

(19)



(11)

EP 4 570 690 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
18.06.2025 Bulletin 2025/25

(51) International Patent Classification (IPC):
B65D 25/42^(2006.01) B65D 43/02^(2006.01)

(21) Application number: **23215738.8**

(52) Cooperative Patent Classification (CPC):
B65D 25/42; B65D 43/022

(22) Date of filing: **12.12.2023**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

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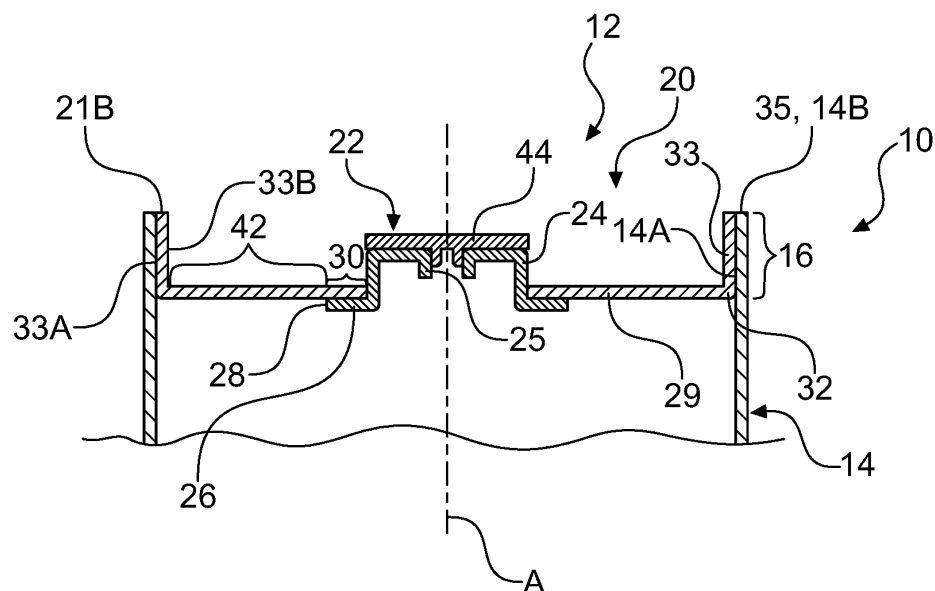
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(54) **TUBE COMPRISING A SHOULDER MADE OF A LAMINATED MATERIAL**

(57) The invention relates to a tube (10) comprising a head (12) and a skirt (14) formed by a tubular sheet, the head (12) comprising:
- a neck (22), and
- a shoulder (20) made exclusively of an annular piece of a laminated material (34) comprising at least one paper layer (36) comprising cellulose fibers, said shoulder (20) extending radially between an upper end section (16) of the skirt (14) and the neck (22),

in which the shoulder (20) comprises an outer annular area (31) folded upwardly to form a peripheral wall (33) extending axially;
in which the shoulder (20) is fitted axially in the upper end section (16) of the skirt (14);
in which the shoulder (20) is attached to the skirt (14) by tightly securing an inner face (14A) of the skirt (14) to an outer face (33A) of the peripheral wall (33) only.

FIG. 2



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Description

[0001] The invention relates to a tube comprising a head and a skirt formed by a tubular sheet extending along a main axis, the head comprising:

- a neck, and
- a shoulder made exclusively of an annular piece of a laminated material comprising at least one paper layer comprising cellulose fibers, said shoulder extending radially between an upper section of the tube skirt and the neck,

in which the shoulder comprises an outer annular area folded upwardly to form a peripheral wall extending axially.

[0002] Nowadays, the worldwide plastic production represents one of the biggest packaging waste sources. The consumption and the recycling of these plastic products is a major concern for national and regional organizations. The non-recycled plastic materials are currently disposed of by a variety of processes from landfill disposal to energy recovery through thermal and chemical treatments.

[0003] In the case of cosmetic packaging industry, laminated materials comprising several plastic layers are widely used as they represent advantages in terms of product protection and mechanical properties.

[0004] Some alternatives to plastics are studied in many technical fields. In the field of cosmetics packaging, it has already been envisaged to replace some plastic layers with a paper layer. As the paper is easily recyclable, the presence of a paper layer improves the recyclability of the laminated material. The thicker the paper layer, the higher the proportion of paper in the laminate and the more recyclable the laminate.

[0005] However, for many applications, the head of the tube, and particularly the neck, has to be in a plastic material. This allows the neck to be sufficiently resistant over time as the tube is used.

[0006] Generally, the neck and the shoulder are made in one piece and the upper end of the skirt containing paper is attached to the shoulder.

[0007] The present invention attempts to reduce the quantity of plastic material in the head of the tube.

[0008] The invention relates to a tube comprising a head and a skirt formed by a tubular sheet extending along a main axis, the head comprising:

- a neck, and
- a shoulder made exclusively of an annular piece of a laminated material comprising at least one paper layer comprising cellulose fibers, said shoulder extending radially between an upper end section of the skirt and the neck,

in which the shoulder comprises an outer annular area folded upwardly to form a peripheral wall ex-

tending axially;

in which the shoulder is fitted axially in the upper end section of the skirt;

in which the shoulder is attached to the skirt by tightly securing an inner face of the skirt to an outer face of the peripheral wall only.

[0009] According to some embodiment, the peripheral wall of the shoulder is straight.

[0010] According to some embodiment, the upper end of the peripheral wall, formed by the outer edge of the laminated material, and the upper end of the skirt, formed by the upper edge of the sheet, are coplanar.

[0011] According to some embodiment, the upper end section of the skirt is straight.

[0012] According to some embodiment, a stretch of the upper end section of the skirt extends above the upper end of the peripheral wall of the shoulder and it is folded inwardly at 180° so that the upper edge of the sheet is arranged against the said upper end of the peripheral wall.

[0013] According to some embodiment, a stretch of the upper end section of the skirt extends above the upper end of the peripheral wall of the shoulder, said stretch being rolled inwardly and welded on itself to form a bead extending just above the upper edge of the peripheral wall.

[0014] According to some embodiment, a stretch of the upper end section of the skirt extends above the upper end of the peripheral wall of the shoulder and it is folded inwardly at an angle strictly less than 180°, the fold of the skirt being at the same level as the upper end of the peripheral wall of the shoulder.

[0015] According to some embodiment, the stretch is folded inwardly at an angle greater or equal to 90°.

[0016] According to some embodiment, the upper end of the neck is arranged under the level of the upper end of the skirt.

[0017] According to some embodiment, the neck is made of plastic material, such as PE.

[0018] According to some embodiment, the neck comprised a peripheral flange, the shoulder comprising an annular inner section covering the flange and being attached to the flange.

[0019] According to some embodiment, an outer edge of the flange is arranged radially at distance from the peripheral wall of the shoulder.

[0020] According to some embodiment, the peripheral wall of the shoulder is tightly secured to the upper end section of the skirt by ultrasonic welding.

[0021] According to some embodiment, the annular inner section of the shoulder is attached to the flange by ultrasonic welding.

[0022] The invention will be better understood thanks to the following description which is only indicative and which is not intended to limit said invention, accompanied with the following figures:

- figure 1 is a perspective view of a tube produced in accordance with a first embodiment of the invention;
- figure 2 is an axial sectional view of figure 1 which show the head of the tube and an upper section of the skirt;
- figure 3 is a perspective view showing a piece of laminate intended to form the shoulder of the tube of figure 2 after folding of its outer annular area;
- figure 4 is an axial sectional view similar to the view of figure 2 which shows the head of a tube and an upper section of the skirt produced in accordance with a second embodiment;
- figure 5 is an axial sectional view similar to the view of figure 2 which shows the head of a tube and an upper section of the skirt produced in accordance with a third embodiment;
- figure 6 is an axial sectional view similar to the view of figure 2 which shows the head of a tube and an upper section of the skirt produced in accordance with a fourth embodiment;
- figure 7 is a cross sectional view of the laminated paper forming the shoulder of the tube according to any of the previous embodiments.

[0023] In the context of the invention, the axial orientation is defined in the direction of the main axis "A" of the tube directed from bottom. A radial orientation extends from the main axis "A" in every direction orthogonally from said main axis "A". An element facing or close to the axis "A" in a radial will be qualified as an "inner" element, whereas an element facing the opposite direction or far from the axis "A" will be qualified as an "outer" element.

[0024] The term "container" is used herein to refer to an item which may contain a product. Such products are usually liquids, gels or pastes. Preferred containers include tubes and pouches. The container may further comprise a lid or a cap and, if necessary, attachment means for the lid or cap (such as a tube head or shoulder) before it forms a useful commercial container. As a consequence, the laminated material can form a tube skirt, an insert of a tube head or a combination thereof.

[0025] The term "flexible laminate" as used herein describes a laminate or a container made thereof which can bend or be bent easily and which does not break (unless it is bent too much). Herein in connection with the containers the term flexible indicates that if the container is subjected to a force, for example, by being filled with a liquid, or by applying pressure with a finger or a hand, it will change its form without breaking. A flexible container can also be considered to be a "squeezable" container.

[0026] The term "polymer" refers to a large molecule, or macromolecule, composed of many repeated subunits.

[0027] The term "PE" refers to polyethylene.

[0028] The term "paper layer" refers to a layer comprising cellulose fibers. This term includes bleached, unbleached, colored and barrier coated paper. It is preferably a bleached paper which is easier and quicker to

recycle.

[0029] Figures 1 show a tube 10 extending along a main axis "A". The tube 10 comprises a head 12 and a skirt 14.

5 **[0030]** The tube 10 is intended to contain a product such as liquids, gels or pastes. Advantageously, the tube 10 is intended to contain a cosmetic product.

[0031] The skirt 14 is made by a cylinder of a sheet of extruded or laminated material. An upper section 16 of the skirt 14 is tightly secured to the head 12. A lower end 18 of the skirt 14 is tightly closed to enclose the content of the tube 10. For instance, the lower end 18 of the skirt 14 is pinched flat and welded.

10 **[0032]** As represented at figures 1 and 2, the tube head 12 may comprise a shoulder 20 and a neck 22.

[0033] The neck 22 extends axially upward from the center of the shoulder 20, along the main axis "A". The neck 22 is made of plastic material. For instance, the plastic material is PE. In the example, the neck 22 is more particularly made in one piece. As variant, the neck could be made in two pieces.

15 **[0034]** The neck 22 presents a central part 24 which is intended to project upward outside the tube 10. The central part 24 comprises a distribution hole 25 from which the content of the tube 10 is intended to be distributed.

20 **[0035]** The neck 22 also comprises a peripheric flange 26 which extends radially from the base of the central part 24. The peripheric flange 26 is radially delimited by an outer edge 28. The outer edge 28 here presents a continuous circular shape. The peripheric flange 26 is intended to be concealed under the shoulder 20, inside the tube 10.

25 **[0036]** As represented on figure 3, the shoulder 20 is made exclusively of an annular piece of a laminated material 34. The annular piece is formed by a flat piece of laminated material 34 which presents an external edge 21A and a central hole delimited by an inner edge 23. The annular piece is for instance cut in a larger sheet of laminated material 34.

30 **[0037]** The outer edge 21A presents a closed outline, such as a circular or oval outline. The inner edge 23 presents a shape which is complementary to the outline of the central part 24 of the neck 26.

35 **[0038]** The shoulder 20 comprises a central section 29 which extends radially with respect to the main axis "A" between the upper end section 16 of the tube skirt 14 and the neck 22. The central section 29 here presents a flat shape extending in a radial plane.

40 **[0039]** As a variant not showed, the central section of the shoulder 20 may present a frustoconical shape.

[0040] The central part 24 of the neck 22 here projects axially upward above the upper face of the central section 29 of the shoulder 20.

45 **[0041]** The central section 29 of the shoulder 20 comprises an annular inner section 30 covering externally the flange 26.

[0042] The annular inner section 30 of the shoulder 20

is tightly secured to the flange 26. The annular inner section 30 of the shoulder 20 is tightly secured to the flange 26 by welding. For instance, the annular inner section 30 of the shoulder 20 is secured by ultrasonic welding.

[0043] The shoulder 20 also comprises an outer annular area 31 folded upwardly to form a peripheral wall 33 extending axially from the periphery of the central section 29. Therefore, the outer edge 21A of the shoulder 20 forms an upper end 21B of the peripheral wall 33. The shoulder 20 thus presents a fold 32 between the central part 29 and the peripheral wall 33.

[0044] The peripheral wall 33 of the shoulder 20 is here straight, so that the outer edge 21A, forms the upper end 21B of the peripheral wall 33 and faces upwards.

[0045] For instance, the shoulder 20 is conformed from the annular piece by a stamping process.

[0046] The shoulder 20 thus shaped is fitted axially in the upper end section 16 of the skirt 14. The fold 32 of the shoulder is arranged at the junction at the base of the upper end section 16 of the skirt 14. An outer face 33A of the peripheral wall 33 is in contact with an inner face of the sheet forming the skirt 14. Said outer face 33A is tightly secured to an inner face 14A of the skirt 14. The shoulder 20 is attached to the skirt 14 by securing the inner face 14A of the skirt 14 only to the outer face 33A of the peripheral wall 33. More particularly, the skirt 14 is not in contact with an inner face 33B of the peripheral wall 33.

[0047] The outer face 33A of the peripheral wall 33 of the shoulder 20 is tightly secured to the inner face 14A of the skirt 14 by welding. For instance, the outer face 33A of the peripheral wall 33 is secured to the skirt 14 by ultrasonic welding.

[0048] According to a first embodiment of the invention as shown in figure 2, the upper end section 26 of the skirt 14 is straight so that the upper edge 35 of the sheet forming the skirt 14 faces upwards. In this case, the upper end 14B of the skirt 14 is formed by the upper edge 35 of the sheet. The upper end 21B of the peripheral wall 33 and the upper end 14B of the skirt 14, formed by an upper edge 35 of the sheet, are coplanar.

[0049] According to a second embodiment of the invention as shown in figure 4, a stretch 37 of the upper end section 16 of the skirt 14 extends above the upper end 21B of the peripheral wall 33 of the shoulder 20. The stretch 37 of the upper end section 26 is folded back on itself inwardly at 180° so that the upper edge 35 of the sheet faces downwards. Thus, the skirt 14 presents a fold 39. Preferably, the upper edge 35 of the sheet is arranged axially against the upper edge 21B of the peripheral wall 33. The upper end 14B of the skirt 14 is formed by the fold 39 which is arranged above the upper edge 35 of the sheet.

[0050] According to a third embodiment of the invention shown in figure 5, a stretch 37 of the upper end section 16 of the skirt 14 extends above the upper edge 21B of the peripheral wall 33. The stretch 37 is folded inwardly at an angle α strictly less than 180° . The fold 39

of the upper end section 16 of the skirt 14 is axially at the same level as the upper edge 21B of the peripheral wall 33. Preferably, the stretch 37 is folded inwardly at an angle α greater or equal to 90° so that the upper end 14B of the skirt 14 is formed by the fold 39. In the example shown at the figure 5, the stretch 37 is folded at an angle α of 90° .

[0051] According to a fourth embodiment of the invention shown in figure 6, a stretch 37 of the upper end section 16 of the skirt 14 extends above the upper edge 21B of the peripheral wall 33. The stretch 37 is rolled inwardly to form a bead 41. The stretch 37 is welded on itself to maintain the bead 41. The bead 41 extends just above the upper edge 21B of the peripheral wall 33 so that the bead 41 protects said upper edge 21B.

[0052] In every embodiment, the shoulder 20 is made exclusively of a laminated material 34 comprising at least one paper layer 36 comprising cellulose fibers. This paper layer 36 forms a structural layer of the laminated material 34 which confers mechanical strength and proper rigidity to the shoulder 20.

[0053] Preferably, the upper end of the neck 22 closed by a cap 44 is arranged under the level of the upper end 14B of the skirt 14. In this way, the tube 10 can stand upright on a flat surface, resting on the upper end 14B of the skirt 14. Moreover, if the tube falls vertically, neck 22 downwards, in this configuration the upper end 14B will avoid that the neck is pushed inside the tube, thereby protecting the welding area between the shoulder 20 and the flange 26 of the neck 22.

[0054] As illustrated in figure 7, the laminated material 34 here comprises one paper layer 36.

[0055] The laminated material 34 can also comprise at least a polymeric layer 38. The polymeric layers 38 can comprise any polymer suitable for their use in the field of cosmetic packaging such as PE. Advantageously, the polymeric layers 38 all comprise PE. More advantageously, the polymeric layers 38 are made of PE, especially LDPE (low density polyethylene).

[0056] Advantageously, the laminated material 34 comprises at least one barrier layer 40. The barrier layer 40 can comprise any material suitable for their use in the field of cosmetic packaging. Advantageously, the barrier layer 40 comprise aluminum and /or ethylene vinyl alcohol (EVOH). As a variant, the barrier layer can be made of other oxygen and/or water barrier materials such as polyvinyl alcohol (PVOH), silicon dioxide (SiOx), aluminum oxide (AlOx), nano cellulose coating, etc.

[0057] Advantageously, the laminated material 34 may comprises adhesive layers (not showed) or tie layers, especially to establish contact between the barrier layer 40 and a neighboring layer. The adhesive layer can comprise any adhesive suitable for this use, such as EAA (Ethylene Acrylic Acid).

[0058] Advantageously, the cellulosic fibers represent at least 60% in mass of the laminated material 34. More advantageously, the cellulosic fibers represent at least 70%, preferably at least 80%, in mass of the laminated

material 34. Such a ratio of paper in the laminated material 34 allows a good recyclability of said laminated material 34.

[0059] Preferably, the paper layer 36 has a thickness comprised between 100 and 400 μm .

[0060] Preferably, the total thickness of the laminated material 34 is comprised between 300 and 450 μm . This range of thickness allows good mechanical properties for a laminated material 34 comprising around 84% of cellulosic fibers in mass.

[0061] Advantageously, the total thickness of the paper layer 36 represent more than 50% of the total thickness of the laminated material 34. More advantageously, the total thickness of the paper layer 36 represent more than 70% of the total thickness of the laminated material 34. Such a ratio of paper 36 in the laminated material 34 allows a good recyclability of said laminated material 34 while keeping good mechanical properties.

[0062] In the example illustrated by figure 7, an external polymeric layer 38A is arranged above said paper layer 36. The external polymeric layer 38A is the first layer starting from the external surface of the laminated material 34.

[0063] An intermediate polymeric layer 38B is arranged under said paper layer 36. Under said intermediate polymeric layer 38B, an internal polymeric layer 38C is arranged under said intermediate polymeric layer 38B. A barrier layer 40 is sandwiched between the intermediate polymeric layer 38B and the internal polymeric layer 38C. The internal polymeric layer 38C is intended to be in direct contact with the product contained in the tube 10.

[0064] According to another aspect of the invention, the outer edge 28 of the flange 26 is arranged radially at distance from the fold 32 of the shoulder 20. This reduces the amount of plastic material used in the overall composition of the tube 10.

[0065] The radial distance between the fold 32 of the shoulder 20 and the outer edge 28 of the flange 26 is preferably greater or equal to the radial width of the flange 26 between the central part 24 of the neck 22 and its outer edge 28.

[0066] Therefore, an unsupported annular section 42 of the shoulder 20, comprised between the upper end section 16 of the skirt 14 and the annular inner section 30 of the shoulder 20 is not supported by the flange 26 of the neck 22. For instance, the radial width of said unsupported annular section 42 of the shoulder 20 is greater or equal the radial width of the annular inner section 30 in contact with the flange 26. The shape integrity of the shoulder 20 is maintained by the laminated material 34 comprising cellulosic fibers.

[0067] The head 22 of the tube 10 may also comprise a closure cap 44 here attached to the central part of the neck 22 by a hinge. As a variant, the cap is a part distinct from the neck.

[0068] The sheet of the skirt 14 is also formed by a laminated material comprising cellulosic fibers.

[0069] Preferably, the sheet of the skirt 14 presents the

same thickness as the laminated material 34 of the shoulder 20.

[0070] Preferably, the sheet of the skirt 14 and the shoulder 20 are formed by the same laminated material 34.

[0071] The cellulose fibers represent at least 70% in mass of the tube 10, preferably at least 75%. For instance, the cellulosic fibers represent between 70% and 75% in mass of the tube 10, including the head 12 taking the cap into account.

[0072] The invention allows to obtain a tube easy to recycle and comprising a very huge ratio by mass of cellulosic fibers. Moreover, the quantity of plastic is minimized to further improve the recyclability of the tube.

Claims

1. Tube (10) comprising a head (12) and a skirt (14) formed by a tubular sheet extending along a main axis (A), the head (12) comprising:

- a neck (22), and
- a shoulder (20) made exclusively of an annular piece of a laminated material (34) comprising at least one paper layer (36) comprising cellulose fibers, said shoulder (20) extending radially between an upper end section (16) of the skirt (14) and the neck (22),
- in which the shoulder (20) comprises an outer annular area (31) folded upwardly to form a peripheral wall (33) extending axially;
- in which the shoulder (20) is fitted axially in the upper end section (16) of the skirt (14);
- in which the shoulder (20) is attached to the skirt (14) by tightly securing an inner face (14A) of the skirt (14) to an outer face (33A) of the peripheral wall (33) only.

2. Tube (10) according to the previous claim, in which the peripheral wall (33) of the shoulder (20) is straight.

3. Tube (10) according to any one of claims 1 or 2, in which the upper end (21B) of the peripheral wall (33), formed by the outer edge (21A) of the laminated material (34), and the upper end (14B) of the skirt (14), formed by the upper edge (35) of the sheet, are coplanar.

4. Tube (14) according to any one of the previous claims, in which the upper end section (16) of the skirt (14) is straight.

5. Tube (14) according to claim 3, in which a stretch (37) of the upper end section (16) of the skirt (14) extends above the upper end (21B) of the peripheral wall (33) of the shoulder (20) and it is folded inwardly at 180°

so that the upper edge (35) of the sheet is arranged against the said upper end (21B) of the peripheral wall (33).

6. Tube (14) according to claim 1 or 2, in which a stretch (37) of the upper end section (16) of the skirt (14) extends above the upper end (21B) of the peripheral wall (33) of the shoulder (20), said stretch (37) being rolled inwardly and welded on itself to form a bead (41) extending just above the upper edge (21B) of the peripheral wall (33). 5
7. Tube (10) according to any one of claims 1 or 2, in which a stretch (37) of the upper end section (16) of the skirt (14) extends above the upper end (21B) of the peripheral wall (33) of the shoulder (20) and it is folded inwardly at an angle (α) strictly less than 180° , the fold (39) of the skirt (14) being at the same level as the upper end (21B) of the peripheral wall (33) of the shoulder (20). 10 15 20
8. Tube (10) according to the previous claim, in which the stretch (37) is folded inwardly at an angle (α) greater or equal to 90° . 25
9. Tube (10) according to any one of the previous claims, in which the upper end of the neck (22) is arranged under the level of the upper end (14B) of the skirt (14). 30
10. Tube (10) according to any one of the previous claims, in which the neck (22) is made of plastic material, such as PE. 35
11. Tube (10) according to any one of the previous claims, in which the neck (22) comprised a peripheric flange (26), the shoulder (20) comprising an annular inner section (30) covering the flange (26) and being attached to the flange (26). 40
12. Tube (10) according to the previous claims, in which an outer edge (28) of the flange (26) is arranged radially at distance from the peripheral wall (32) of the shoulder (20). 45
13. Tube (10) according to any one of the previous claims, in which the peripheral wall of the shoulder (20) is tightly secured to the upper end section (16) of the skirt (14) by ultrasonic welding. 50
14. Tube (10) according to any one of the claims 11 to 13, in which the annular inner section (30) of the shoulder (20) is attached to the flange (26) by ultrasonic welding. 55
15. Tube (10) according to any one of the previous claims, in which the sheet forming the skirt (14) is made of laminated material comprising at least one

paper layer (36) comprising cellulose fibers.

16. Tube (10) according to the previous claim, in which the shoulder (20) and the skirt (14) are made of the same laminated material (34).
17. Tube (10) according to any one of the previous claims, in which the cellulose fibers represent at least 70% in mass of the tube (10), preferably more than 80%.
18. Tube (10) according to any one of the previous claims, in which the laminated material (34) comprises at least an internal polymeric layer (38C).

FIG. 1

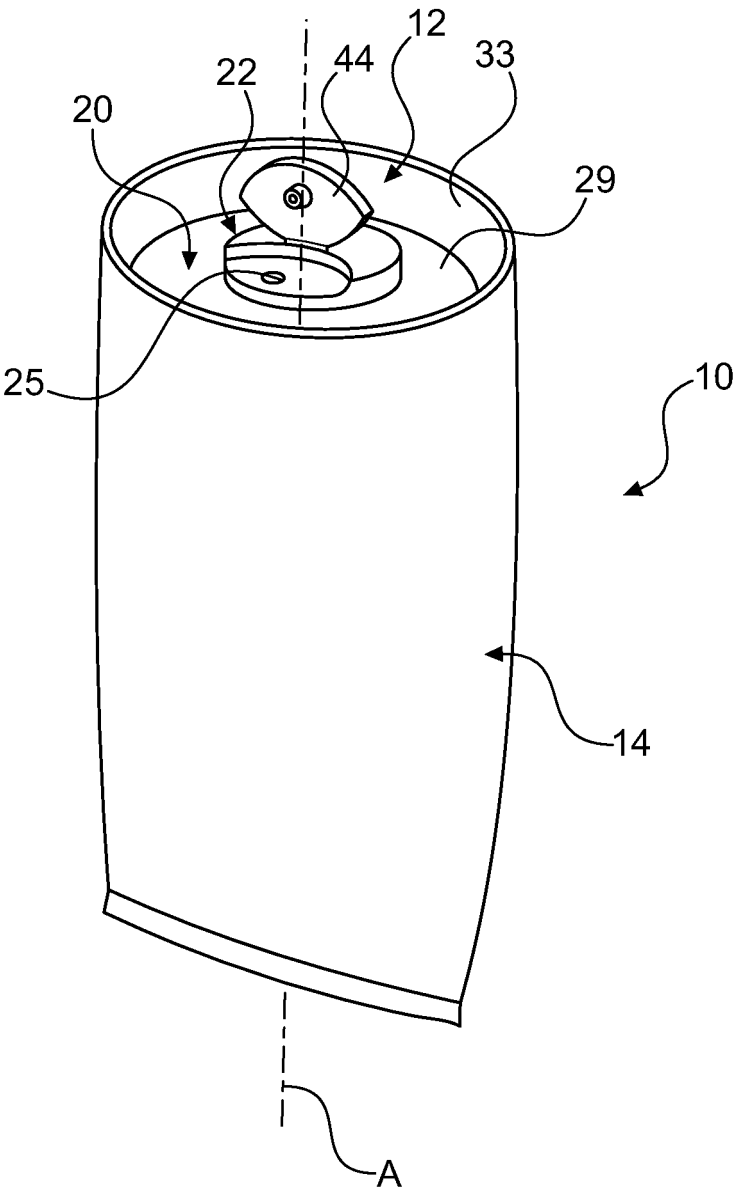


FIG. 2

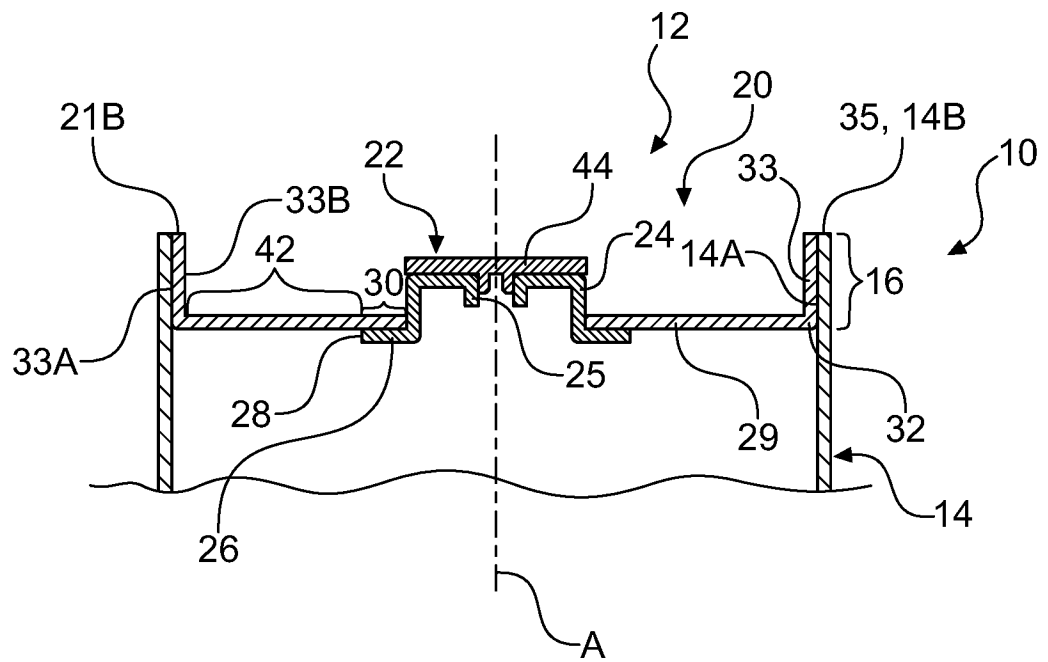


FIG. 3

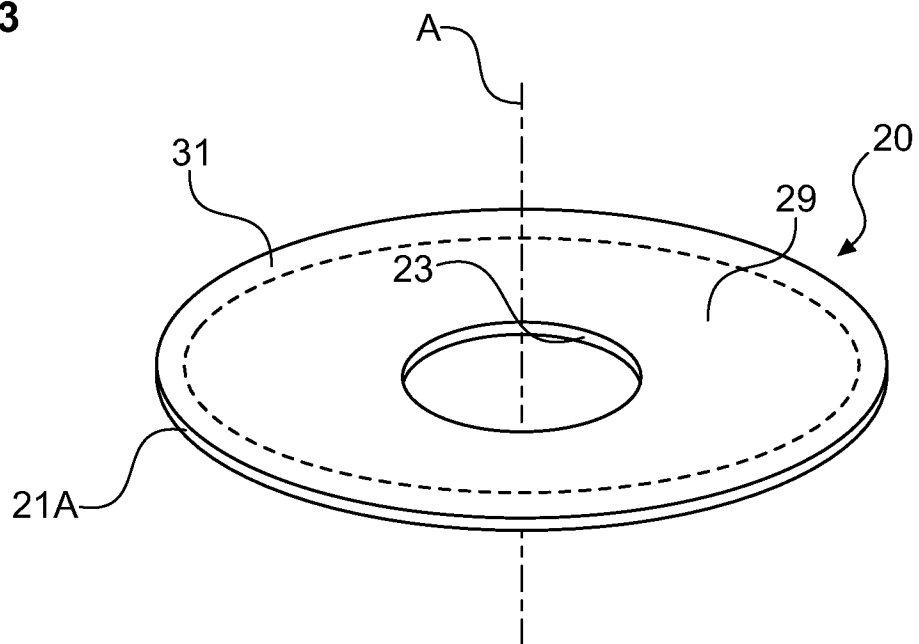


FIG. 4

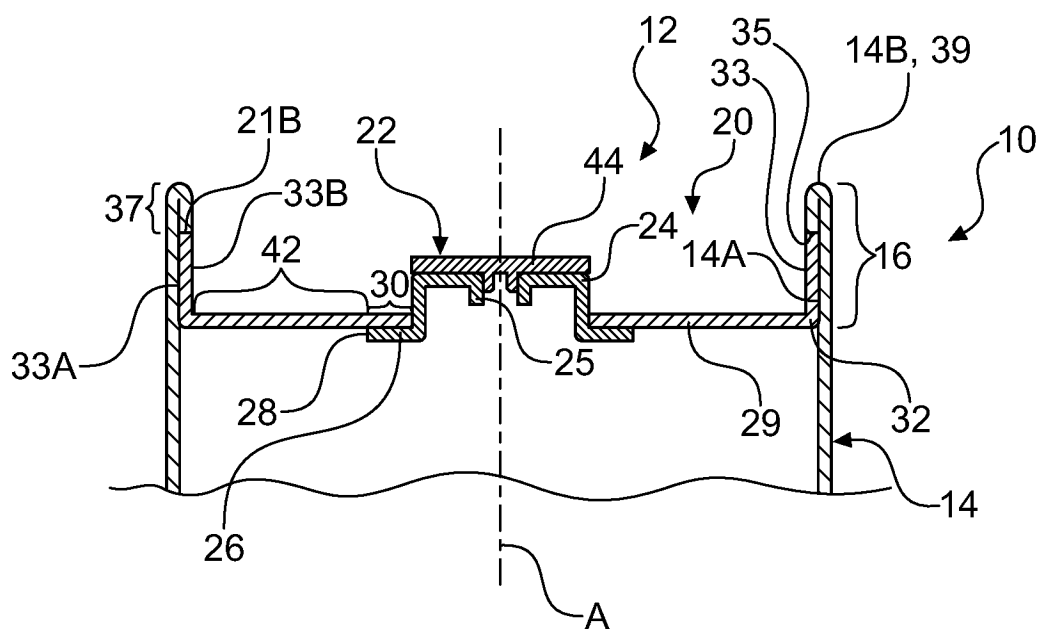


FIG. 5

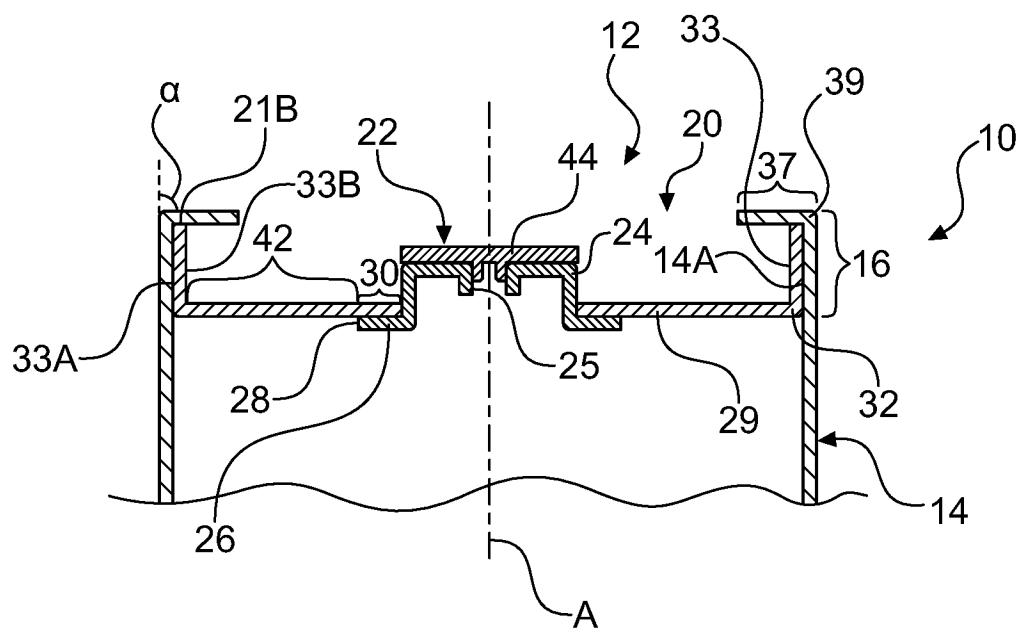


FIG. 6

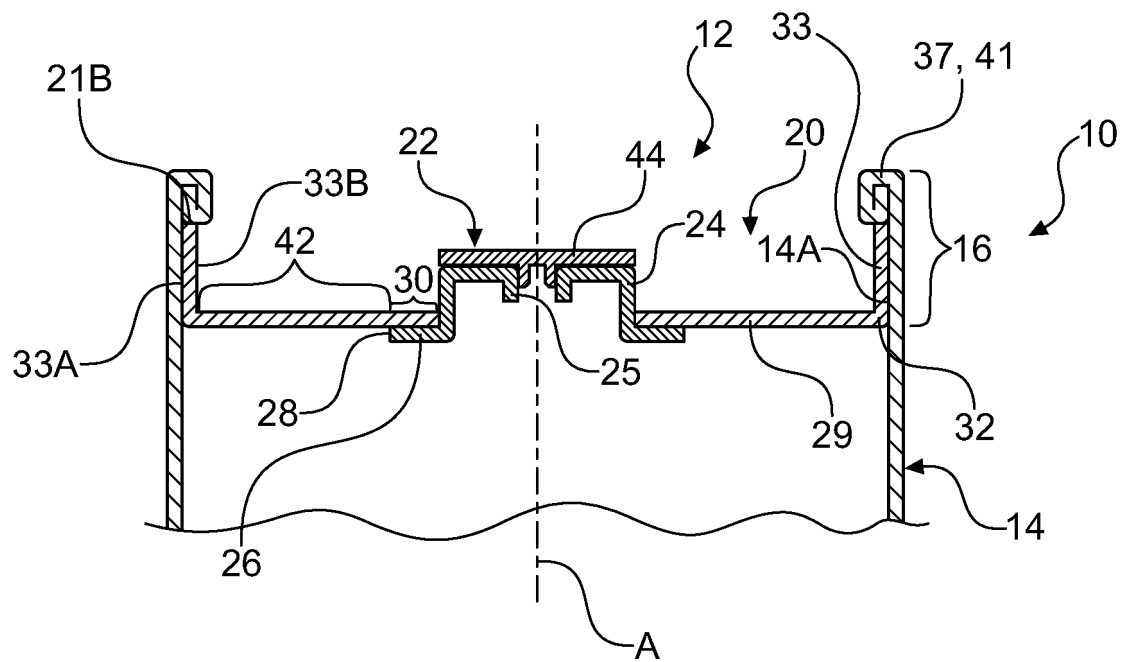
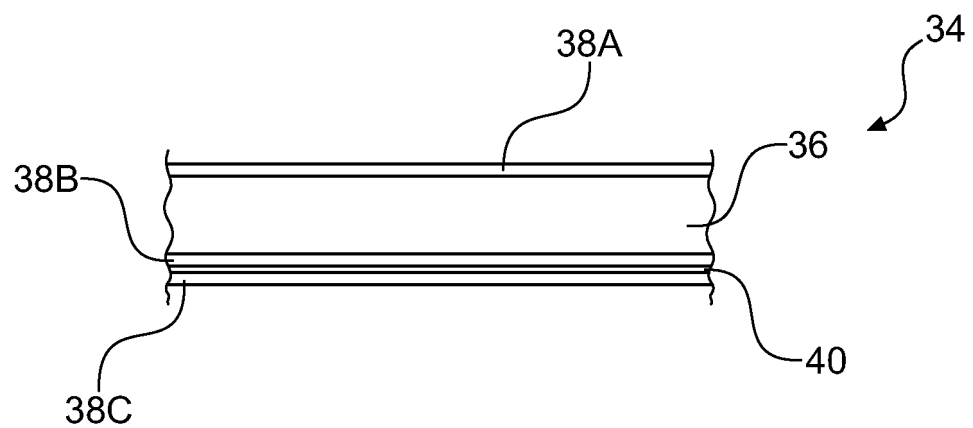


FIG. 7





EUROPEAN SEARCH REPORT

Application Number

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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		16 May 2024	Jervelund, Niels
CATEGORY OF CITED DOCUMENTS			
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