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CA 2311511 C 2007/01/09

(11)(21) 2 311 511

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(86) Date de dépôt PCT/PCT Filing Date: 1998/11/23
(87) Date publication PCT/PCT Publication Date: 1999/06/03
(45) Date de délivrance/Issue Date: 2007/01/09
(85) Entrée phase nationale/National Entry: 2000/05/25
(86) N° demande PCT/PCT Application No.: EP 1998/007554
(87) N° publication PCT/PCT Publication No.: 1999/026852
(30) Priorités/Priorities: 1997/11/25 (DE297 20 725.3);
1998/05/22 (DE298 09 094.5)

(51) Cl.Int./Int.Cl. *B65D 21/02* (2006.01),
B65D 1/12 (2006.01), *B65D 71/00* (2006.01),
B65D 71/02 (2006.01)

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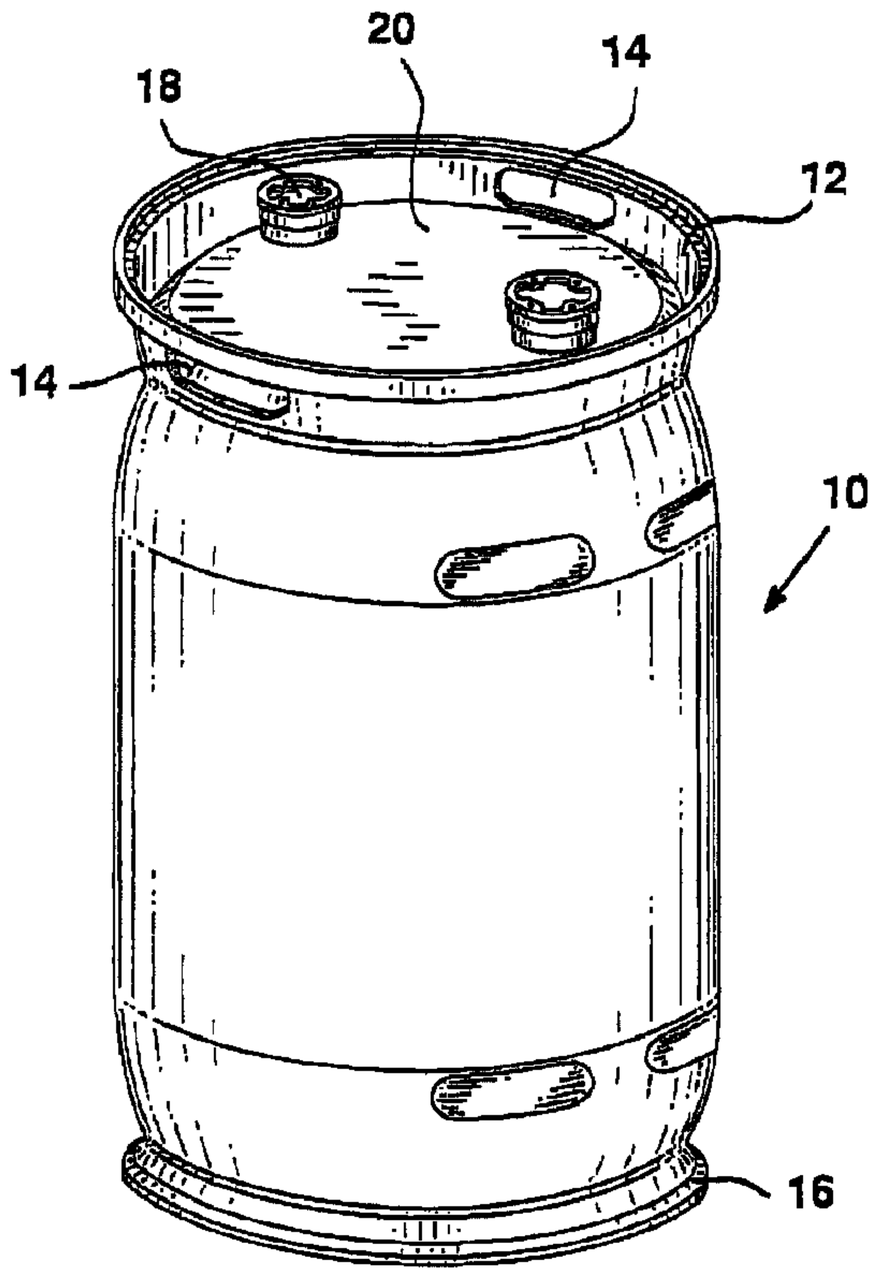
(54) Titre : RECIPIENT REUTILISABLE GERBABLE
(54) Title: STACKABLE RE-USABLE CONTAINER



(57) Abrégé/Abstract:
The invention concerns a reusable container made of thermoplastic material, with at least one filling and removal opening in the top and with upper and lower peripheral stacking rings. The upper stacking ring has a slightly larger diameter than the lower stacking ring, wherein the upper stacking ring comprises on its upper end edge on the inside a recess adapted to the diameter of the lower stacking ring and on the outside an upwardly projecting flange ring, in such a way that, when stacked one on top of the other, the lower stacking ring of the upper container is inserted in the recess of the upper stacking ring and centered from the outside in form-locking relationship by the upwardly projecting flange ring. As a result, direct and reliable multiple stacking of containers according to the invention is made possible.

Abstract

The invention concerns a reusable container made of thermoplastic material, with at least one filling and removal opening in the top and with upper and lower peripheral stacking rings. The upper stacking ring has a slightly larger diameter than the lower stacking ring, wherein the upper stacking ring comprises on its upper end edge on the inside a recess adapted to the diameter of the lower stacking ring and on the outside an upwardly projecting flange ring, in such a way that, when stacked one on top of the other, the lower stacking ring of the upper container is inserted in the recess of the upper stacking ring and centered from the outside in form-locking relationship by the upwardly projecting flange ring. As a result, direct and reliable multiple stacking of containers according to the invention is made possible.

STACKABLE RE-USABLE CONTAINER

The invention concerns a reusable container made of thermoplastic material, with at least one filling and removal opening in the top or container cap and with upper and lower peripheral stacking rings.

A similar container is known for example from DE-A 2 629 630. This known container with extruded thin side wall has a comparatively poor stack loading capacity, can be emptied of residues only inadequately and is not suitable for repeated use.

It is an object of the invention to eliminate such drawbacks, and to provide a reusable container which is of stable construction, which even without intermediate elements (such as e.g. stacking pallets) can be repeatedly stacked directly one on top of the other, which is easy to empty of residues, and which in particular can be used repeatedly and is easy to handle.

In one aspect, the invention provides a container, made of a thermoplastic material, with at least one filler opening in the top panel or container lid and with a center section and an upper and a lower circumferential stacking ring, wherein the upper stacking ring has a slightly larger diameter than the lower stacking ring, the upper stacking ring is provided on the inside of its upper rim with a recess which matches the diameter of the lower stacking ring, and on its outside with a vertically protruding circular flange so that, when stacked one container atop the other, the lower stacking ring of the upper container fits into the recess in the upper stacking ring of the container underneath and is snugly centered by the vertically protruding circular flange.

Due to the fact that the upper stacking ring has a slightly larger diameter than the lower stacking ring, and that the upper stacking ring comprises on its upper end edge on the inside a recess adapted to the diameter of the lower stacking ring and on the outside an upwardly projecting flange ring, in such a way that, when stacked one on top of the other, the lower stacking ring of the upper container is inserted in the recess of the upper stacking ring and centred from the outside in form-locking relationship by the upwardly projecting flange ring, reliable multiple stacking of containers according to the invention is made possible,

avoiding stacking pallets. The larger diameter of the upper stacking ring also allows better handling and manipulation of full containers of this kind. The subsidiary claims contain further advantageous developments of the present invention.

Due to the structural design of the container and the advantages gained with it, it is made possible for the container according to the invention to be particularly well suited to comparatively hazardous liquids such as e.g. plant protection agents (herbicides, pesticides) as well and to be repeatedly usable. The novel reusable container is further distinguished by the following characteristics and advantages:

- the upper edge at the upper end of the connecting web of the upper stacking ring is solid and of rectangular cross-section, from which the flange ring projects upwardly in an axial direction on the outside,
- the connecting web of the upper stacking ring widens conically outwards slightly obliquely,
- the container body is of full cylindrical construction over a certain distance in the middle and slightly curved or conically reduced at the top and bottom towards the connecting point of the upper stacking ring and towards the connecting point of the lower stacking ring,
- the height (=axial length) of the curved reduced region of the container wall from the connecting point of the upper or lower stacking ring or of the respective connecting web to the beginning of the full cylindrical region of the container wall is about 110 mm,
- the largest diameter of a container which can be manipulated or carried by hand with a limited capacity of not more than 70 litres in the region of the full cylindrical container wall or of the outer edge of the upper stacking ring is about 380 mm,
- the top is essentially flat or slightly curved and in its flat edge region comprises two opposed upright bung sockets with gas-tightly closable bung openings,
- the essentially flat or slightly outwardly curved (=cambered) top is connected by an obliquely conical or curved ring piece at the point of connection of the upper stacking ring to the conically reduced region of the lower container wall,
- the bottom slopes down slightly obliquely or flatly to one side in such a way that below a bung socket is formed a depression (=hollow) as a pump sump,
- in the bottom in the region of the pump sump are formed at least three slightly inwardly upwardly projecting recesses as a means of centring the lower end of a pump tube (e.g. a Micromatic filling and emptying suction tube),
- the central region of the bottom is cambered slightly inwards or curved upwards for the purpose of better emptying of residues,
- the central region of the top is cambered slightly inwards or curved downwards for the purpose of better emptying of residues overhead,

- the container wall is multi-layered and consists of at least two or more different plastic materials (coextrusion),
- the container has a limited capacity of not more than about 70 litres and is equipped with at least two handles in the upper stacking ring, so that the container can still be manipulated or carried by hand,
- containers of different height (with the same diameter, top and bottom) with capacities of e.g. 25, 30, 50, 60 or 70 litres can be made in a single interchangeable blow mould according to the invention by insertion of ring pieces of different height in the full cylindrical region of the container body,
- by providing corresponding apertures (e.g. holes) in the connecting web of the lower stabilising ring above the angled base ring there is the possibility of mutually fixing the lower base ring of a container stacked on top to the upper stacking ring of a container stacked underneath, wherein corresponding fastening means (such as e.g. wire clips or plastic cable ties) can be passed through an aperture and a gripping opening,
- for mutual fixing at least two adjacent containers are oriented in such a way that their gripping openings are aligned, so that an elongate fastening means (such as e.g. a tightening strap or a wooden batten or a board) can be inserted through the gripping openings, and the containers can be fixed together,
- to increase the stacking reliability during storage and transport several containers stacked on top of a pallet can be fixed together and/or to the pallet by fastening means passed through the gripping openings in the upper stacking ring and/or through the apertures in the lower base ring.

The new blow mould for the manufacture of a reusable container according to the invention is distinguished in particular by the fact that in each of the two blow mould halves is provided an insert by means of which the gripping openings arranged in the upper stacking ring are punched out.

The blow mould is further constructed as an interchangeable blow mould, wherein the blow mould halves are split horizontally in the full cylindrical portion for the central region of the container, so that, by corresponding exchange and insertion of a respective ring piece, different container sizes with the same diameter but with

different heights can be manufactured easily. Thus by insertion of a respective central ring piece in a single blow mould, different container sizes with a filling volume from 25 to 70 litres can be made.

Accordingly then in another aspect, the invention provides a blow mold for producing a reusable container from a thermoplastic material by the blow-mold process, wherein a specially configured cavity for producing a reusable container that is provided with at least one filler and drain opening in the top panel or container lid and with an upper and a lower circumferential stacking ring, where the upper stacking ring is of a slightly larger diameter than the lower stacking ring and the upper stacking ring is provided on the inside of an upper rim with a recess which matches the diameter of the lower stacking ring and on its outside with a vertically protruding circular flange so that, when containers are stacked one atop the other, the lower stacking ring of the upper container fits into the recess of the upper stacking ring of the container underneath and is snugly centered by the vertically protruding circular flange surrounding it.

The present invention is illustrated and described in more detail below with the aid of practical examples shown in the drawings. They show:

Figure 1 a 50-litre tight-head container according to the invention in a perspective view,

Figure 2 the reusable container according to Fig. 1 in a partial-section side view with the Micromatic pump tube inserted,

Figure 3 a bottom view of the reusable container according to Fig. 1,

Figure 4 a screw-cap container according to the invention in a perspective view,

Figure 5 a 60-litre screw-cap container in a partial-section side view,

Figure 6 a 25-litre reusable container in a side view,

Figure 7 a top view of the screw-cap container according to Fig. 4,

Figure 8 a top view of a rectangular reusable container,

Figure 9 in a partial-section side view, the top and bottom regions of two reusable containers stacked one on top of the other,

Figure 10 a detail of the upper stacking ring with gripping opening,

Figure 11 in a partial-section side view, the top and bottom regions of two reusable containers stacked one on top of the other with mutual stack fixing,

Figure 12 in a partial-section side view, the top and bottom regions of reusable containers stacked one on top of the other with other stack fixing,

Figure 13 a top view of a pallet with nine reusable containers,

Figure 14 a side view of palleted reusable containers,

Figure 15 a top view of a container with a square basic shape,

Figure 16 a top view of a container with a hexagonal basic shape,

Figure 17 in a side view, a 70-litre screw-cap container and

Figure 18 in a partial-section side view, the top region of a container with cap.

In Figure 1 is shown a preferred embodiment according to the invention of a reusable container 10 made of thermoplastic material, here with a filling volume of 50

litres with a height-to-diameter ratio of H/D = 1.60. At the upper edge of the barrel is mounted an integral peripheral stacking ring 12 (carrying and transport ring) connected in one piece with the container body, with two diametrically opposed gripping openings 14 therein. At the lower edge of the container body is formed a corresponding stand ring 16. In the top 20 are formed two mutually opposed, internally threaded two-inch bung sockets closed with bungs 18. In the partial-section side view in Figure 2 can be seen an inserted pump tube 62 (Micromatic tube) which at the bottom below the bung stands on the bottom 64 in the pump sump 66 which is formed there. It becomes clear from the top view of the bottom 64 in Figure 3 that in the region of the pump sump 66 are formed four inwardly and upwardly projecting centring projections 68 which centre the lower end of the pump tube 62 or position it in the pump sump.

Figure 4 shows a modification of the reusable container in an advantageous embodiment as a screw-cap barrel 22 with a capacity of 50 litres (H/D = 1.60), wherein in the top 20 is provided only one large central filling and emptying opening which is closed with a screw cap 24. The upright threaded socket can be constructed optionally as an internally threaded two-inch or three-inch bung socket and closed with a corresponding externally threaded bung, or the threaded socket is provided with an external thread and closed with an internally threaded screw cap. The diameter can in this case be about 80 mm (for screw cap K 80) to about 400 mm for large screw caps. Particularly preferred are current diameter sizes of 150 mm, 220 mm or 250 mm.

In Figure 5 is shown a 60-litre screw-cap container (diameter about 380 mm, height about 665 mm, H/D ratio = 1.75) with inserted intermediate ring piece 70. The reusable container can be made of transparent plastic material (without addition of dye) or, in case of dyed plastic material, with a viewing strip 72; then appropriately a level scale is provided on the outer wall of the container. If necessary two outwardly projecting peripheral double-fold rings can be provided in the transition region between the cylindrical wall and the curved reduced wall regions.

In Figure 6 is shown a small 25-litre reusable container with a H/D ratio of 0.97. Figure 7 shows in a top view a screw-cap barrel 22 with central filling and

emptying opening for the large screw cap 24, wherein the upper stacking ring 12 is shown broken off in the region of the right gripping opening 14 in a partial sectional view.

In Figure 8 is shown a corresponding top view of a particular embodiment of the reusable container according to the invention as a canister version 26 with upper L-ring-shaped stacking ring 12. This canister version 26 (L-ring jerrican) has a basic essentially rectangular shape, wherein the gripping openings 14 in the upper stacking ring 12 are arranged on the two opposed longer side walls, and the filling and emptying opening closed with a screw cap 28 at the outer edge of the top 20 is arranged on one of the two shorter side walls in between. In this case, by contrast with the lower stacking ring, the upper stacking ring 12 does not extend around the whole circumference, but in front of the filling and emptying opening comprises an interruption or recess 30 for pouring out the liquid contents unhindered. With a central arrangement of a large filling and emptying opening, the upper stacking ring continues around the whole circumference as well.

Figure 9 shows as a detail in a part-sectional view the corner regions of two containers stacked one on top of the other. Here the upper container stands with its stand ring 16 with the downwardly facing horizontal bearing surface 50 of its base ring 48 on the horizontal upwardly facing bearing surface 36 of the angled portion 32 of the upper stacking ring 12 of the lower container. The flange edge 38 (=centring ring) which projects upwards on the outside on the angled portion 32 centres the base ring 48 of the barrel stacked on top and prevents the barrels from slipping sideways e.g. due to vibrations during transport. In case of direct stacking of the containers, the upright flange edge 38 is not loaded in the axial direction (no lever action).

The container wall 40 is slightly oblique or curved below the connecting point 42 of the connecting web 44 of the upper stacking ring as well as above the connecting point of the connecting web 46 of the lower stand ring 16, over a height of about 100 mm as far as the cylindrical barrel body region. The maximum angle of inclination here is about 15° to 20°. Also the connecting web 44 of the upper stacking ring 12 (angle of inclination about 5°-8°) and the connecting web 46 of the lower

stabilising ring 16 slope outwards slightly. The upper edge or the angled portion 32 of the upper stacking ring is comparatively thick, i.e. solidly constructed, to increase the radial rigidity.

On the lower side of the angled portion 32 of the upper stacking ring 12 is formed a wide, essentially horizontal or slightly inclined contact face 34 for the lower claw of a barrel gripper. The upper claw of the barrel gripper comes into contact on the inside of the angled portion 32 as a counter support in extension of the connecting web 44.

The partial view in Figure 10 shows a gripping opening 14 in the stacking ring 12. According to the invention the containers are preferably made in one piece by blow moulding in a single operation in a blow mould with two mould slides for upsetting the two peripheral stacking rings, wherein at the same time the gripping openings in the upper stacking ring are punched out in the blow mould by means of two peripheral punching rings.

In Figure 11 is shown one possible way of securing transport of the containers according to the invention. In the connecting web of the lower stabilising ring or above the base ring 48 are made several evenly spaced-apart apertures 52. These can be e.g. ordinary holes. But they can also be transverse slots which are already made during the blow moulding operation when upsetting the base ring 48. Thus through the aperture 52 and the gripping opening 14 can be pulled a fastening means, e.g. a binding wire or, as shown here, a cable tie 54 by means of which the two containers stacked one on top of the other can be rigidly fixed together. To eliminate the fixing, the cable tie is simply squeezed through.

In Figure 12 is shown another possible way of securing transport by means of a wooden batten 56 passed through the aligned gripping openings, as a means of fastening containers according to the invention. The top view in Figure 13 illustrates this type of fastening of adjacent containers on a bottom pallet 58.

In Figure 14 are shown, in triple direct stacking (without further intermediate pallets), 3 x 3 x 3 = 27 containers 10 which are stacked on a bottom pallet 58 and which, to increase stacking reliability particularly against vibrations during transport, are fixed relative to each other and on the pallet 58 itself e.g. by means of clamping

straps 60 which extend vertically through the gripping openings in the upper stacking ring and below the pallet deck as well as by means of horizontally extending clamping straps 60 encompassing the containers.

When loading 60-litre containers according to the invention (diameter about 380 mm, height about 665 mm) in a 20-foot ISO container (DIN 668) with a free area for 10 ISO pallets (1140 x 1140 mm) adjacent to each other, nine containers in one plane or 27 containers in a triple stack can be shipped on one ISO pallet, and with ten pallets 270 containers with a total contents of 16,200 litres can be shipped.

The reusable containers according to the invention can also have a basic approximately rectangular or square or hexagonal shape with round stacking and stand rings in the container body. In Figure 15 is shown a rectangular container 74 and in Figure 16 a hexagonal container 76. The rounded corner regions can in this case also have a larger radius or a larger curvature.

A particularly tall-format container 78 with a capacity of about 70 litres is shown in Figure 17. The tall-format container 78 is provided with an externally threaded filling and emptying socket 80 (diameter 80 mm) arranged laterally in the top for a screw cap K80. But the opening socket 80 could be arranged centrally in the top.

A special design of a container according to the invention is shown in a detail in Figure 18 in the form of a barrel 82 with cap. Here the removable cap 84 is provided with a stacking ring 12 (and gripping opening 14) and at least one lateral bung socket 86. Below the stacking ring 12, the cap 84 has a downwardly opening U-shaped cap flange edge 88 in which a gasket 90 is inserted by placement or foaming. The cap flange edge 88 lies on a shell flange 92 at the upper opening edge of the barrel body. Cap flange edge 88 and shell flange 92 are held together gas-tightly and liquid-tightly by a clamping ring 94 in the closed state. This barrel 82 with cap is particularly suitable for repeated use of viscous or granular contents.

Larger containers can also have a larger capacity of e.g. 100, 120, 150, 200 or 220 litres for reuse in a stable construction depending on requirements. When full, however, these containers can no longer be manipulated by hand, but are preferably

to be handled with an elevating truck or fork lift truck with suitable barrel gripper tools (parrot beak).

The characteristics described can readily be exchanged and/or combined with each other.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A container, made of a thermoplastic material, with at least one filler opening in a top panel or container lid and with a center section and an upper and a lower circumferential stacking ring, wherein the upper stacking ring has a slightly larger diameter than the lower stacking ring, the upper stacking ring is provided on the inside of its upper rim with a recess which matches the diameter of the lower stacking ring, and on its outside with a vertically protruding circular flange so that, when stacked one container atop the other, the lower stacking ring of the upper container fits into the recess in the upper stacking ring of the container underneath and is snugly centered by the vertically protruding circular flange.

2. The container of claim 1, wherein the upper stacking ring includes a collar with an upper end defining an upper rim which has a solid, square cross section and from the outside of which the circular flange protrudes vertically in the axial direction.

3. The container of claim 2, wherein the collar of the upper stacking ring extends upwardly and is slightly flared toward the outside.

4. The container of claim 2, wherein the collar of the upper stacking ring extends upwardly and is provided with two mutually opposite handle openings.

5. The container of any one of claims 1 to 4, wherein the center section of the container is fully cylindrical over a certain axial length while slightly rounded or tapered toward respective top and bottom junctions with the upper and lower stacking ring.

6. The container of claim 5, wherein the height of the rounded, tapered section of the container from the junction respectively with the upper and lower

stacking ring to the point where the container wall becomes fully cylindrical is approximately 110 mm.

7. The container of claim 5, wherein for a container with a limited capacity of not more than 70 liters, the maximum diameter in the area of the fully cylindrical container wall or of the outer edge of the upper stacking ring is about 380 mm.

8. The container of any one of claims 1 to 7, wherein the top panel is substantially flat or slightly convex and is provided near the perimeter with two diametrically opposite, protruding bung fittings with gas-tight-sealable bung holes.

9. The container of any one of claims 1 to 8, wherein the top panel is substantially flat and connects to a tapered lower container wall section by way of a flared or cambered circular adapter section at the junction of the upper stacking ring.

10. The container of any one of claims 1 to 7, wherein the container has bottom panel which is slightly sloped toward one side, thus forming a depression, constituting a sump underneath a bung fitting.

11. The container of claim 10, wherein the bottom panel is provided in the area of the sump with at least three inward-pointing protrusions serving to center a bottom end of a pump tube.

12. The container of claim 10, wherein for facilitated residual drainage a center area of the bottom panel is slightly domed or convex.

13. The container of any one of claims 1 to 7, wherein for facilitated residual drainage of the inverted container the center area of the top panel between two bung fittings is slightly curved inward or concave.

14. The container of any one of claims 1 to 13, wherein the container is a multi-layered wall structure, consisting of at least two different thermoplastic materials co-extruded.

15. The container of any one of claims 1 to 7, wherein the top panel is provided in its center with a protruding, internally threaded bung fitting with a 2-inch or 3-inch bung hole, permitting gas-tight and impermeable sealing by means of a bung with an external thread.

16. The container of any one of claims 1 to 7, wherein the top panel is provided in its center with a protruding, externally threaded bung fitting with a bung-hole diameter equal to or larger than 80 mm, permitting gas-tight and impermeable sealing by means of a screw cap with an internal thread.

17. The container of any one of claims 1 to 16, wherein the thermoplastic material is transparent or, if it is of an opaque color, a level-viewing strip is incorporated and the container is provided with a molded-in fill-level scale.

18. The container of any one of claims 1 to 17, wherein the lower stacking ring includes a collar, above an angled circular foot, which is provided with at least one perforation through which a fastening aid can be inserted to allow the fastening of the lower stacking ring of a stacked container to the upper stacking ring of the container underneath.

19. The container of claim 18, wherein at least two side-by-side containers are lined up in such fashion that their handle openings are aligned, permitting a length of a fastening aid to be inserted through the handle openings for securing the containers to one another.

20. The container any one of claims 1 to 19, wherein for enhanced stacking stability during storage and transport, several containers stacked on a pallet can be secured to one another or to the pallet itself or both by inserting fastening aids

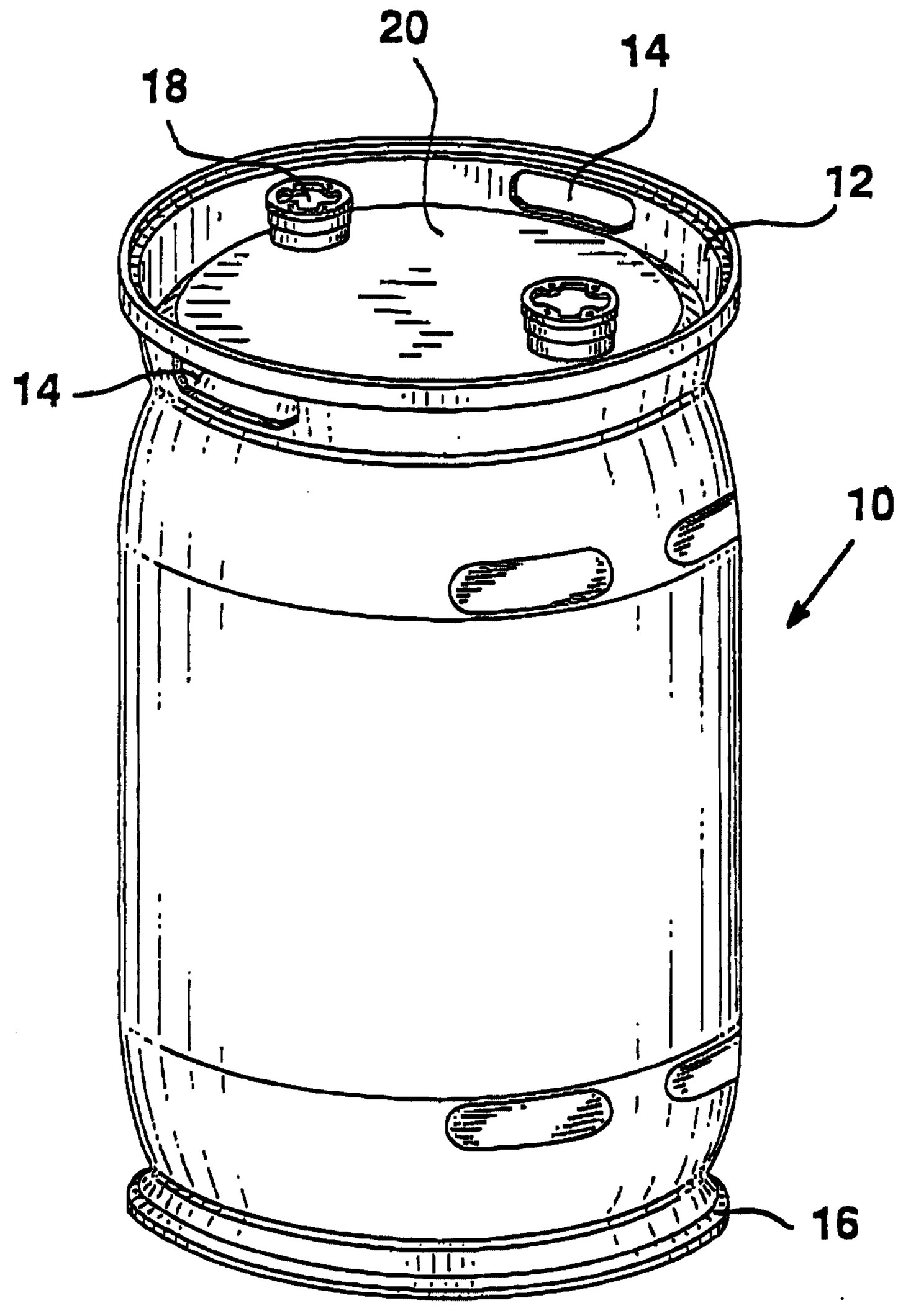
through handle openings provided in the upper stacking ring or through perforations in the lower stacking ring or both.

21. A blow mold for producing a reusable container from a thermoplastic material by the blow-mold process, wherein a specially configured cavity for producing a reusable container that is provided with at least one filler and drain opening in a top panel or container lid and with an upper and a lower circumferential stacking ring, where the upper stacking ring is of a slightly larger diameter than the lower stacking ring and the upper stacking ring is provided on the inside of an upper rim with a recess which matches the diameter of the lower stacking ring and on its outside with a vertically protruding circular flange so that, when containers are stacked one atop the other, the lower stacking ring of the upper container fits into the recess of the upper stacking ring of the container underneath and is snugly centered by the vertically protruding circular flange surrounding it.

22. The blow mold of claim 21, wherein each of two parts of the blow mold is provided with an attachment by means of which the handle openings in the upper stacking ring are punched out.

23. The blow mold of claim 21 or 22, wherein a fully cylindrical part of the blow mold is horizontally separated for the center section of the container and can be easily exchanged, so that by appropriate interchanging of ring sections it is possible to produce a variety of containers, all of the same diameter but different in height.

24. The blow mold of claim 23, wherein each of the variety of containers has a capacity selected from the group of capacities consisting of 25, 30, 50, 60 and 70 liters.



Figur 1

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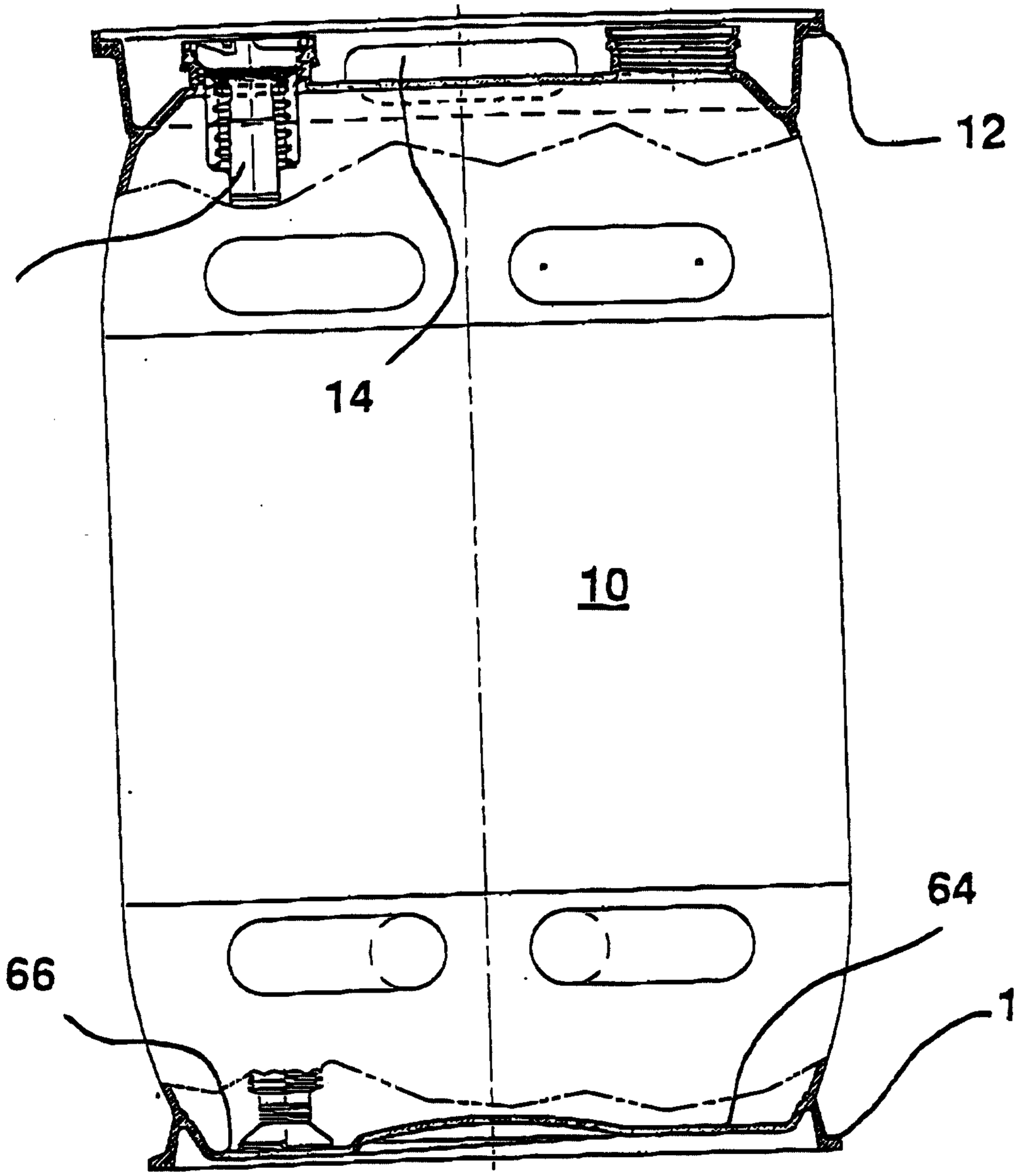
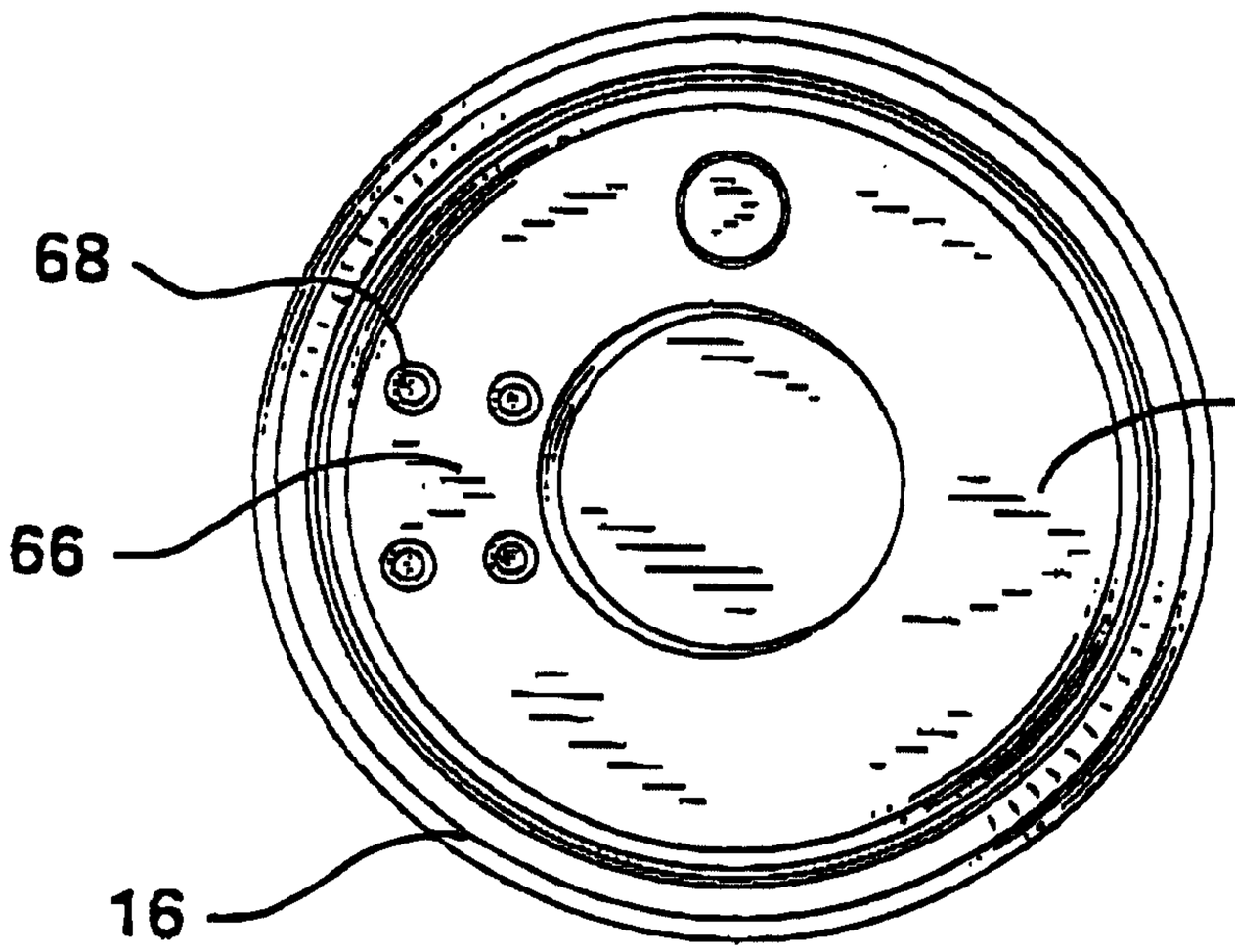


Figur 2



Figur 3

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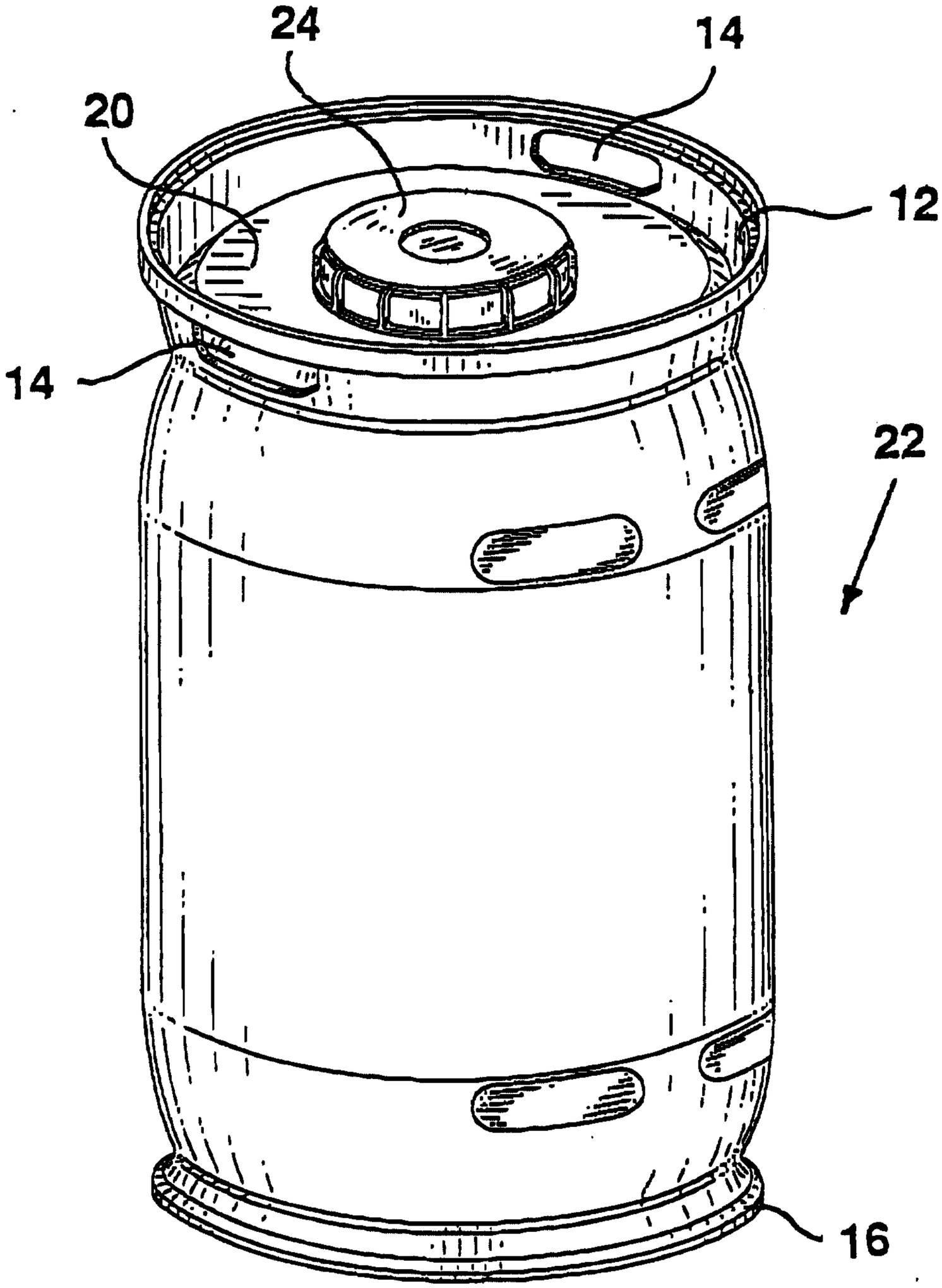
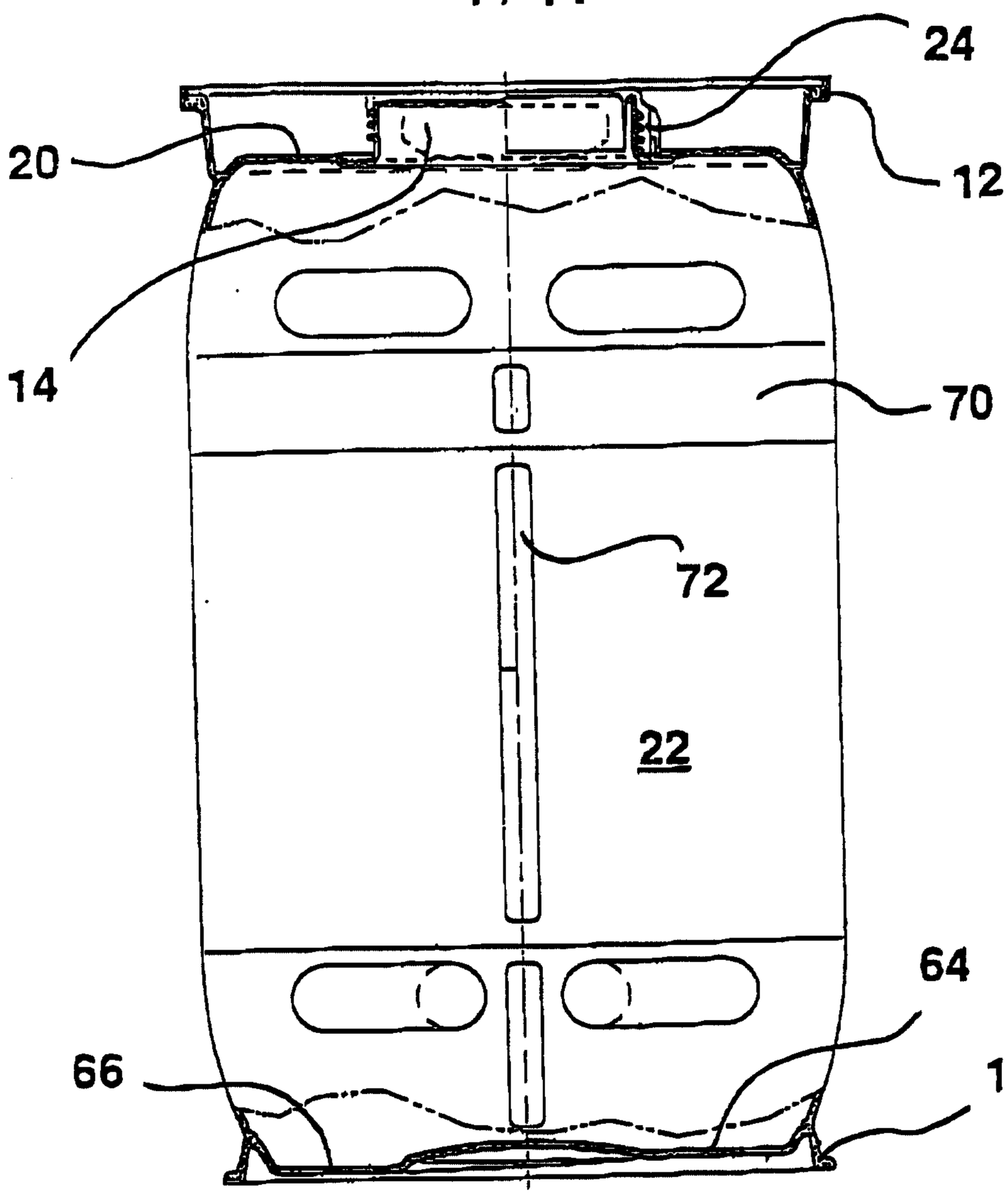
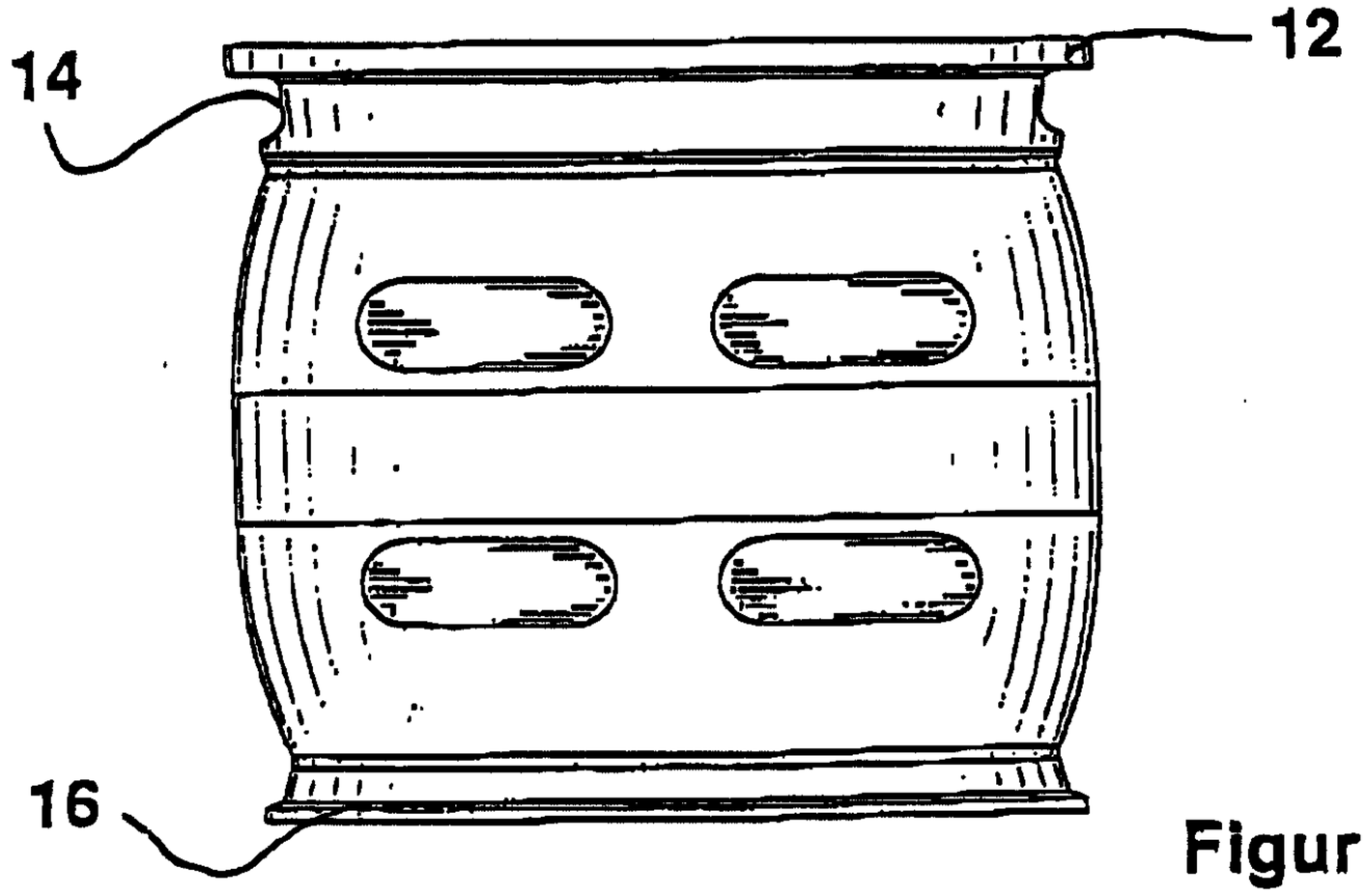


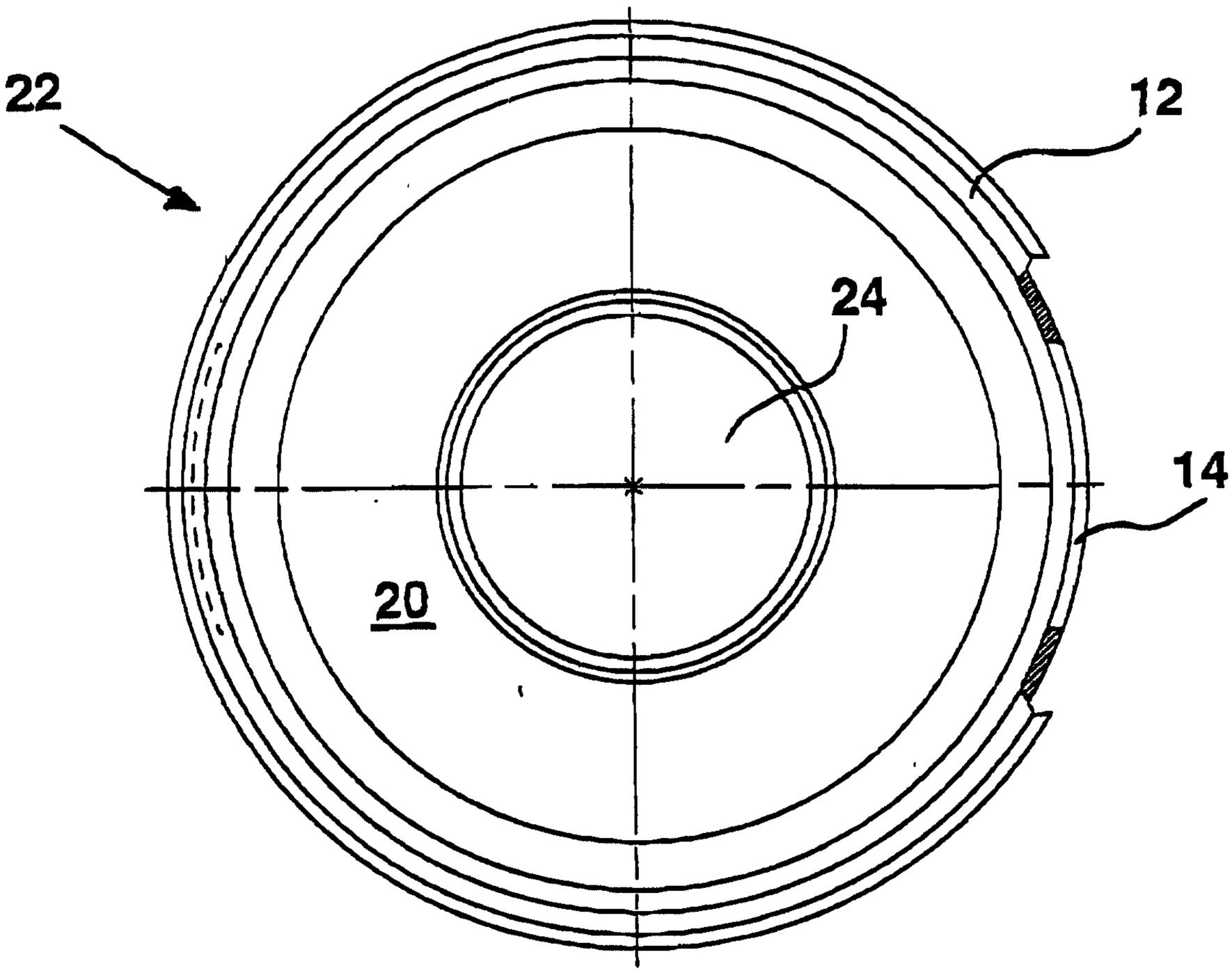
Figur 4



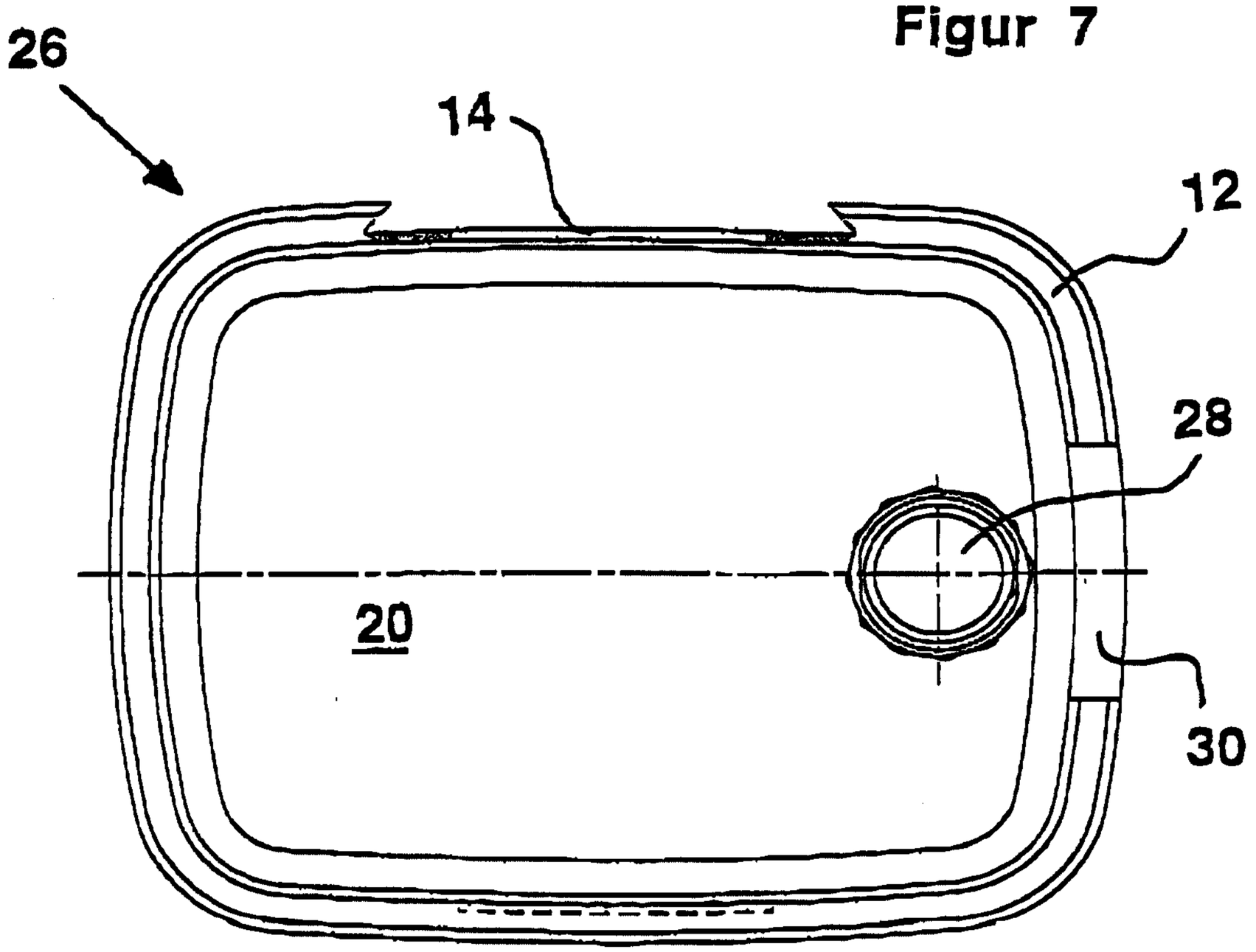
Figur 5



Figur 6



Figur 7



Figur 8

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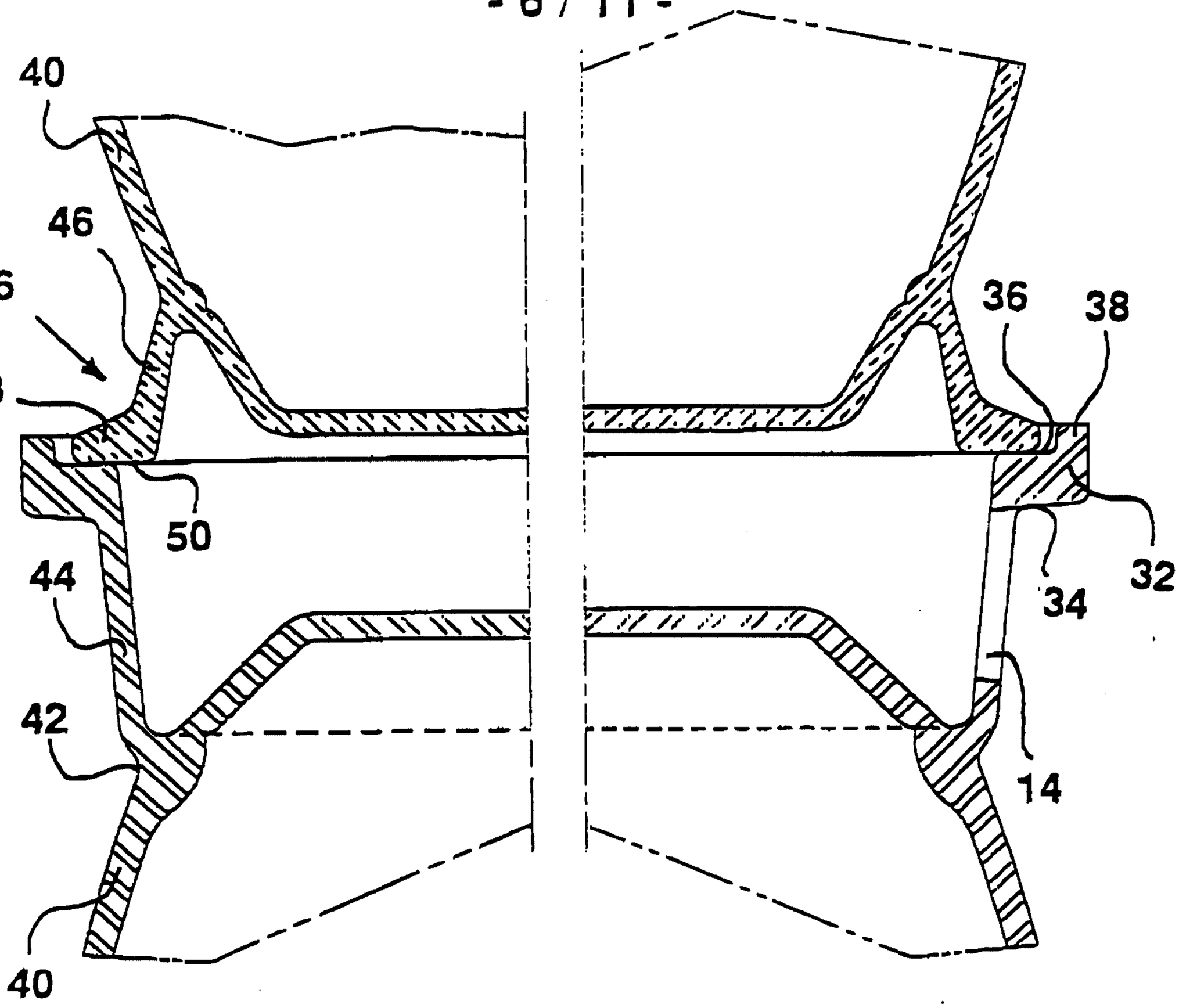
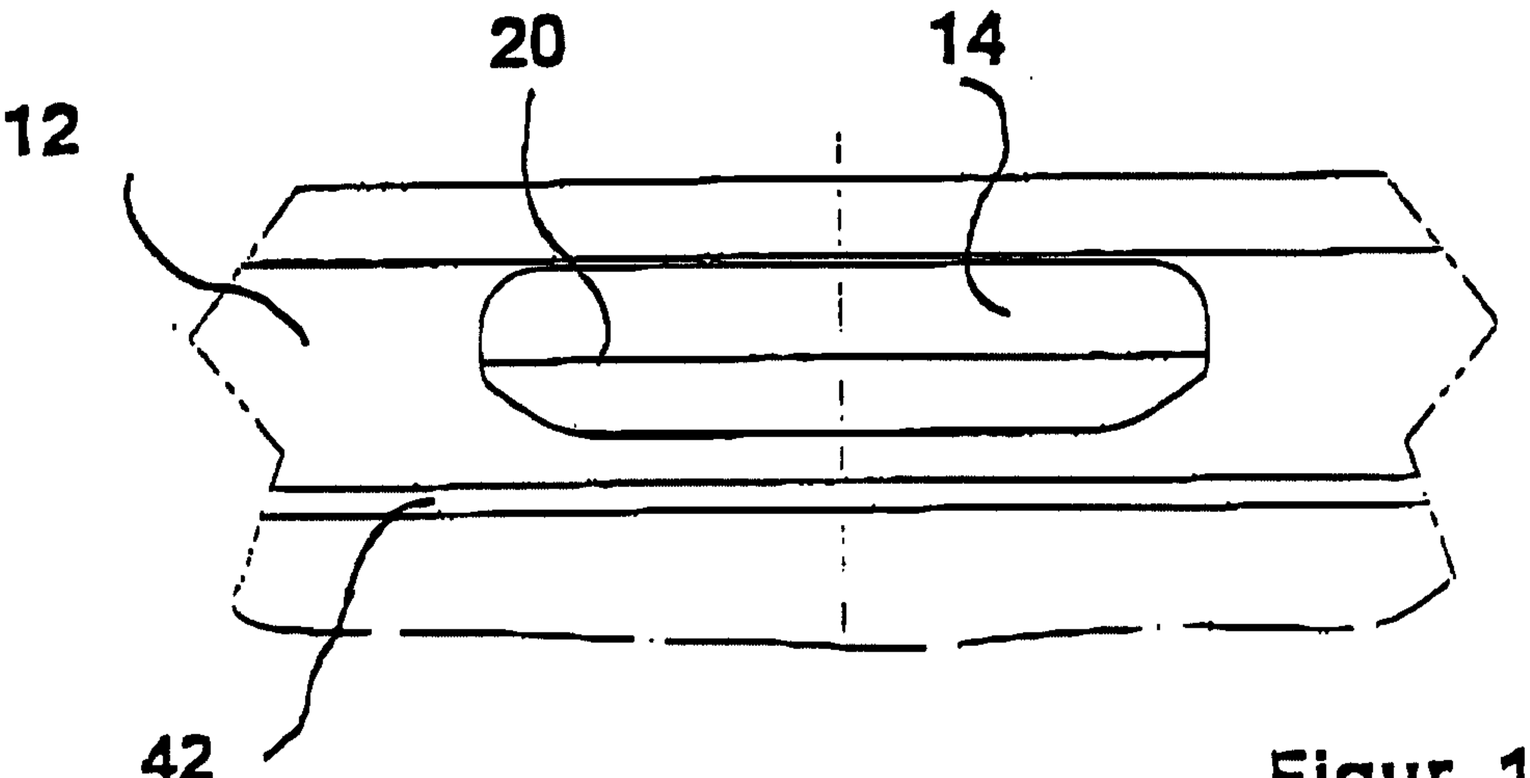


Figur 9



Figur 10

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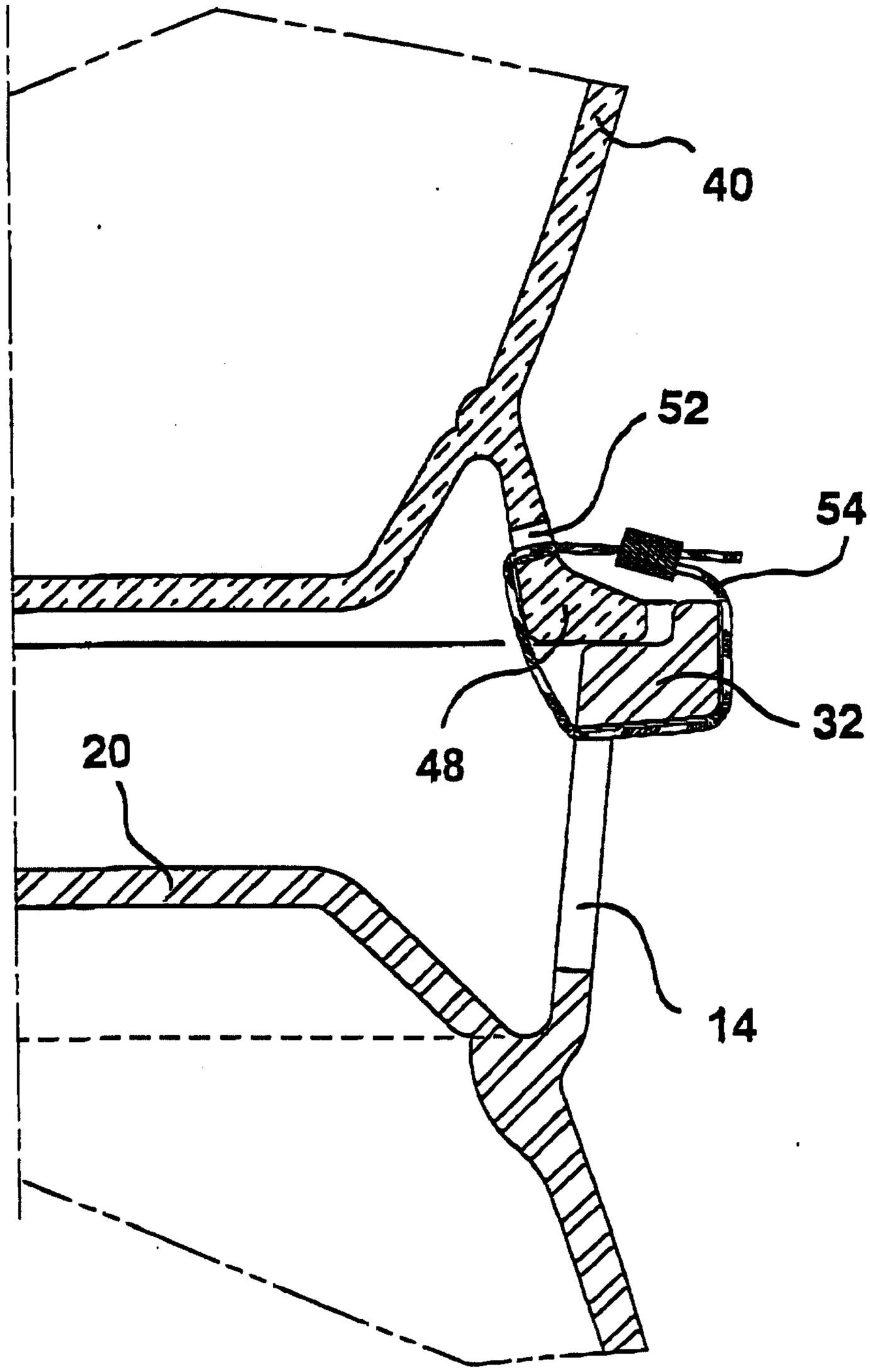
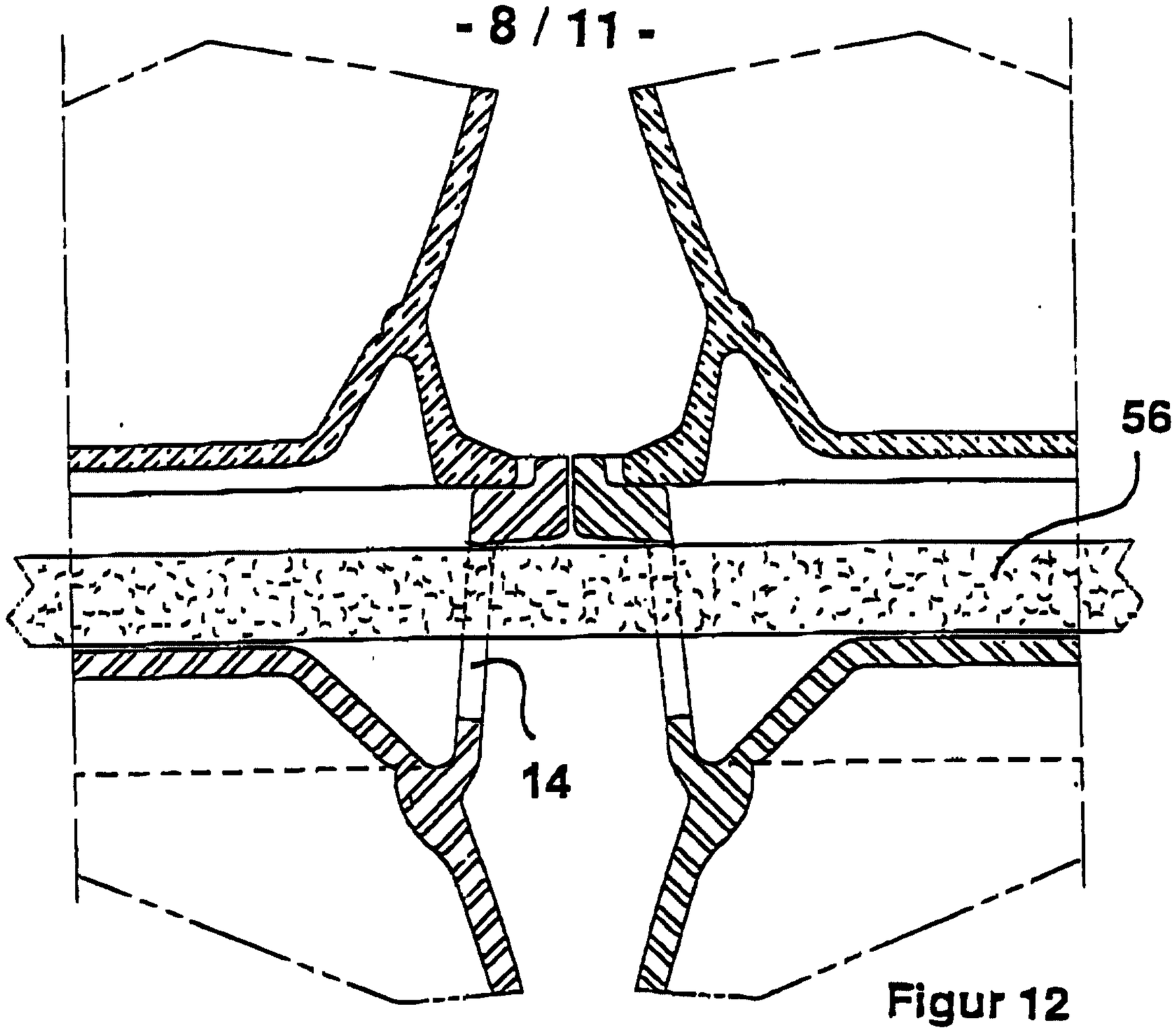
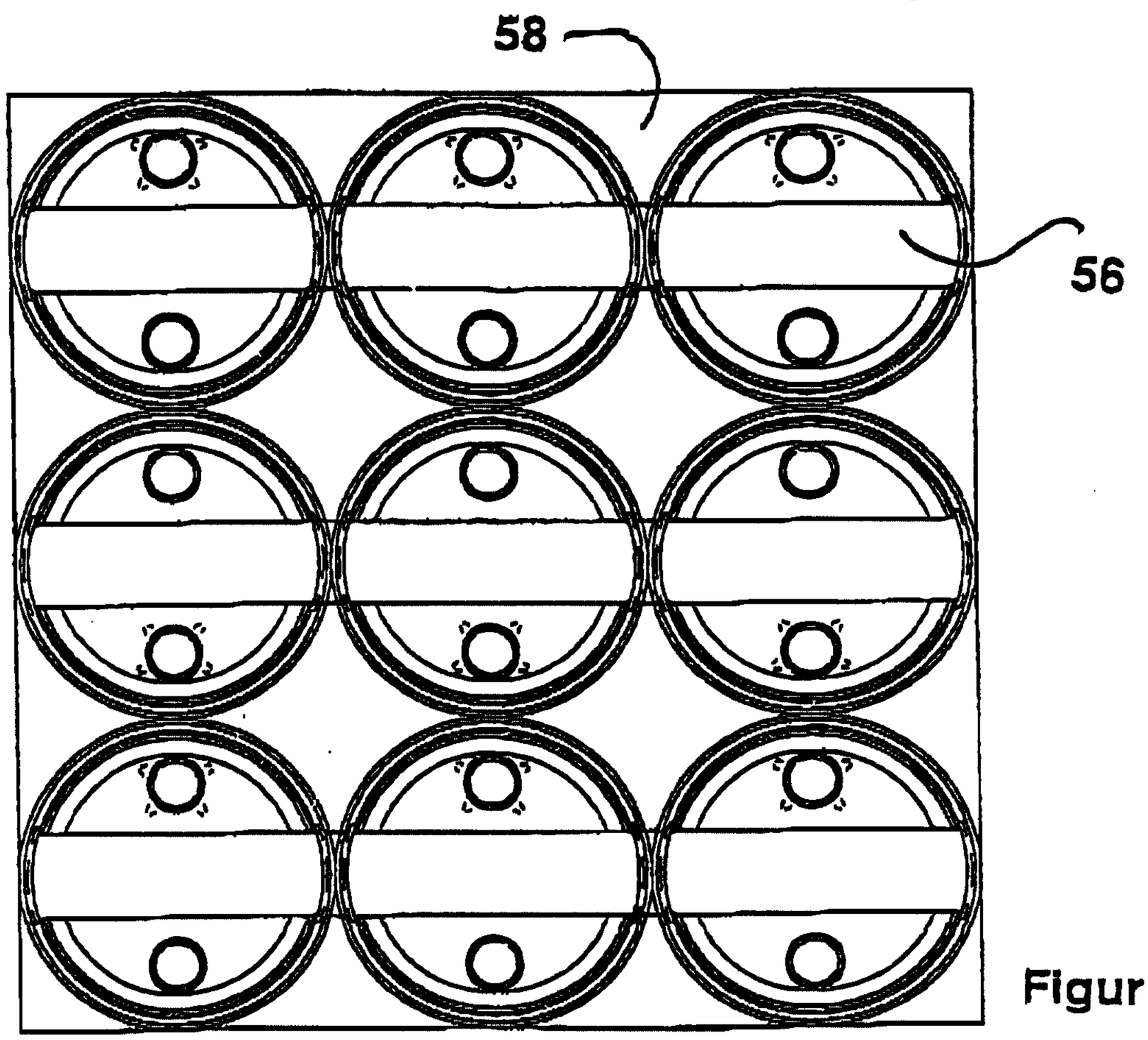


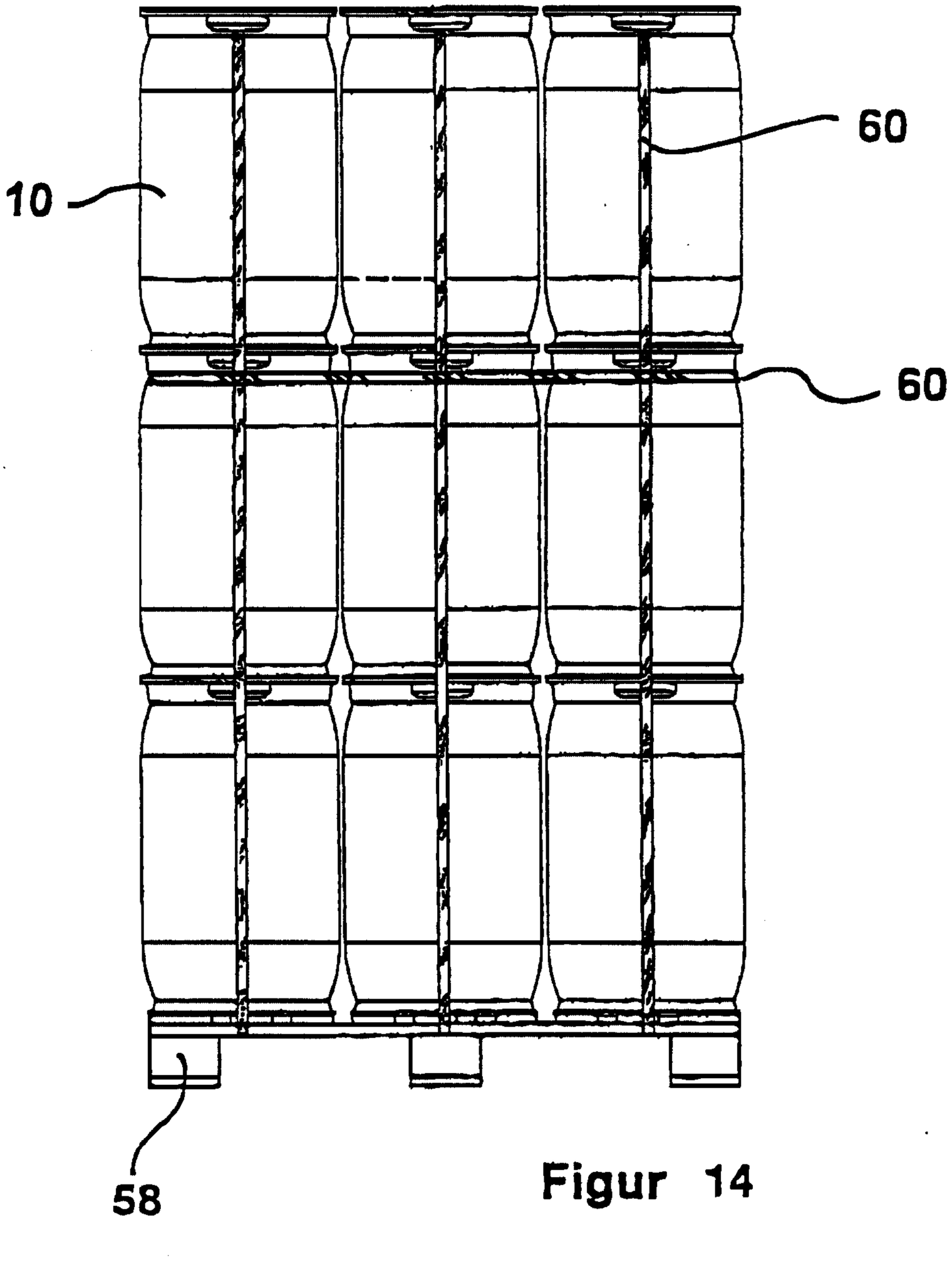
Figur 11



Figur 12

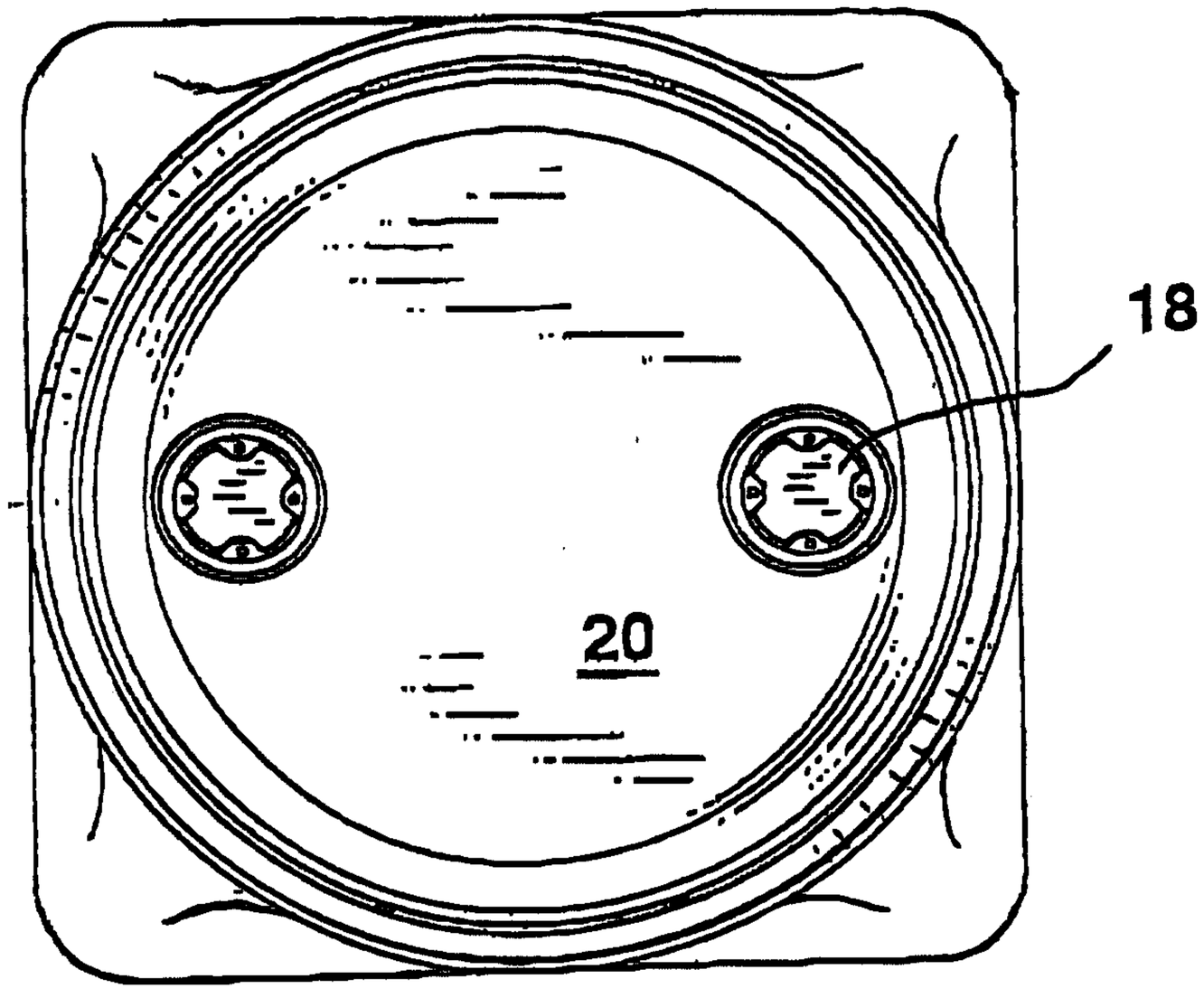


Figur 13

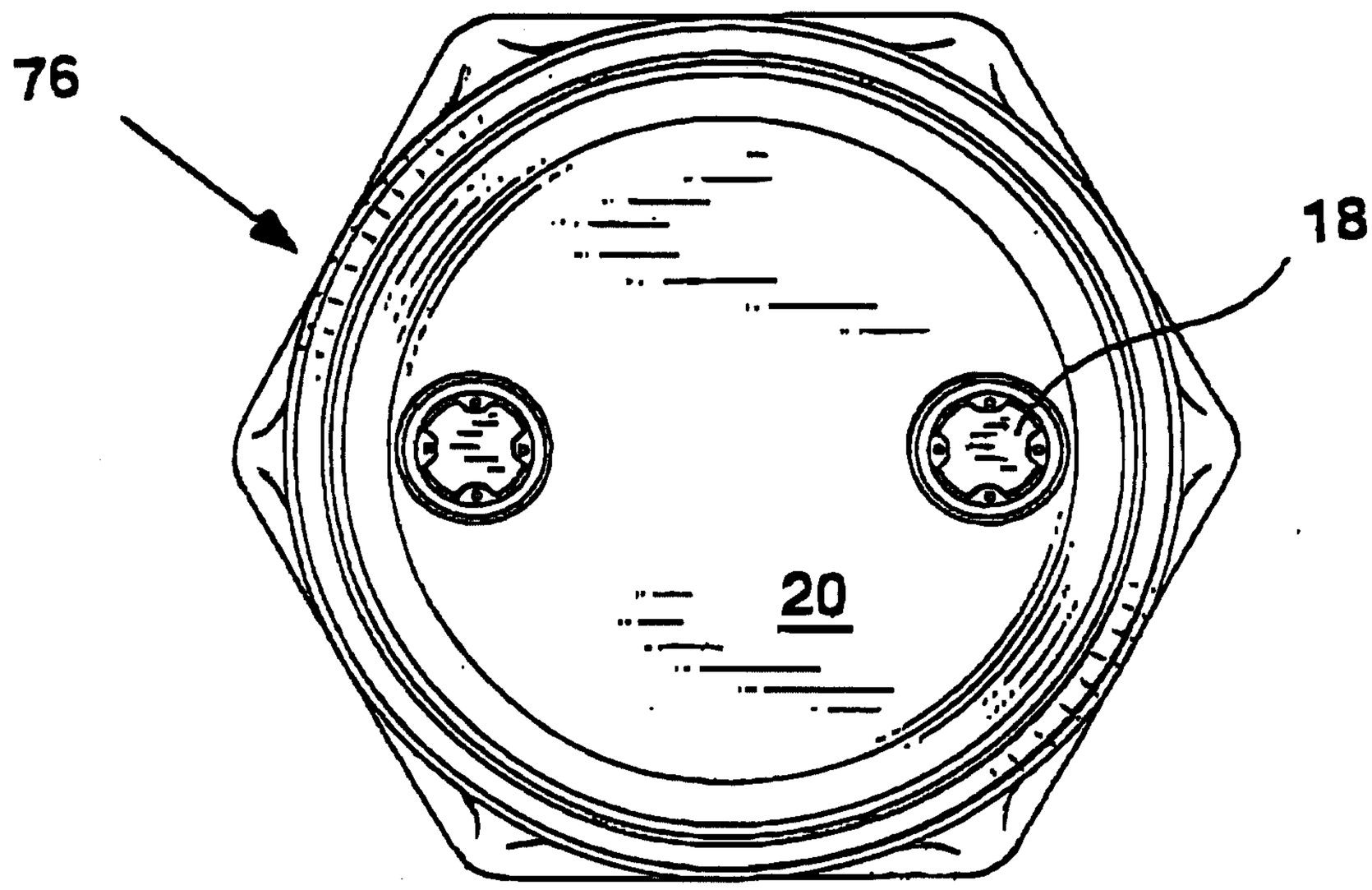


Figur 14

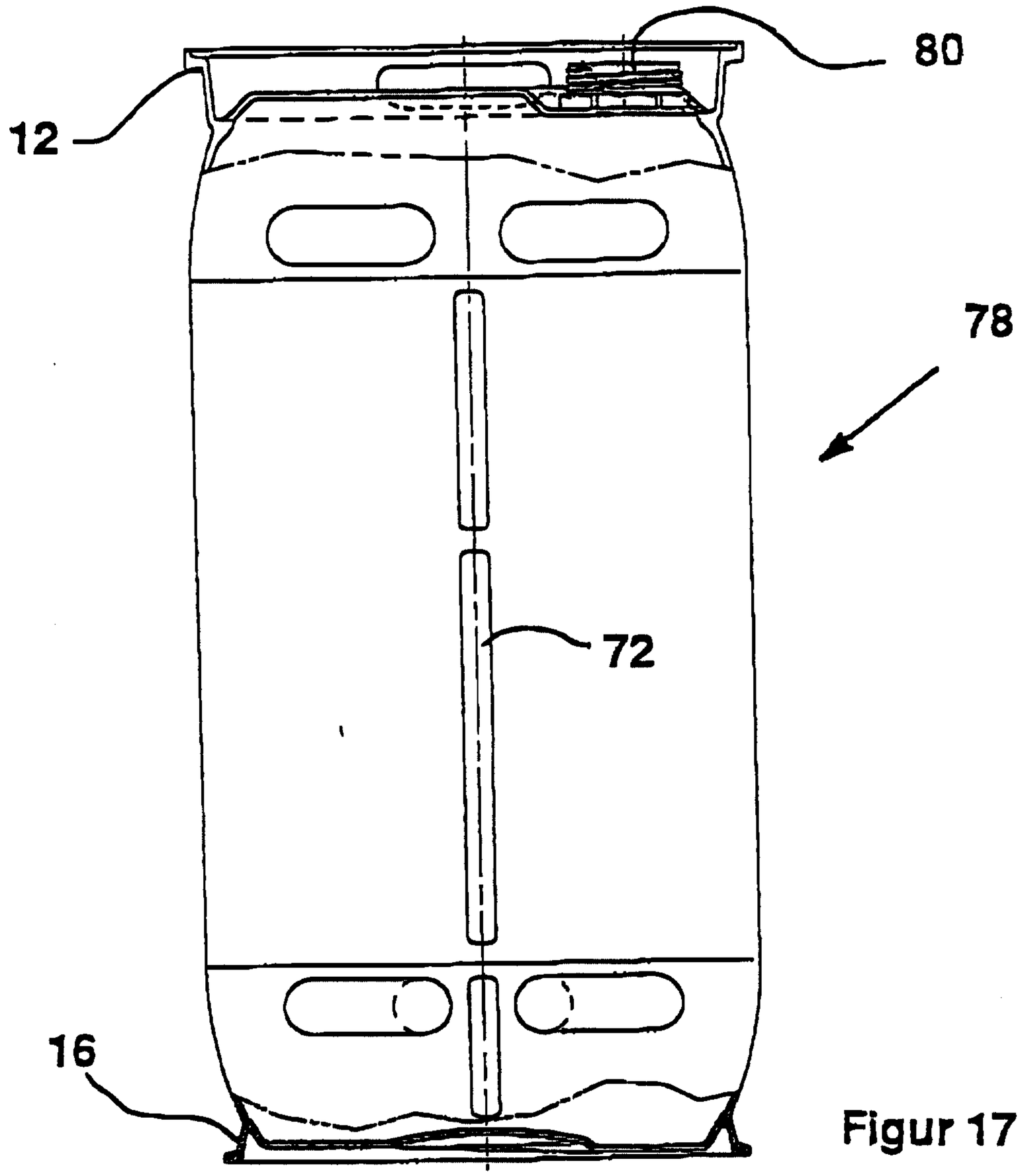
Marks & Clerk



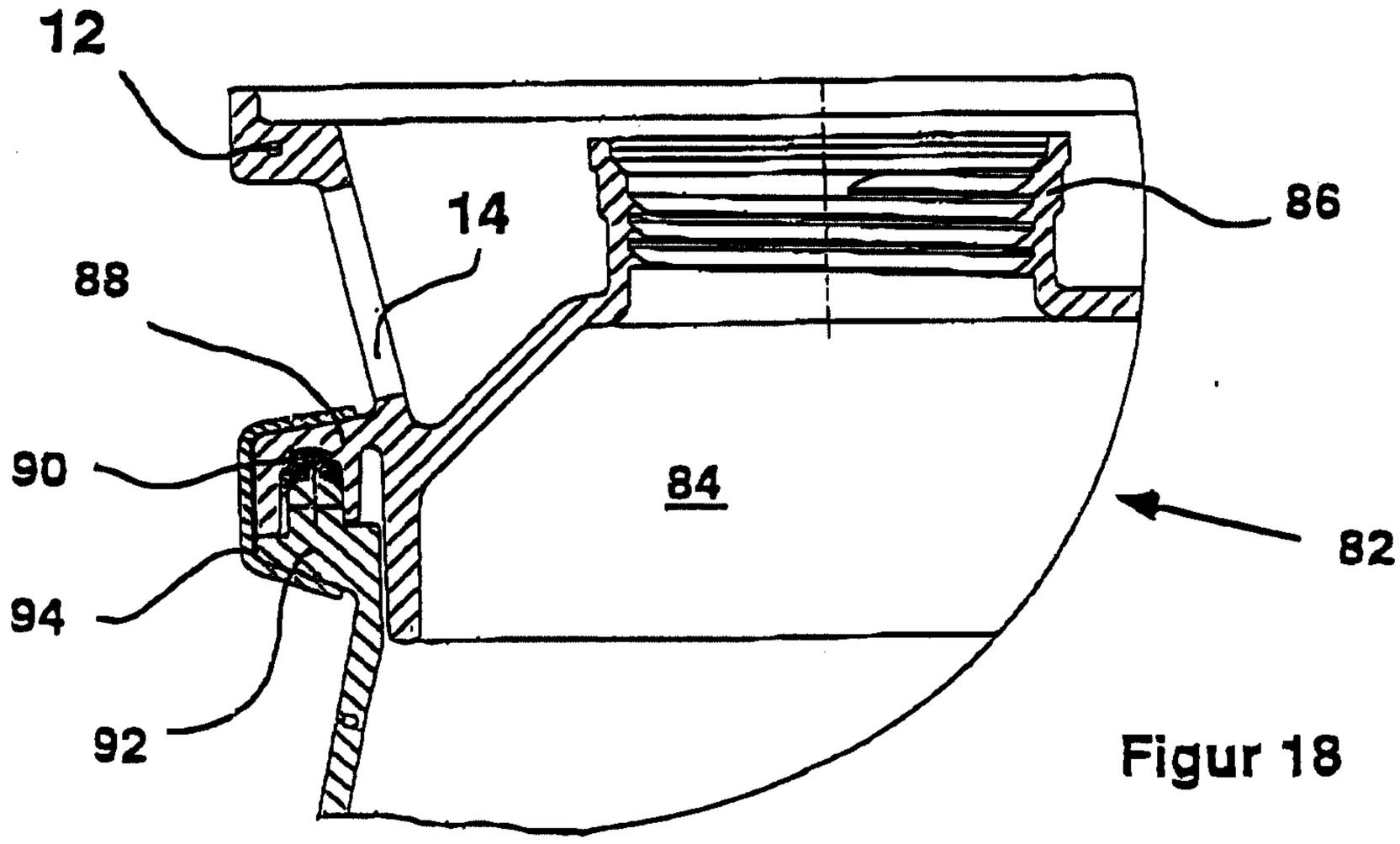
Figur 15



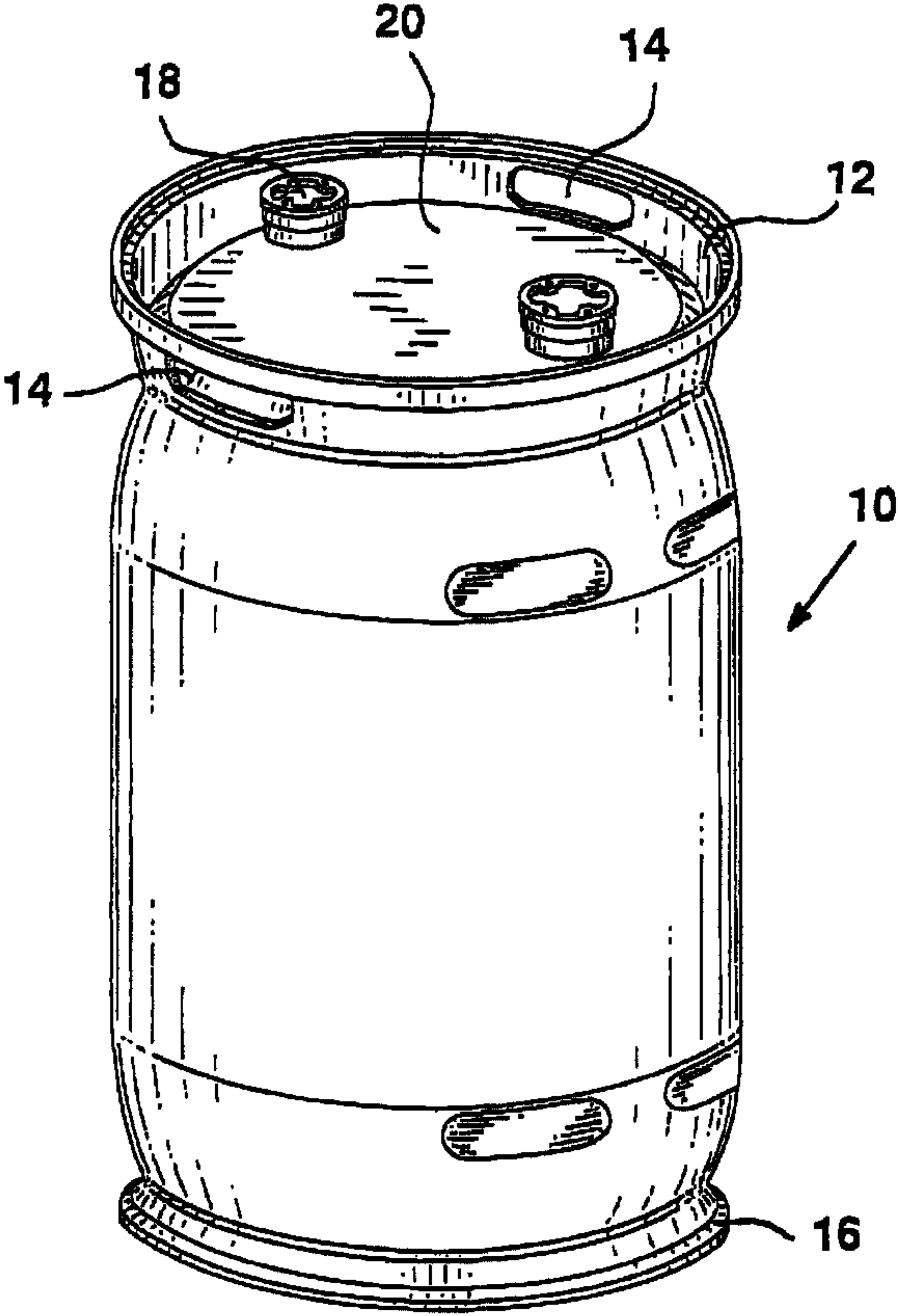
Figur 16



Figur 17



Figur 18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