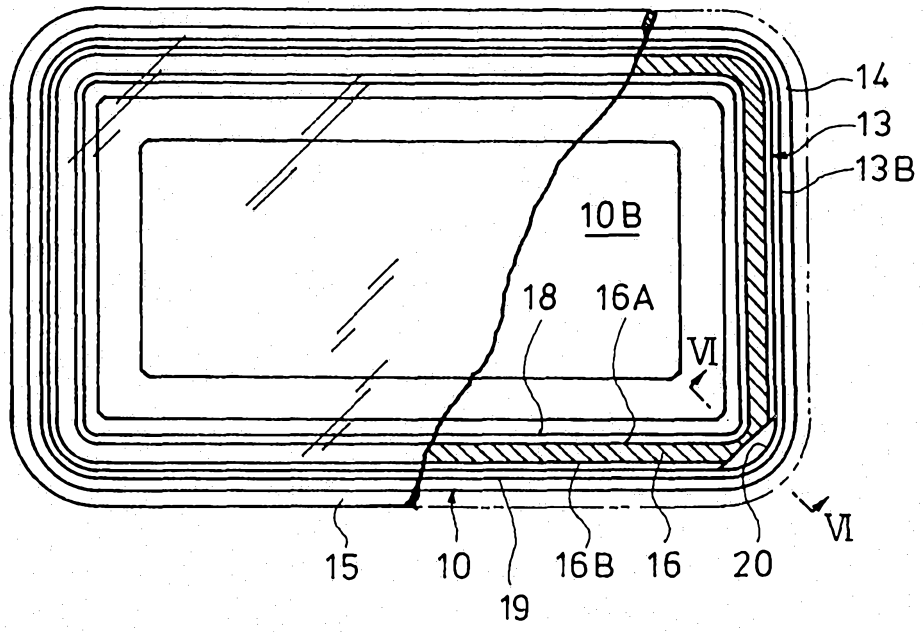
14
13
13B
10B
18
16A
VI
VI
15
10
19
16B
16
20

FIG.6(B)

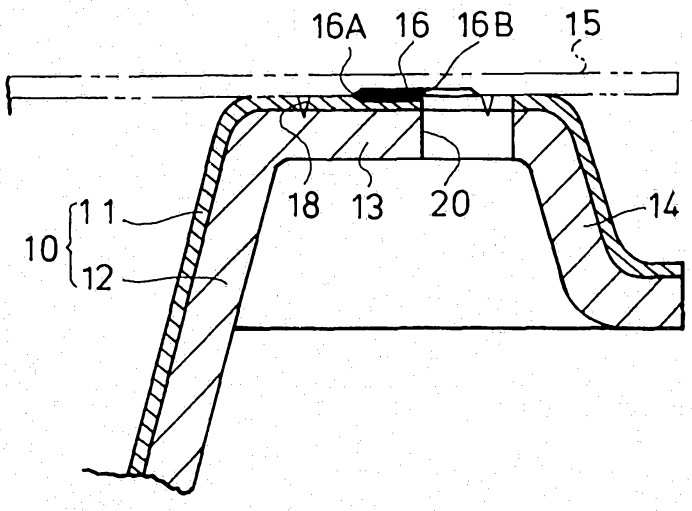
16A
16
16B
15
18
13
20
14
10
11
12

FIG. 7

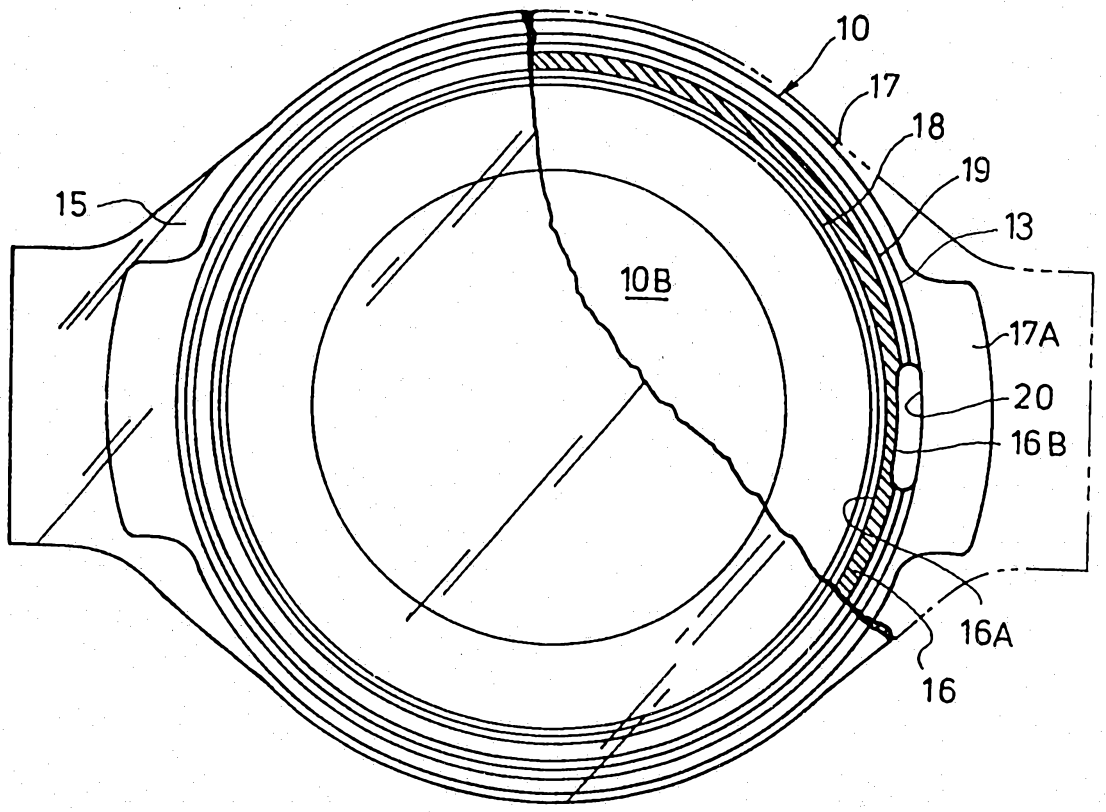

FIG. 8

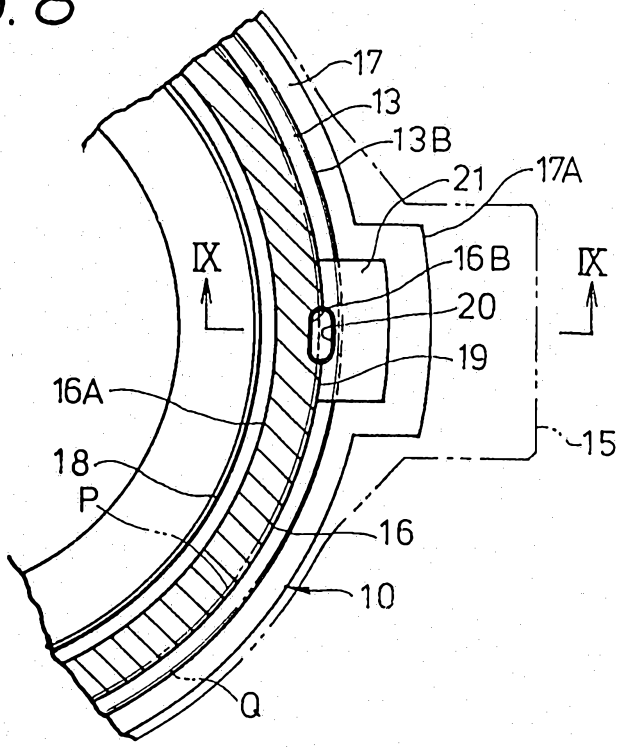
17
13
13B
21
17A
IX
16B
IX
20
19
16A
15
18
P
16
10
Q

FIG. 10

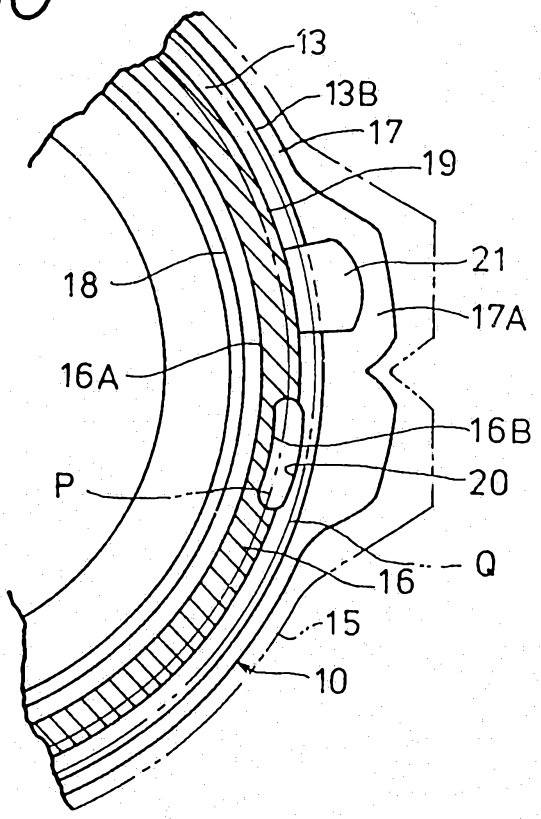
13
13B
17
19
21
18
17A
16A
16B
P
20
Q
16
15
10

FIG.11

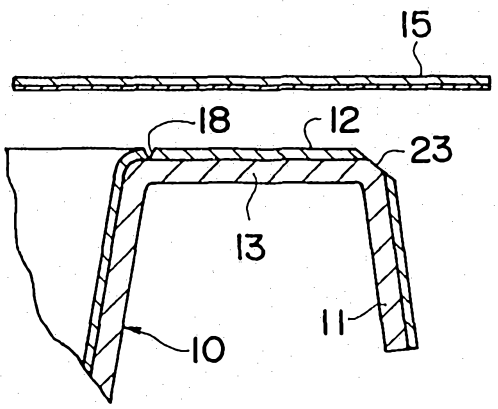

FIG.12

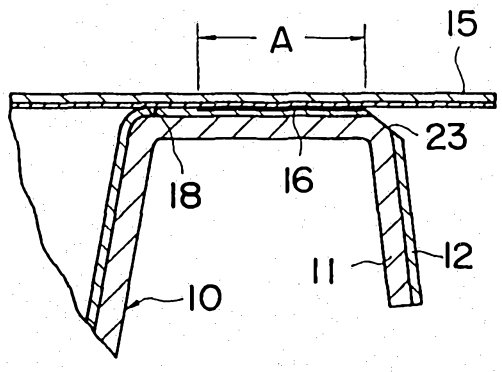

FIG.13

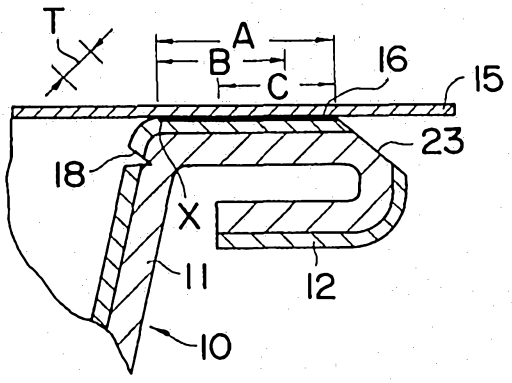

FIG. 14

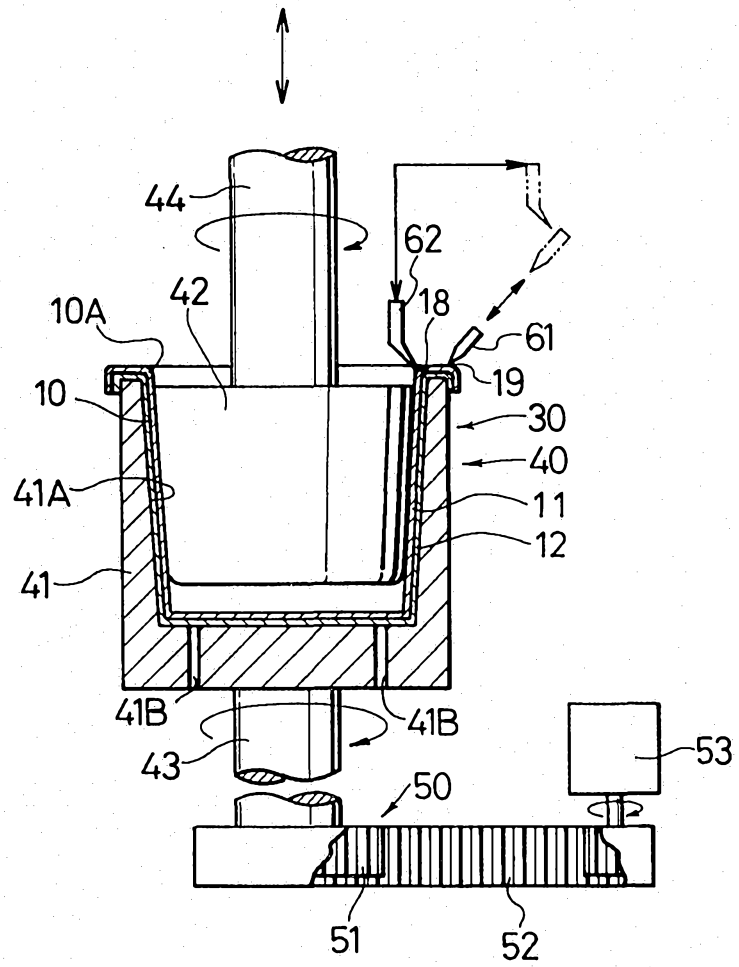

FIG. 15

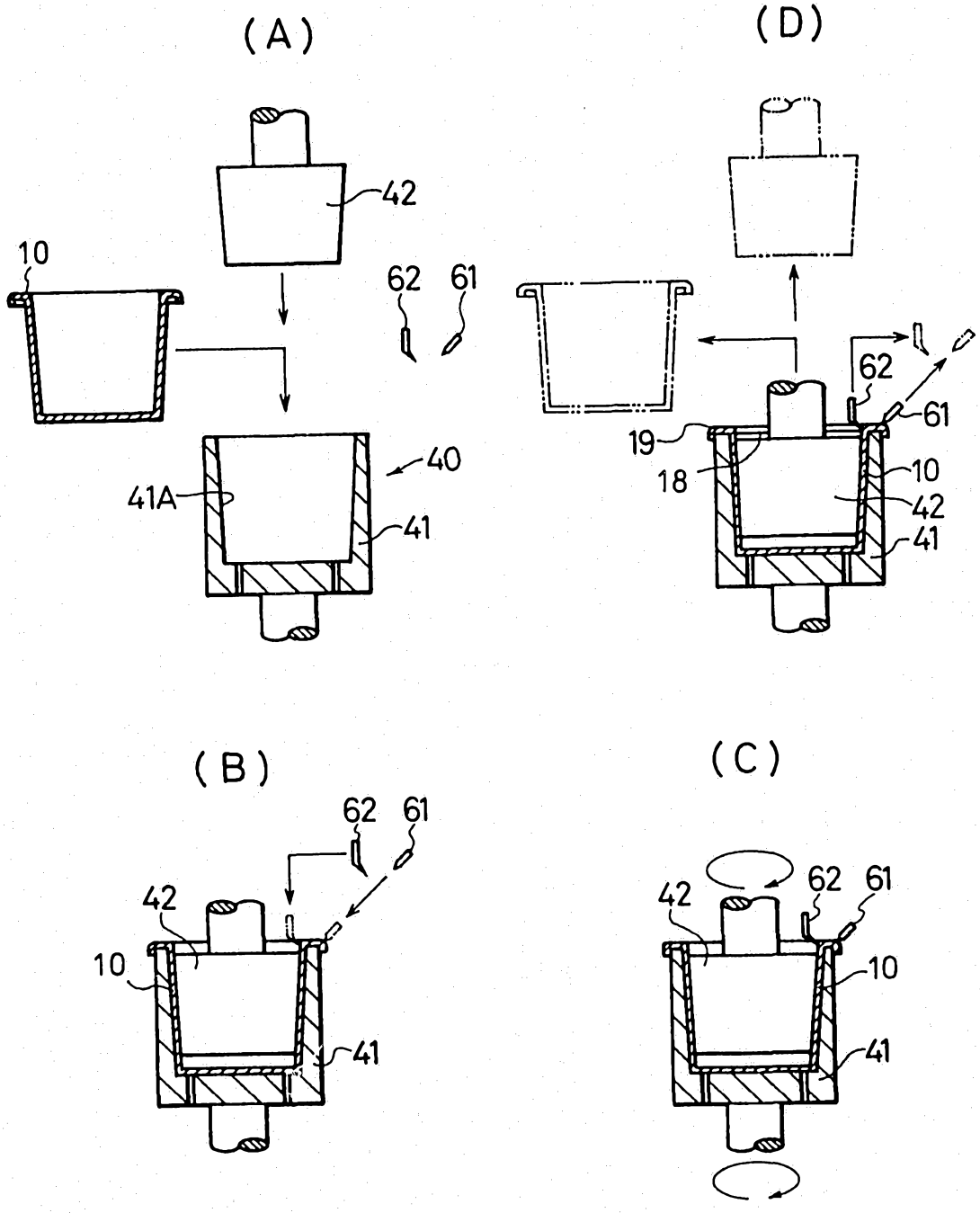
(A)
42
10
62
61
40
41A
41
(D)
62
61
19
18
10
42
41
(B)
62
61
42
10
41
(C)
42
62
61
10
41

FIG.16

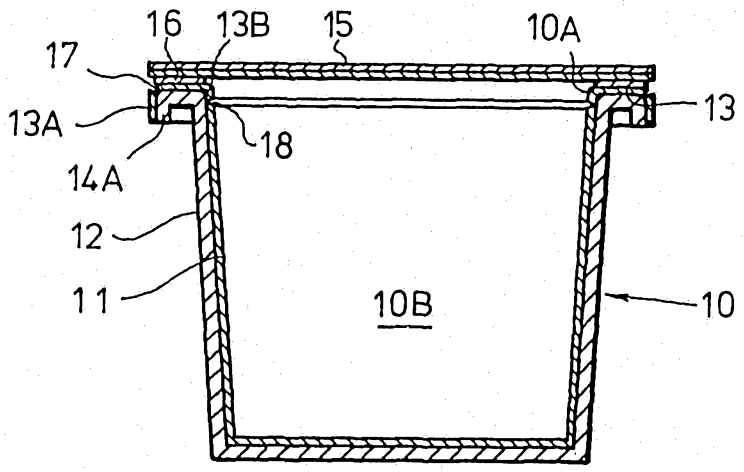
16
13B
15
10A
17
13A
13
18
14A
12
11
10B
10

FIG.17

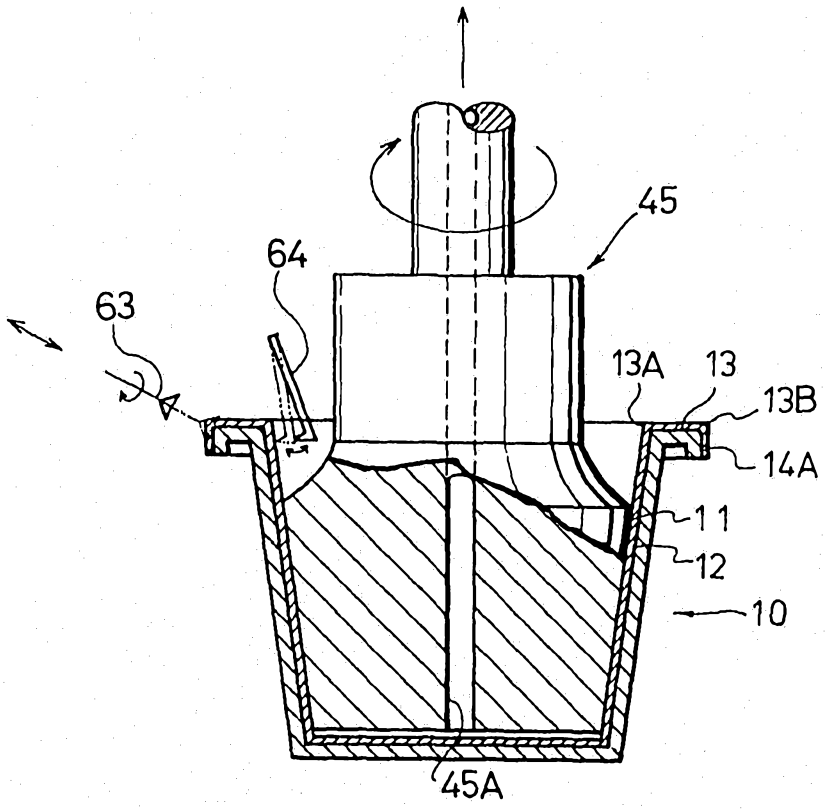
45
64
63
13A
13
13B
14A
11
12
10
45A

FIG.18

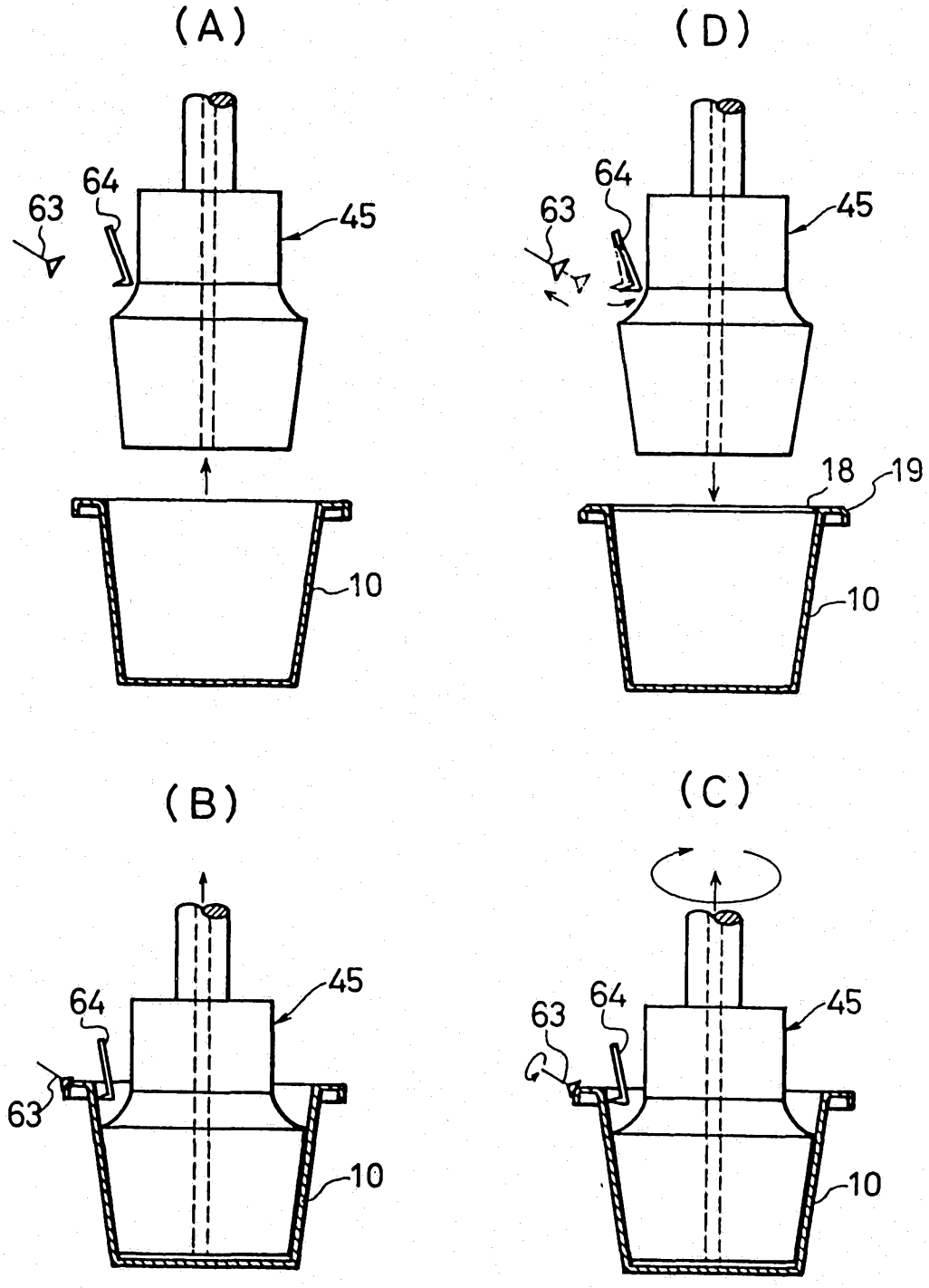

FIG. 19

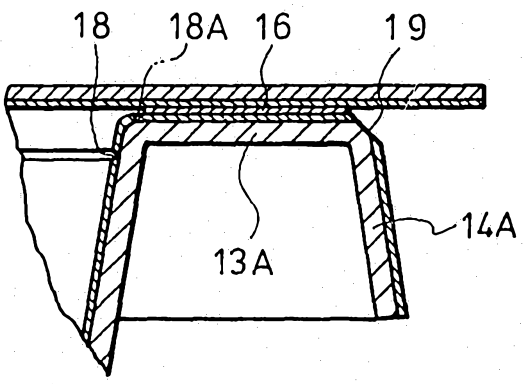
18
18A
16
19
14A
13A

FIG. 20

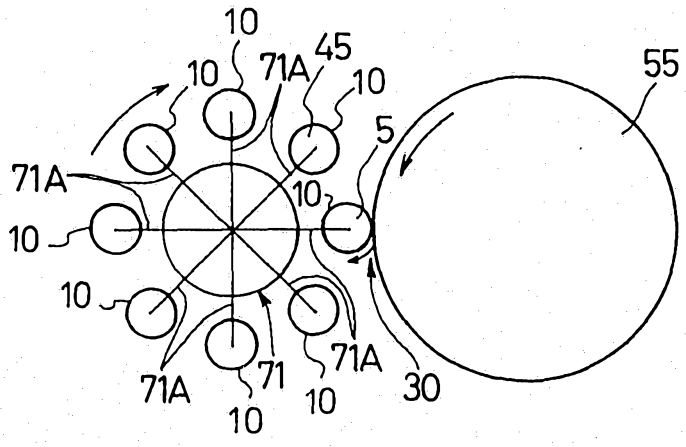
10
10
71A
45
10
55
5
71A
10
10
10
71A
71
71A
30
10
10

FIG. 21

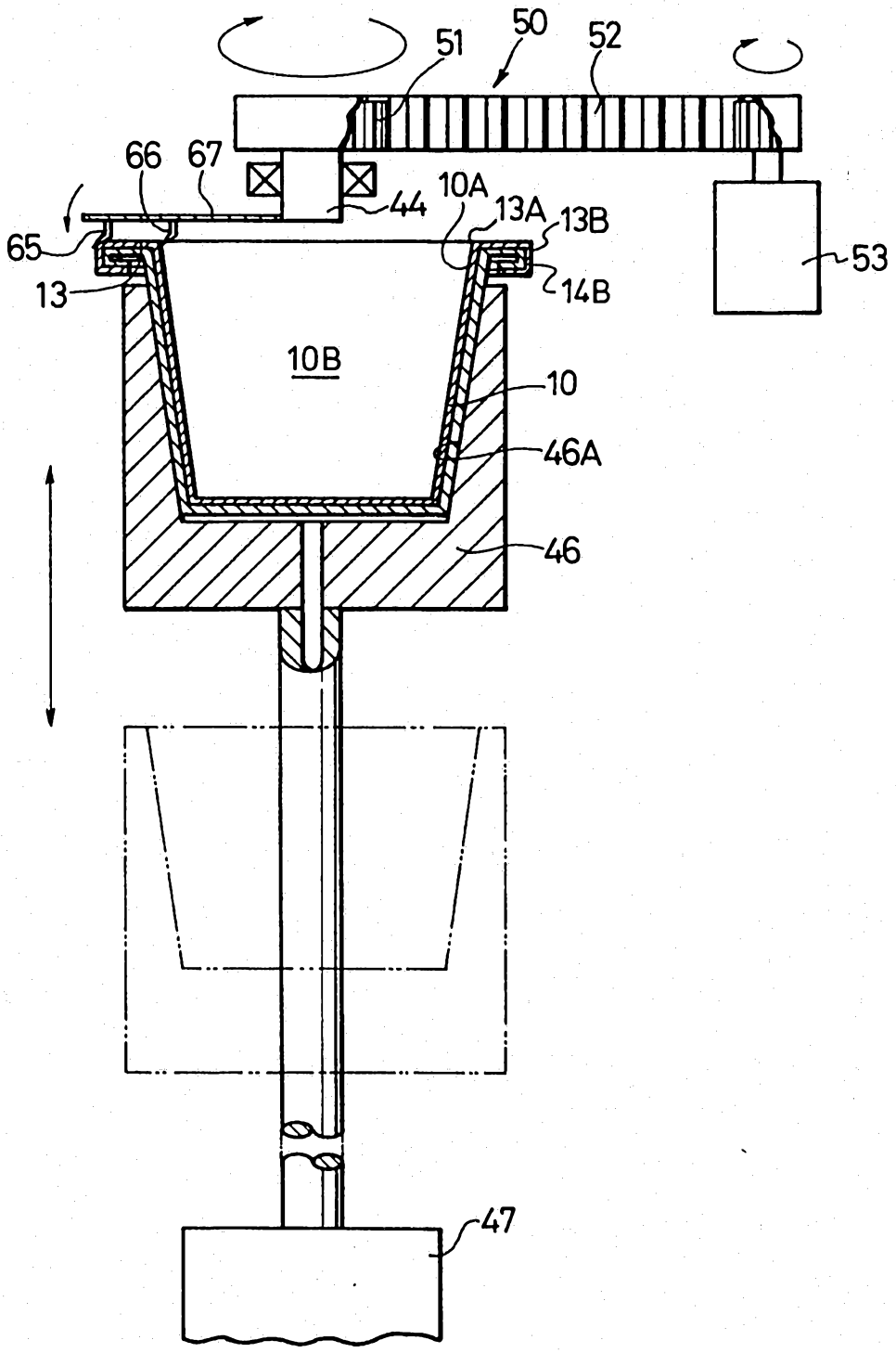

FIG. 22

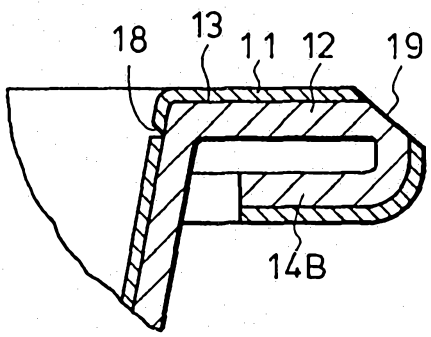

FIG. 23