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(54) **A cylinder**

(57) This invention relates to the assembly of pressure cylinders used for the transportation and storage of liquefied petroleum gas or other hydrocarbons. The cylinder of the present invention comprises, fundamentally, a body inside which especially liquefied petroleum gas is carried and stored, and which is manufactured of a composite material; a regulator for the gas to exit; a valve; a handle which enables it to be carried easily by the user; a lid placed on the handle; a base which enables its standing in balance; at least one central piece which connects the handle and the base around the composite body in order to fix them on the cylinder, gives an aesthetic appearance to the transparent body and has the optimum surface area to enable easy evaporation of the gas inside the cylinder; and characterised by pawls placed on the upper and lower sides of the central piece and have a form to be able to locked into the corresponding pockets on the handle and the base, are preferably in the form of a semi-arrow and are sufficient in numbers to provide sufficient strength so as to allow mechanical assembly.

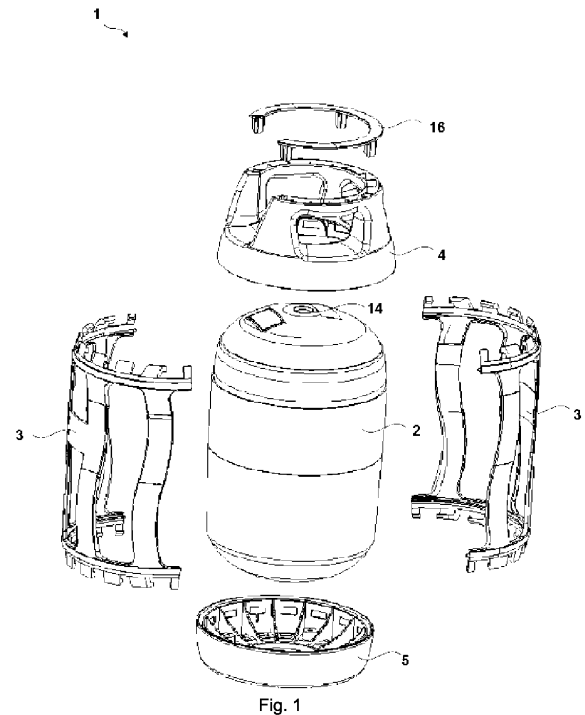


Fig. 1

Description

[0001] Technical Field

[0002] This invention relates to pressure cylinders used for the transportation and storage of liquefied petroleum gas or other hydrocarbons.

[0003] Prior Art

[0004] In the state of art, liquefied petroleum gas (LPG) to be used at residences and offices, is offered for consumption in cylinders, the bodies of which are manufactured by welding together two or more metal parts.

[0005] In accordance with the related standards, the permanent internal stresses which build up as a consequence of the welding processes, are released by applying stress relief and/or normalisation heat treatment on the cylinders. Completed cylinders are subjected to various tests, after which the surfaces of the cylinders are cleaned. Zinc and/or an undercoat painting are applied on the cleaned surfaces of the cylinders against oxidation. In the next step, the surfaces of the cylinders are painted.

[0006] Manufactured cylinders are transported several times between various places including the manufacturing plant, the filling station, the sales unit and the final consumption site. Hence, the paintings at the contact area of the cylinders are easily worn resulting in oxidation of that area.

[0007] Furthermore, elements must be attached onto the cylinders, which bear information such as the sign of the manufacturer or the dealer firm or the operating directives. Various problems are observed when elements are attached onto the cylinders used in the prior art.

[0008] In addition to these, the fact that the cylinders with steel bodies are heavy, makes them difficult to be carried and this situation diversely affects their transportation. Moreover, because the body is manufactured from a non-transparent material, the consumer cannot see the amount of the gas in the cylinder and can only realise that the gas is running out in the course of use and consequently the user experiences difficulty in emergent cases.

[0009] In the prior art, cylinders have been developed which have transparent bodies, are light, and are manufactured from a composite material, so as to prevent wearing and consequent oxidising of the paint resulting from frequent contact with another one, to enable them to be carried easily, and to provide them with a more aesthetic appearance.

[0010] Above mentioned composite cylinders that are completely covered are manufactured and sold under the brandname Compolite CS® by the firm "Composite Scandinavia." Another similar product is manufactured by the firm "Kompozit-Praha" and offered for sale in the market with the trademark Composafér. The firm "Ragasco" is another composite cylinder manufacturer.

[0011] Composite cylinders in the prior art comprise strong (durable) polymer pieces surrounding their bodies devised with the aim of facilitating their transportation

and storage. For the fixation of these pieces to each other, thermal or ultrasound welding technologies are employed. However, due to the fact that their assembly costs are high, these technologies increase manufacturing cost of the cylinders. In addition, while these manufacturing technologies are fully automatic, a damage to the cylinder due to a problem resulting from a device in the process, cannot be identified precisely and hence a non-welding of the polymer pieces may lead to extremely serious hazards.

[0012] Brief Description of the Invention

[0013] The object of the present invention is to realise a cylinder wherein the parts forming the cylinder are assembled mechanically.

[0014] A further object of the present invention is to attain a transparent, oxidation-proof, stain-proof, aesthetic and economical cylinder whereon a sign and/or trademarks can be applied easily.

[0015] The cylinder subject to the present invention, in its most basic form, comprises a body in which liquefied petroleum (LPG) gas is stored and carried, a valve, a handle for it to be carried easily by the user, a lid located on the handle, a base for the cylinder to stand upright (in balance), a central piece which connects the handle and the base around the composite body of the cylinder in order for them to be fixed on the cylinder, which gives an aesthetic appearance to the transparent body and has the optimum surface area to enable easy evaporation of the gas inside the cylinder; and is characterised by pawls placed on the upper and lower sides of the central piece and locked into the corresponding pockets on the handle and the base.

[0016] Detailed Description of the Invention

[0017] The cylinder realised to attain the objects of the present invention is illustrated in the annexed drawings, wherein;

[0018] Figure 1 is an exploded perspective view of the cylinder which is subject to the present invention,

[0019] Figure 2 is a front schematic view of the lid of the cylinder which is subject to the present invention,

[0020] Figure 3 is a top schematic view of the lid of the cylinder which is subject to the present invention,

[0021] Figure 4 is a top perspective view of the lid of the cylinder which is subject to the present invention,

[0022] Figure 5 is a bottom perspective view of the lid of the cylinder which is subject to the present invention,

[0023] Figure 6 is a front schematic view of the handle of the cylinder which is subject to the present invention,

[0024] Figure 7 is a bottom schematic view of the handle of the cylinder which is subject to the present invention,

[0025] Figure 8 is a top perspective view of the handle of the cylinder which is subject to the present invention,

[0026] Figure 9 is a bottom perspective view of the handle of the cylinder which is subject to the present invention,

[0027] Figure 10 is a front schematic view of the base of the cylinder which is subject to the present invention,

[0028] Figure 11 is a bottom schematic view of the base of the cylinder which is subject to the present invention,

[0029] Figure 12 is a top perspective view of the base of the cylinder which is subject to the present invention,

[0030] Figure 13 is a bottom perspective view of the base of the cylinder which is subject to the present invention,

[0031] Figure 14 is a front schematic view of the central piece of the cylinder which is subject to the present invention,

[0032] Figure 15 is a side schematic view of the central piece of the cylinder which is subject to the present invention,

[0033] Figure 16 is a top perspective view of the central piece of the cylinder which is subject to the present invention,

[0034] Figure 17 is a bottom perspective view of the central piece of the cylinder which is subject to the present invention,

[0035] The components in the figures have each been numbered corresponding to the following:

1. Cylinder
2. Body
3. Central piece (shell)
4. Handle
5. Base
6. Pawl
7. Pocket
8. Band
9. Rib
10. Tooth
11. Recess
12. Column
13. Channel
14. Bushing recess
15. Groove
16. Lid

[0036] The cylinder of the present invention comprises a body (2) which is manufactured of a composite material by a known technique and which has a suitable geometry, preferably a cylinder, with rounded upper and lower bases. There exists a bushing recess (14) on the top of the body which enables placement of accessories such as the valve, the regulator, etc.

[0037] The central pieces (3) completely surround the body (2) so as to protect it from external factors and prevent its contact with another cylinder during transportation, stacking, and storage. The pawls (6) that are placed on the upper and lower edges (3) seat into the corresponding pockets (7) on the handle (4) and the base (5) that are known in the prior art. Said pawls (6) are preferably in the form of a semi-arrow and are sufficient in numbers to provide sufficient strength depending on the weight of the cylinder.

[0038] The central piece (3) comprises wave-formed

aesthetic bands (8) on the outside and a flat or cut-out part extending between the two bands (8) so as to bear the logo or the trademark of the company.

[0039] The central piece (3) comprises on the inner surface of every wave-formed band (8), membrane-like edge ribs (9) which do not impede evaporation of the LPG during operation and which protect the body (2) of the cylinder (1) from impacts and damages. The central piece (3) further comprises pin holes on both of its sides, in order to guide the two parts.

[0040] There are pockets (7) on the body of the handle (4) which have a form, preferably rectangular, matching with the form of the pawls (6). The handle (4) comprises a groove (15) on its upper surface. The surface area of the groove (15) is equal to the circular area of the lid (16) which involves a recess extending over an arc of a certain angle, whereas its depth is equal to the wall thickness of the lid (16). Inside said groove (15), there are a certain number of membrane-like channels (13) which prevent massive polymer material collapse, improve strength and provide material saving.

[0041] There are ergonomic columns (12) on the handle (4) which enable the cylinder (1) to be carried easily. The handle (4) is manufactured so as to enable marking on its lower part.

[0042] The lid (16) is employed to carry information relating to the properties of LPG, the filling station, security warnings, etc. and also the lid (16) may have a colour different than the rest of the design and thereby allows for geographical, regional or technical differentiation.

[0043] The geometry of the lid (16), which is circular, fits to the geometry of the handle (4). The lid (4) comprises at its bottom a number of teeth (10), preferably four, for its attachment to the handle (4). All these parts are integral (mono-bloc) and manufactured in a single plastic injection mould or in separate injection moulds.

[0044] The cylinder (1) of the present invention comprises a base (5) which enables standing upright on the floor and being stacked on top of each other. Said base (5) comprises pockets (7) which have a form, preferably rectangular, which matches with the pawls (6) on the central piece (3). It comprises on its body a number of channels (10) to provide necessary strength and recesses (11) to provide optimum material usage and also to allow draining of rain water or other liquids. The base (5) enables labelling to be made in accordance with the standards and legislation which is compulsory in cylinder (1) manufacturing.

[0045] The central piece (3), the handle (4), the base (5) and the lid (16) are made of a rustproof material which does not get dirty quickly, and has high impact and mechanical strength. The material is preferably ethylene propylene diene terpolymer added copolymer polypropylene, however other polypropylene derivatives and suitable additives may also be used. Said polymers, may be selected from a group comprising polymers such as PBT, ABS, PE, POM, PC, or mixtures of these in certain ratios.

[0046] In a preferred embodiment of the invention, the body of the cylinder (1) is made of aluminium, steel or a similar strong material meeting the standards.

[0047] Industrial Applicability

[0048] During the mechanical assembly of the cylinder (1), which is the subject of the invention, the two identical central pieces (3) are attached together. Next, the pawls (6) on the upper side of the central pieces (3) are inserted into the recesses at the bottom of the handle (4) between its inner wall and outer wall and then locked into the pockets (7) on said inner wall. Finally, once the pawls (6) on the lower side of the central pieces (3) are placed inside the recesses at the top of the base (5) between its inner wall and outer wall, and then locked into the pockets (7) on said inner wall, the mechanical assembly is completed.

[0049] Thanks to the mechanical assembly a cylinder is realized which possesses the features of prior art composite cylinders but which has a more cost-effective production method when compared with thermal or ultrasound welding. Thus, technical problems which emerge during one of the automatic phases of said welding methods but which cannot be identified are eliminated.

[0050] The cylinder (1) further allows attaching parts bearing information relating to the signs of the manufacturer and dealer firms, the operating directives, etc.

[0051] It is possible to develop wide range of embodiments for the cylinder (1) which is the subject of the invention without departing from this main concept and the invention is principally as disclosed in the claims and it cannot be restricted with the examples stated herein.

Claims

1. A cylinder (1) comprising a body (2) inside which especially liquefied petroleum gas is carried and stored, and which is manufactured of a composite material, a regulator for the gas to exit, a valve, a handle (4) which enables it to be carried easily by the user, a lid (16) placed on the handle (4), a base (5) which enables its standing in balance, at least one central piece (3) which connects the handle and the base around the composite body in order to fix them on the cylinder, which gives an aesthetic appearance to the transparent body and has the optimum surface area to enable easy evaporation of the gas inside the cylinder, and **characterised by** pawls (6) placed on the upper and lower sides of the central piece (3), which have a form that fits into the corresponding pockets (7) on the handle (4) and the base (5), which are preferably in the form of a semi-arrow and are sufficient in numbers to provide sufficient strength so as to allow mechanical assembly.
2. A cylinder (1) according to Claim 1, **characterised in that** the central piece (3) comprises on the inner surface of every wave-formed band (8), membrane-

like edge ribs (9) which do not prevent evaporation of the LPG during operation and which protect the body (2) of the cylinder (1) from impacts and damages.

3. A cylinder (1) according to any one of the preceding claims **characterised in that** it comprises a central piece (3) having pin holes on both of its sides in order to guide the two parts.
4. A cylinder (1) according to any one of the preceding claims **characterised in that** it comprises a central piece (3) having aesthetic bands (8) on the outside for bearing the logo or the trademark of the company.
5. A cylinder (1) according to any one of the preceding claims **characterised in that** it comprises a handle (4) having pockets (7) which have a form, preferably rectangular, matching with that of the pawls (6) on the central piece (3).
6. A cylinder (1) according to Claim 5 **characterised in that** it comprises a handle (4) having a groove (15) on its upper surface, the surface area of which is equal to the circular area of the lid (16) which involves a recess extending over an arc of a certain angle, and the depth of which is equal to the wall thickness of the lid (16).
7. A cylinder (1) according to Claim 6 **characterised in that** it comprises a handle (4) having a certain number of membrane-like channels (13) on it, which prevent massive polymer material collapse, improve strength and provide material saving.
8. A cylinder (1) according to Claim 7 **characterised in that** it comprises a handle (4) having ergonomic columns (12) on the handle (4) which enable the cylinder (1) to be carried easily.
9. A cylinder (1) according to Claim 8 **characterised in that** it comprises a handle (4) the bottom surface of which is flat so as to enable marking.
10. A cylinder (1) according to any one of the preceding claims **characterised in that** it comprises a lid (16), which is circular in form in order to fit the geometry of the handle (4), carries information relating to the properties of LPG, the filling station, security warnings, etc., and the colour of which different than the rest of the design and thereby allows for geographical, regional or technical differentiation.
11. A cylinder (1) according to Claim 10, **characterised in that** it comprises a lid (16) having at its bottom a number of teeth (10), preferably four, for attaching it to the handle (4).

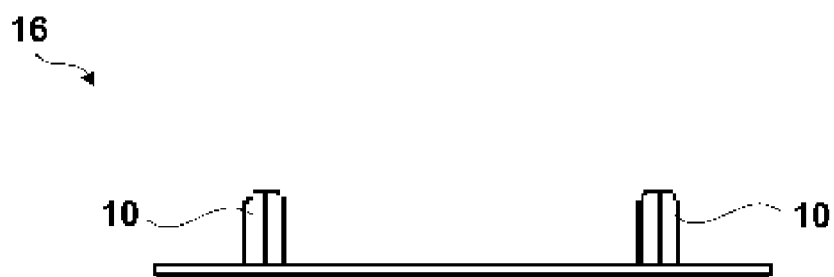
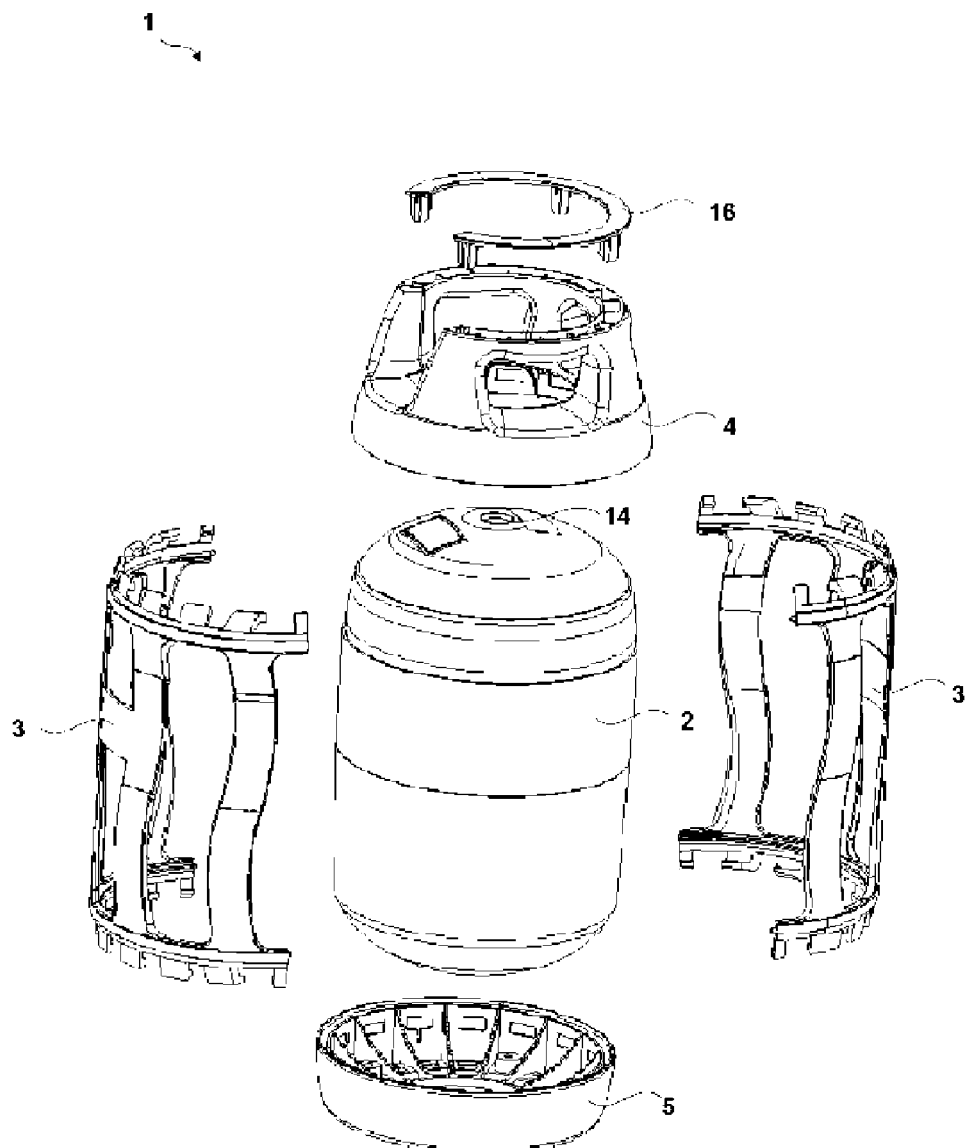
12. A cylinder (1) according to any one of the preceding claims **characterised in that** it comprises a base (5) which enables standing upright on the floor and being stacked on top of each other and the central diameter of which decreases downwards. 5
13. A cylinder (1) according to Claim 12 **characterised in that** it comprises a base (5) having a number of channels (13) to provide the necessary strength and the elasticity while being carried. 10
14. A cylinder (1) according to Claim 13 **characterised in that** it comprises a base (5) having recesses (11) on its body, to provide optimum material usage and also to allow draining of rain water or other liquids. 15
15. A cylinder (1) according to Claim 14, **characterised in that** it comprises a base (5) having a flat surface so as to enable markings to be made in accordance with the standards and legislation which is compulsory in cylinder (1) manufacturing. 20
16. A cylinder (1) according to any one of the preceding claims **characterised in that** it comprises internal pieces (3), a handle (4), a base (5) and a lid (16) 25
which are made of a strong material, namely of polymers such as PBT, ABS, PE, POM, PC, or mixtures of these in certain ratios, preferably ethylene propylene diene terpolymer added copolymer polypropylene. 30
17. A cylinder (1) according to any one of the preceding claims **characterised in that** it comprises a body (2) made of aluminium, steel or a similar strong material meeting the standards. 35

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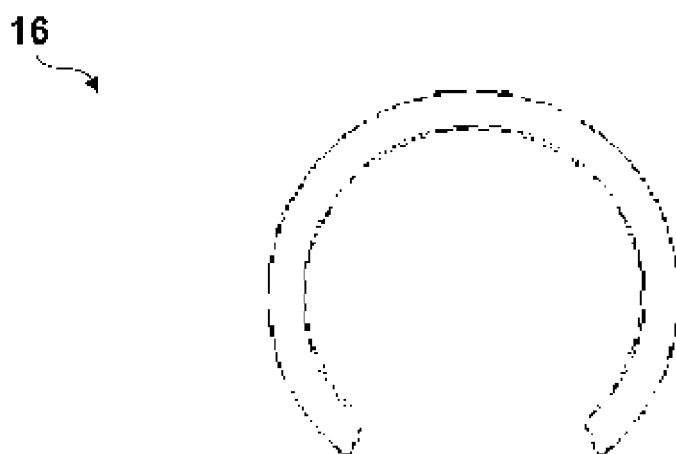


Fig. 3

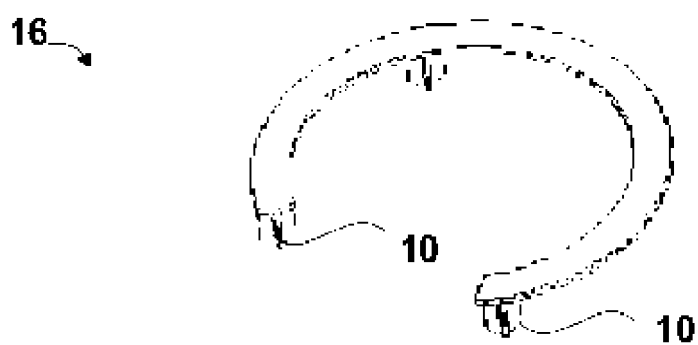


Fig. 4

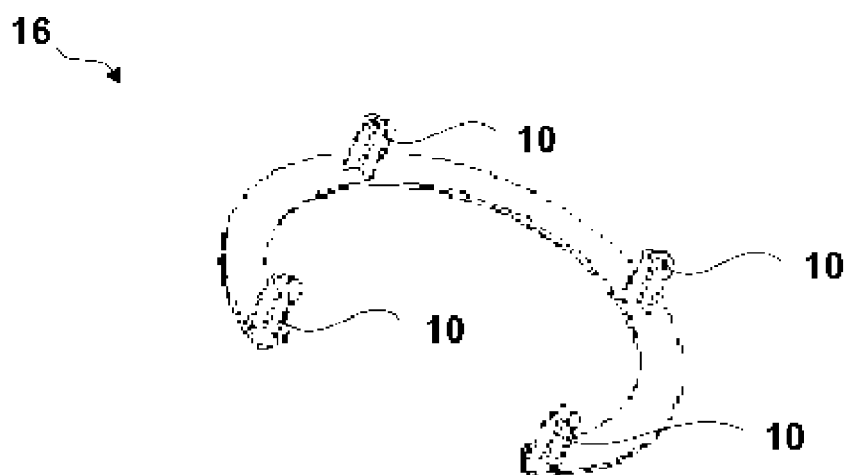


Fig. 5

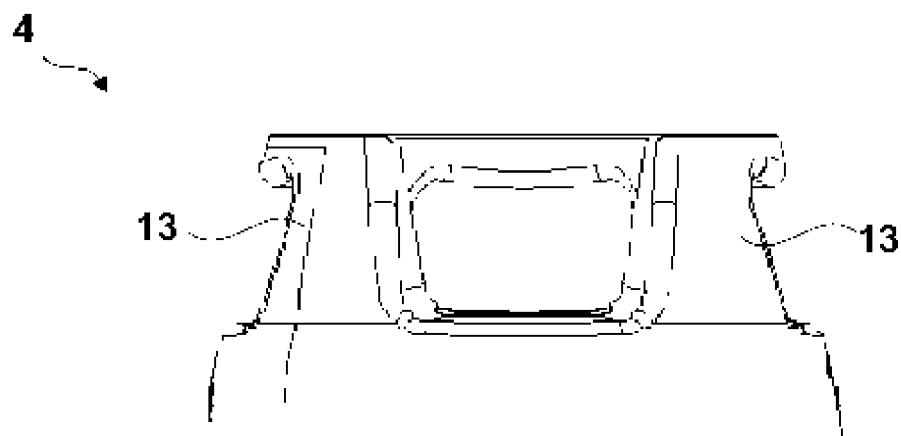


Fig. 6

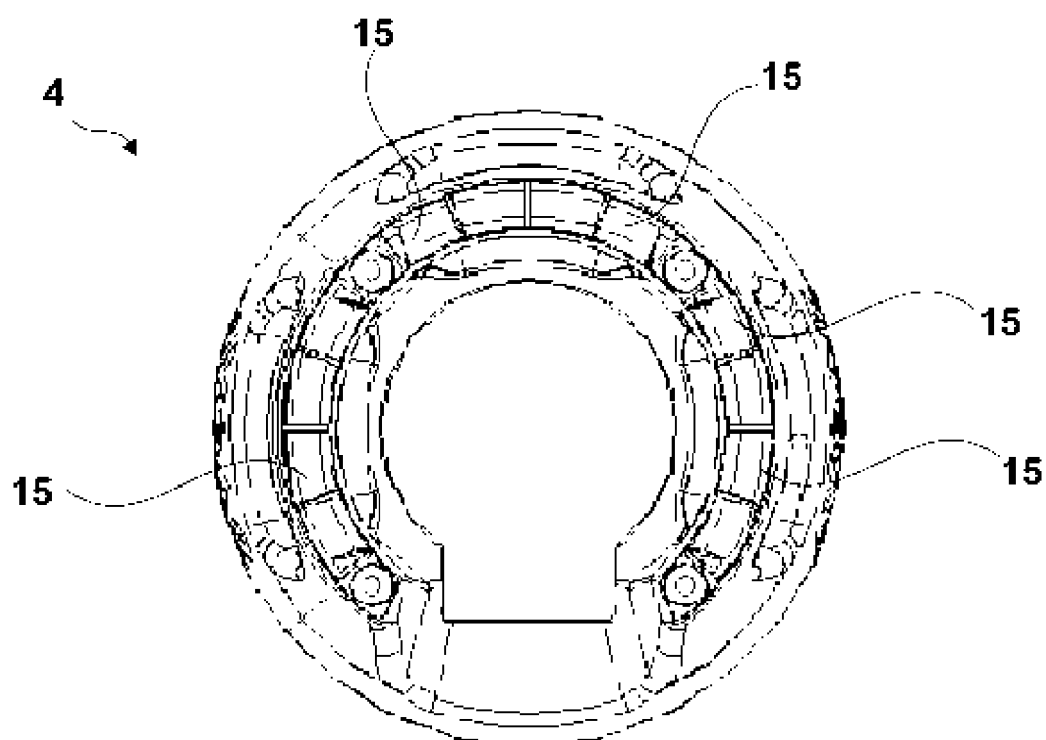


Fig. 7

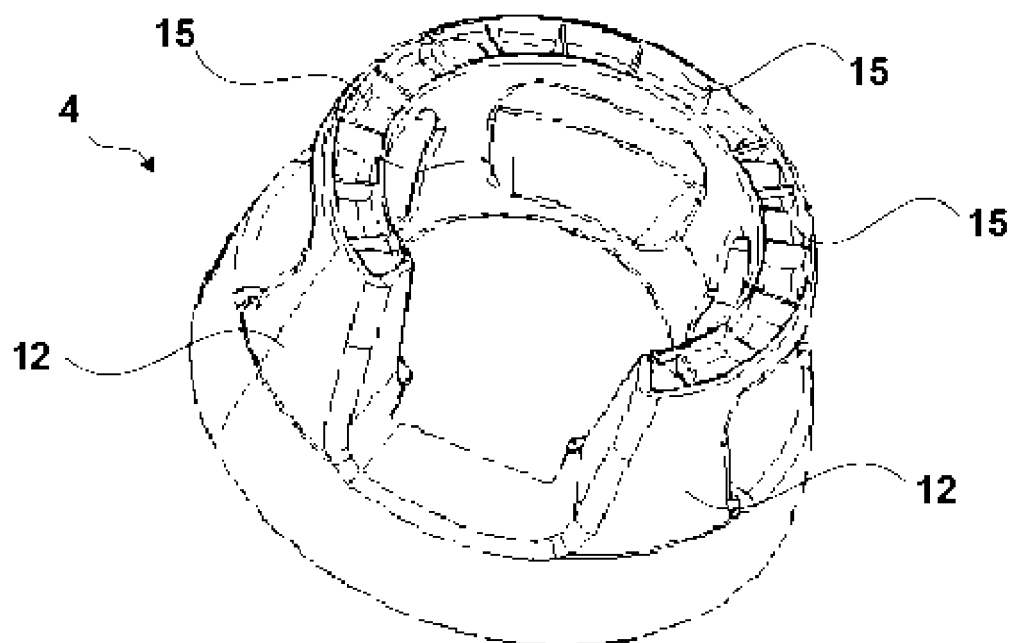


Fig. 8

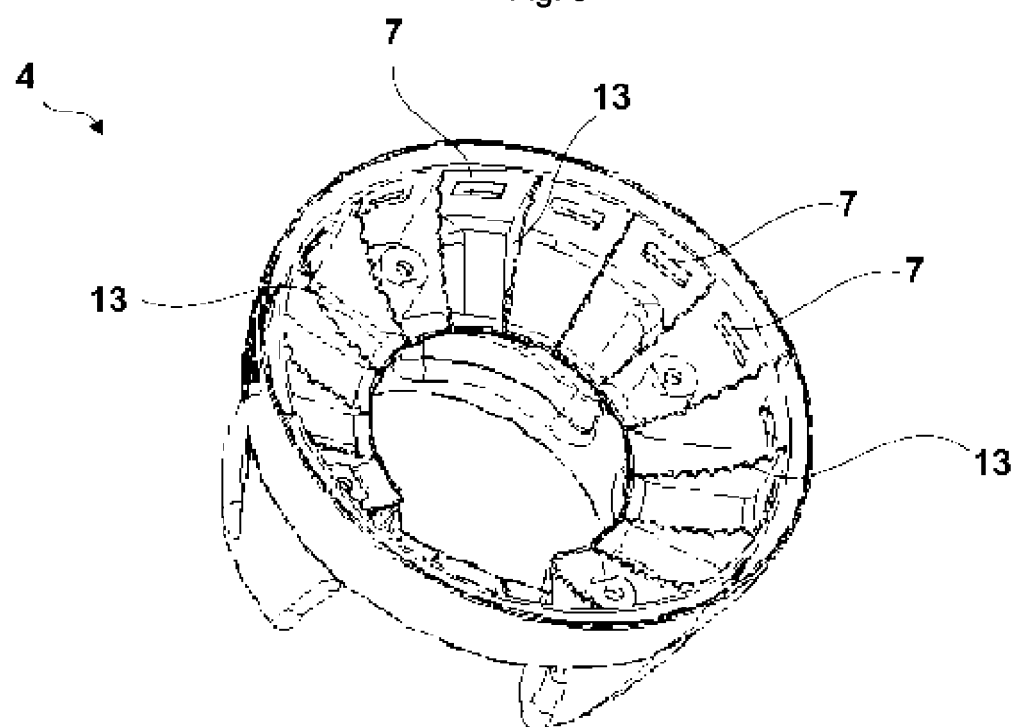


Fig. 9

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Fig. 10

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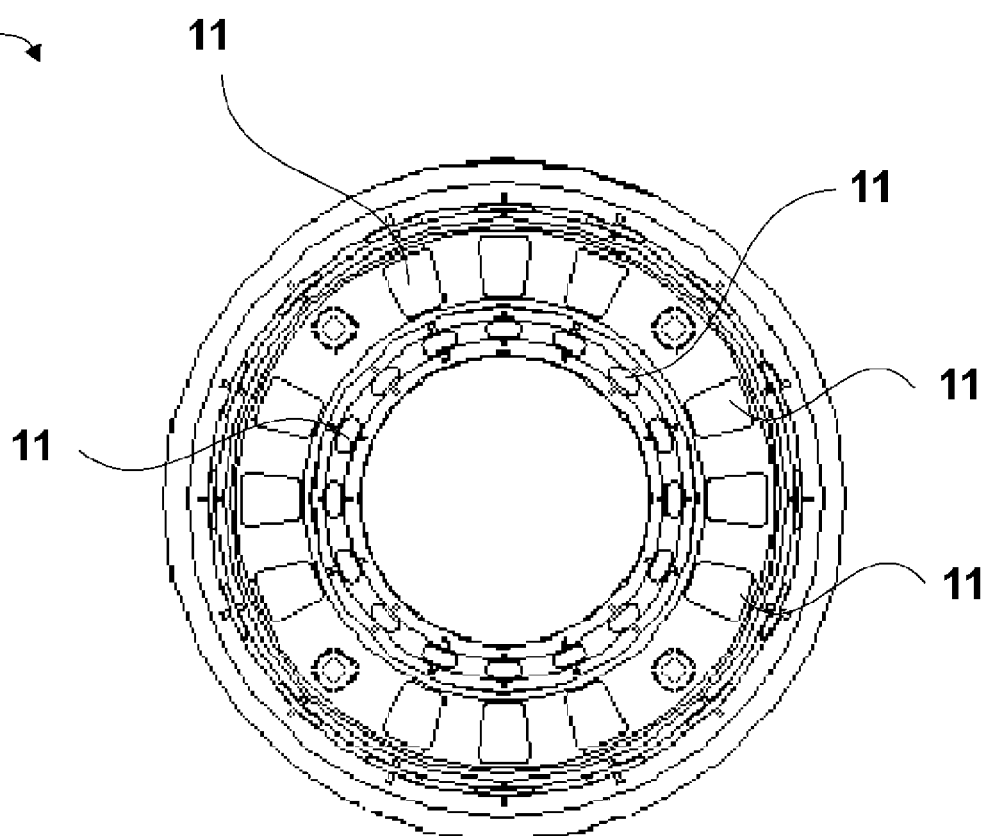


Fig. 11

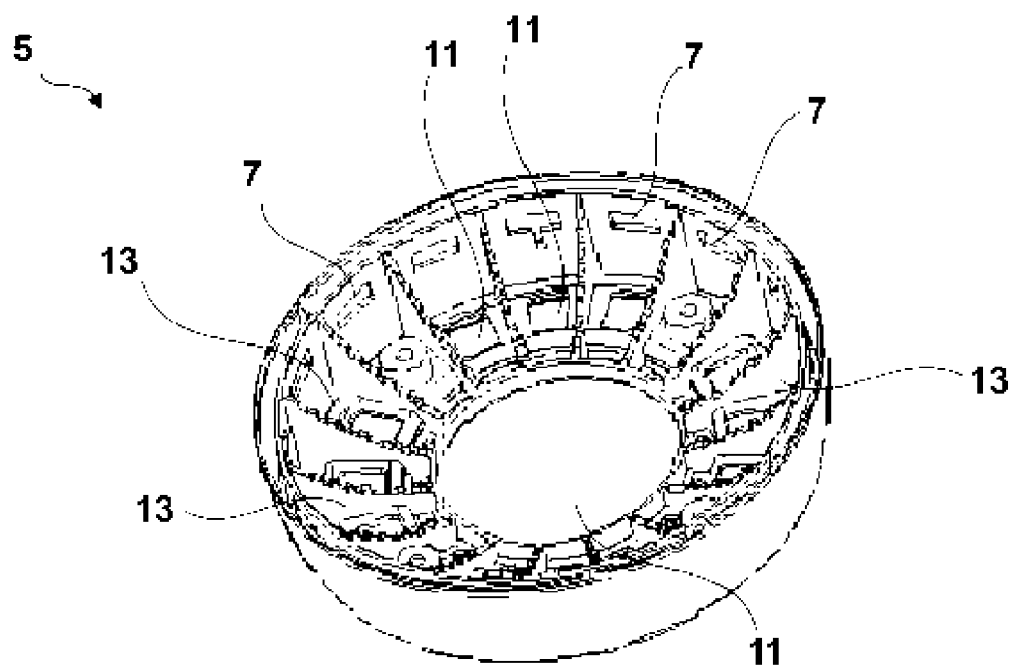


Fig. 12

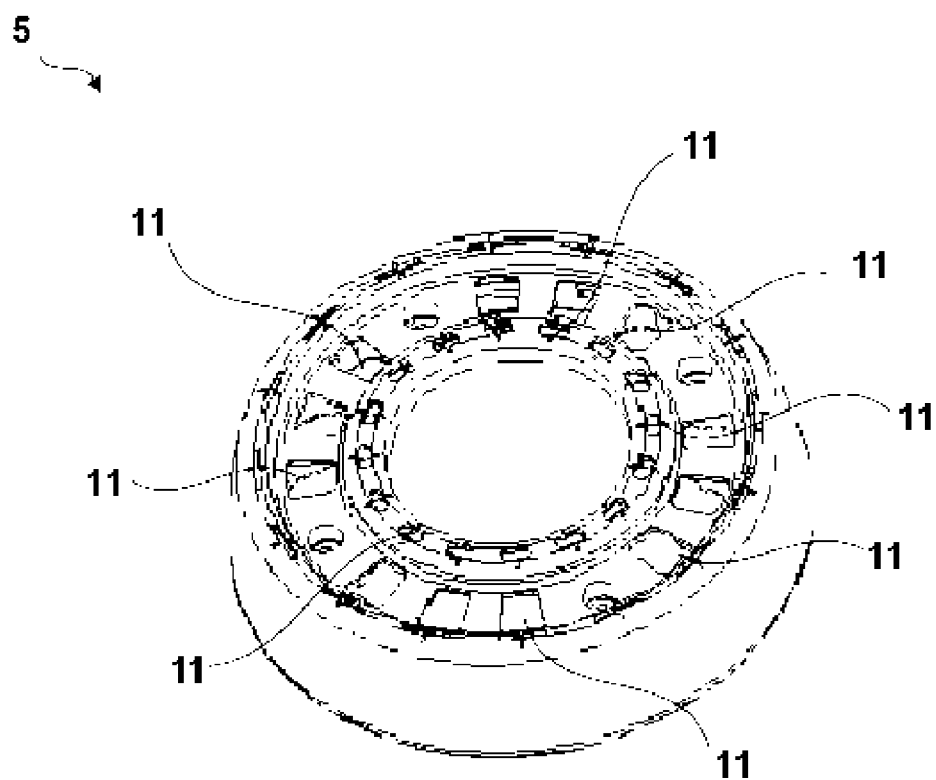


Fig. 13

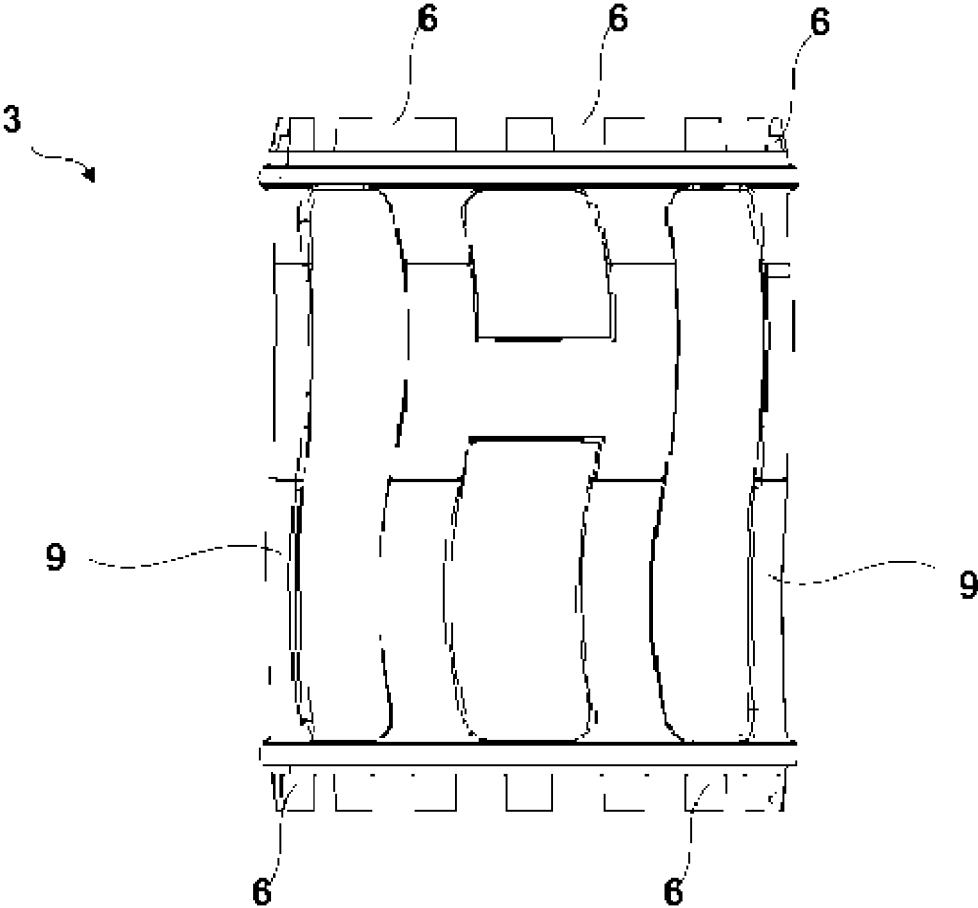


Fig. 14

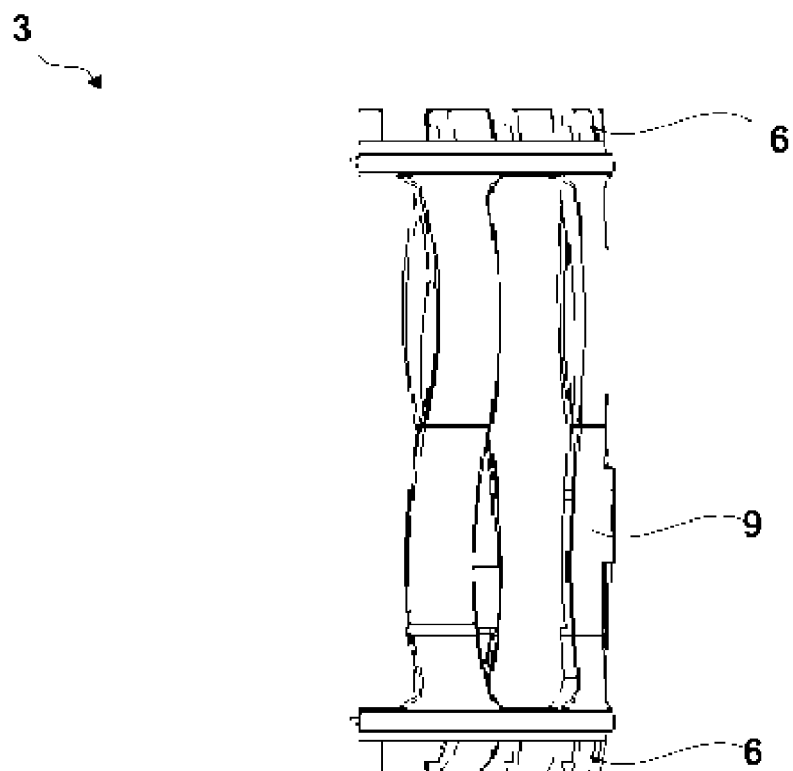


Fig. 15

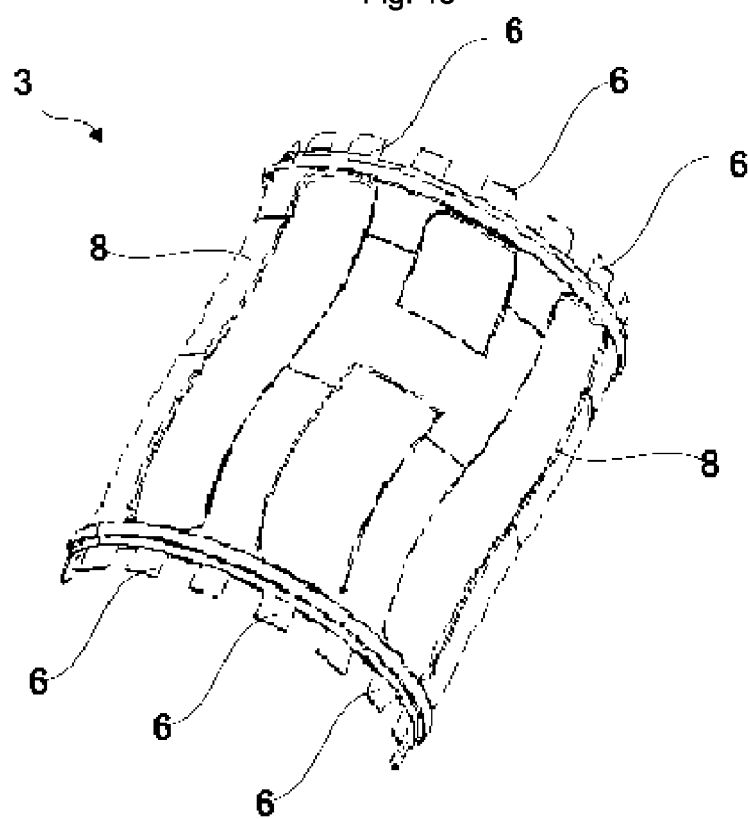


Fig. 16

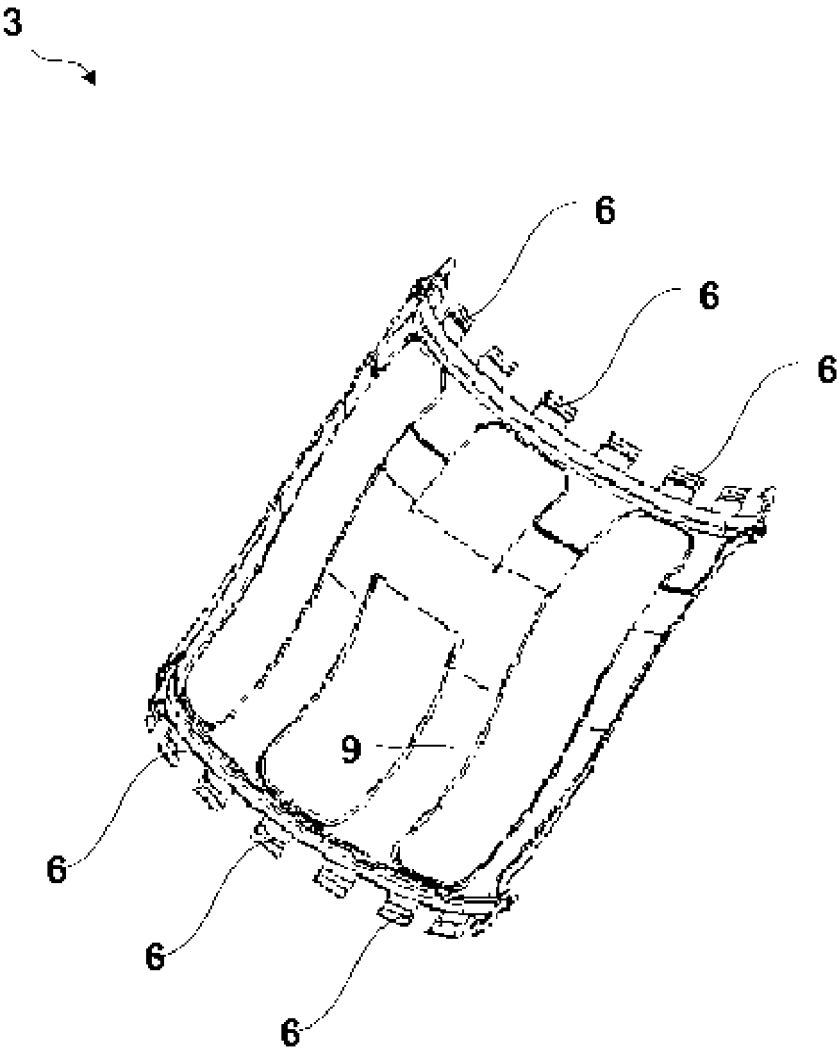


Fig. 17