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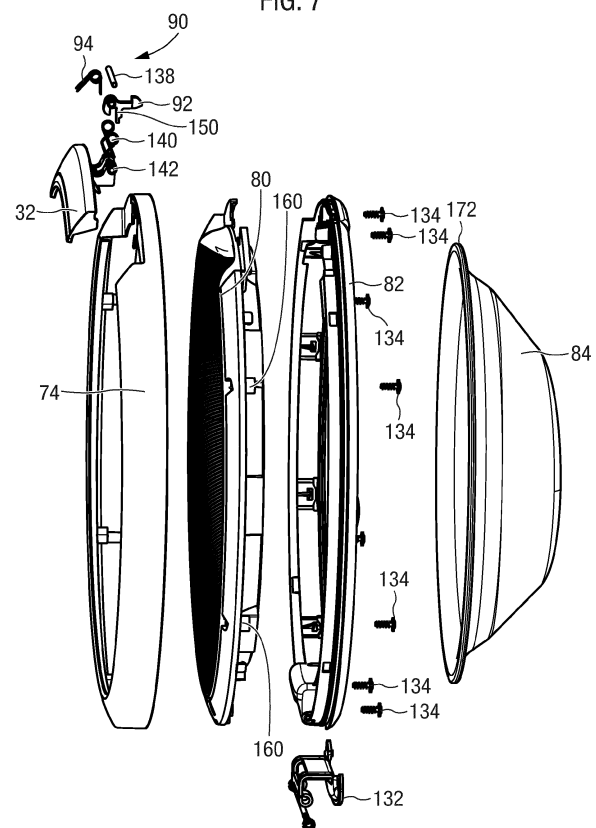
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(54) **LAUNDRY TREATMENT MACHINE**

(57) Laundry treatment machine (2), comprising a casing (6) and a laundry treatment chamber arranged in said casing (6) for receiving laundry, said casing (6) comprising an opening (28) which grants access to said laundry treatment chamber, said laundry treatment machine (2) further comprising a door (24), wherein said door comprises a closure portion (72) having the function of closing said opening (28), said closure portion (72) being mounted to said casing (6); a finishing portion (74) associated with said closure portion (72); a movable handle (32) having the function of keeping said door (24) in the closed position when not actuated and to release said door (24) from said closed position when actuated, whereby said handle (32) is arranged on said finishing portion (74).

FIG. 7



Description

Field of the invention

[0001] The present invention concerns the field of household appliances, especially laundry treatment machines. In particular, the present invention refers to a laundry treatment machine with a door with a movable handle.

Background Art

[0002] Nowadays the use of laundry treatment machines is widespread. Laundry treatment machines comprise both "simple" laundry washing machines (i.e. laundry washing machines which can only wash and rinse laundry) and laundry washing-drying machines (i.e. laundry washing machines which can also dry laundry), or drying machines (i.e. drying machines which can dry laundry).

[0003] In the present description, the term "laundry treatment machine" refers to simple laundry washing machines, laundry washing-drying machines or drying machines. Laundry treatment machines such as laundry washing machines generally comprise an external casing provided with a washing tub which contains a laundry treatment chamber built as a rotatable perforated drum where the laundry is placed. A loading/unloading door ensures access to the drum. Laundry treatment appliances typically comprise a water supply unit and a products supply unit, preferably a drawer, for the introduction of water and washing/rinsing products (i.e. detergent, softener, rinse conditioner, etc.) into the tub. Known laundry treatment appliances are also provided with water draining devices that may operate during different phases of the washing program to drain the dirty water.

[0004] According to the known art, a complete treating program typically includes different phases during which the laundry to be washed is subjected to adequate treatments. A treating cycle usually comprises a main washing phase during which the laundry is treated by means of water and a detergent. The water is typically heated to a predetermined temperature based on the washing program selected by the user. It is also possible that hot water is introduced into the tub from the hot water mains. During the main washing phase the drum is rotated, so as to apply also a mechanical cleaning action on the laundry. At the end of the main washing phase the drum is typically rotated at high rotational speed, in such a way that dirty washing liquid (i.e. water mixed with detergent) is extracted from the laundry, and this dirty washing liquid is drained to the outside by the water draining devices.

[0005] A combined washer/dryer is built for washing and drying clothes and comprises a laundry treatment chamber which is built as a drying chamber into which the clothes to be dried are introduced. The drying chamber is rotatable supported within a cabinet and made to rotate by means of a driving motor, typically consisting

of an electric motor connected to the drying chamber via a belt. The drying chamber usually is a drum, and one or more drying phases are added which typically commence after the washing phases. The drying phase usually involves rotating the drum and applying hot air to the laundry.

[0006] Most laundry treatment machines comprise a door. In some variants, a door of a laundry treatment machine can be composed of a back frame, a front frame, and a glass part sandwiched between said back and frontal frames; the assembly of said components consists of the structural part of the door. Additionally, the door can comprise a movable handle associated with a rotatable hook suitable to allow the unlocking of the door from the known locking element provided on the machine, when an associated handle is rotated by the user. The assembly of the handle and the rotatable hook can be provided on the rear frame and / or the outer frame.

[0007] The EP 0 293 984 A1 discloses a washing machine with a hinged door which comprises a frusto-conical window and an annular frame. A handle and a catch are supported by the annular frame, whereby by operating the handle, the catch is disengaged, thereby unlocking the door.

[0008] The US 9,003,840 B2 discloses a washing machine with a door which comprises an inner and an outer frame and a transparent port-hole window fitted between the two frames. On the outer frame, a handle is arranged for locking / unlocking the door.

Summary of the invention

[0009] The aim of the invention is to provide a laundry treatment machine which allows the use of door components for several machine models.

[0010] Another aim of the invention is to provide a flexible composition of functional and aesthetic door components.

[0011] Another aim of the invention is to provide a door for a laundry treatment machine that is cheap, easy to assemble, maintaining a good aesthetical look.

[0012] The invention therefore relates to a laundry treatment machine comprising a casing and comprising a laundry treatment chamber arranged in the casing for receiving laundry, the casing comprising an opening which grants access to the laundry treatment chamber, the laundry treatment machine further comprising a door, the door comprising:

- a closure portion having the function of closing the opening, the closure portion being mounted, preferably hinged, to the casing;
- a finishing portion associated with the closure portion;
- a movable handle having the function of keeping the door in the closed position when not actuated and to release the door from the closed position when actuated,

whereby the handle is arranged, preferably fixed to / hinged on the finishing portion.

[0013] Preferred embodiments of the invention are described in relation to the dependent claims and the description of the enclosed drawings.

[0014] The invention is based on the consideration that on the one hand the design of laundry treatment machines is an important process which requires providing especially designed machine parts and components. Since the handle and the door are essential components with a strong visual impression on the user, they should fit to the overall design of the machine. On the other hand, from a manufacturing point of view it would be most economic if components such as the door could be used for a series of machines with different overall design.

[0015] Application has found that these demands can be met by providing a closure portion and a finishing portion and provision the handle on the finishing portion. Both portions have, respectively, a dedicated function. The closure portion provides the door function and thereby yields access to the drum for entering and removing laundry. It is therefore predominantly a functional component.

[0016] The finishing portion is an additional component which has predominantly an aesthetic function. In other words, the finishing portion is the component that does not interact with the chamber, because the closure portion itself has the function of actually closing-opening the opening which grants the access to the laundry treatment chamber.

[0017] In this way, the closure portion can be adapted to fit a variety of laundry treatment machines with various designs, while only the aesthetic frame needs to be adapted to the overall design of the machine. Since the handle is an essential and important element for handling the machine, it should also have a design which fits with the design of the overall machine. By providing the handle on the finishing portion, both handle and finishing portion can be built according to the machine design whereby the closure portion as an essentially functional component can be used for a series of machines. In this way, while the closure portion of the door can be used for different types of machines, only the finishing portion with the handle need to be custom-made to match the design of the specific machine.

[0018] The closure portion is preferably hinged on the casing. To this end, preferably a door hinge is provided which allows a rotation of the door around this hinge for yielding access to the drum. The hinge is preferably arranged at a side of the door which is essentially and preferably opposite to the position of the handle, thereby allowing a strong and convenient leverage for the user when opening the door.

[0019] The casing preferably is built as a cabinet or comprises a cabinet.

[0020] The handle is preferably fixed and/or hinged on the finishing portion.

[0021] Preferably, a profile of said handle flushes with

a profile of said finishing portion in a non-actuated position of said handle. This prevents the user from hitting against edges of the handle while operating the door and additionally yields an aesthetically pleasing look of the machine door.

[0022] In a preferred embodiment, the laundry treatment machine comprises a handle assembly which comprises the handle, a rotatable hook for engagement with a locking structure in the casing in a non-actuated position and at least a spring element which acts on the hook and/or the handle to urge them toward a non-actuated position.

[0023] The locking structure advantageously comprises a recess in said casing in which said hook engages. In the engaged position, the door is blocked. The door can be opened when the hook is disengaged.

[0024] Preferably a door lock is provided in / behind the recess.

[0025] Preferably, the closure portion comprises a frame assembly and the finishing portion comprises at least one frame.

[0026] The closure portion preferably comprises a front frame and a rear frame; preferably, the rear frame respectively provides a recess which allows an at least partial rotational movement of the hook in an assembled state.

[0027] Preferably the handle is at least partially rotatable arranged on the finishing portion such that the actuation of the handle causes its rotation, moving the hook to a disengaging actuated position, releasing the door from the closed position.

[0028] Advantageously the front frame comprises an uncovered area which is not covered by the finishing portion. In this way, material for the production of the finishing portion can be reduced.

[0029] The uncovered area preferably comprises an aesthetically designed surface.

[0030] In a preferred embodiment, the aesthetically designed surface comprises a plurality of curved grooves which provide optically a turbine effect.

[0031] Preferably the finishing portion in an assembled state is fixed to the front frame and/or the rear frame.

[0032] In a preferred embodiment the finishing portion is welded to the closure portion.

[0033] In another preferred embodiment the finishing portion is attached to the closure portion by an adhesive connection. The adhesive connection is especially provided by an adhesive / bi-adhesive tape.

[0034] In still another embodiment the finishing portion is fixed to the closure portion by a screw and/or snap connection.

[0035] The described ways of attaching the finishing portion to the closure portion can also be combined.

[0036] The finishing portion on its rear side preferably comprises domes which receive screws which are led through openings in the closure portion.

[0037] In a preferred embodiment, the front frame and rear frame are attached to each other by a screw con-

nection, while the finishing portion is attached to the front frame by a snap connection.

[0038] Advantageously the handle comprises a finishing look which corresponds to the finishing look of the closure portion.

[0039] The advantages of the invention are especially as follows. By attaching the handle to the finishing portion, the closure portion can be built for a series / variety of machines. In order to provide an individual design, only the handle and the finishing portion need to be adapted. This is especially advantageous since the handle reflects a considerable design aspect of the machine. In this way, the number of parts that need to

[0040] be manufactured for a given variety of machines can be reduced and costs can be saved.

Brief description of the drawings

[0041] Further features and advantages of the present invention shall become clearer from the following detailed description of some of its preferred embodiments, made with reference to the attached schematic drawings and given as an indication and not for limiting purposes.

[0042] In particular, the attached drawings are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification. The drawings together with the description explain the principles of the invention. In the drawings, corresponding characteristics and/or components are identified by the same reference numbers. In these drawings:

- FIG. 1 shows a laundry treatment machine with a closure portion and a finishing portion in a preferred embodiment;
- FIG. 2 shows the closure portion and the finishing portion in an first exploded view.
- FIG. 3 shows the finishing portion attached to the closure portion;
- FIG. 4 shows a first cross section through closure and finishing portions;
- FIG. 5 shows a top view on closure and finishing portions;
- FIG. 6 shows another cross section through closure and finishing portions; and
- FIG. 7 shows a second exploded view of closure and finishing portions.

[0043] Identical parts are labelled with the same reference numerals.

[0044] In FIG. 1 a laundry treatment machine 2 is shown which is built as a front-loading washing machine and comprises a housing or casing 6 with a preferable

parallelepiped shape, the casing 6 comprising a front wall 10, two side walls 14, a cover plate 20 and a rear wall (not shown). Front wall 10 and side walls 14 are preferably part of a cabinet. A front door 24 is provided which can be opened for loading or unloading laundry through an opening 28 into a washing drum. Front door 24 comprises a movable handle 32 for convenient opening and closing of the door 24.

[0045] Advantageously a washing tub is contained within casing 6, whereby a rotatable and perforated drum is contained by the washing tub. Both washing tub and drum have a substantially cylindrical shape. Advantageously, the tub is suspended in a floating manner inside casing 6 by means of a number of coil springs and shock absorbers. The drum is rotated by an electric motor (not shown), which transmits the rotating motion of a motor shaft to the drum by a belt/pulley system. In a different embodiment of the invention, the motor can be directly associated with the shaft of the drum. The tub is preferably connected to casing 6 by means of an elastic bellows or gasket. Alternatively, the laundry treatment machine 2 can be a dryer (in which case the tub is not provided) or a combined washer and dryer.

[0046] The preferred washing machine shown in FIG. 1 on a front panel 48 comprises a drawer 30 with a front plate 34 and a handle 44 for pulling out and pushing back the drawer 30. Drawer 30 preferably comprises at least one compartment for detergent or washing additives. Preferably, adjacent to drawer 30, a rotatable or rotary knob 38 is arranged for selecting a laundry treatment program and/or at least one parameter of a laundry treatment program. Knob 38 is preferably provided on a control panel 62 or user interface which can provide further indicating and/or control elements. Knob 38 is preferably arranged on front panel 48 adjacent to drawer 30, whereby preferably no user interface elements such as controls (buttons, dials) or indicating elements (displays, lights) are arranged between drawer 30 and knob 38. On control panel 62, user interface elements such as at least one display and/or buttons and/or indicators can be provided. A service hatch 70 is preferably provided on front wall 70 which preferably yields access to a filter unit.

[0047] The door 24 comprises a closure portion 72 which is mounted on / attached to casing 6 as well as a finishing portion 74. The finishing portions 74 is associated with / attached to closure portion 72. While, as will be explained below, the closure portion 72 serves to open / close the door and obtain access to the drum, the finishing portion 74 provides mainly an aesthetic effect and serves as a carrier element for the handle 32.

[0048] With reference to all FIGs and especially in FIGs 2, 4 and 7, closure portion 72 preferably comprises a front frame 80 and a back or rear frame 82 as well as a cover portion 84 for covering the opening 28, whereby cover portion 84 or transparent port-hole window is preferably built from a transparent material, especially glass and is preferably built with a bowl-like shape. When looking at the laundry treatment machine 2, the front frame

80 is an outer frame and the rear frame 82 is an inner frame which is arranged closer to the casing than front frame 80. The cover portion 84 is preferably arranged in a sandwiched way between front frame 80 and rear frame 82. The front frame 80 preferably comprises an area 88 which in the assembled state is not covered by the finishing portion 74. The area 88 in the present preferred example is designed with a pattern of curved lines / grooves which yields an optical turbine effect.

[0049] Preferably, although not strictly necessarily, the inner or rear frame 82 is made of glass-filled nylon, i.e., a composite thermoplastic material comprising polyamide (PA) and reinforcing glass fibres (typically, 25% of glass fibres) and having a density higher than pure nylon and a higher heat resistance. Alternatively, the inner or rear frame 80 may be made of polypropylene (PP), i.e. a plastic compound having a high ultimate strength, a low density, a good thermal resistance and a good resistance to abrasions, possibly glass-filled poly-propylene or talc-filled poly-propylene, which may be obtained through any known technique, for example injection moulding or extrusion. The front frame 80 may be formed in plastic materials, metal or a combination thereof. Alternatively, the front frame 80 may be formed of glass-filled nylon or other composite thermoplastic materials. Alternatively, the rear/front frame can be made of ABS. Moreover, according to a preferred embodiment the finishing portion and preferably the handle can be made of ABS.

[0050] Laundry treatment machine 2 comprises a handle assembly 90 (see especially FIG. 7) which preferably comprises handle 32, a rotatable hook 92 for engagement with a locking structure in casing 6 in a non-actuated position, a spring element 94 which acts on hook 92 to urge it in a not-actuated tensioning position and/or a further spring 140 which acts on handle 32 to urge it toward a non-actuated position, as will be explained below. In rear frame 82, a recess 102 is preferably provided which allows an at least partial rotational movement of hook 92 in an assembled state. Preferably, also in the front frame 80 a recess is provided, allowing the passage / partial rotational movement of the hook 92. In FIG. 3, front frame 80, back frame 82 and finishing portion 74 are displayed in an assembled state.

[0051] The handle assembly 90 preferably comprises a pin 138 and a hinge element 142. In the mounted configuration, pin 138 is lead through corresponding openings in hook 92, hinge element 142, spring element 94 and the further spring 140. Spring element 94 and the further spring 140 in the preferred shown embodiment are built as torsion springs. In the mounted configuration, spring element 94 is with one end associated to hook 92 and with its other end associated to the handle 32. It serves to push hook 92 into the engaged position, whereby hook 90 engages in a corresponding recess in casing 6 when the door is in its closed position, i.e. it does not grant access to the laundry treatment chamber. In the same way, the further spring 140 is with one end asso-

ciated to handle 32 and with its other end associated to the finishing portion 74. It serves to push the handle 32 into the non-actuated position.

[0052] Catch or hook 92 preferably comprises a leg portion 150 which in the mounted configuration engages with hinge element 142 / handle 32. In this way, when handle 32 is inclined / rotated / turned, hook 92 is rotated and disengaged from the recess in casing 9, thereby unlocking door 24.

[0053] When handle 32 is actuated, hook 92 is rotated into a disengaged / actuated position. The hook 90 is therefore controlled by handle 32 and both the hook and the handle are preferably assembled on the finishing portion 74 in a rotatable manner. Preferably, all the handle assembly 60 is arranged / assembled on the finishing portion 74. Door 24 is blocked when hook 92 is engaged with the recess in casing 6 and is unblocked when handle 32 is actuated and hook 90 is released from the recess.

[0054] A door hinge 132 is preferably provided which is preferably mounted to rear frame 82 and to casing 6 to allow a partial rotation of door 24 such that door 24 can be opened and closed for accessing the opening 28. On its rear side, i.e. its side facing the rear frame 82 and which is in the assembled state not visible to the user, front frame 80 preferably comprises several domes 160 into which screws are lead which are guided through corresponding openings in rear frame 82, thereby attaching back frame 82 to front frame.

[0055] Front frame 80 preferably comprises several domes 160 which receive screws which are lead through both rear frame 82 and front frame 80. Domes 160 preferably have apertures which allow screws 134 to pass through these openings to be screwed into domes arranged at finishing portion 74. Alternatively, the finishing portion 74 can be screwed only to front 80 or to rear frame 82. According to a further additional / alternative embodiment, the front frame 80 can comprise several snap elements which engage with corresponding snap elements which are arranged on corresponding positions on rear side of finishing portion 74.

[0056] The cover portion 84 comprises a rim 172 which in the assembled state is tightly fitted / sandwiched between front frame 80 and rear frame 82.

[0057] In a preferred embodiment of a method for assembling the door 24, cover portion 84 is arranged in a sandwiched way between the front frame 80 and the rear frame 82. Front frame 80 and rear frame 82 are preferably fixed to each other by a screw connection. The cover portion 84 in this way is tightly fitted between the two frames 80, 82. In a first preferred variant, rear frame 82 is fixed to front frame 80 by a screw connection, whereby finishing portion 74 is fixed to front frame 80 and / or rear frame 82 by a separate connection, preferably also a screw connection. In this case, front frame 80 preferably comprises domes 160 and rear frame 82 corresponding holes.

[0058] Screws are lead through these holes in rear frame 82 into the domes 160 of front frame 80, thereby

fixing these two frames 80, 82 to each other, while cover portion 84 is at least partially arranged in a tight-fit-manner between them. In another preferred variant, the finishing portion 74 comprises domes which receive screws which are lead through both frames 80, 82. In this way, the number of screws necessary for the assembly of finishing portion 74 and frames 80, 82 can be reduced. The handle assembly 90 is previously attached to finishing portion 74 so that, when the finishing portion is attached to the frames 80, 82, also the handle assembly is consequently assembled on the door.

[0059] Depending of the overall design of the machine, a dedicated finishing portion, with a suitable handle assembly (i.e. having the suitable shape, the wished aesthetical combination with the finishing portion) is assembled on the closure portion, the latter preferably comprising the rear frame, the front frame and the cover portion as explained above, said closure portion preferably being a common part for several series/models of machine.

[0060] Preferably subsequently in a method for assembling / manufacturing a laundry treatment machine 2, the thus assembled door 24 is mounted to a hinge 132 and is attached to the casing 6 of the laundry treatment machine 2 by connecting hinge 132 to the casing 6. In this way, the door 24 is at least partially rotatably mounted to casing 6 and can thus be opened and closed.

[0061] The invention thus conceived can be subjected to numerous modifications and variants all falling within the scope of the inventive concept.

[0062] In addition, all details can be replaced by other technically equivalent elements. In practice, all the materials used, as well as the shapes and contingent dimensions, may vary depending on the requirements without departing from the scope of protection of the following claims.

Claims

1. Laundry treatment machine (2), comprising a casing (6) and comprising a laundry treatment chamber arranged in said casing (6) for receiving laundry, said casing (6) comprising an opening (28) which grants access to said laundry treatment chamber, said laundry treatment machine (2) further comprising a door (24), said door comprising:
 - a closure portion (72) having the function of closing said opening (28), said closure portion (72) being mounted to said casing (6);
 - a finishing portion (74) associated with said closure portion (72);
 - a movable handle (32) having the function of keeping said door (24) in the closed position when not actuated and to release said door (24) from said closed position when actuated,
 characterized in that said handle (32) is arranged on said finishing

portion (74).

2. Laundry treatment machine (2) according to claim 1, whereby a profile of said handle (32) flushes with a profile of said finishing portion (74) in a non-actuated position of said handle (32).
3. Laundry treatment machine (2) according to claim 1 or 2 with a handle assembly (90) which comprises said handle (32), a rotatable hook (92) for engagement with a locking structure in said casing (6) in a non-actuated position and at least a spring element (94) which acts on said hook (92) and/or said handle (32) to urge them toward a non-actuated position.
4. Laundry treatment machine (2) according to claim 3, whereby said locking structure comprises a recess in said casing (6) in which said hook engages.
5. Laundry treatment machine (2) according to claim 3 or 4, whereby said closure portion (72) comprises a front frame (80) and a rear frame (82).
6. Laundry treatment machine (2) according to one of the claims 3 to 5, whereby said handle (32) is at least partially rotatably arranged on said finishing portion (74) such that the actuation of said handle (32) causes its rotation, moving said hook (92) to a disengaging actuated position, releasing said door (24) from the closed position.
7. Laundry treatment machine (2) according to one of the claims 5 to 6 when depending to claim 5, whereby said front frame (80) comprises an uncovered area (88) which is not covered by said finishing portion (74).
8. Laundry treatment machine (2) according to claim 7, whereby said uncovered area (88) comprises an aesthetically designed surface.
9. Laundry treatment machine (2) according to claim 8, whereby said aesthetically designed surface comprises a plurality of curved grooves which provide optically a turbine effect.
10. Laundry treatment machine (2) according to one of the claims 5 and 6 to 9 when depending to claim 5, whereby said finishing portion (74) in an assembled state is fixed to said front frame (80) and/or said rear frame (82).
11. Laundry treatment machine (2) according to any one of the claims 1 to 10, whereby said finishing portion (74) is welded to said closure portion (72).
12. Laundry treatment machine (2) according to any one of the claims 1 to 10, whereby said finishing portion

(74) is attached to said closure portion (72) by an adhesive connection.

13. Laundry treatment machine (2) according to one of the claims 1 to 12, whereby said finishing portion (74) is fixed to said closure portion (72) by a screw and/or snap connection. 5
14. Laundry treatment machine (2) according to claim 13, whereby said finishing portion (74) on its rear side comprises domes which receives screws which are led through openings in said closure portion (72). 10
15. Laundry treatment machine (2) according to one of the previous claims, whereby said handle (32) comprises a finishing look which corresponds to the finishing look of said closure portion (72). 15

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FIG. 1

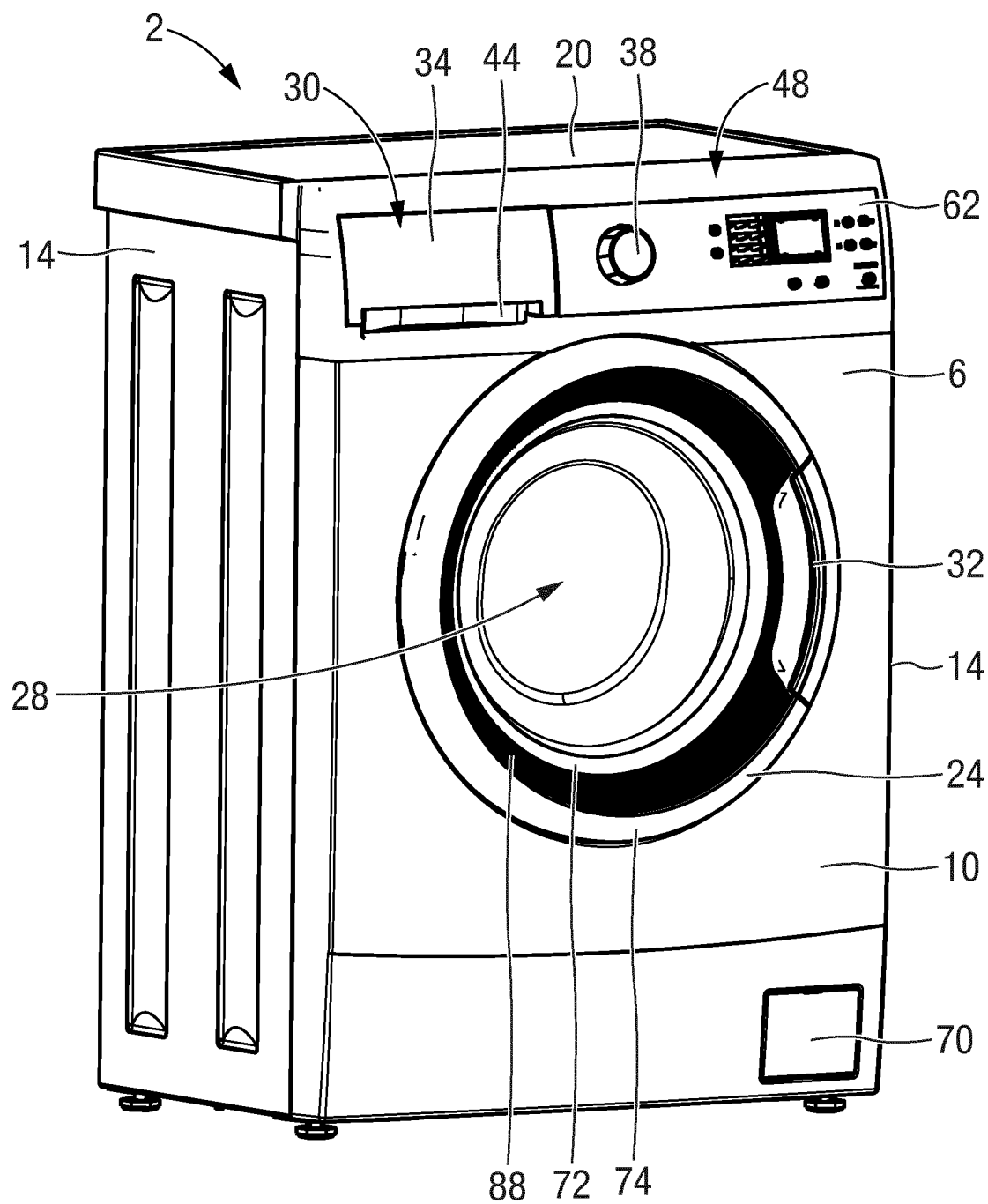


FIG. 2

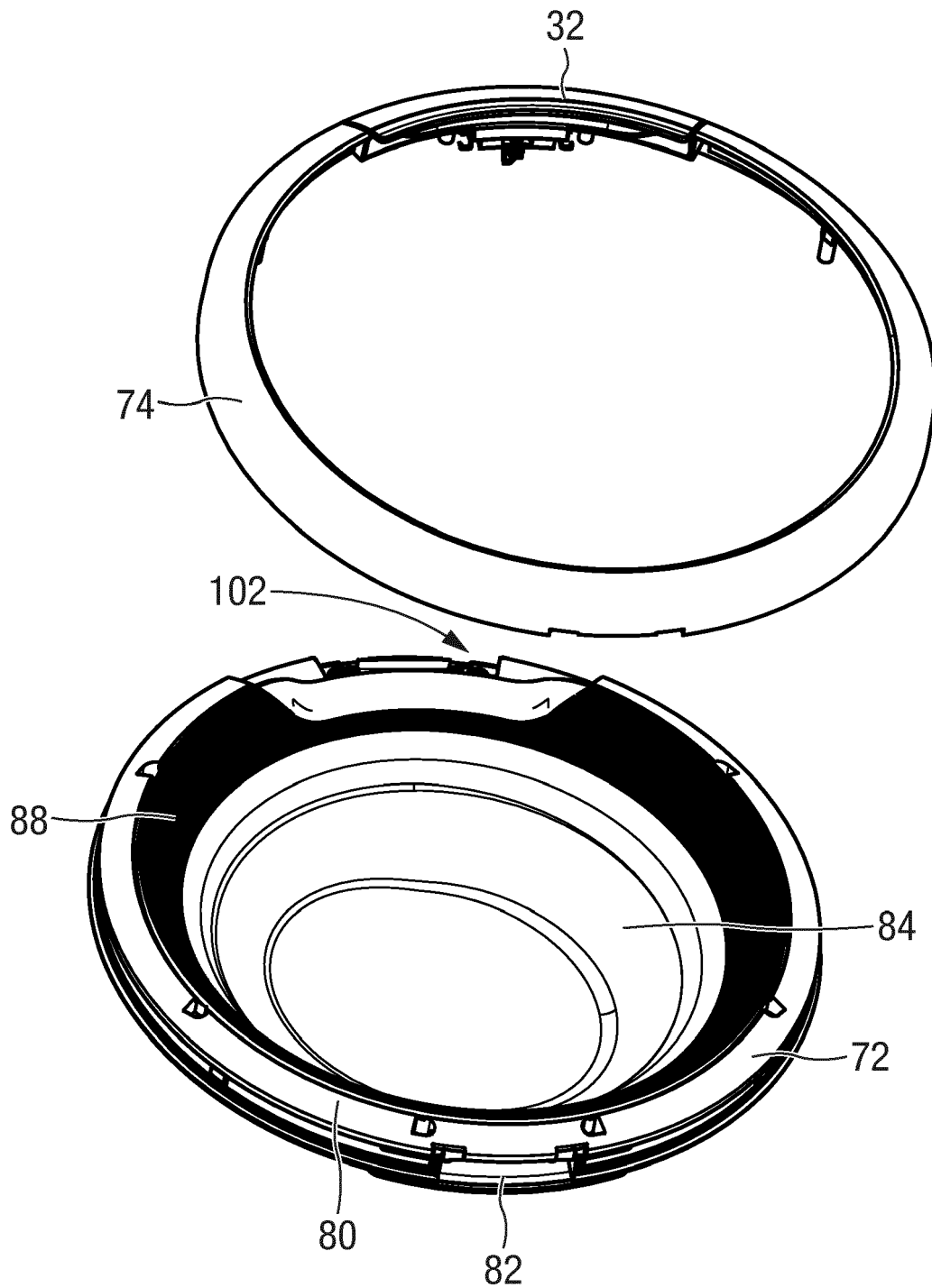


FIG. 3

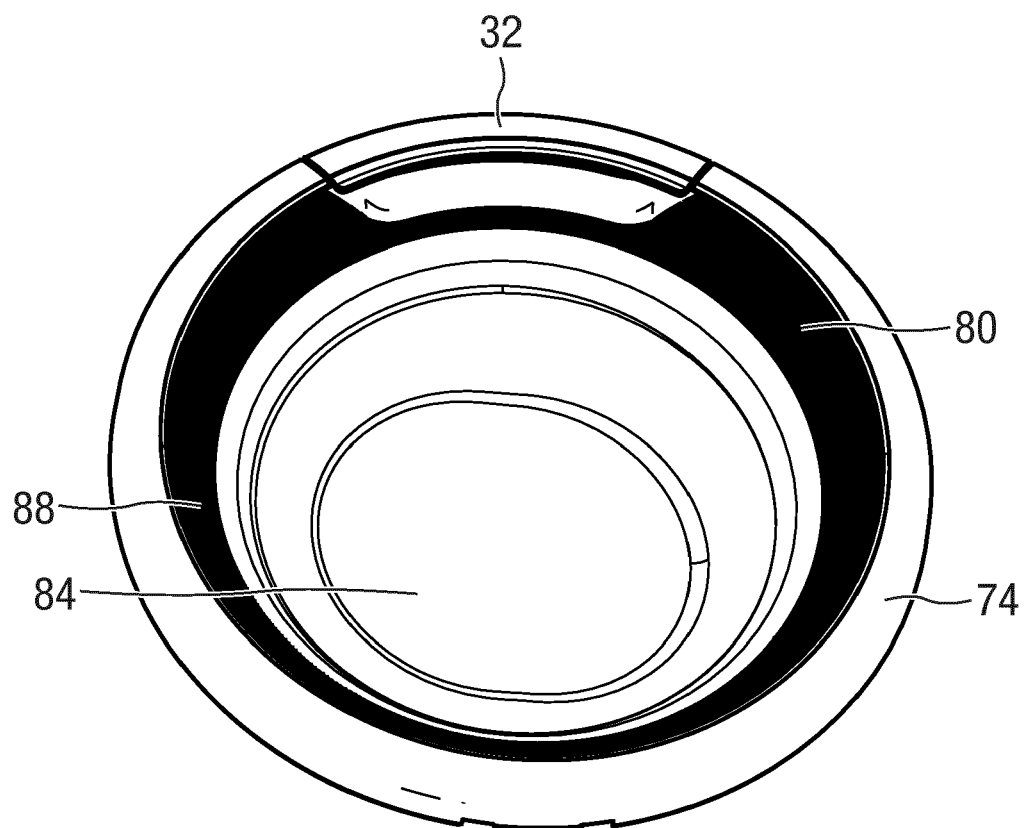


FIG. 4

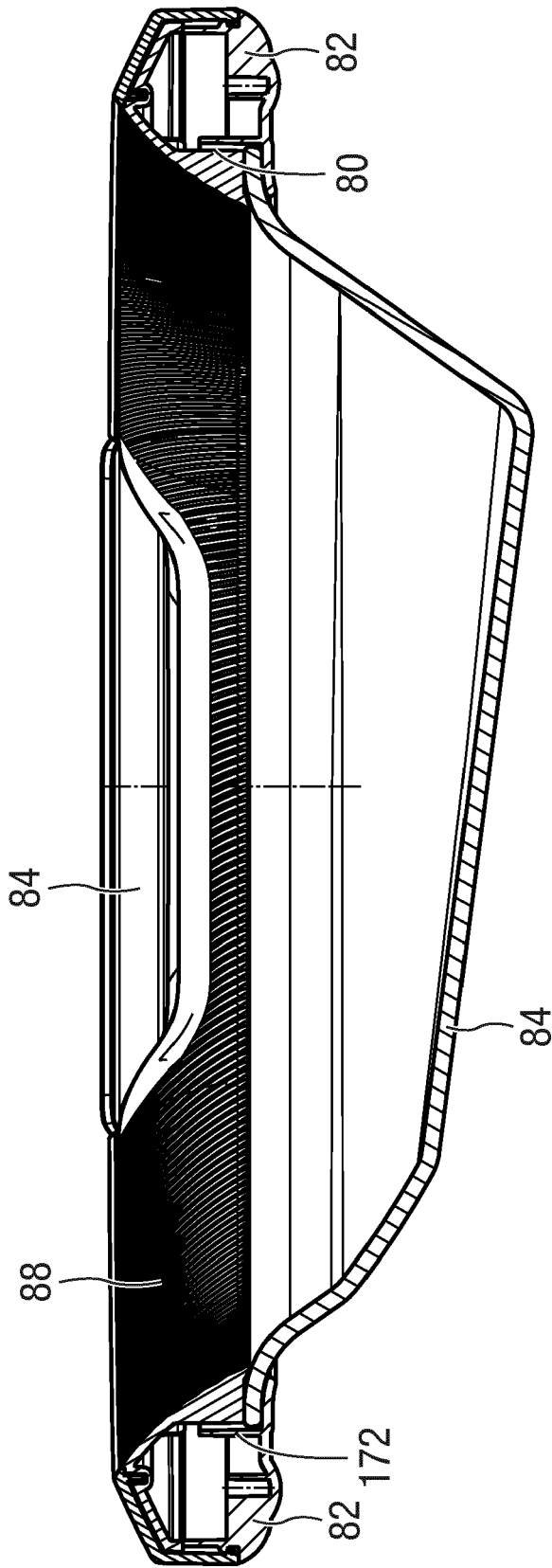


FIG. 5

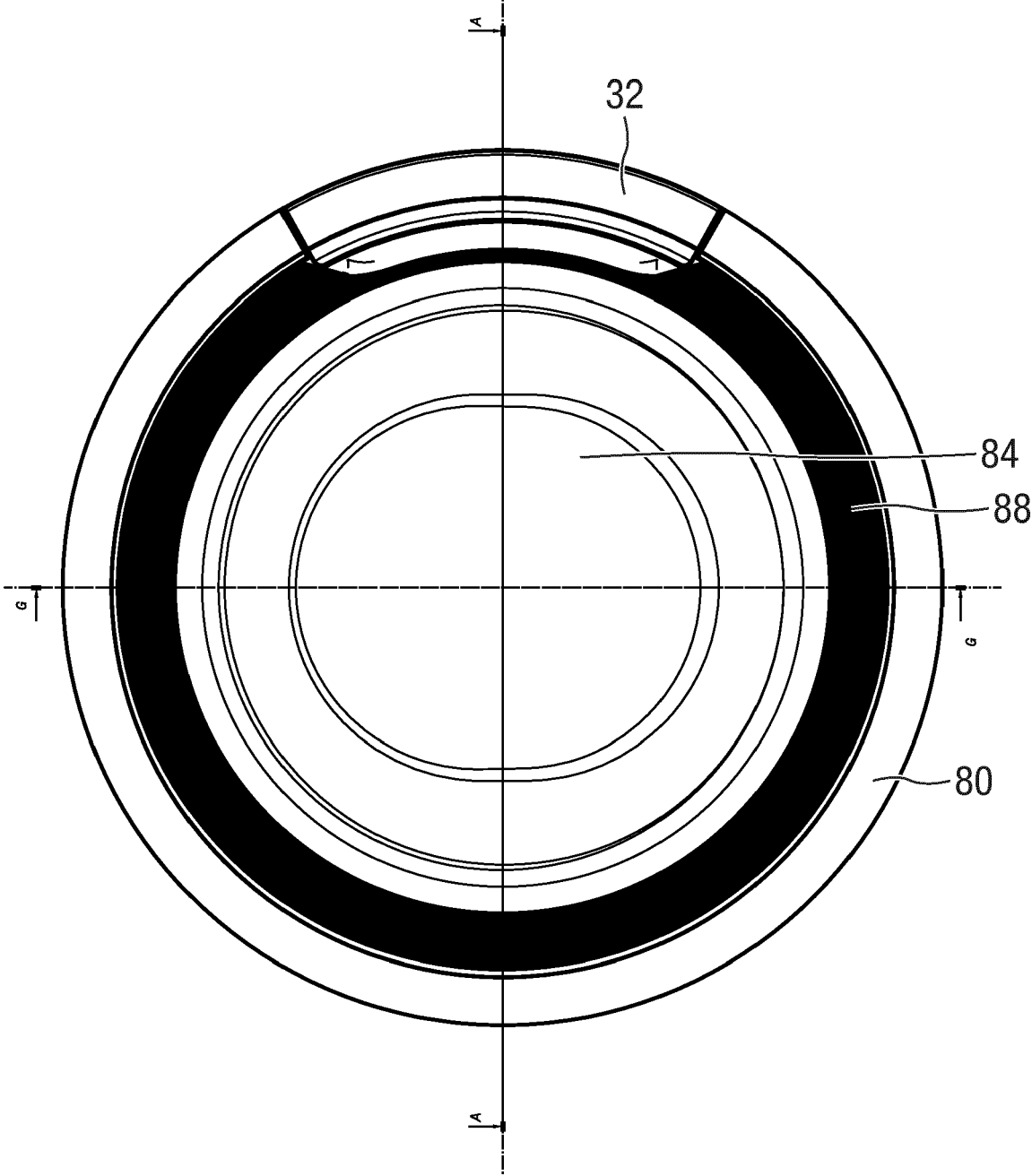


FIG. 6

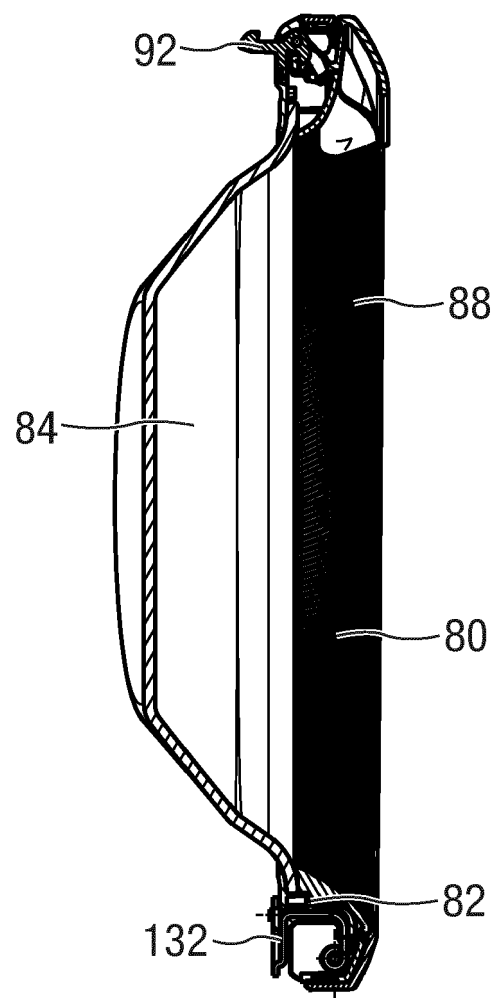
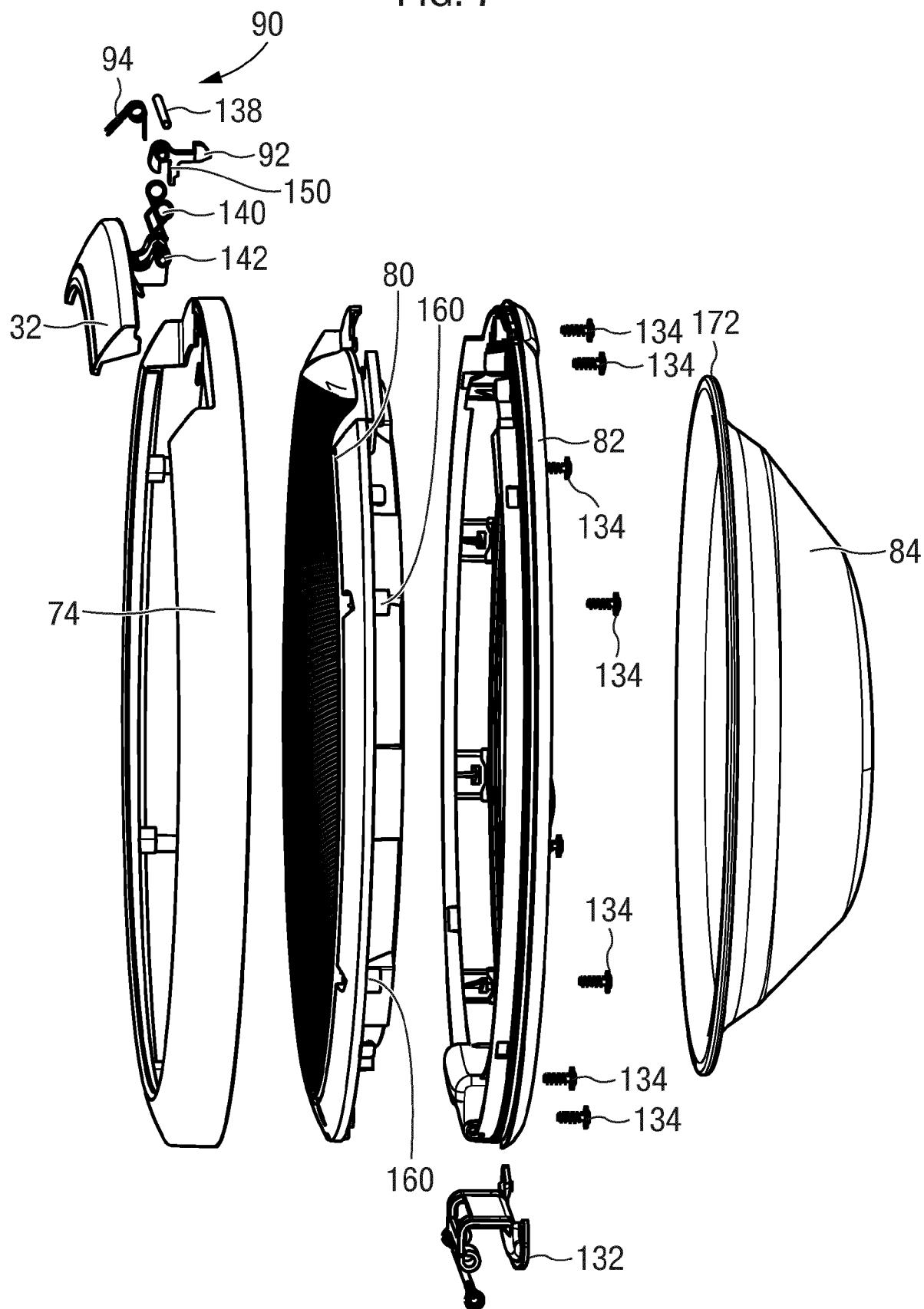


FIG. 7





EUROPEAN SEARCH REPORT

Application Number
EP 17 21 0011

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Y	* paragraphs [0002] - [0004], [0021], [0022], [0051] - [0068], [0085] - [0093]; claims; figures *	5,7,8, 10-12,14	
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A	* paragraphs [0056] - [0066]; claims; figures *	1-4,6,9, 11-15	
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A	* paragraphs [0001], [0002], [0034] - [0037], [0045] - [0052]; claims; figures *	1-10,13, 15	
			TECHNICAL FIELDS SEARCHED (IPC)
			D06F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 8 June 2018	Examiner Clivio, Eugenio
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 21 0011

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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08-06-2018

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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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