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(54) Transport packaging element for a household-type washing machine

(57) Transport packaging element for a household-type washing machine, said element being constituted by at least two coaxial and elastically deformable parts (3, 4) that are mutually connected through flexible connecting means (2). One of these parts (3) is adapted to be retained between a zone (5) of the loading door (6) and the rotating drum (8). In a preferred embodiment of the invention, the other one of said parts (4) is adapted to be retained between another zone (9) of the same loading door (6) and the outer casing (12) of the washing machine, said two parts having preferably a toroidal shape in such a case.

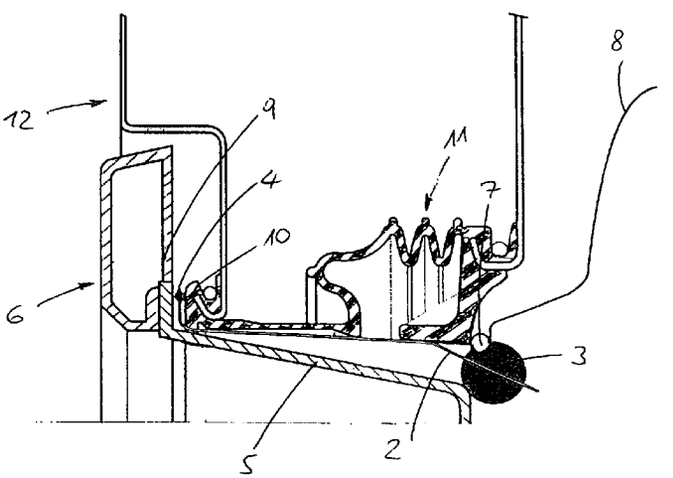


Fig. 2

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Description

The present invention refers to a transport packaging element that is capable of preventing the suspended washing assembly of the washing machine from undergoing any displacement with respect to the outer machine casing during handling and transport of the same machine from the end of the production line at the factory through to the installation site thereof.

While the general term "household washing machine" is used throughout this text, it will be appreciated that, further to rotating drum, front or top loading washing machines, such a term is intended to also mean and include clothes tumble driers and the so-called washer-driers.

Traditionally, a washing machine is contituted by a series of various sub-assemblies, one of which, a stationary one, comprises the load-bearing structure and the outer casing of the machine and another one, generally termed "washing assembly", "suspended assembly" or even "oscillating assembly" in the art, comprises in particular the rotating drum accomodating the washload, along with the driving motor thereof. The door that closes the aperture provided to load the clothes into the rotating drum is hinged on to the outer casing. The washing assembly is supported elastically by the stationary subassembly of the washing machine since it is subject to continuous, repeated oscillations during the operation of the machine. The transport packaging must therefore include means that are capable of locking the washing assembly in position during all handling and transport operations that the machine undergoes starting from the end of the production line through to the installation site thereof at the user's home, in view of preventing any damage from occurring, such as for example due to said washing assembly impinging against the outer casing.

A number of solutions have been hitherto proposed to ensure the above mentioned locking in position of the washing assembly before the installation of the washing machine. These for instance include the arrangements being a part of the transport packaging, which are described in the patent documents DE-A-25 27 185 and IT-U-182 365.

All such arrangement that are generally used in the art, however, are rather complex in their nature, since they comprise a plurality of prevailingly metal component parts, such as screws, bolts, tie rods and the like, which, being generally purchased from different suppliers, require a careful, exacting management of the materials procurement service of the factory in which the washing machines are manufactured. In order to be removed from the washing machine after the latter has reached its installation site,so as to enable said machine to start operating regularly, such arrangements not only require the use of tools such as screwdrivers or the like, but also a certain dexterity, which the buyer/user not always possess, so that he/she may be forced to look for other people to help him/her in such task. Finally, the component parts of said arrangements are generally intended for disposal alter their use, ie. they generally end up in the waste dump, which obviously means a clear waste of resources from both an economic and a environment-protection point of view.

It therefore is a main purpose of the present invention to provide a transport packaging element which is capable of ensuring a most effective action in locking the washing assembly in position during all handling and transport operations that follow the production of the washing machine, said element being further capable of being quickly installed in the same machine at the manufacturing factory thereof, and being also capable of being removed without any problem at all alter the washing machine has reached its site of installation . A further purpose of the present invention is to avoid creating particular materials management problems at the factory where the washing machines are manufactured, since the above cited element is very simple in its construction. Still a further purpose of the present invention is to make it possible for said transport packaging element to be repeatedly reused, even several times, at said manufacturing factory owing to the fact that, upon being removed from a washing machine at the installation site thereof, said element can be most conveniently returend to the manufacturing factory, as this will be better explained further on.

According to the present invention, these and further aims are reached in a transport packaging element for washing machines having the features and characteristics as recited in the appended claims.

Anyway, the invention will be more readily and clearly understood from the description that is given below by way of non-limiting example with reference to the accompanying drawings, in which

- Figure 1 is a perspective, partially cut-off view of a first embodiment of the present invention;
- Figure 2 is a partial longitudinal-section view of a household washing machine in which the transport packaging element shown in Figure 1 is mounted to the afore cited purposes;
- Figure 3 is apartially cut-away perspective view of a second embodiment of the present invention;
- Figure 4 is a partial perspective view of a household washing machine in which the transport packaging element illustrated in Figure 3 is mounted to the afore mentioned purposes.

It should be noticed that a number of items and parts usually entering the construction of a washing machine of the afore cited kind are omitted both in the following description and the accompanying drawings, since they do not bear any direct relevance to the

present invention and are on the other hand generally known to those skilled in the art.

The first embodiment of the afore cited transport packaging element adapted to lock in place the washing or suspended assembly of a household washing machine essentially consists of a single piece, which is generally indicated at 1 in the drawings and comprises two coaxially arranged portions in the shape of toroidal rings 3 and 4, along with an intermediate portion 2 which serves the purpose of flexibly connecting said rings 3 and 4 to each other, in the form of a frustoconical surface (see Figure 1).

The toroidal rings 3 and 4 , the first of which can be noticed to have a considerably larger section than the second one, are made of an elastically deformable material, such as for instance closed-cell polyurethane foam having a density comprised between 75 and 100 kg/cu.m or elastomeric rubber. The above mentioned flexible portion 2 may for instance be made of rubberized fabric having an adequately sized thickness, eg. in the region of some tenths of a millimeter.

One among the possible methods that can be used to manufacture the element 1 includes the phase in which a plane length of rubberized cloth in the shape of a sector of a part of a circle ring which is generally known to constitute the development on a plane of a frustoconical surface. In a second phase of the above cited method, the polyurethane foamd is moulded, ie. injected over said length of rubberized cloth duly clamped inside a mould provided with two double cavities adapted to create the radial sections of the toroidal rings 3 and 4, which can best be seen in Figure 1, thereby obtaining a semi-processed part that comprises two "beads" in the form of concentric arcs of a circle made of elastically deformable material, which are connected to each other through a flexible material in the above cited form of a part of a circle ring. Of these beads, the one having a smaller development has a considerably larger cross-section than the other one.

In the subsequent and final phase of the manufacturing method, the two free ends of the first and the second bead, as well as the free edges of the rubberized cloth that are a part of the above mentioned semi-processed item, are connected to each other. This last phase of the manufacturing process can be carried out with the utilization of any appropriate technique that is known in the art for joining synthetic and similar materials, eg. by means of adhesive bonding or ultrasonic welding, so that no further explanation is felt to be necessary here.

Therefore, the so obtained element 1 according to the invention is a part that, as this has already been stated earlier, has a frustoconocal shape in which the thicker toroidal ring 3 is the circumferential edge of the smaller base and the thinner toroidal ring 4 is the circumferential edge of the larger base (see Figure 1). The element 1 is in this way ready for being mounted in a washing machine with a front-loading door as the latter is being packaged for transport after its assembly and final inspection and testing at the manufacturing factory.

As this is best shown in Figure 2, the dimensions and the mechanical properties of the materials of which the parts used in the construction of said element 1 are so selected as to ensure that, when it is mounted in the washing machine, it settles into following arrangement when the front-loading door 6 of the machine is shut: the thicker ring 3 remains elastically squeezed between the dome-shaped portion 5 of the door 6 and the circumferential edge 7 of the washing drum 8 which delimits the clothes loading aperture of the same drum. The thinner ring 4 remains elastically squeezed between the outer flange 9 of the same door 6 (to which the system, not shown in the Figure, for hinging the door on to the outer casing 12 of the washing machine is attached) and the circumferential edge 10 of the bellows-like gasket 11 that is attached to the front surface of the same outer casing 12.

The intermediate flexible portion 2 of the element 1 is able to extend along said bellows-like gasket 11, since it has the possibility of adapting itself to both the shape and the dimensions of the latter. Test carried out at the factory by the Applicant on a package arrangement inclusive of the above mentioned element 1 have demonstrated that such an element is actually capable of ensuring an effective protection against shocks to both the washing assembly and the outer casing of the machine during handling and transport of the washing machine up to its final installation site. In fact, the thicker ring 3 keeps the drum 8 separated from the loading door 6, while the thinner ring 4 keeps the same door 6 separated from the bellows-like gasket 11 and, as a result, from the outer casing 12.

The elastic deformability, the low weight, the absence of metal parts are as many features that make it much easier and convenient for the element 1 to be both assembled at the factory where the washing machines are manufactured and, of course, removed from the washing machine (so as to enable the latter to start operating regularly) at the site of installation thereof, even by a person that does not possess any particular dexterity or skill in this connection, and without any tool being actually required. All it takes to do that, in fact, is to open the loading door 6, pulling with the hand the thinner toroidal ring 4, which is situated in a conveniently exposed position on the front surface of the casing 12, outwardly in the direction shown by the arrow F1 or, practically, according to the axis of the door 6. The flexible connecting portion 2 between the two rings will in this way cause the thicker ring 3, which by this time is no longer pressed by the dome-shaped portion of the door 6, to separate from the edge 7 of the loading aperture of the washing drum 8 (see Figure 2).

At this point the buyer, alter having so removed the element 1 from the washing machine in which it was mounted, will find no problem at all in returning it back to the manufacturer or, anyway, the factory where said

washing machine was made. To this particular end, he or she will only have to follow the indications given by the manufacturer in connection with the optimum logistic flow, such directions calling for instance for a direct return by parcel post or a return by the intermediate cooperation of the shop that sold the machine. In all cases, it will in this manner be possible for the above described transport packaging element to be reused, even repeatedly, thereby obtaining considerable economic and environmental benefits, especially in the case of mass-produced machines (ie. hundreds of thousands machines manufactured each year).

A variant, not described in the following, but largely similar to the afore illustrated embodiment of the invention and capable of being used in washing machines having a quadrilateral loading door on their top, will feature the shape of a truncated pyramid, with toroidal rings that have a substantially square development. Furthermore, if required by particular needs, the toroidal rings that are a part of the elemnt 1 can be provided in a greater number than two.

The second embodiment of a transport packaging element capable of locking in place the washing assembly of a household washing machine comprises, as this is illustrated in Figure 3, a first portion constituted by a frustoconical hollow body 20, and a second portion constituted by a circular toroidal ring 30 having a substantially circular cross-section. Both portions 20 and 30 are made of a synthetic flexible material, such as for instance polypropylene without additives. The body 20 has a larger base in the shape of a flanged circular ring 21 and a smaller base 22 in the shape of a circular ring with three radial appendixes 23 extending on a transversal plane with respect to the axis X of the frustoconical body 20 and spaced by an angle of 120° from each other. Said bases 21 and 22 of the body 20 are parallel to and at a distance L from each other. The frustoconical side surface 24 of the body 20 is constituted by an array of strips 25 extending in an inclined manner with respect to the axis X and terminating at the bases 2 and 3, respectively, said strips being further separated from each other by interruptions 6 extending in the same way as the strips. The toroidal ring 30 (which is shown only partially in Figure 3 for reasons of greater clearness) is provided with a slit 31 extending along the inner circumference thereof so as to fit in the flanged portion of the larger base 21 of the same frustoconical body 20.

Figure 4 illustrates the manner in which the above described packaging element is mounted in a household washing machine with front loading door at the factory in which said machine is manufactured, during the packaging operations that are carried out after the assembly and the final inspection thereof, to the purpose of making it sure for the washing assembly of the same machine to be safely locked in place until the machine reaches its site of installation.

The washing assembly of a machine of the above mentioned kind comprises a rotating washing drum 40 formed by a front flange 41 with a central aperture 42 for loading the clothes thereinto, a rear flange 43 and a substantially cylindrical side surface 44. The clothes loading aperture 42 is delimited by the inner circular protruding edge 45 of the front flange 41. The rear flange 43, which is situated at a distance D from the front flange 41, is provided with a central trilobate press-stamped impression 46. The machine also comprises a porthole-like loading door 47 that is hinged on to the front surface of the outer casing (not shown) of the machine in a generally known manner and comprises a dome-shaped portion 48 associated to the loading aperture 42 of the drum 40.

The element for locking in place the washing assembly is introduced in the drum 40 through the eprture 42 by pushing it in the direction shown by the arrow F3 up to the point in which the radial appendixes 23 of the smaller base 33 of the frustoconical body 20 get into position between the lobes of the deep-drawn impression 46 of the rear wall 43, thereby preventing the hollow body 20 from falling inside the drum 40. At the same time, the toroidal ring 30 abuts against the protruding edge 45 of the front flange 41, which defines the aperture 42 of the drum 40. As a result, the length of the hollow body 20 undergoes a certain reduction from the initial value L thereof (see further above) down to the final value D, since the frustoconical surface 24 thereof undergoes an elastic deformation (torsion).

At this point, the loading door 47 is shut (as indicated by the arrow F2 in Figure 4), so that the dome-shaped portion 48 thereof is brought to intefere with the toroidal ring 30, thereby causing the latter to undergo an elastic deformation owing to the pressure that is exerted against the afore mentioned protruding edge 45. The toroidal ring 30 remains in this way retained between the drum 40 and the door 47 and is no longer able to come off. At the same time, the smaller base 22 of the frustoconical body 20 remains pressed against the rear flange 43 of the drum 40 (as indicated by the arrow F3) since the radial appendixes 23 thereof are retained by the trilobate deep-drawn impression 46 provided in the same flange 43. The desired effect in this way obtained of ensuring an effective protection of both the washing assembly and the outer cabinet against the risk of impinging against each other during the subsequent handling and transport of the washing machine up to the installation site thereof.

Also this embodiment of the present invention, thanks to the elastic deformability of the parts involved, the low weight, the absence of metal parts, makes it particularly easy and convenient for the element to be not only mounted in the washing machine, as described above, at the factory, but also to be removed from the washing machine after the latter reaches the installation site thereof. Such a removal can in fact be carried out, without any use of tools, even by a person who does not possess any particular manual dexterity. All this person has in fact to do in this connection is to open the port-

hole-like door 47, remove the toroidal ring 30 from the protruding edge 45 of the drum 40 by separating it from the flange of the larger base 21 of the frustoconical body 20. The latter can at this point be removed from the drum 40 through the aperture 42 by pulling it in the opposite direction with respect to the one indicated by the arrow F3 (see Figure 4).

Once the two parts constituting the washing assembly locking arrangement according to the present invention, ie. the frustoconical body 20 and the toroidal ring 30, have been so removed from the washing machine, it is most easy for the purchaser to return them to the factory, or the shop, as this has already been described above.

It will be appreciated that also this embodiment of the present invention is open to variants, in particular in the case of top-loading washing machines. It will be further appreciated that, further to these variants, a number of other embodiments may be developed by those skilled in the art on the basis of the afore described innovative principles, which therefore do not depart from the scope of the present invention.

Claims

1. Transport packaging element for a household-type washing machine with an outer casing, a clothes loading door (6; 47) hinged on to said outer casing, and a washing assembly comprising a rotating drum (8; 40) adapted to be closed behind said loading door (6; 47), **characterized in that** it comprises two or more substantially coaxial parts (3, 4; 22, 30) that are joined to each other through flexible connection means (2; 24), at least a first, elastically deformable part (3; 30) of the element being adapted to be retained between said loading door (6; 47) and said rotating drum (8; 40) so as to prevent said washing assembly and said outer casing from impinging against each other during handling and transport of the washing machine from the end of the production line at the factory up to the site of installation thereof.

2. Transport packaging element according to claim 1, **characterized in that** said first elastically deformable, toroidally shaped part (3) is adapted to remain elastically squeezed between a first portion (5) of said loading door (6) and the edge (7) of the loading aperture of the rotating drum (8), and that a second, equally elastically deformable and toroidally shaped part (4) thereof is adapted to remain elastically squeezed between a second portion (9) of said loading door (6) and the outer casing (12) of the washing machine.

3. Transport packaging element according to claim 2, **characterized in that** said first toroidal part (3) has a larger cross-section area and a smaller perimetral development than said second toroidal part (4).

4. Transport packaging element according to claim 2 or 3, **characterized in that** said first portion (5) of the loading door (6) is the one protruding towards the interior of the rotating drum (8), while said second portion (9) is the one to which the hinging system of the same loading door on the outer casing (12) of the washing machine is attached.

5. Transport packaging element according to any of the preceding claims 2 to 4, **characterized in that** said two elastically deformable parts (3, 4) have a circulare development in the case of a washing machine with its loading door on the front, and a substantially square development in the case of a washing machine with its loading door on top.

6. Transport packaging element according to any of the preceding claims, **characterized in that** said flexible connection means (2) between said elastically deformable parts (3, 4) are constituted by a length of rubberized cloth or similar material having the shape of a frustum of cone in the case of a washing machine with front loanding door, and having the shape of a truncated pyramid in the case of a washing machine with top loading door.

7. Transport packaging element according to claim 1, **characterized in that** a second part (20) thereof is an elongated body, a first extremity (22) of which is adapted to be pressed against a zone (43) of the drum (40) that is diametrically opposed to the aperture (42) closed by said loading door (47), in a manner that the distance between said first part (30) and said extremity (22) of the second part (20, 30) is elastically reduced from the initial value (L) thereof to the distance (D) between the loading aperture (42) and said diametrically opposite zone of the drum (8).

8. Transport packaging element according to claim 7, **characterized in that** said first part (30) consists essentially of a toroidal ring which, provided with a slit (31), extends along the inner periphery thereof and is adapted to accomodate the flanged zone of a second extremity of said second part (20) of the element,

9. Transport packaging element according to claim 8, **characterized in that**, when the washing machine is of the kind with a front loading door (47), said second part (20) thereof has the shape of a frustum of cone and its flexible surface (24) consists of a plurality of strips (25) extending according to an inclined pattern with respect to the axis (X) and separated from each other by interruptions (26) following the same inclined pattern as the strips.

10. Transport packaging element according to claim 9, **characterized in that** said first extremity of said second part thereof is provided with a plurality of radial appendixes (23) that are adapted to be retained by a plurilobate deep-drawn impression (46) provided in the zone (43) of the drum (40) which is diametrically opposed to the aperture (42) closed by said loading door (47).

11. Transport packaging element according to any of the preceding claims, **characterized in that** it is adapted to be removed by hand from the washing machine, alter the latter has reached its installation site, and to be then returned to the manufacturing factory in view of being subsequently reused.

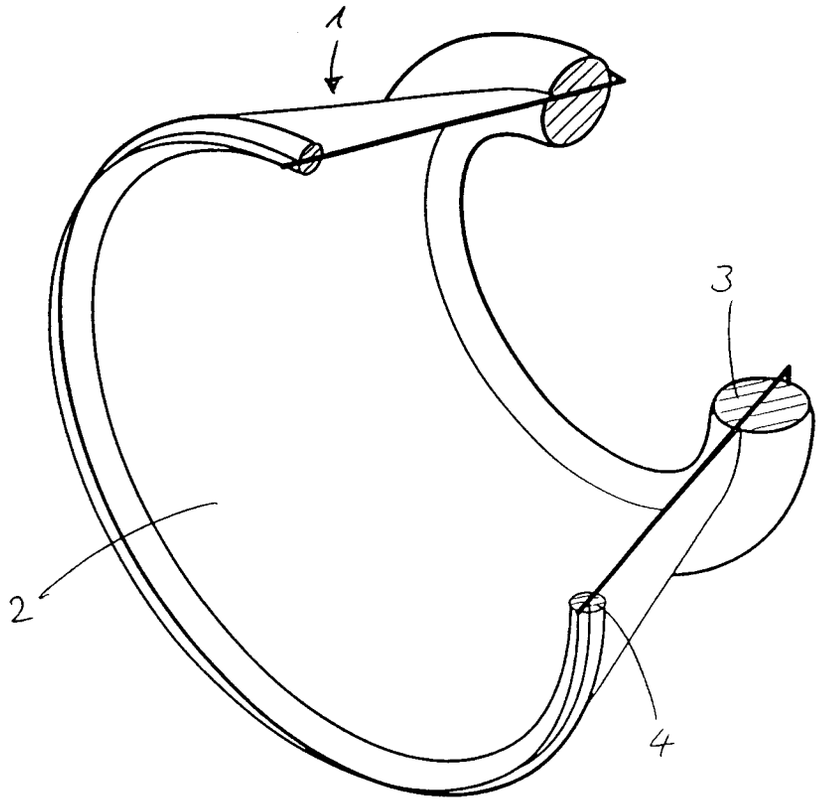


Fig. 1

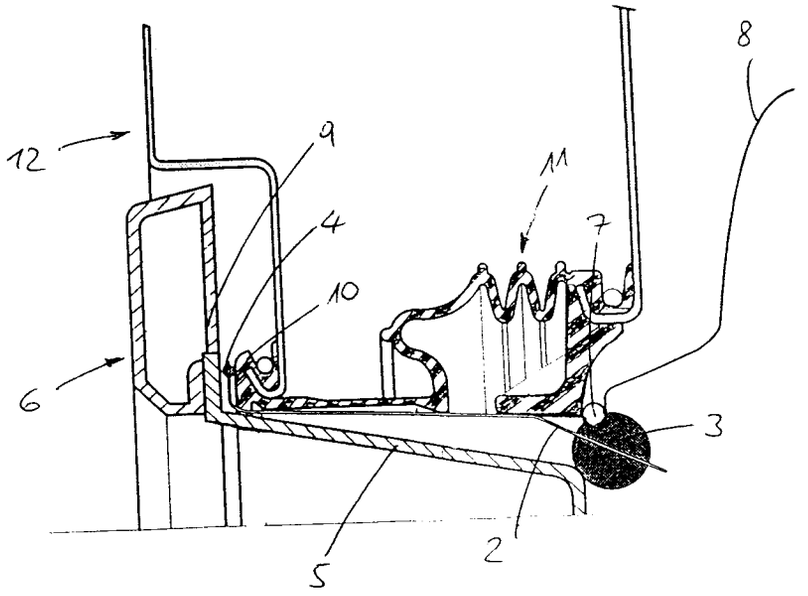


Fig. 2

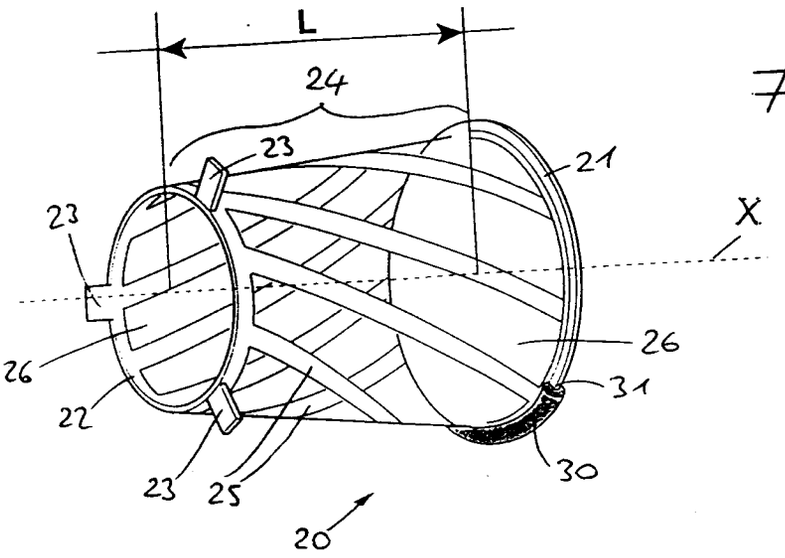

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Fig. 3

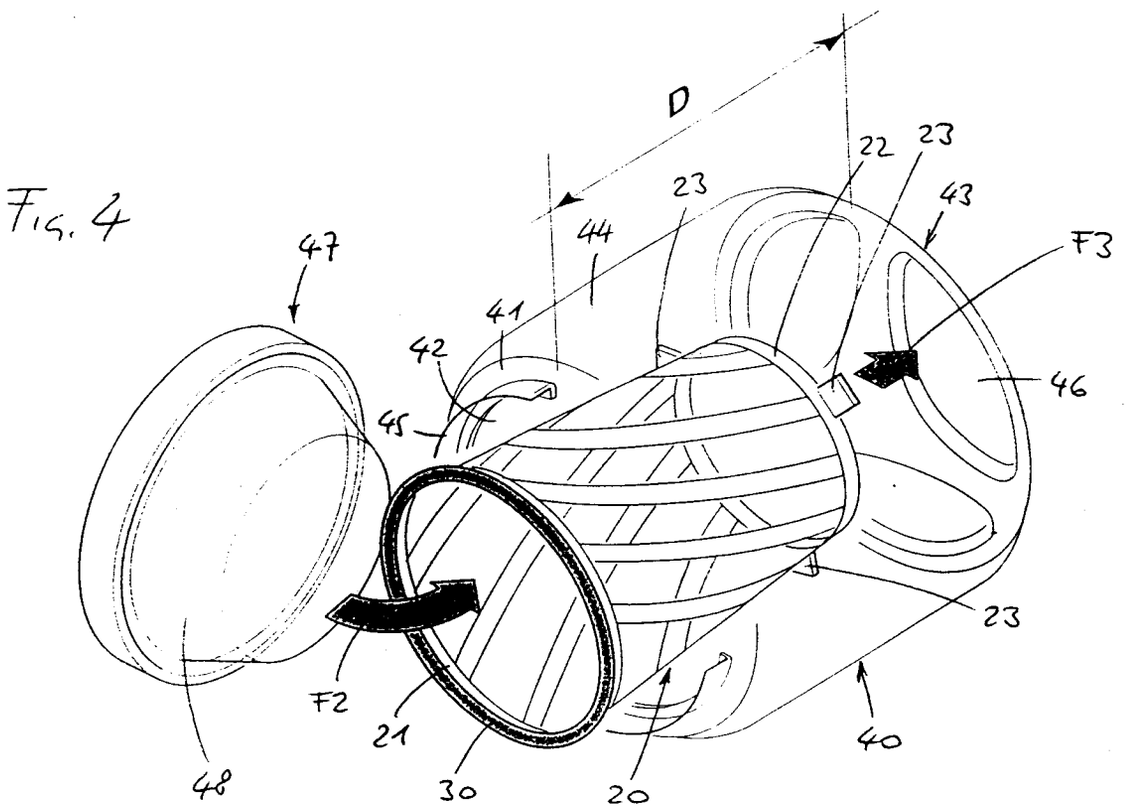

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Fig. 4