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# (54) LAUNDRY TREATMENT MACHINE

WÄSCHEBEHANDLUNGSMASCHINE

MACHINE DE TRAITEMENT DU LINGE

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## Description

**[0001]** The present invention relates to a laundry treatment machine (also called laundry machine) for washing and/or drying laundry.

**[0002]** In the present application, the laundry machine can be a laundry washing machine (or simply washing machine) or a laundry drying machine (or simply dryer) or a laundry washing-drying machine (or simply washer/dryer, i.e. a laundry machine which can both wash and dry the laundry).

**[0003]** A laundry treatment machine typically includes a cabinet wherein the processing chamber for housing the laundry to be treated is housed, and a door or porthole for providing access to and tightly closing the chamber.

**[0004]** In the case of a washing machine or a washer/dryer, the chamber is usually a drum, rotatably mounted within a washing tub. In the case of a dryer, the chamber is usually a rotatable drum, there being air circulation ducts, a heater, and a blower for circulating heated air in the ducts and in the chamber.

**[0005]** The porthole is mounted to the cabinet, typically hinged to the cabinet, so as to rotate between an open position wherein access to the chamber is provided, and a closed position wherein the chamber is tightly closed.

**[0006]** In the case of a front-load, horizontal-axis machine arranged on a horizontal supporting plane, the porthole is usually hinged about a vertical axis, the hinge being usually arranged across a horizontal centerline or median plane of the porthole.

**[0007]** The porthole may be reversible from a left hinge condition to a right hinge condition.

**[0008]** The porthole usually has a handle to be gripped by a user.

**[0009]** The porthole usually has a lock suitable to block / unblock the porthole to the cabinet of the laundry treatment machine.

**[0010]** There are known portholes provided with a finishing portion distinct from a closure portion or subassembly. The closure portion actually has the function of closing - and opening- the laundry treatment chamber. The finishing portion does not interact with said chamber, and plays no role in its actual closure. Thus, the porthole is fully operative even when the finishing portion is not assembled with the closure portion.

**[0011]** The closure portion of the porthole is the portion of the porthole that is actually mounted to the cabinet, typically hinged to it.

**[0012]** The finishing portion of the porthole is, conversely, associated with and more in particular borne by the closure portion.

**[0013]** According to the invention, the closure portion comprises a frame assembly, the frame assembly comprises at least one frame, and the closure portion further comprises a bowl.

**[0014]** In the present description and in the attached claims, "bowl" has to be read as a protective element having the function, together with the rest of the closure portion of the porthole, of tightly closing the processing chamber of the machine and, preferably (if this bowl is transparent of partially transparent), to at least partially allow to see the internal of the chamber for treating laundry when the porthole is closed; therefore the bowl may be made of glass, but also of different material (e.g. plastic material), and it may be transparent, opaque, or partially transparent.

**[0015]** According to the invention, the frame assembly comprises an outer frame, and an inner frame, and the bowl is sandwiched between the outer and inner frames.

**[0016]** As used in the present description and in the attached claims, terms "outer" and "inner", and "outwards" and "inwards" refer to the cabinet or the laundry treatment machine, and in the closed condition as far as the porthole is concerned.

**[0017]** Terms "radial", "radially inner", "radially inwards", "radially outer" and "radially outwards" refer to the axis of rotation of the processing chamber, when the porthole is closed.

**[0018]** The bowl is is clamped between the outer frame and the inner frame, because the outer frame and the inner frame are so fixed to each other as to be pressed one towards the other. In the case of a circular porthole, the inner and outer frames are generally annular, and the bowl is generally circular.

**[0019]** In the present description and in the attached claims, "generally" or "essentially"or "substantially" means in disregard of specific instances and with regard to an overall picture.

**[0020]** Thus, e.g, "substantially flat" means that a wall may depart slightly or locally from a flat configuration, still being prevailingly flat or essentially two-dimensional.

**[0021]** The bowl is generally cup-shaped, having a flange retained between the frames, and protruding towards the inner of the laundry machine.

**[0022]** The finishing portion of the porthole may comprise an essentially disc shaped cap, or a finishing ring.

**[0023]** The disc shaped cap may e.g. be made of transparent or non-transparent plastics, and is usually arranged in an outer position with respect to the bowl. It may be provided e.g. so that the bowl - that may reach high temperatures during operation of the laundry treatment machine - cannot be touched.

**[0024]** The finishing ring may also be made of transparent or non-transparent plastics, but in principle also of metal. The finishing ring may have an aesthetical function. E.g., the finishing ring may be aesthetically particularly attractive, such as being of a superior quality plastics, being colored, having a glazed surface, a textured surface, etc.

**[0025]** Each of the disc shaped cap and the finishing ring of the known portholes is generally fixed to a frame of the closure portion through glueing, screws, and / or other coupling means.

**[0026]** WO2012153261 discloses a front-loading washing machine door that includes an annular door frame, a plastic frame cover covering the door frame, and

a circular window component with an edge held between the door frame and the frame cover, wherein the door frame and the cover are bound by means of fastening elements. The fastening element has a bonding element that is made/bonded integrally as a single piece with the frame cover, and one end of the bonding element, which protrudes through an aperture in the door frame opposite the frame cover, is widened toward the aperture edge, forming a head fastening the door frame by a form-fitted connection.

**[0027]** US2011025178 discloses a door frame for a door assembly of a household appliance including a housing having an opening, a tub disposed inside the housing, the door assembly having a see-through portion, being pivotably coupled to the housing and movable between an open and a closed position, and including a front ring and inner ring, wherein the door frame includes a front face having an outside edge and inside edge, wherein the inside edge defines an opening in the front face that substantially corresponds to a shape of the opening of the housing, a rear face on an opposite side of the door frame from the front face, a plurality of first fastening points spaced around the door frame for coupling the door frame to the inner ring, and a plurality of second fastening points spaced around the door frame for separately coupling the door frame to the front ring.

**[0028]** The object of the invention is to provide an alternative means for fixing the finishing portion to the closure portion of the porthole.

**[0029]** A further object of the invention is to provide a laundry treatment machine having a porthole with a good appearance.

**[0030]** An additional object of the invention is to provide a cost-effective, easy and reliable assembly method of the porthole.

**[0031]** Applicant has found that through rivet-like fasteners, the finishing portion can be assembled in an easy and reliable way to the closure portion of the porthole, without the need of complicated, expensive and/or additional connection means.

**[0032]** In a first aspect, the invention relates to a laundry treatment machine comprising a cabinet housing a chamber for treating laundry, and a porthole movable between an open position for providing access to the chamber and a closed position for closing the chamber, wherein said porthole comprises:

- a closure portion having the function of closing and opening the chamber, said closure portion being mounted to the cabinet, wherein said closure portion comprises an inner frame facing said cabinet and an outer frame on the side opposite said cabinet when said porthole is in closed position, and a bowl sandwiched between said inner frame and outer frame, wherein said porthole further comprises:

- a finishing portion associated with the closure portion, wherein said finishing portion is fixed to said outer frame through at least one rivet-like fastener placed in an internal chamber defined by the closure portion, wherein said internal chamber is defined by said inner frame and said outer frame.

**[0033]** Under rivet-like fastener associated with two components it is meant a connection device comprising an inserting portion provided on a first component, said inserting portion being inserted in an opening provided on a second component so that, in its inserted position, the inserting portion extends beyond said opening with its extremity, and said extremity being deformed enlarging its cross section, at least partially overlapping the radial periphery of the opening, preventing the extraction of the inserting portion from the opening, and so preventing the disassembly between the first and the second component.

**[0034]** The provision of rivet-like fasteners between the finishing portion and the closure portion provides a secure, simple, cost-effective and durable coupling of the two portions.

**[0035]** The provision of rivet-like fasteners between the finishing portion and the closure portion does not run the risk of a serious failure of the porthole in case of breakage of the fasteners because they affect the finishing portion assembly only, and said finishing portion doesn't interact with the laundry treatment chamber.

**[0036]** The component(s) of the finishing portion is(are) distinct from the component(s) of the closure portion.

**[0037]** The finishing portion is preferably borne by the closure portion.

**[0038]** The laundry treatment chamber is preferably rotatable about a rotation axis.

**[0039]** The or each rivet-like fastener preferably comprises a first element associated with the closure portion, and a second element associated with the finishing portion.

**[0040]** Preferably the first element is integrated on or integral with the closure portion.

**[0041]** In the present description and in the attached claims, "integral with" means "made as one piece with".

**[0042]** Preferably the second element is integrated on or integral with the finishing portion.

**[0043]** More preferably the or each rivet-like fastener comprises a stud protruding from, and even more preferably integral with, the finishing portion, and a hole provided at, and even more preferably formed in, the closure portion, the stud being inserted within, and riveted or upset at the hole.

**[0044]** The stud is preferably sized for insertion within and protrusion from the hole in an initial, non-riveted condition, and is riveted or upset at the hole in a mounted condition.

**[0045]** The hole is preferably made in a bushing protruding from, and more preferably integral with, the closure portion.

**[0046]** As an alternative, the hole may be made in an insert that protrudes, or not, from the closure portion. The insert may be inserted within a bigger hole formed in the closure portion.

**[0047]** Preferably the bushing protrudes inwards from a wall of a component of the closure portion, and has a free end.

**[0048]** Preferably the stud protrudes inwards from a wall of a component of the finishing portion, and has a free end.

**[0049]** In the present invention and in the attached claims, "free end" is meant to indicate the end opposite that on the side of the wall.

**[0050]** Preferably in the riveted, mounted condition, the free end of the stud has a head having a bigger cross-section than the hole, so that the stud is retained in the hole.

**[0051]** Preferably the mounted condition of the rivet-like fastener is obtained through a plastic deformation of the free end of the stud.

**[0052]** More preferably the plastic deformation is obtained by a rotary tool.

**[0053]** The rotary tool preferably presses the free end of the stud against the hole.

**[0054]** By such a rotary tool, the stud is heated by friction, and eventually deformed.

**[0055]** Even more preferably, the plastic deformation is obtained by a non-heated rotary tool.

**[0056]** As an alternative, the plastic deformation may be obtained by a heated tool, rotary or stationary.

**[0057]** Preferably, the hole is countersunk.

**[0058]** Alternatively or additionally, the free end of the bushing may have a collar protruding away from a longitudinal axis the bushing.

**[0059]** The hole may have a tapering insertion end, a countersunk at the free end of the bushing, and preferably an intermediate length of a constant cross-section.

**[0060]** Preferably, the hole has a circular cross-section, and the stud has a circular outer cross-section, but they may have differently shaped -and matching- cross-sections, such as square, hexagonal or triangular cross-section, or a cross-section in the shape of a circle having a sector removed, so as not to allow rotation of the finishing portion with respect to the closure portion about the fastener.

**[0061]** Preferably the stud is sized for insertion within the hole without slack.

**[0062]** More preferably the stud is sized to be force fitted within the hole.

**[0063]** Preferably a longitudinal blind hole extend within the stud.

**[0064]** Preferably said at least one rivet-like fastener comprises a plurality of rivet-like fasteners, comprising at least two, more preferably at least three, and even more preferably at least four rivet-like fasteners.

**[0065]** Preferably said rivet-like fasteners are arranged along a closed line proximal to an outer periphery of the porthole, such as along a circumference concentric with, and radially inner to, the circumferential radially outer edge of the porthole in the case of a circular porthole.

**[0066]** In one alternative embodiment, the rivet-like fasteners are equally spaced apart.

**[0067]** In a further alternative embodiment, the rivet-like fasteners are not equally spaced apart.

**[0068]** The rivet-like fasteners are preferably all equal to one another, though they might differ in shape and/or size.

**[0069]** According to the arrangement and/or shape and/or size of the rivet-like fasteners, the finishing portion may only have one or a selected number of arrangements with respect to the closure portion.

**[0070]** According to the invention, the closure portion comprises at least one frame and a bowl fixed to said at least one frame.

**[0071]** According to the invention, the closure portion comprises an inner frame facing the cabinet, an outer frame on the side opposite the cabinet when the porthole is in closed position, wherein a bowl is sandwiched between said inner and outer frame. Moreover, according to the invention, the finishing portion is fixed to the outer frame.

**[0072]** In this way, the rivet-like fastener(s) is(are) sheltered by the inner frame and hidden to view.

**[0073]** According to the invention, the rivet-like fastener(s) is (are) placed in the internal chamber defined by the closure portion, said chamber being defined by the inner frame, the outer frame and the bowl of said closure portion.

**[0074]** Preferably, the closure portion comprises a seat for receiving the finishing portion.

**[0075]** Preferably, the closure portion comprises a seat for housing the finishing portion. In one alternative embodiment, the finishing portion comprises a finishing disc shaped cap.

**[0076]** The finishing disc shaped cap may be made in any of the above mentioned materials, as well as in a shock-absorbing material.

**[0077]** The finishing cap may also comprise a radially inner portion made of transparent or at least partly transparent material, so as to allow the inner of the laundry processing chamber to be seen therethrough, and an opaque annular portion radially outer to the radially inner portion, that conceals functional features, such as the rivet-like fastener(s).

**[0078]** According to a further alternative embodiment, the finishing portion comprises a finishing ring.

**[0079]** Preferably, the finishing portion comprises both a finishing disc shaped cap and a finishing ring.

**[0080]** The finishing ring may be made in any of the above mentioned materials.

**[0081]** In embodiments, the seat for housing the finishing portion may be unique for alternatively housing a finishing disc shaped cap or a finishing ring.

**[0082]** Preferably the finishing ring is so sized and housed within a seat of an outer frame of the closure portion as not to protrude from the outer frame.

**[0083]** The finishing ring may alternatively slightly protrude outwards from the closure portion, and may be made in a shock-absorbing material.

**[0084]** In an aspect, the invention relates to a porthole for a laundry treatment machine as disclosed above.

**[0085]** In another aspect, the invention relates to a method of assembling a laundry treatment machine according to independent claim 12.

**[0086]** Preferably, the or each of the rivet-like fastener comprises a stud protruding from the finishing portion, and a hole provided at the closure portion, wherein the step of fixing the finishing portion to the closure portion comprises the steps of:

- inserting the stud within the hole in an initial, non-riveted condition, and
- riveting said stud at the hole in a mounted condition.

**[0087]** Preferably, the step of riveting comprises plastically deforming a free end of the stud.

**[0088]** According to a preferred embodiment of the invention, the at least one rivet-like fastener is on a position so that, on the assembled state of the finishing portion on the closure portion, it is contained inside a chamber defined by said inner frame, said outer frame and said bowl.

**[0089]** More preferably said step of plastically deforming is carried out through a rotary tool and/or a heated tool.

**[0090]** Preferably said at least one rivet-like fastener comprises a plurality of rivet-like fasteners, said step of inserting the stud of each rivet-like fastener within the hole of the or the same rivet-like fastener comprises aligning the stud of the or each rivet-like fastener with the hole of the or the same rivet-like fasteners, and simultaneously inserting the studs of all rivet-like fasteners within the holes of the corresponding rivet-like fasteners, so that the finishing portion snaps towards the closure portion.

**[0091]** Further features of the mounting method are similar to those disclosed in connection with the laundry treatment machine.

**[0092]** Features and advantages of the present invention will be more readily understood from the following detailed description of some advantageous embodiments thereof, which is provided below by way of non-limiting example with reference to the accompanying drawings, wherein:

- FIG. 1 shows a perspective view of a laundry treatment machine, wherein a porthole of the laundry machine is closed;
- FIG. 2 shows a front view of a first embodiment of a porthole of a laundry treatment machine according to the invention
- FIG. 3 shows a cross-sectional view of the porthole taken along line A-A of FIG. 2;
- FIG. 4 shows a cross-sectional and partially broken away view of the porthole shown in FIG. 2, in a mounted condition;
- FIG. 5 shows a cross-sectional and partially broken away view of parts of the porthole shown in FIG. 2, during assembly thereof;
- FIG. 6 shows a front view of a second embodiment of a porthole of a laundry treatment machine according to the invention;
- FIG. 7 shows a cross-sectional view of the porthole taken along line A-A of FIG. 6;
- FIG. 8 shows a cross-sectional and partially broken away view of the porthole shown in FIG. 6, in a mounted condition and
- FIG. 9 shows a cross-sectional and partially broken away view of parts of the porthole shown in FIG. 6, during assembly thereof.

**[0093]** Like elements are denoted by like reference signs throughout the figures.

**[0094]** In FIG. 1 a laundry treatment machine 1 is shown in a perspective view. In the case shown, the laundry machine 1 is a laundry drying machine, but the laundry machine of the invention can be a washing machine or a washing-drying machine.

**[0095]** The laundry treatment machine 1 comprises a parallelepiped cabinet (or housing) 2. The cabinet 2 may be advantageously made of a frame covered by a metal sheet, e.g. a steel sheet.

**[0096]** Cabinet 2 houses a chamber 3 for treating laundry. The chamber 3, in the case shown of a laundry drying machine, is a drum rotatably mounted about a rotation axis RR. The drum may be supported by one or more rollers rotatably mounted on a supporting structure connected to the cabinet 2. Said one or more rollers can be provided either on one or both drum end regions, and are preferably idle rollers, i.e. rollers that rotate due to the rotation of the drum which is applied by a driving arrangement, such as an electrical motor and a transmission belt connecting the motor to the drum.

**[0097]** In the case of a washing machine or a washing-drying machine, the drum is rotatable within a tub. Said tub is usually suspended in a floating manner inside the cabinet by means of a number of coil springs and shock absorbers.

**[0098]** When the laundry treatment machine 1 is installed on the floor, in an operative position, like in the example shown in FIG. 1, rotation axis RR is substantially horizontal, but in a different advantageous embodiment rotation axis RR can be inclined, or also vertical.

**[0099]** The laundry treatment machine 1 shown in FIG. 1 is a front-loading machine.

**[0100]** As shown, the cabinet 2 of the laundry drying

machine 1 may advantageously include a pull-out condensate collecting tank 4, as well as a control panel 5. These components may be missing and/or other components may be present on the cabinet 2. In particular, in the case of a laundry dryer machine, cabinet 2 will further house -in a manner known *per se*- air circulation ducts, a heater, a drying air moisture condenser, and a blower for circulating heated air in the ducts and in the chamber 3, besides an electronic control unit. A panel 6 may be movable from the front of cabinet 2 to provide access to a part of said components.

**[0101]** In the case of a washing machine or a washing-drying machine, e.g., the pull-out condensate collecting tank 4 may be replaced by a drawer for a detergent, softening agent and/or other additives.

**[0102]** A porthole 7 for providing access to and tightly closing the chamber 3 is provided at a wall of the cabinet 2 (the front wall in the case shown), specifically at an opening of the cabinet 2 and at an opening of the chamber 3.

**[0103]** Alternatively, the porthole can provide to the first opening or closure of the access to the chamber, whereas the tightly closure is provided by an additional door provided between the laundry treatment chamber and the porthole.

**[0104]** A hinge (not shown) is provided to pivot the porthole 7 to the cabinet 2 so that it can be opened by rotating it, generally about a vertical axis in the configuration of the machine 1 shown in FIG. 1.

**[0105]** The hinge may be any conventional hinge, preferably of the type that is not visible when the porthole 7 is closed.

**[0106]** A handle (not visible) may be provided at the porthole 7, to be gripped by a user.

**[0107]** A lock (not visible) is provided between the porthole 7 and the cabinet 2 to block/unlock the former to the latter. The lock generally comprises a portion or first member fixed to the cabinet 2 and a portion or second, matching member fixed to the porthole 7 that cooperate with each other.

**[0108]** A sensor of the open/closed state of the porthole 7 may be provided - externally of or embedded within the lock - to issue a state signal to an electronic control unit of the laundry washing machine 1.

**[0109]** The porthole 7 may be reversible from a left hinge condition to a right hinge condition.

**[0110]** The porthole 7 shown in the figures and described herein has a circular shape, even though other shapes of the porthole are possible, such as square and rectangular.

**[0111]** A first embodiment of a porthole or door 7 is now better disclosed with reference to FIGs. 2-5.

**[0112]** Porthole 7 comprises a closure portion 8 or closure subassembly that actually has the function of closing - and opening - the laundry treatment chamber 3, and a finishing portion 9 that does not interact with the laundry treatment chamber 3. The finishing portion 9 does not contribute to the actual closing / opening of the laundry treatment chamber 3.

**[0113]** The closure portion 8 is the portion of the porthole 7 that is actually mounted to the cabinet 2 through the above mentioned hinge, or in other manners.

**[0114]** As will be better disclosed hereinbelow, the finishing portion 9 of the porthole is, conversely, associated to, more in particular borne by, the closure portion 8, and preferably is not directly mounted to the cabinet 2.

**[0115]** Finishing portion 9 may be provided in order to enhance the aesthetical appearance of the front side of the porthole 7, but may also be advantageous from a functional point of view, as will be better understood from the following description. Again, it has however no function in closing the chamber 3.

**[0116]** According to the invention, the closure portion 8 comprises a frame assembly comprising an inner frame 10 and an outer frame 11.

**[0117]** The inner frame 10 and the outer frame 11 are preferably made in any suitable plastic material, but may also be made of other materials, such as metal.

**[0118]** According to the invention, the closure portion 8 further comprises a bowl 12.

**[0119]** The bowl 12 is usually made of a transparent or partly transparent glass, but may be made in any other suitable material, even opaque.

**[0120]** As best seen in FIG. 3, bowl 12 is preferably generally convex towards the laundry treatment chamber 3 in the assembled condition of the porthole 7, and preferably has a portion 13 that protrudes inside the laundry treatment chamber 3 in the assembled condition of the porthole 7.

**[0121]** The bowl 12 is sandwiched between the inner frame 10 and the outer frame 11, as better disclosed hereinbelow.

**[0122]** The bowl 12 advantageously comprises a flange or circumferential rim 14 that extends radially outwardly, and is sandwiched between the inner frame 10 and the outer frame 11.

**[0123]** The shape of the bowl 12 can however depart from what shown.

**[0124]** Finishing portion 9 may be also made of any suitable material, for example plastic and/or metal, and usually is of a different material and/or surface finishing than the frame assembly.

**[0125]** E.g., finishing portion 9 may be of a superior quality plastics, may be colored, may have a glazed surface, a textured surface, etc.

**[0126]** The finishing portion 9 is preferably associated with, specifically fastened to the outer frame 11 as disclosed below. However, in different embodiments it can be fastened to the inner frame 10, or to any other part of the closure portion 8.

**[0127]** The finishing portion 9 of the embodiment now described comprises a finishing ring 15.

**[0128]** In the case of a circular porthole 7, the finishing ring 15 is preferably of annular shape, and it is preferably concentric with the frame assembly as shown in FIG. 2, so as to be centered on the drum rotation axis R-R, in

the closed condition of the porthole 7.

**[0129]** With particular reference to FIGs. 4 and 5, closure portion 8 of porthole is assembled in a manner known *per se*.

**[0130]** Typically, inner frame 10 and outer frame 11 are suitably securely fastened to each other, e.g. through at least one screw - not visible - passing through at least one internally threaded bushing 16. Any other fastening means may be used, such as snap pins, welding, glueing, rivets, nails, nuts and bolts, and similar.

**[0131]** Inner frame 10 comprises a generally annular wall 17 that faces the cabinet 2 in the closed condition of porthole 7.

**[0132]** Preferably, annular wall 17 defines a radially outer circumferential edge 18 and a radially inner circumferential edge 19 of inner frame 10.

**[0133]** More in detail, from radially outer circumferential edge 18 towards radially inner circumferential edge 19, annular wall 17 includes a first slanted portion 20, which adjoins a second portion 21; the second portion 21 is perpendicular to the rotation axis R-R in the closed condition of the porthole 7, and adjoins a third slanted portion 22; the third slanted portion 22 adjoins a fourth portion 23, which is parallel to the second portion 21.

**[0134]** Advantageously, the inner frame 10 further comprises a generally annular rim 24 that extends generally outwards from the generally annular wall 17, essentially in the direction of rotation axis R-R in the closed condition of porthole 7, near the radially outer circumferential edge 18.

**[0135]** Outer frame 11 preferably comprises a generally annular wall 25, that in the mounted condition of porthole 7 is substantially parallel to and spaced from generally annular wall 17 of inner frame 10 on the side opposite the cabinet 2 of the laundry treatment machine 1 when the porthole is in closed position. Generally annular wall 25 will be better disclosed below.

**[0136]** The outer frame 11 further comprises a circumferential radially outer rim 26 that extends generally inwards from the generally annular wall 25, essentially in the direction of rotation axis R-R in the closed condition of porthole 7.

**[0137]** In the mounted condition of the frame assembly, rim 24 of inner frame 10 is radially inner with respect to rim 26 of outer frame 11, but the *vice versa* may apply.

**[0138]** Rim 26, at its inner extremity, preferably comprises a notch 27 for locating and receiving the outer circumferential edge 18 of inner frame 10.

**[0139]** Thus, the frame assembly is essentially closed at its radially outer periphery, defining an internal chamber.

**[0140]** Circumferential radially outer rim 26 of outer frame 11 defines an outer circumferential edge 28 of outer frame 11.

**[0141]** The outer frame 11 further comprises a generally sloped wall 29 that extends radially inwards of, and generally inwards from, the generally annular wall 25.

**[0142]** More in detail, generally sloped wall 29 comprises an outer edge 30, a first slanted inner portion 31, a second slanted inner portion 32 having a different slope than the first slanted portion 31, and an inner rim 33 that extends for a short length essentially along the direction of rotation axis R-R in the closed condition of porthole 7 and defines the inner circumferential edge 34 of outer frame 11.

**[0143]** Ribs 35 may preferably be provided at either of inner frame 10 and outer frame 11 and are configured to improve the frame assembly stiffness as well as to assure the correct spacing between the inner and outer frames 10, 11.

**[0144]** The annular wall 17 of inner frame 10 at the circumferentially inner edge 19 and the inner rim 33 of outer frame 11 are spaced from each other in the direction lying along rotation axis R-R in the closed condition of porthole 7, so that a gap 36 is formed.

**[0145]** During assembly, the flange 14 of bowl 12 is sandwiched between the inner frame 10 and outer frame 11 at the gap 36.

**[0146]** Bowl 12 is more specifically just clamped between the inner frame 10 and the outer frame 11, namely held between them because the inner frame 10 and the outer frame 11 are so fixed to each other as to be pressed one towards the other.

**[0147]** Advantageously, the flange 14 of the bowl 12 is sandwiched within gap 36 between the fourth portion 23 of the generally annular wall 17 of the inner frame 10, and the end of inner rim 33 of the outer frame 11. In the assembled condition, a small gap 37 may be present between the radially inner circumferential edge 19 of inner frame 10 and the bowl 12 in order to accommodate a bowl 12 having high circularity tolerance.

**[0148]** The portion of bowl 12 that is radially inner to the inner circumferential edge 34 of outer frame 11 is preferably visible from the outside of the laundry washing machine 1, and the laundry treatment chamber 3 is therefore visible through bowl 12 when the latter is at least partly transparent.

**[0149]** The inner frame 10 may also be provided with centering protrusions 38 which aid in properly positioning the bowl 12 and/or the outer frame 11 during assembly.

**[0150]** It should be noted that the shape of the inner frame 10 and of the outer frame 11 may however depart even considerably from that shown and disclosed.

**[0151]** As mentioned, finishing portion 9 is associated to the closure portion 8.

**[0152]** A seat 39 is preferably provided in closure portion 8 for receiving the finishing portion 9.

**[0153]** Preferably, seat 39 is defined in outer frame 11, more preferably in generally annular wall 25 of outer frame 11 as shown.

**[0154]** In the shown preferred embodiment, seat 39 comprises at least one, and preferably two grooves 40, 41. The grooves 40, 41 are preferably circular and are arranged near the outer circumferential edge 28 of outer frame 11, and near the generally sloped wall 29 of outer frame 11, respectively.

**[0155]** Each groove 40, 41 has preferably a substantially C-shaped cross-section so as to have an essentially flat bottom 42, 43 and lateral walls 44, 45, 46, 47 extending essentially perpendicular to the bottom 42, 43 of the groove 40, 41. Any other cross-sectional shape of the grooves 40, 41 is however possible. It is noted that lateral wall 47 of groove 41 is longer than lateral wall 46.

**[0156]** Finishing portion 9, namely finishing ring 15 in the presently discussed embodiment, comprises a substantially flat annular wall 48.

**[0157]** Advantageously, finishing ring 15 comprises a radially inner and a radially outer edge which are bent inwards, thus forming rims 49, 50. Finishing ring 15 thus has an essentially C-shaped cross-section.

**[0158]** Rims 49, 50 are housed within grooves 40, 41, respectively, of seat 39 of the frame assembly. More in particular, rims 49, 50 preferably rest on the bottoms 42, 43 of grooves 40, 41.

**[0159]** However, seat 39 may also be otherwise shaped, and rims 49, 50 may be replaced by suitable means of the finishing portion 9 matching with the seat, or may be omitted. Furthermore, seat 39 may be altogether absent.

**[0160]** Preferably the outer edge 30 of generally sloped wall 29 of outer frame 11 protrudes slightly outwardly with respect to generally annular wall 25 of outer frame 11, so that the finishing ring 15 does not protrude outwards from the outer frame 11 when housed within seat 39. Preferably finishing ring 15 is flush with said outer frame 11.

**[0161]** According to the invention, the finishing portion 9 is fastened to the closure portion 8 of the porthole 7 through at least one rivet-like fastener 51. The finishing portion 9 is borne by closure portion 8.

**[0162]** Under rivet-like fastener associated with two components it is meant a connection device comprising an inserting portion provided on a first component, said inserting portion being inserted in an opening provided on a second component so that, in its inserted position, the inserting portion extends beyond said opening with its extremity, and said extremity being deformed enlarging its cross section, at least partially overlapping the radial periphery of the opening, preventing the extraction of the inserting portion from the opening, and so preventing the disassembly between the first and the second component.

**[0163]** More specifically, in the embodiment shown, the finishing portion 9 is fastened to the frame assembly of the closure portion 8, and preferably to the outer frame 11 of the porthole 7, through said at least one rivet-like fastener 51.

**[0164]** Preferably, there is a plurality of rivet-like fasteners 51, comprising two, three, or more rivet-like fasteners 51. Two such rivet-like fasteners 51 are visible in FIG. 3.

**[0165]** Preferably said rivet-like fasteners 51 are arranged along a closed line proximal to an outer periphery of the porthole 7, namely proximal to outer circumferential edge 28 of outer frame 11.

**[0166]** In embodiments, the rivet-like fasteners 51 are equally spaced apart, namely equally distributed along the periphery of the porthole 7. This allows for the finishing portion 9 to be rotated in a plurality of different positions with respect to the closure portion 8 corresponding in number to the number of rivet-like fasteners 51.

**[0167]** In other embodiments, the rivet-like fasteners 51 are not equally spaced apart, so that the finishing portion 9 may only assume less rotational positions with respect to the closure portion 8.

**[0168]** The rivet-like fasteners 51 are preferably all equal to one another, though they might differ in shape and/or size.

**[0169]** Preferably each rivet-like fastener 51 comprises a stud 52 provided on, preferably integral with, the finishing portion 9, and a hole 53 provided on, preferably formed in the closure portion 8.

**[0170]** The hole 53 is advantageously a non-threaded through hole.

**[0171]** The stud 52 preferably protrudes inwards from the annular wall 25 of finishing ring 15, and has a free end that is labeled 54 in FIG. 5 and 60 in FIG. 4 for reasons that will be clear below.

**[0172]** Free end 54 of stud 52 is preferably slightly beveled, to facilitate its insertion into hole 53.

**[0173]** The stud 52 is sized for insertion within the hole 53 in an initial, non-riveted condition, which is shown in FIG. 5.

**[0174]** The shown stud 52 is also sized so that its free end 54 protrudes from the hole 53 in the initial, non-riveted condition. According to the rivet-like fastener definition above explained, the free end 54 of the stud 52 represents the inserting portion extremity extending beyond the opening, the latter being the hole 53.

**[0175]** The hole 53 is more preferably made through a bushing 55, or holed protrusion 55, which is preferably integral with the closure portion 8. Alternatively, hole 53 may be made in an insert, that protrudes or not from closure portion 8.The insert may be inserted within a bigger hole formed in the closure portion.

**[0176]** Preferably the bushing 55 is integral with and protrudes inwards from generally annular wall 25 of outer frame 11, and has a free end 56.

**[0177]** The bushing 55 is preferably substantially tubular in shape.

**[0178]** The hole 53 is preferably countersunk.

**[0179]** Alternatively, the hole 53 might be counterbored. As another alternative, the free end 56 of the bushing 55 might have a collar protruding away from a longitudinal axis the bushing 55.

**[0180]** The hole 53 of the bushing 55 at the end 57 opposed to the free end 56 may also be tapered as shown, to facilitate the insertion of stud 52 thereinto.

**[0181]** Advantageously, the hole 53 is initially - at the outer end 57 at the annular wall 25 of outer frame 11 - comparatively large, then it narrows down to a minimum inner diameter, then it can have an intermediate length

58 of a constant diameter, and thereafter it widens again at the free end 56 of the bushing 55.

**[0182]** Preferably, the hole 53 has a circular cross-section, and the stud 52 has a circular outer cross-section. They may however have differently shaped -and matching-cross-sections, such as a square, hexagonal or triangular cross-section, or a cross-section in the shape of a circle having a sector removed, so as not to allow rotation of the finishing portion 9 with respect to the closure portion 8 about the fastener 51, even when there is a single fastener 51.

**[0183]** The bushing 55 can have any outer cross-sectional shape; in a preferred embodiment, however, the outer cross-sectional shape is circular.

**[0184]** Preferably, a hole 59 extends longitudinally along the stud 52. The stud 52 is therefore tubular.

**[0185]** More preferably, hole 59 is blind and in particular does not extend through the annular wall 48 of finishing ring 15, in such a way that blind hole 59 is not visible from the outside of the porthole 7.

**[0186]** Hole 59 may be slightly countersunk as shown.

**[0187]** The stud 52 is preferably sized so that it is inserted in the hole 53 without slack.

**[0188]** More preferably the stud 52 is sized to be force fitted within the hole 53.

**[0189]** The dimensions, the tolerances, and/or the above described conformation of the hole 53 and the stud 52, provide a snapping action when the stud 52 is inserted in the hole 53, and in particular when all studs 52 are initially faced at and aligned with the corresponding holes 53 of the rivet-like fasteners 51, and then the finishing portion 9 is pushed towards the closure portion 8 to insert the studs 52 into the holes 53.

**[0190]** After the insertion of the stud 52 in the hole 53, the free end of the stud 52, which is depicted as straight and labeled with reference number 54 in FIG. 5, is upset, or riveted, at the hole 53 so as to obtain the mounted or associated condition of the finishing portion 9, wherein it is securely fastened to the closure portion 8 and borne thereby. According to the rivet-like fastener definition above provided, the free end of the stud 52 acts as the free end of the insertion portion, that is deformed enlarging its cross section, at least partially overlapping the radial periphery of the hole 53, preventing the extraction of the stud 52 from the hole 53, and so preventing the disassembly between the finishing portion 9 and the closure portion 8.

**[0191]** The assembled condition of the porthole 7 is shown in FIG. 4. It may be seen that at the free end of the stud 52, in FIG. 4 labeled with reference number 60, a head is now formed having a bigger cross-section than the hole 53, so that the stud 52 is retained in the hole 53.

**[0192]** More in particular, the free end 60 of stud 52 is now flared and conforms to the countersunk of hole 53 at the free end 56 of bushing 55.

**[0193]** According to a preferred embodiment of the invention, the deformed free end 60 of the stud 52 is placed at a position so that, in the assembled state of the finishing portion 9 on the closure portion 8, it is contained inside the chamber defined by said closure portion 8, preferably defined by the inner frame10, the outer frame 11 and preferably the bowl 11.

**[0194]** To this end, a tool (not shown) engages the free end 54 of the stud 52 after the stud 52 has been fully inserted into hole 53 (FIG. 5), and plastically deforms it.

**[0195]** When stud 52 is provided with blind hole 59, a bit of the tool is advantageously inserted into the blind hole 59, thus ensuring a proper alignment between the tool and the stud 52.

**[0196]** The bit of the tool may be rounded, but is preferably pointed or conical.

**[0197]** Preferably, a rotary tool is used. The tool is preferably motorized, and it may be provided with a conical bit.

**[0198]** The rotary tool deforms the free end 54 of the stud 52, due to the rotary movement of said tool - as well as the pressure - towards the countersunk portion of hole 53.

**[0199]** Heat is thus generated through friction between the bit of the tool itself and the free end of the stud 52, thereby softening the material of the stud 52, until it is brought beyond its yield point.

**[0200]** Pressure of the rotary tool against the free end of stud 52 towards the free end 56 of bushing 55 may contribute to softening the material of stud 52.

**[0201]** The free end of the stud 52 is thus deformed against the wall about hole 53, e.g. is deformed into the flared shape that conforms to the countersunk of hole 53 of bushing 55 shown in FIG. 4.

**[0202]** The rotary tool may conveniently be a non-heated tool, thus avoiding any risk of burn.

**[0203]** Alternatively, the tool may be heated. When the tool is heated, it may also be stationary.

**[0204]** In the alternative embodiment where the stud / insertion portion is not provided with a blind hole, resulting in a non-tubular stud / portion, different known tools can be advantageously used for deforming the free extremity of said stud / insertion portion; for example, it can be used a tool imparting an axial pressure toward the stud / insertion portion, allowing the deformation of said end; preferably, said deformation can be improved by a suitable tool shape (i.e. a dome shape) and / or by the use of a heated tool.

**[0205]** The coupling obtained between the studs 52 and the bushings 55, thanks to the force fit and riveting of the studs 52, is extremely secure.

**[0206]** Another advantageous embodiment of a porthole 7 is now disclosed with reference to FIGs. 6-9, wherein like parts are labeled similarly to the corresponding parts of the previously described embodiment, with the same reference numerals or reference numerals increased by 100. This embodiment will only be described in what differs from the embodiment of FIGs. 2-5.

**[0207]** The finishing portion 9 of the embodiment now described comprises a finishing cap 115.

**[0208]** In the case of a circular porthole 7, the finishing

cap 115 is preferably a disc shaped cap, and it is preferably concentric with the frame assembly as shown in FIG. 6 so as to be centered on the drum rotation axis R-R, in the closed condition of the porthole 7.

**[0209]** It is noted that in FIG. 6, it is assumed that finishing cap 115 is opaque, so that bowl 12 is concealed by the finishing cap 115, but this is not mandatory as stated above.

**[0210]** The finishing cap 115 may also comprise a radially inner portion made of transparent or at least partly transparent material, so as to allow the inner of the laundry processing chamber 3 to be seen therethrough, and an opaque annular portion radially outer to the radially inner portion, that conceals the rivet-like fasteners 51 and other features of the closure portion 8.

**[0211]** The finishing cap 115 can play an aesthetic role, and may also have the function of safeguarding against injuries that might arise should the bowl 12 - which may reach high temperatures during operation of the laundry machine 1 - be reachable in the closed condition of the porthole 7.

**[0212]** The seat 139 for finishing cap 115 differs from seat 39 for finishing ring 15 in that it comprises a single groove 140, preferably circular and arranged near the outer circumferential edge 28 of outer frame 111. The inner groove 41 of the previous embodiment near the generally slanted wall 29 of outer frame 11 is replaced by a step 141. The shape of generally slanted wall 129 is also slightly different from that of the previous embodiment.

**[0213]** The finishing cap 115 comprises a substantially disc shaped wall 148.

**[0214]** Finishing cap 115 preferably comprises a radially outer edge which is bent inwards, thus forming a rim 149.

**[0215]** Finishing cap 115 further preferably comprises a circular ridge 150 protruding inwards.

**[0216]** Rim 149 and ridge 150 are housed within groove 140 and step 141, respectively, of seat 139 of the frame assembly of porthole 7.

**[0217]** Thus, differently from the previous embodiment, in the presently disclosed embodiment the finishing portion 9 does protrude outwards from the outer frame 11 when housed within seat 139. According to this provision, the finishing cap 115 preferably defines essentially the entire outer surface of the porthole 7, that is visible when the porthole 7 is in the closed condition; therefore the aesthetic appearance of the porthole 7 may be improved.

**[0218]** However, also seat 139 may be otherwise shaped, and finishing cap 115 be shaped so as to match with the seat 139. For example, step 141 may be still be replaced by a groove, that has however not a radially inner lateral wall deeper or longer than the radially outer lateral wall.

**[0219]** Furthermore, seat 139 may be altogether absent.

**[0220]** In other embodiments, the rim 149 and ridge 150 of finishing cap 115 can be suitably longer than what shown in order for the finishing cap 115 to be seated within seat 39 of outer frame 11 of the previous embodiment.

**[0221]** Thus, the seat for housing the finishing portion 9 may be unique for alternatively housing a finishing disc shaped cap or a finishing ring, thus avoiding the need of a dedicated outer frame for each finishing portion 9.

**[0222]** It will be appreciated that in a method of assembling the laundry treatment machine 1, the following steps will be carried out:

- providing the finishing portion 9 and the closure portion 8 of the porthole 7;
- fixing said finishing portion 9 to the closure portion 8 through at least one rivet-like fastener 51; and
- mounting the porthole 7 to the cabinet 2.

**[0223]** When the at least one rivet-like fastener 51 comprises a stud 52 protruding from the finishing portion 9, and a hole 53 provided at the closure portion 8, the step of fixing the finishing portion 9 to the closure portion 8 comprises the steps of:

- inserting the stud 52 within the hole 53 in an initial, non-riveted condition, and
- riveting said stud 52 at the hole 53 in a mounted condition.

**[0224]** Preferably, as said above the step of riveting comprises plastically deforming a free end 54 of the stud 52, the plastic deformation being obtained by a rotary tool and/or by a heated tool.

**[0225]** Preferably the assembly of the porthole 7 will take place by first securing the finishing portion 9 or finishing ring 15 to the outer frame 11, then riveting the fastener(s) 51, and only thereafter securing the inner frame 10 to the outer frame 11 with the interposition of bowl 12 (for example through screw means).

**[0226]** It is indeed noted that the rivet-like fastener(s) 51 is(are) covered by - and thus advantageously sheltered by - the inner frame and hidden to view. Due to the fact of said coverage of the rivet-like fastener(s), the latter remain(s), in the assembled state of inner frame 10, the outer frame 11 and of the bowl 12, contained inside the resulting chamber; consequently, said fastener(s) is(are) not externally visible, with the advantageous prevention of the aesthetical impact on the porthole.

**[0227]** The above is a description of various embodiments of inventive aspects, and further changes can be made without departing from the scope of protection of the present invention. The shape and/or size and/or location and/or orientation of the various components and/or the succession of the various steps can be changed. The functions of one element or step can be

carried out by two or more components or steps, and vice-versa. Components shown directly connected or in contact can have intermediate structures arranged between them. Steps shown as directly subsequent can have intermediate steps carried out between them. The details shown in a figure and/or described with reference to a figure or to an embodiment can apply in other figures or embodiments. Not all of the details shown in one figure or described in a same context necessarily have to be present in a same embodiment. Features or aspects that turn out to be innovative with respect to the prior art, alone or in combination with other features, should be deemed to be described per se, independently of what has been explicitly described as innovative.

**[0228]** In particular, the closure portion of the porthole may largely differ from that shown and described. It might comprise a single frame, and/or a bowl one piece with the single frame or with one of the inner and outer frames.

**[0229]** From the description that has been made, the features of the laundry treatment machine and of its assembling method, object of the present invention, are manifest, just as the relative advantages are also manifest.

**[0230]** Further variants of the embodiments described above are possible, without departing from the teachings of the invention.

**[0231]** In an alternative not shown in the drawings, the finishing ring 15 and the finishing disc shaped cap 115 may both be provided, the finishing ring 15 being arranged radially outer with respect to the finishing disc shaped cap 115. In this case, two series of rivet-like fasteners 51 will be provided for in the closure portion 8 of the porthole 7.

## Claims

1. A laundry treatment machine (1) comprising a cabinet (2) housing a chamber (3) for treating laundry, and a porthole (7) movable between an open position for providing access to the chamber (3) and a closed position for closing the chamber (3), wherein said porthole (7) comprises a closure portion (8) having the function of closing and opening the chamber (3), said closure portion (8) being mounted to the cabinet (2), wherein said closure portion (8) comprises an inner frame (10) facing said cabinet (2), and an outer frame (11, 111) on the side opposite said cabinet (2) when said porthole (7) is in closed position, and a bowl (12) sandwiched between said inner frame (10) and outer frame (1, 111), wherein said porthole (7) further comprises a finishing portion (9) associated with the closure portion (8), and fixed to said outer frame (11, 111),
   wherein said finishing portion (9) is fixed to said outer frame (11, 111) through at least one rivet-like fastener (51) placed in an internal chamber defined by the closure portion, wherein said internal chamber is defined by said inner frame (10) and said outer frame (11, 111).

2. The laundry treatment machine (1) according to claim 1, wherein said at least one rivet-like fastener (51) comprises a first element integrated on said closure portion (8) and a second element integrated on said finishing portion (9).

3. The laundry treatment machine (1) according to claims 1 or 2, wherein the at least one rivet-like fastener (51) comprises a stud (52) protruding from the finishing portion (9), and a hole (53) provided at the closure portion (8), the stud (52) being inserted within, and riveted at the hole (53).

4. The laundry treatment machine (1) according to claim 3, wherein the hole (53) is made in a bushing (55) protruding from the closure portion (8).

5. The laundry treatment machine (1) according to any of claims 3-4, wherein a mounted condition of the rivet-like fastener (51) is obtained through a plastic deformation of a free end (54) of the stud (52).

6. The laundry treatment machine (1) according to any of claims 3-5, wherein the hole (53) is countersunk.

7. The laundry treatment machine (1) according to any of claims 3-6, wherein the stud (52) is sized to be force-fitted within the hole (53).

8. The laundry treatment machine (1) according to any of claims 3-7, wherein a longitudinal blind hole (59) extend within the stud (52).

9. The laundry treatment machine (1) according to any of the previous claims, wherein the closure portion (8) comprises a seat (39, 139) for receiving the finishing portion (9).

10. The laundry treatment machine (1) according to any of the previous claims, wherein the finishing portion (9) comprises a finishing disc-shaped cap (115).

11. The laundry treatment machine (1) according to any of the previous claims, wherein the finishing portion (9) comprises a finishing ring (15).

12. Method of assembling a laundry treatment machine (1) comprising a cabinet (2) housing a chamber (3) for treating laundry, and a porthole (7) movable between an open position for providing access to the chamber (3) and a closed position for closing the chamber (3), wherein said porthole (7) comprises a closure portion (8) having the function of closing and opening the chamber (3), comprising at least an inner frame (10) facing said cabinet (2), an outer frame

(11, 111) on the side opposite said cabinet (2) when said porthole (7) is in closed position, and a bowl (12), and a finishing portion (9) associated with said closure portion (8), the method comprising the steps of:

- providing the finishing portion (9) and the closure portion (8) of the porthole (7);
- fixing said finishing portion (9) to said outer frame (11, 111) through at least one rivet-like fastener (51);
- mounting said inner frame (10) with said outer frame (11, 111) having said finishing (9) portion fixed, fixing said bowl (12) between said inner frame (10) and outer frame (11, 111), in such a way that said at least one rivet-like fastener (51) is contained inside a chamber defined by said closure portion (8), wherein said chamber is defined by said inner frame (10) and outer frame (11, 111); and
- mounting said porthole (7) to said cabinet (2).

**13.** The method according to claim 12, wherein the at least one rivet-like fastener (51) comprises a stud (52) protruding from the finishing portion (9), and a hole (53) provided at the closure portion (8), the step of fixing the finishing portion (9) to the closure portion (8) comprising the steps of:

- inserting the stud (52) within the hole (53) in an initial, non-riveted condition, and
- riveting said stud (52) at the hole (53) in a mounted condition.

**14.** The method according to claim 13, wherein the step of riveting comprises plastically deforming a free end (54) of the stud (52), the plastic deformation being obtained by a rotary tool and/or by a heated tool.

**Patentansprüche**

**1.** Wäschebehandlungsmaschine (1), umfassend einen Schrank (2), der eine Kammer (3) zur Behandlung von Wäsche und eine Kammeröffnung (7), die zwischen einer geöffneten Stellung, um Zugriff auf die Kammer (3) zu geben, und einer geschlossenen Stellung zum Schließen der Kammer (3) beweglich ist, enthält, wobei die Kammeröffnung (7) einen Verschlussabschnitt (8) umfasst, der die Funktion des Schließens und Öffnens der Kammer (3) aufweist, wobei der Verschlussabschnitt (8) am Schrank (2) montiert ist, wobei der Verschlussabschnitt (8) einen Innenrahmen (10), der dem Schrank (2) zugewandt ist, und einen Außenrahmen (11, 111) auf der dem Schrank (2) entgegengesetzten Seite, wenn sich die Kammeröffnung (7) in der geschlossenen Stellung befindet, umfasst, und eine Schüssel (12), die zwischen dem Innenrahmen (10) und dem Außenrahmen (1, 111) angeordnet ist, wobei die Kammeröffnung (7) ferner einen Abschlussabschnitt (9) umfasst, der dem Verschlussabschnitt (8) zugeordnet und am Außenrahmen (11, 111) fixiert ist,
wobei der Abschlussabschnitt (9) durch mindestens ein nietenartiges Befestigungselement (51), das in einer durch den Verschlussabschnitt definierten inneren Kammer platziert ist, am Außenrahmen (11, 111) fixiert ist, wobei die innere Kammer durch den Innenrahmen (10) und den Außenrahmen (11, 111) definiert ist.

**2.** Wäschebehandlungsmaschine (1) nach Anspruch 1, wobei das mindestens eine nietenartige Befestigungselement (51) ein erstes Element, das in den Verschlussabschnitt (8) integriert ist, und ein zweites Element, das in den Abschlussabschnitt (9) integriert ist, umfasst.

**3.** Wäschebehandlungsmaschine (1) nach Anspruch 1 oder 2, wobei das mindestens eine nietenartige Befestigungselement (51) einen Stift (52), der vom Abschlussabschnitt (9) vorsteht, und eine Bohrung (53), die an dem Verschlussabschnitt (8) vorgesehen ist, umfasst, wobei der Stift (52) in die Bohrung (53) eingesetzt und damit vernietet ist.

**4.** Wäschebehandlungsmaschine (1) nach Anspruch 3, wobei die Bohrung (53) in einer Buchse (55) hergestellt ist, die vom Verschlussabschnitt (8) vorsteht.

**5.** Wäschebehandlungsmaschine (1) nach einem der Ansprüche 3-4, wobei ein Montagezustand des nietenartigen Befestigungselements (51) durch plastisches Verformen eines freien Endes (54) des Stifts (52) erhalten wird.

**6.** Wäschebehandlungsmaschine (1) nach einem der Ansprüche 3-5, wobei die Bohrung (53) angesenkt ist.

**7.** Wäschebehandlungsmaschine (1) nach einem der Ansprüche 3-6, wobei der Stift (52) dazu dimensioniert ist, in die Bohrung (53) pressgepasst zu werden.

**8.** Wäschebehandlungsmaschine (1) nach einem der Ansprüche 3-7, wobei sich eine längs verlaufende Blindbohrung (59) innerhalb des Stifts (52) erstreckt.

**9.** Wäschebehandlungsmaschine (1) nach einem der vorstehenden Ansprüche, wobei der Verschlussabschnitt (8) einen Sitz (39, 139) zur Aufnahme des Abschlussabschnitts (9) umfasst.

**10.** Wäschebehandlungsmaschine (1) nach einem der vorstehenden Ansprüche, wobei der Abschlussab-

schnitt (9) eine scheibenförmige Abschlusskappe (115) umfasst.

**11.** Wäschebehandlungsmaschine (1) nach einem der vorstehenden Ansprüche, wobei der Abschlussabschnitt (9) einen Abschlussring (15) umfasst.

**12.** Verfahren zur Montage einer Wäschebehandlungsmaschine (1), umfassend einen Schrank (2), der eine Kammer (3) zur Behandlung von Wäsche und eine Kammeröffnung (7), die zwischen einer geöffneten Stellung, um Zugriff auf die Kammer (3) zu geben, und einer geschlossenen Stellung zum Schließen der Kammer (3) beweglich ist, enthält, wobei die Kammeröffnung (7) einen Verschlussabschnitt (8) umfasst, der die Funktion des Schließens und Öffnens der Kammer (3) aufweist, umfassend mindestens einen Innenrahmen (10), der dem Schrank (2) zugewandt ist, und einen Außenrahmen (11, 111) auf der dem Schrank (2) entgegengesetzten Seite, wenn sich die Kammeröffnung (7) in der geschlossenen Stellung befindet, und eine Schüssel (12) und einen Abschlussabschnitt (9), der dem Verschlussabschnitt (8) zugeordnet ist, wobei das Verfahren die folgenden Schritte umfasst:

- Vorsehen des Abschlussabschnitts (9) und Verschlussabschnitts (8) der Kammeröffnung (7);
- Fixieren des Abschlussabschnitts (9) durch mindestens ein nietenartiges Befestigungselement (51) am Außenrahmen (11, 111);
- Montieren des Innenrahmens (10) am Außenrahmen (11, 111), wobei der Abschlussabschnitt (9) fixiert ist, wodurch die Schüssel (12) derart zwischen dem Innenrahmen (10) und dem Außenrahmen (11, 111) fixiert wird, dass das mindestens eine nietenartige Befestigungselement (51) innerhalb einer Kammer enthalten ist, die durch den Verschlussabschnitt (8) definiert ist, wobei die Kammer durch den Innenrahmen (10) und Außenrahmen (11, 111) definiert ist;
und
- Montieren der Kammeröffnung (7) am Schrank (2).

**13.** Verfahren nach Anspruch 12, wobei das mindestens eine nietenartige Befestigungselement (51) einen Stift (52), der vom Abschlussabschnitt (9) vorsteht, und eine Bohrung (53), die an dem Verschlussabschnitt (8) vorgesehen ist, umfasst, wobei der Schritt des Fixierens des Abschlussabschnitts (9) am Verschlussabschnitt (8) die folgenden Schritte umfasst:

- Einsetzen des Stifts (52) in die Bohrung (53) in einem nicht vernieteten Ausgangszustand und
- Vernieten des Stifts (52) mit der Bohrung (53) in einem Montagezustand.

**14.** Verfahren nach Anspruch 13, wobei der Schritt des Vernietens das plastische Verformen eines freien Endes (54) des Stifts (52) umfasst, wobei die plastische Verformung durch ein Drehwerkzeug und/oder durch ein Heizwerkzeug erhalten wird.

**Revendications**

**1.** Machine de traitement de linge (1) comprenant une caisse (2) contenant une chambre (3) pour le traitement du linge, et un hublot (7) déplaçable entre une position ouverte, permettant d'accéder à la chambre (3), et une position fermée, fermant la chambre (3), dans laquelle ledit hublot (7) comprend une partie de fermeture (8) ayant la fonction de fermer et ouvrir la chambre (3), ladite partie de fermeture (8) étant installée sur la caisse (2), dans laquelle ladite partie de fermeture (8) comprend un cadre intérieur (10) faisant face à ladite caisse (2), et un cadre extérieur (11, 111) sur le côté à l'opposé de ladite caisse (2) lorsque ledit hublot (7) se trouve dans la position fermée, et une cuvette (12) prise en sandwich entre lesdits cadre intérieur (10) et cadre extérieur (11, 111), dans laquelle ledit hublot (7) comprend, en outre, une partie de finition (9) associée à la partie de fermeture (8), et fixée audit cadre extérieur (11, 111),
dans laquelle ladite partie de finition (9) est fixée audit cadre extérieur (11, 111) au moyen d'au moins un élément de fixation de type rivet (51) placé dans une chambre intérieure définie par la partie de fermeture, dans laquelle ladite chambre intérieure est définie par ledit cadre intérieur (10) et ledit cadre extérieur (11, 111).

**2.** Machine de traitement de linge (1) selon la revendication 1, dans laquelle ledit au moins un élément de fixation de type rivet (51) comprend un premier élément intégré à ladite partie de fermeture (8) et un second élément intégré à ladite partie de finition (9).

**3.** Machine de traitement de linge (1) selon la revendication 1 ou 2, dans laquelle l'au moins un élément de fixation de type rivet (51) comprend un goujon (52) faisant saillie à partir de la partie de finition (9), et un trou (53) formé au niveau de la partie de fermeture (8), le goujon (52) étant inséré à l'intérieur du trou (53) et riveté au niveau de celui-ci.

**4.** Machine de traitement de linge (1) selon la revendication 3, dans laquelle le trou (53) est réalisé dans une douille (55) faisant saillie à partir de la partie de fermeture (8).

**5.** Machine de traitement de linge (1) selon l'une ou l'autre des revendications 3 et 4, dans laquelle un état posé de l'élément de fixation de type rivet (51) est obtenu par déformation plastique d'une extrémité libre (54) du goujon (52).

**6.** Machine de traitement de linge (1) selon l'une quelconque des revendications 3 à 5, dans laquelle le trou (53) est fraisé.

**7.** Machine de traitement de linge (1) selon l'une quelconque des revendications 3 à 6, dans laquelle le goujon (52) est dimensionné pour être emmanché à force à l'intérieur du trou (53).

**8.** Machine de traitement de linge (1) selon l'une quelconque des revendications 3 à 7, dans laquelle un trou borgne longitudinal (59) s'étend à l'intérieur du goujon (52).

**9.** Machine de traitement de linge (1) selon l'une quelconque des revendications précédentes, dans laquelle la partie de fermeture (8) comprend un siège (39, 139) destiné à recevoir la partie de finition (9).

**10.** Machine de traitement de linge (1) selon l'une quelconque des revendications précédentes, dans laquelle la partie de finition (9) comprend un chapeau discoïde de finition (115).

**11.** Machine de traitement de linge (1) selon l'une quelconque des revendications précédentes, dans laquelle la partie de finition (9) comprend un anneau de finition (15) .

**12.** Procédé d'assemblage d'une machine de traitement de linge (1) comprenant une caisse (2) contenant une chambre (3) pour le traitement du linge, et un hublot (7) déplaçable entre une position ouverte, permettant d'accéder à la chambre (3), et une position fermée, fermant la chambre (3), dans laquelle ledit hublot (7) comprend une partie de fermeture (8) ayant la fonction de fermer et ouvrir la chambre (3), comprenant au moins un cadre intérieur (10) faisant face à ladite caisse (2), un cadre extérieur (11, 111) sur le côté à l'opposé de ladite caisse (2) lorsque ledit hublot (7) se trouve dans la position fermée, et une cuvette (12), et une partie de finition (9) associée à ladite partie de fermeture (8), le procédé comprenant les étapes suivantes :

- préparer la partie de finition (9) et la partie de fermeture (8) du hublot (7) ;
- fixer ladite partie de finition (9) sur ledit cadre extérieur (11, 111) au moyen d'au moins un élément de fixation de type rivet (51) ;
- installer, sur ledit cadre intérieur (10), ledit cadre extérieur (11, 111) sur lequel est fixée ladite partie de finition (9), en fixant ladite cuvette (12) entre ledit cadre intérieur (10) et ledit cadre extérieur (11, 111), de telle sorte que ledit au moins un élément de fixation de type rivet (51) soit situé à l'intérieur d'une chambre définie par ladite partie de fermeture (8), ladite chambre étant définie par lesdits cadre intérieur (10) et cadre extérieur (11, 111) ; et
- installer ledit hublot (7) sur ladite caisse (2).

**13.** Procédé selon la revendication 12, dans lequel l'au moins un élément de fixation de type rivet (51) comprend un goujon (52) faisant saillie à partir de la partie de finition (9), et un trou (53) formé au niveau de la partie de fermeture (8), l'étape de fixation de la partie de finition (9) à la partie de fermeture (8) comprenant les étapes suivantes :

- insérer le goujon (52) à l'intérieur du trou (53) dans un état initial non riveté, et
- riveter ledit goujon (52) au niveau du trou (53) dans un état posé.

**14.** Procédé selon la revendication 13, dans lequel l'étape de rivetage comprend la déformation plastique d'une extrémité libre (54) du goujon (52), la déformation plastique étant obtenue par un outil rotatif et/ou par un outil chauffé.

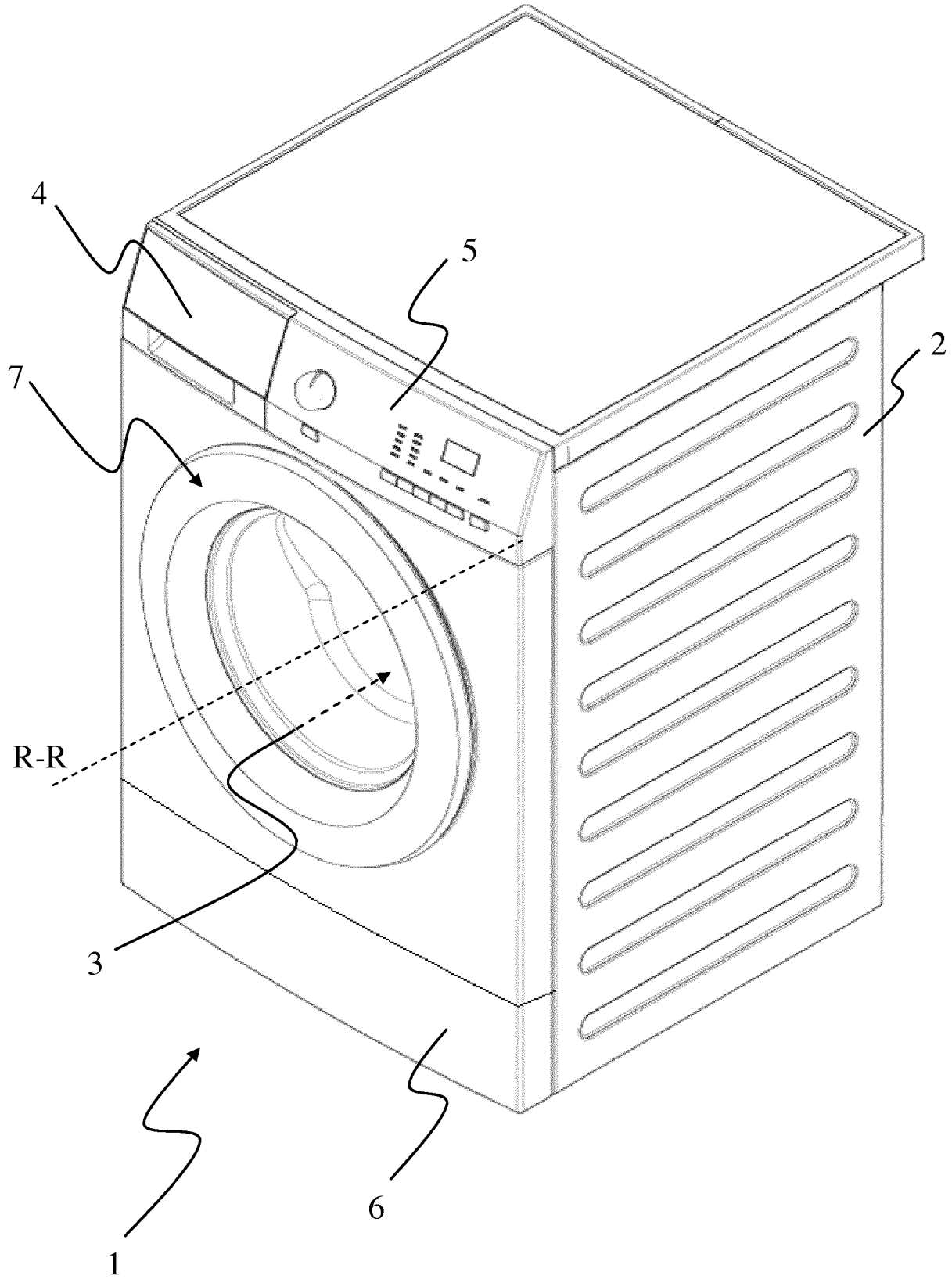


FIG. 1

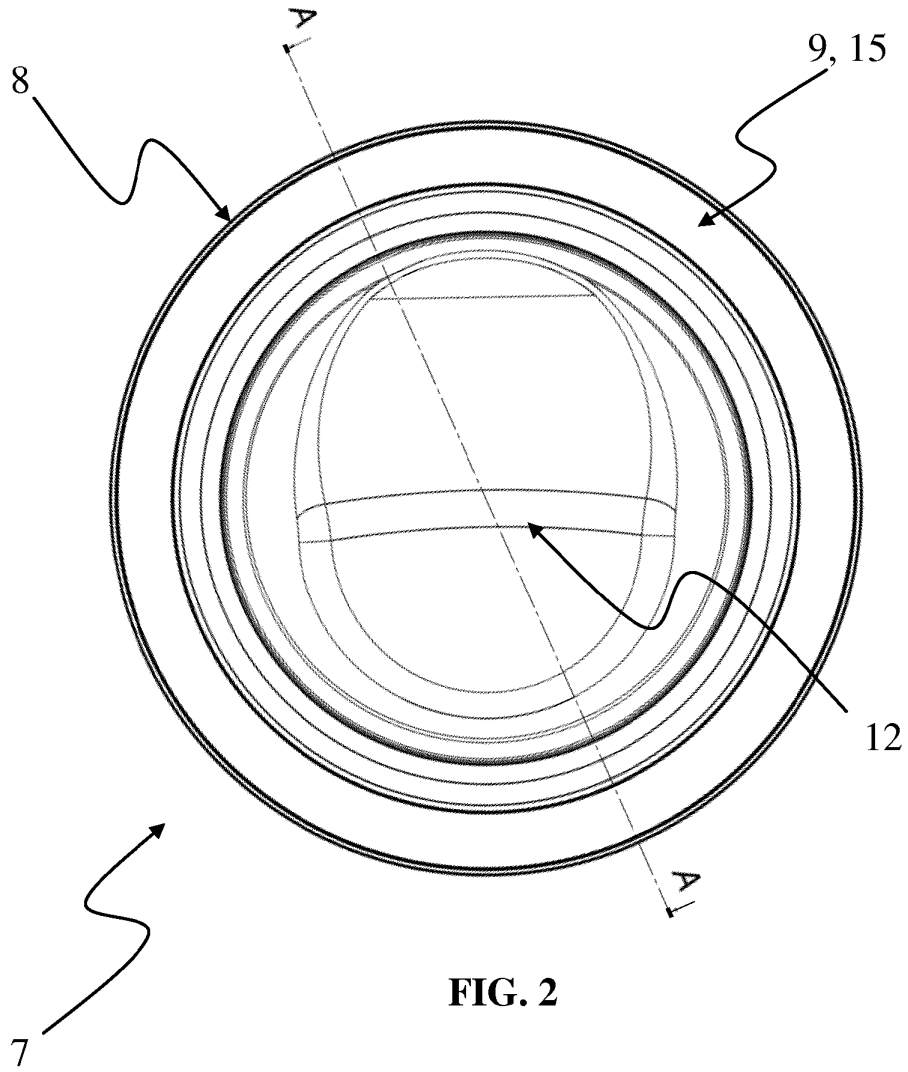


FIG. 2

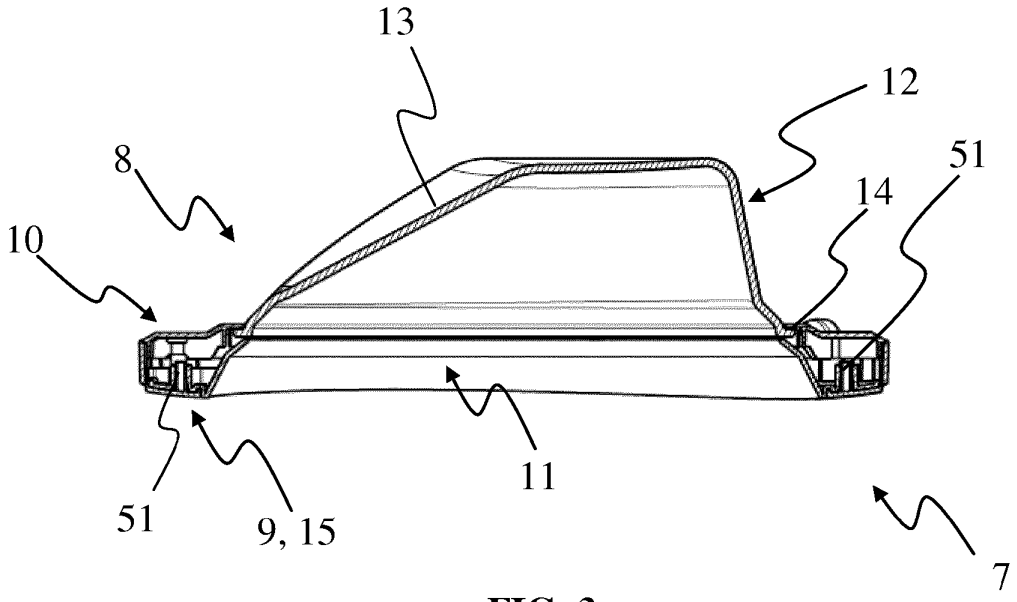


FIG. 3

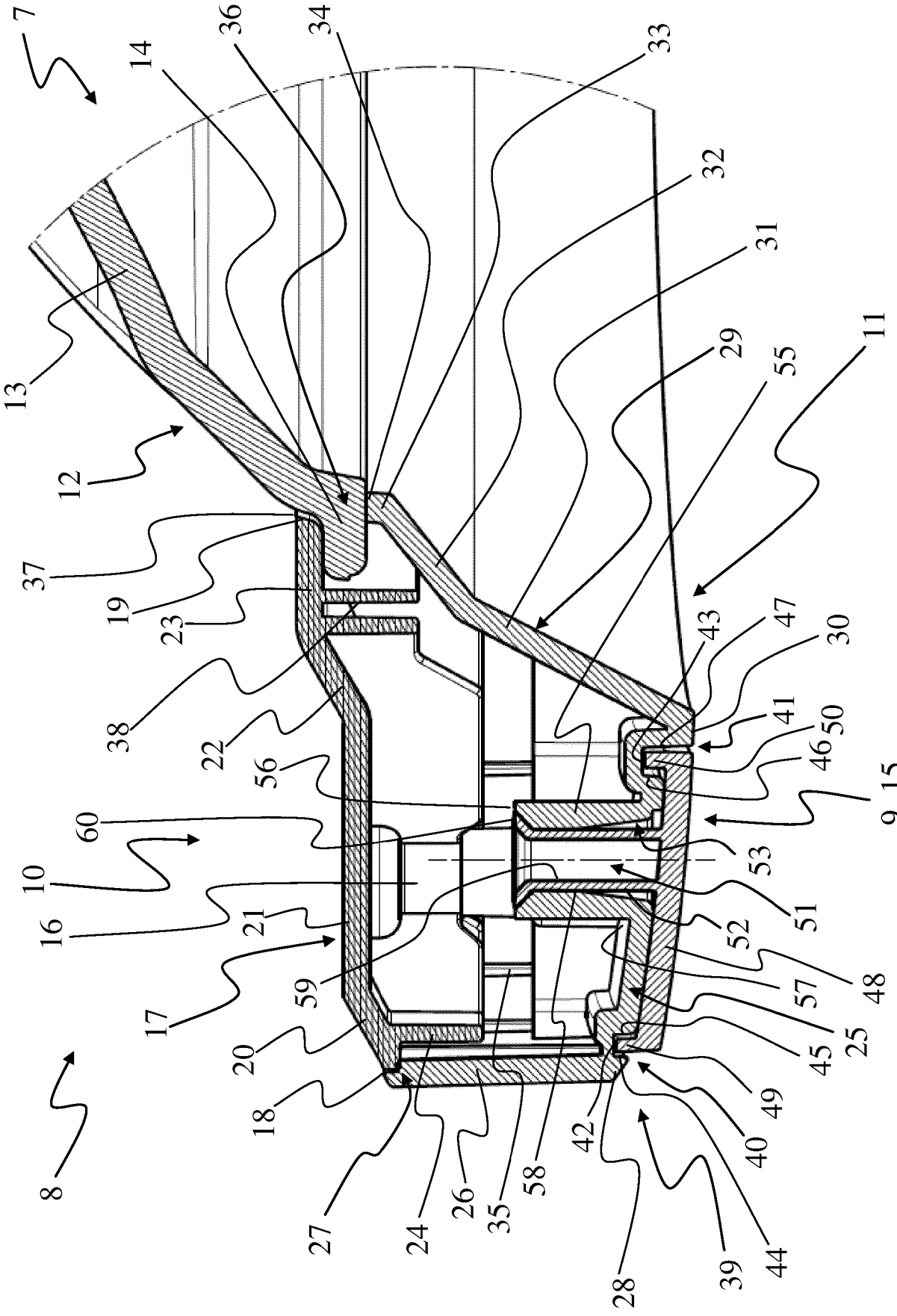
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FIG. 4

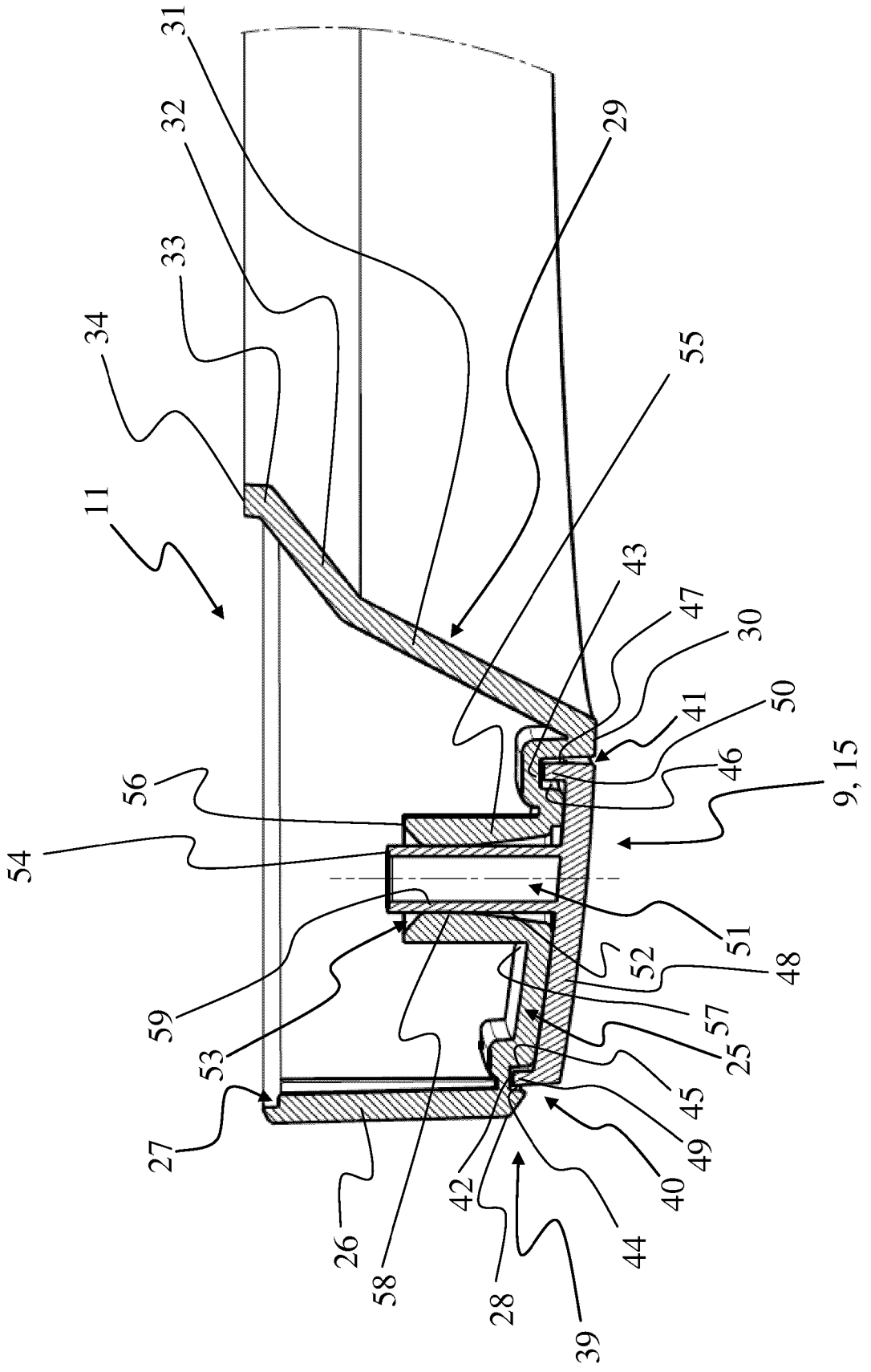
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FIG. 5

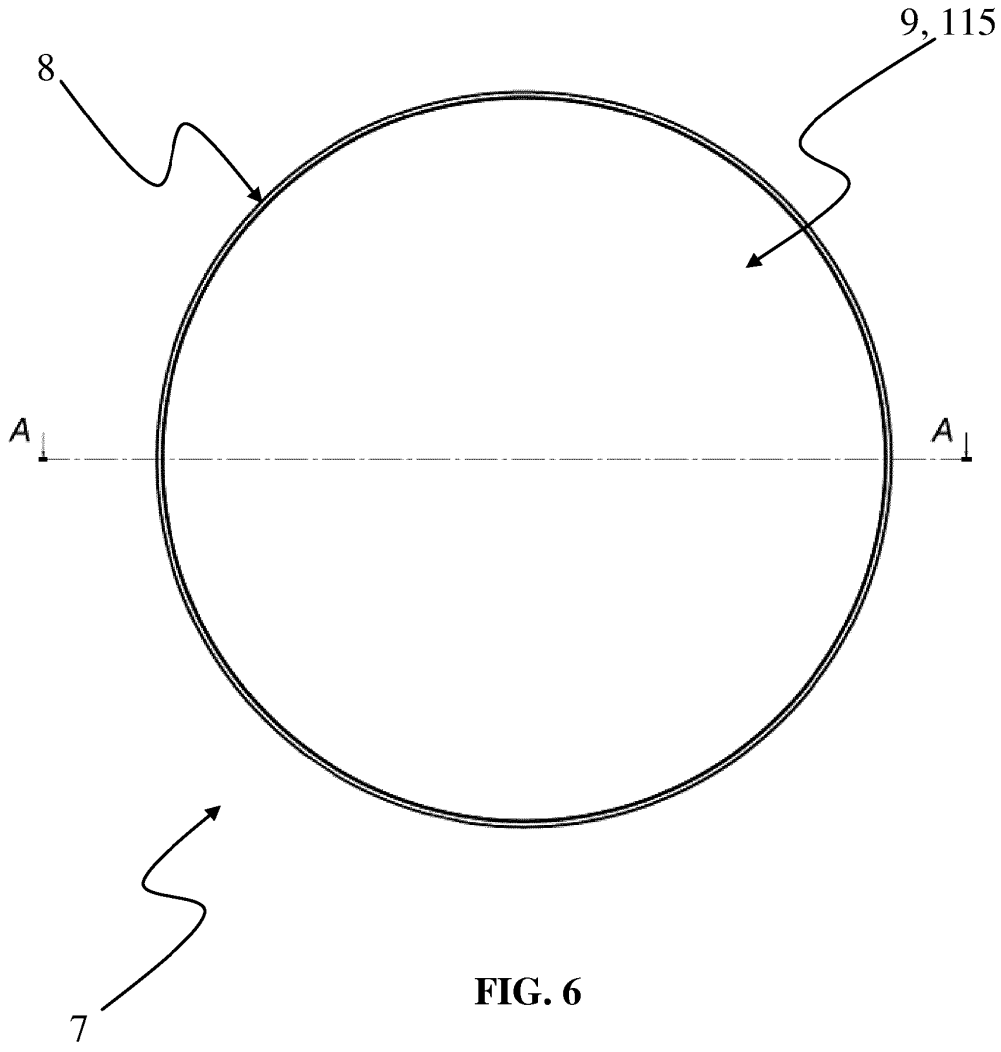


FIG. 6

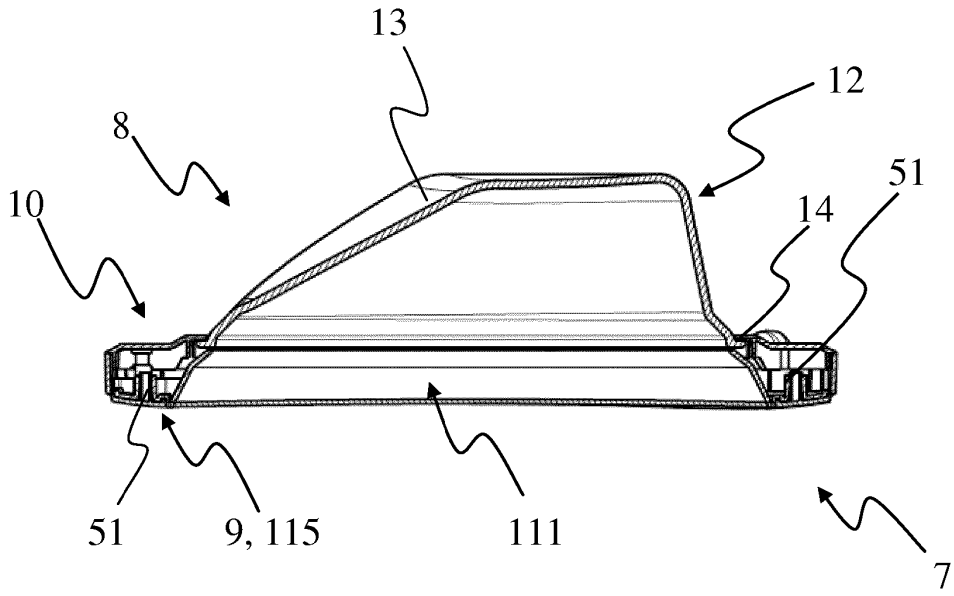


FIG. 7

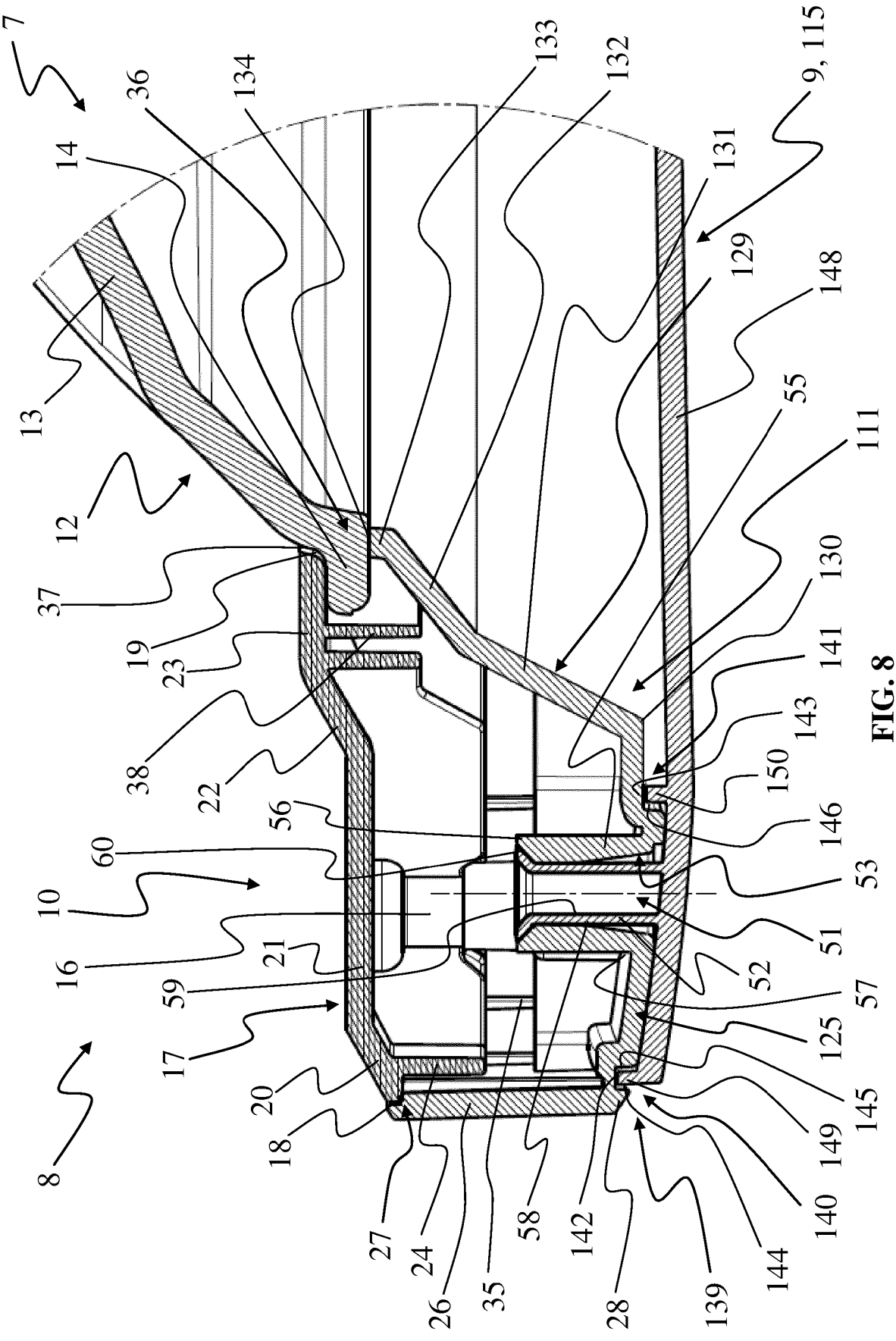
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FIG. 8

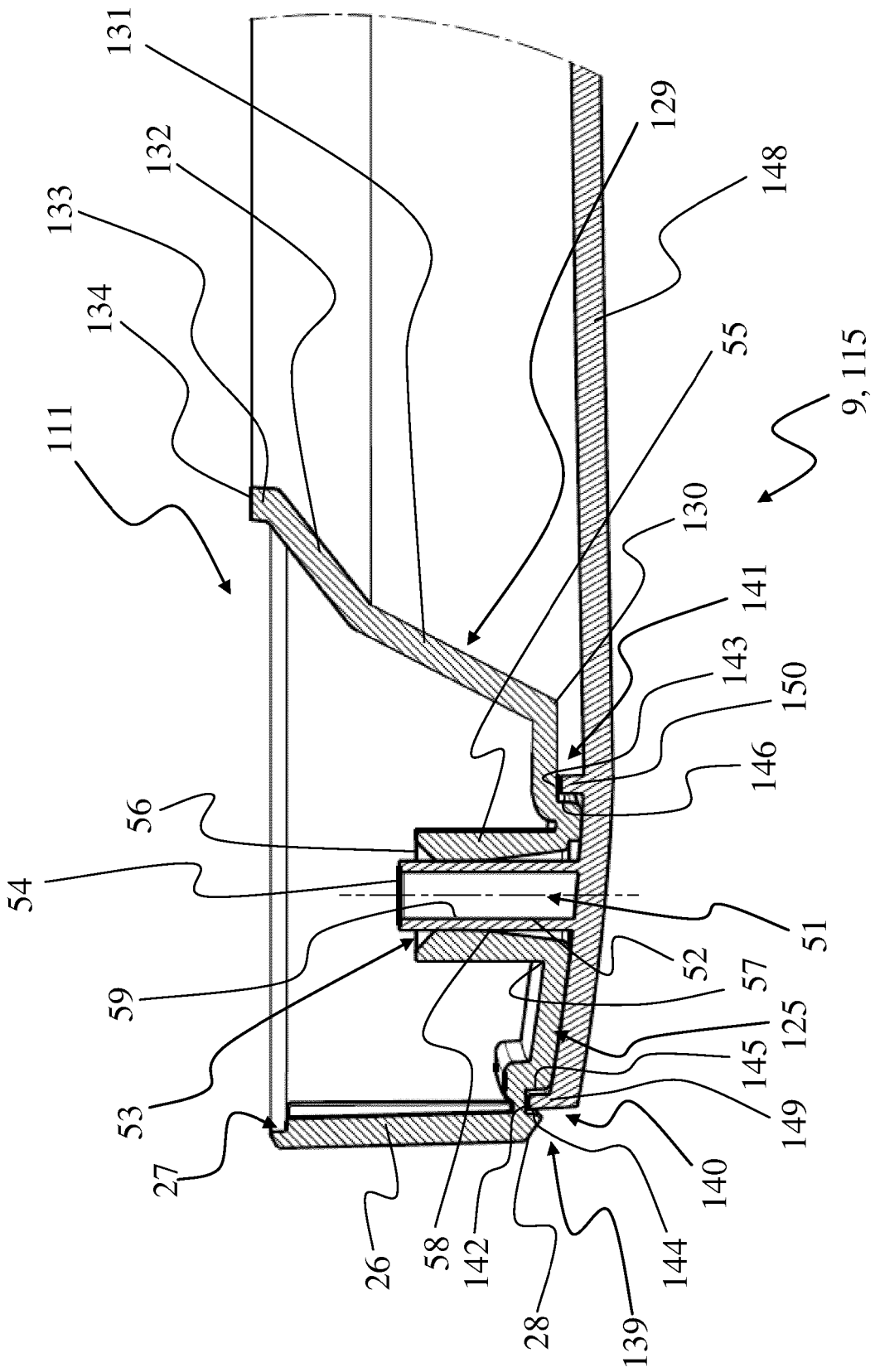
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FIG. 9

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


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