

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
16.03.2016 Bulletin 2016/11

(51) Int Cl.:
D06F 39/14 (2006.01)

(21) Application number: **14184748.3**

(22) Date of filing: **15.09.2014**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR
 Designated Extension States:
BA ME

(71) Applicant: **BSH Hausgeräte GmbH**
81739 München (DE)

(72) Inventor: **Wezyk, Pawel**
91-829 Lodz (PL)

(54) **A door for closing an opening of a housing of a household appliance for laundry care, a household appliance for laundry care, and a method for manufacturing a respective door**

(57) The invention relates to a door (2) for closing an opening (3) of a housing (32) of a household appliance (1) for laundry care, the housing (32) having an inner space (7) that can be accessed through the opening (3) in order to allow laundry items to be inserted into the inner space (7) for the purpose of treating them by the household appliance (1) and/or to allow the laundry items to be removed from the inner space (7), the door (2) compris-

ing:
a door body (13) being adapted to be hinged to the housing (32), wherein the door body (13) has a recess (5) in order to provide a handle for a user, wherein at least a major portion of the recess (5) is formed above a horizontal centre line (17) of the door body (13), the horizontal centre line (17) being defined in a status, in which the door body (13) is hinged to the housing (32).

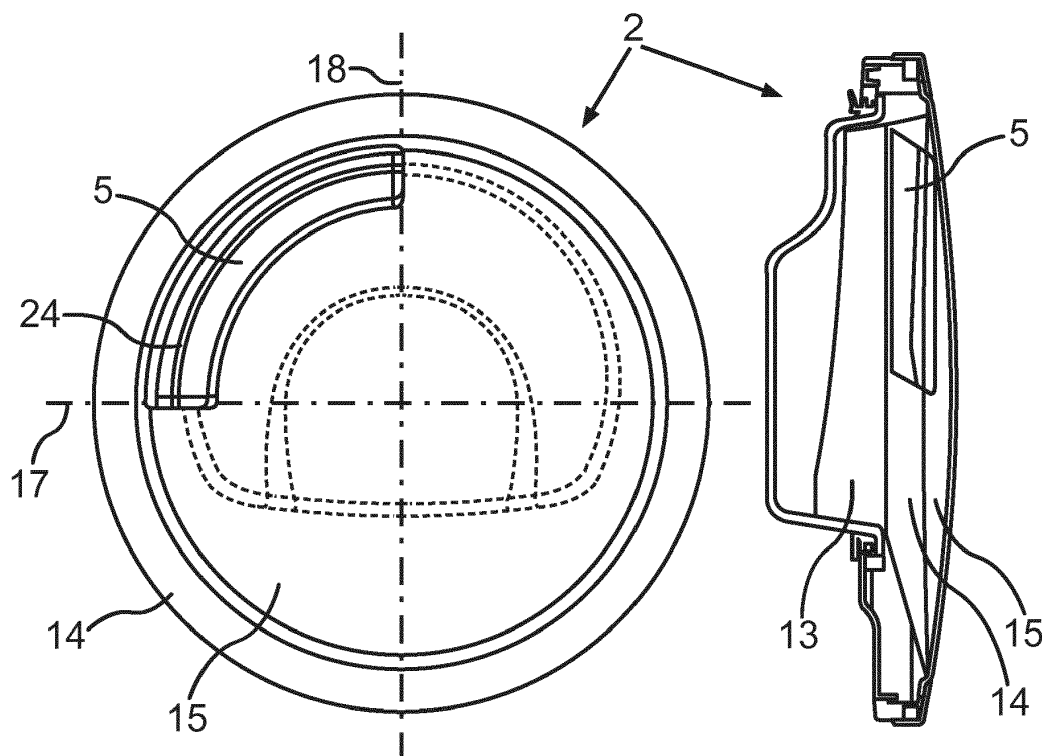


Fig.2

Fig.3

Description

[0001] The present invention relates to a door for closing an opening of a household appliance for laundry care, the housing having an inner space that can be accessed through the opening in order to allow laundry items to be inserted into the space for the purpose of treating them by the household appliance and/or to allow the laundry items to be removed from the space, the door comprising: a door body being adapted to be hinged to the housing, wherein the door body has a recess in order to provide a handle for a user. The invention further relates to a household appliance for laundry care, the household appliance comprising: a housing; an inner space provided inside the housing, wherein the inner space is adapted to receive the laundry; an opening provided in the housing in order to allow the inner space to be accessed via said opening. Finally, the invention further relates to a method for manufacturing a door for closing an opening of a housing of a household appliance for laundry care, the housing having an inner space that can be accessed through the opening in order to allow laundry items to be inserted into the space for the purpose of treating them by the household appliance and/or to allow the laundry items to be removed from the space, the method comprising: providing a door body being adapted to be hinged to the housing; and providing the door body with a recess in order to allow a user to grasp the door.

[0002] A generic household appliance and a door as well as a method is known from the European patent application EP 2 455 536 A1. This document discloses a door for a washing machine having a door hinge in order to hinge the door such that it can be pivoted about a vertical axis at one side of an opening of the washing machine. In order to allow a user to operate the door, the door is provided with a handle which is directly opposite to the hinge. The hinge and the handle are arranged such that they are arranged in a horizontal plane when the door is hinged to the housing of the washing machine. The handle of the door is provided with a recess forming the handle.

[0003] Although this technology is currently distributed, it appears that operating the door by a user is difficult. Generally, the door of the laundry machine is situated such that the user has to bend in order to grasp the recess so that the door can be operated. Moreover, applying a force on the door by the user is disadvantageous from ergonomic point of view, since the user has to provide a force transverse to his bending.

[0004] Therefore, it is an object of the invention to improve a door for a laundry machine, a laundry machine and a method therefore in order to allow a more ergonomic operation of the door by the user.

[0005] This object is solved by a door, a household appliance and a method according to the independent claims.

[0006] Especially, according to the invention, a door for closing an opening of a housing of a household ap-

pliance for laundry care is proposed. The housing has an inner space that can be accessed through the opening in order to allow laundry items to be inserted into the inner space for the purpose of treating them by the household appliance and/or to allow the laundry items to be removed from the inner space. The inventive door comprises a door body which is adapted to be hinged to the housing. The door body has a recess in order to provide a handle for a user which is preferably situated approximately opposite to the hinge. According to the invention, at least a major portion of the recess is formed above a horizontal centre line of the door body, the horizontal centre line being defined in a status, in which the door body is hinged to the housing.

[0007] The invention recognizes that, on the one hand, the door is to be pivoted about a vertical axis when hinged to the housing, and, on the other hand, that it is easier for the user to act on the door when the handle is located in an, at least slightly, upper portion of the door. This results in the user needing less to be bent itself and simplifying applying an operating force on the door. So, the invention enables more ergonomic operation for the user.

[0008] The door body can provide the complete door as a single part. However, the door body can comprise or be composed of two or more parts which are mounted together in order to form the completed door body. For example, the door body can have an aperture in order to allow a glass member to be located inside the aperture so that a window is formed in the door. The door body can additionally comprise elements such as a design ring, a cover glass, a door seal, a rear frame, combinations thereof and the like.

[0009] Commonly, the door is hinged to the housing of the laundry machine such that it can be pivoted about a vertical axis. This is connected with the advantage that the door can have any position in a possible pivot range without being fixed in this position by breaking or the like. The door is provided at the housing of the laundry machine in order to close an opening of the housing so that the opening is closed during the intended use of the laundry machine when treating the laundry items inserted into the inner space of the laundry machine.

[0010] The inner space of the laundry machine is commonly provided by a drum, especially a washing drum, which is rotatably arranged inside the housing. In case, the laundry machine is a dryer, the inner space is preferably provided by a dryer drum. However, the inner space can be provided by any other suited element which is adapted to allow containing and treating of the laundry items.

[0011] Laundry items, for example, comprise shirts, jackets, trousers, skirts, dresses, socks, household linen, any other items of a household that can be treated by a laundry machine, and the like. The before-mentioned definitions of the terms are supposed to limit not the scope of the before mentioned terms.

[0012] The horizontal centre line is a virtual line extending through a centre of the door body. It is arranged

in a plane through the door body which is parallel to a plane of the opening when the door is in the closed position. Consequently, the plane extends in one of its dimension in vertical direction.

[0013] Preferably, the recess is shaped as a quarter segment of a toroid. The toroid may correspond to a circular ring. Preferably, the quarter segment is arranged at the door body in an upper portion, most preferably above the horizontal centre line. However, the recess may be substantially arranged opposite to the hinge of the door body, preferably completely above the horizontal centre line. So, a range of a grasping area for the user is provided so that the user himself or herself can be in the most ergonomic position for grasping the recess in order to operate the door.

[0014] Moreover, it is preferred that an outer circumference of the door body is substantially circular. Most preferably, the circumference of the door body is formed in shape with respect to the quarter segment. Especially, the quarter segment can be arranged narrow to the outer circumference of the door body. This allows providing a lever so that the door body can be operated with a minimum of force exerted by the user. Moreover, the circular circumference allows the door body and as a result to reduce material expenditure for the door body and the door, respectively.

[0015] In order to improve secure grasping of the recess, it is preferably suggested that the recess is provided with an undercut. The undercut allows the user to grasp the door body so that a high force can be exerted on the door body, on the one hand, and, on the other hand, sliding off during grasping can be prevented from.

[0016] Advantageously, the undercut projects radially outwardly inside the door body. So, the undercut can be integrally formed with the door body so that no additional elements will be needed. This allows to provide the undercut without the necessity of further material expenses.

[0017] Preferably, dimensions of the undercut vary such that a depth of the undercut is larger at a position close to the horizontal centre line than the depth of the undercut at a position close to a vertical centre line defined in a status, in which the door body is hinged to the housing. This allows the user to find easily an optimal position for grasping the recess only by touching. So, the user may grasp the recess and gets respective information by touching which position in the recess allows opening the door with a minimum force. No further optical feedback for the user needs to be necessary.

[0018] It is moreover preferred that a cover is fixed to the door body, the cover having an aperture adapted to the recess of the door body such that the recess is partially covered by the cover in order to form the undercut. So, the cover can be used, on the one hand, to form the undercut of the recess. For this purpose, the cover may cover the recess partially so that the covered portion of the recess forms the undercut. For example, the aperture can be adapted to the quarter segment such that a radially arranged outer portion of the quarter segment is cov-

ered by the cover and an inner portion of the quarter segment is kept free for grasping by the user. Preferably, the cover is adapted to an outer shape of the door body; most preferably, it is arranged at an outer surface of the door body. The cover can be made from plastics, ceramic material, compound material, combinations thereof, or the like.

[0019] According to a preferred embodiment, the recess is arranged close to the circumference of the door body. This allows providing a large lever for introducing the force by the user. Only a small wall between the outer circumference of the door body and the recess is necessary, wherein a wall thickness depend on material characteristics of the door body.

[0020] Preferably, the shape of the recess corresponds to the circumference of the door body. This embodiment allows further improving the rigidity since the force applied to the door by the user can be equally distributed over the extension of the recess.

[0021] According to an advantageous embodiment, the door body is provided with a circumferential seal in order to provide a sealing of the opening when the door body is arranged inside the opening. So, the door body is enabled to close the door opening such that, during common operation of the household appliance, the space is sealed properly. Treatment fluids will consequently be kept inside the inner space. No further support for the sealing is necessary.

[0022] According to a further advantageous embodiment, the door body is provided with a glass member, wherein the glass member is directed to the inner space of the housing in the closed position of the door. This embodiment allows providing a window in the door so that a user may control the status and/or the progress of treatment of the laundry.

[0023] Especially, a household appliance for laundry care according to the invention comprises a housing, an inner space provided inside the housing, wherein the inner space is adapted to receive and to treat the laundry, and an opening provided in the housing in order to allow the inner space to be accessed via said opening. The household appliance further comprises a door according to the invention.

[0024] A household appliance of the generic art includes an apparatus for treating laundry, for instance, a washing machine, a dryer, combinations thereof, and the like.

[0025] The household appliance preferably includes electric devices which realize the determined function or treatment, respectively. The electric devices, for example, may be an electric machine, an electric heater, an inverter, especially a DC converter, combinations thereof, and the like. In order to control the electric devices in a determined way, the household appliance includes a control unit. The control unit in turn can comprise an input unit which allows a user to provide manually inputs for controlling the household appliance. Moreover, the control unit may include a display device in order to display

operating statuses to be visually noted by the user. Additionally, the display device and the input device can be integral with each other, for instance, a touch screen, or the like. Finally, the control unit may further comprise sensors as well as evaluation units in order to control the electric devices, parameters such as temperature, water quantity, and the like. The control unit may further comprise a computer unit so that different operations can be selected. The different operations may be selected by input of a user or in dependence on evaluated measurement results of the sensors. The control unit may also be adapted to communicate with external devices, for example, such as a communication terminal, especially a mobile phone, or the like.

[0026] The method according to the invention serves for manufacturing a door for closing an opening of a housing of a household appliance for laundry care. The housing has an inner space that can be accessed through the opening in order to allow laundry items inserted into the space for the purpose of treating them by the household appliance and/or to allow the laundry items to be removed from the space. The inventive method comprises providing a door body being adapted to be hinged to the housing and providing the door body with a recess in order to allow a user to grasp the door. According to the invention, at least a major portion of the recess is formed above a horizontal centre line of the door body, the horizontal centre line being defined in a status, in which the door body is hinged to the housing. Especially, the recess may be formed by using sliders which can be moved in a mold during the molding process of the door body. This allows easy manufacturing of the inventive door.

[0027] Preferably, the recess is provided with an undercut. In order to receive the undercut, the mold may have an additional slider adapted to the shapes of the recess and the undercut so that the undercut can be formed at the same time with the door body without providing any further steps of manufacturing. Moreover, this method step allows producing the undercut integrally with the recess.

[0028] Preferably, the recess is shaped as a quarter segment of a toroid. For this purpose, the mold may be provided with an additional slider being shaped as a toroid or circular ring, respectively. So, the quarter segment can be manufactured with small costs.

[0029] Advantageous embodiments of the door also have to be regarded as advantageous embodiments of the method and the household appliance. For this purpose, apparatus components of the door may be formed as a single component or in combination with other components in order to provide the method steps.

[0030] Additional features of the invention will become apparent from the claims, the figures and a detailed description of an embodiment. All before mentioned features of the description and combinations thereof as well as those of the following detailed description of an embodiment and/or single features shown in the figures and combinations thereof are not only to be used in the re-

spective described combination but also in different combinations or alone without leaving the scope of the invention. Consequently, additional embodiments of the invention have to be regarded as being comprised and disclosed which are not directly shown and described but which are apparent and clear for those skilled in the art by separating combinations of features of the embodiments described.

[0031] An exemplary embodiment of the invention will be described in the following by considering the accompanying drawings in detail. In the figures, equal reference characters designate equal functions and features.

[0032] In the figures show:

- 15 Fig. 1 a schematic perspective view on a front side of a washing machine according to the invention;
- Fig. 2 a schematic front view on a door according to the invention of the washing machine according to Fig. 1;
- 20 Fig. 3 a schematic side view on the door according to Fig. 2;
- 25 Fig. 4 a perspective schematic view of a cutaway of the door according to Fig. 2;
- 30 Fig. 5 a schematic perspective view on a door body of the door according to Fig. 2;
- Fig. 6 a schematic front view of a cutaway of the door body according to Fig. 5;
- 35 Fig. 7 a schematic view according to Fig. 6, wherein grasping areas are indicated;
- Fig. 8 in a schematic view a cutaway of a section of the door according to Fig. 2 in an outer range of the door;
- 40 Fig. 9 a schematic view on a front side of the door body according to Fig. 6;
- 45 Fig. 10 a schematic perspective view of a cutaway of the door body according to Fig. 9; and
- 50 Fig. 11 in a schematic perspective view an exploded assembly drawing of the door according to Fig. 2.

[0033] Fig. 1 shows in a schematic perspective view a front side of a washing machine 1 as household appliance for laundry care. The washing machine 1 comprises a housing 32 in which a washing drum 7 is provided inside in order to provide an inner space. The washing drum 7 is adapted to receive and to treat the laundry. The household appliance 1 further comprises an opening 3 provided

in the housing 32 in order to allow the washing drum 7 to be accessed via said opening 3. The opening 3 can be closed by a door 2 that is hinged to the housing 32 by a hinge 4 such that the door 2 can be pivoted about a vertical axis which is indicated in Fig. 1 by an y-axis of a coordinate system. The vertical axis is parallel to the y-axis.

[0034] The door 2 comprises a recess 5 that is adapted to provide a portion of the door 2 where a user can grasp the door 2 in order to open or close the door 2.

[0035] The washing machine 1 further comprises a belt 6 which is adapted to drive the washing drum 7 and which is in turn driven by a driver 8. The washing machine 1 further comprises a control unit 11 that is connected with an electric power network in order to receive energy therefrom so that the washing machine 1 is enabled to provide the intended treatment. The driver 8 is connected to the control unit 11 via a power cord 9 which supplies electric energy to the driver 8 for driving purposes. Moreover, the control unit 11 is connected with the driver 8 via a control cord 10 in order to provide the driver 8 with control signals so that the washing drum 7 can be operated according to a control program, i. e. a washing program.

[0036] The control unit 11 is further connected with a display 12 that displays operational data and statuses to a user. Presently, the display 12 is further provided with control knobs (not referenced) in order to allow a user to provide an input in order to adjust operating of the washing machine 1.

[0037] Fig. 2 shows the door 2 in a schematic front view as well as Fig. 3 in a schematic side view. The door 2 serves for closing the opening 3 of the housing 32 of the household appliance 1. The door 2 comprises a door body 13 that is adapted to be hinged to the housing 32 by a hinge 4. The door body 13 presents a recess 5 in order to provide a handle for a user. At least a major portion of the recess 5 is formed above a horizontal centre line 17, the horizontal centre line 17 being defined in a status, in which the door body 13 is hinged to the housing 32. The horizontal centre line 17 is parallel orientated to an x-axis shown in Fig. 1.

[0038] As can be seen from Fig. 2 and Fig. 3, the door body 13 is covered by a cover 15 which is surrounded by a design ring 14. The door body 13 presents an outer circumference which is substantially circular. The cover 15 is provided with an aperture 24 which is located in the range of the recess 5. The recess 5 is shaped as a quarter segment of a circular ring. Presently, the aperture 24 is adapted to the recess 5.

[0039] The recess 5 of the door body 13 is provided with an undercut 16 that projects radially outwardly inside the door body 13. Additionally, Fig. 2 shows a vertical centre line 18 which is perpendicular according to the horizontal centre line 17. Both centre lines cross in a centre point of the door body 13 and refer to the situation when the door 2 is hinged to the housing 32. Consequently, the vertical centre line 18 is parallel to the y-axis ac-

cording to Fig. 1, wherein the horizontal centre line 17 is parallel to the x-axis as shown in Fig. 1.

[0040] However, in an alternate embodiment, the aperture 24 of the cover 15 is formed such that a radially outer portion of the recess 5 is covered, too. Therefore, the cover 15 which is fixed to the door body 13 presents together with the door body 13 an undercut.

[0041] Fig. 4 shows a cutaway portion in a schematic perspective view of the door 2 according to Figs. 2 and 3. Fig. 4 allows enhancing the view on the recess 5 and the undercut 16. Fig. 6 and 7 show a respective portion of Fig. 4 in a frontal view of the door body in the range of the recess 5 in a cutaway view. Fig. 7 corresponds to Fig. 6 and differs from Fig. 6 only by arrows 20, 21. Arrow 20 refers to a range for a grasping area, where the user can grasp into the recess 5. The portion indicated by arrow 21 corresponds to a non-grasping area which hinders the user to grasp properly inside the recess 5. This results in avoiding that the user provides a substantial vertical force on the door 2 which may affect or damage the hinge 4. So, the shape of the recess 5 leads the user automatically to an ergonomic grasping into the recess 5 in order to operate the door 2. In Figs. 6 and 7, the cover 15 and the design ring 14 according to Fig. 2 to 5 are removed.

[0042] As can be seen additionally from Fig. 6 and 7, the door body 13 is provided with a glass member 19 in order to allow the user to visually control operation of the household appliance 1 when treating laundry.

[0043] Fig. 8 shows a schematic sectional view of a cutaway according to Fig. 3, wherein a portion of a finger 23 of the user is located inside the recess 5. Fig. 8 shows the mounting situation of the door 2, namely, the door body 13 presenting the recess 5 and being covered by the cover 15 presenting the aperture 24 in the range of the recess 5. In the present embodiment the undercut 16 is provided by the door body 13 itself.

[0044] As can also be seen from Fig. 8, the undercut 16 is partially covered and enforced by the design ring 14. This allows the user to present high forces without damaging the door body 13. This is especially advantageous when the door 2 is closed and needs to be opened by the user. Often, it is necessary to present a high force for opening the door 2 in order to overcome the frictional fixation of the door 2 in the closed state.

[0045] As can also be seen from Fig. 8, the glass member 19, which also may be referred to as door glass, is fixed to the door body 13 by a sealing ring 22. The sealing ring 22 properly fixes the glass member 19 to the door body 13 and allows adjusting some clearances which may appear when high temperatures or pressure or the like act on the door 2 as a result of the determined operation of the household appliance 1 during treatment of the laundry.

[0046] Fig. 9 shows the door body 13 without the cover 15 and the design ring 14 in a schematic frontal view. On the right side in Fig. 9, the hinge 4 is located. Moreover, Fig. 9 shows the recess 5 in the left upper portion of the

door body 13 and the glass member 19 being connected with the door body 13 via the sealing ring 22. Fig. 10 shows a cutaway in a schematic perspective view of the door body 13 according to Fig. 9 in the range of the recess 5. As can be seen from Figs. 9 and 10, the recess 5 is not continuous in circumferential direction but the radial distance with respect to the centre of the door body 13 is larger in the range of the horizontal centre line 17 than this portion of the recess 5 which is narrow to the vertical centre line 18.

[0047] Fig. 11 shows a schematic exploded assembly drawing of the complete door 2. As can be seen from Fig. 11, the door body 13, also referred to as spacer, presents the recess 5. Moreover, the door body 13 presents an opening 33 in which is inserted the glass member 19 including the sealing ring 22. On the rear side of the door body 13, there is provided a rear frame 25 enhancing a proper support for the glass member 19 and the sealing ring 22 at the door body 13. Additionally, the rear frame 25 supports a hook 27 as well as a pin 26 in order to present an interlocking for the door 2 in the closed state. The group comprised of hook 27 and pin 26 is arranged at the horizontal centre line 17 opposite to the hinge 4. Consequently, the rear frame 25 presents on his opposite portion a hinge element 29 which is pivotably connected with the rear frame 25 via a hinge pin 30 as well as two hinge bushes 28. The group of the before mentioned elements form a mounting group 31. So, this embodiment shows that the door body 13 needs not to be a single component but itself can have or be composed of a plurality of components.

[0048] As can be additionally seen from Fig. 11, the mounting group 31 is covered by cover 15 having the aperture 24 and, finally, by the design ring 14.

[0049] Summarized, the invention allows integrating handle features to the interior of the door construction so that proper operation can be achieved in two kinds of appliance design concepts:

- deep stamped front panel with integrated doors, especially, where the external surface of the door is aligned with the surface of the front panel so that preferably no side areas of the door are accessible when the door is closed;
- flat stamped front panel with add-on door, especially, where the door comes out of the appliance and some side areas are accessible when the door is closed.

[0050] Depending on variants, the door 2 can be composed with or without front cover 15, especially a front cover glass, as well as parts that have different colors that could be applied by colored raw material, painting, coating such as chrome, satin, gold, combinations thereof, or the like. Surfaces of the door body 13 or a space, respectively, and the cover 15 can also be decorated using tempo prints, hot stamps, stickers, combinations thereof or the like. The dimensions of the handle and its

geometry may differ depending on brand design.

[0051] The invention is based on the finding that the operation of the door 2 can be improved from ergonomic point of view. Due to technical construction of the household appliance 1, a door lock or interlocking, respectively, is preferably arranged at a 9 o'clock position and, at the same time, provides the opening function by using the physical grasp which should be placed preferably in the range of this position.

[0052] This requirement may interfere with the wish to make the grasping area over a angle range of 90°. Consequently, the invention proposes to visually indicate a 90° access while the recess itself allows only grasping in an angle range that is smaller, preferably arranged in the 9 to 10 o'clock position. However, according to the invention, the grasping range is preferably above the horizontal centre line 17. In the non-grasping area, the recess is formed such that it does not allow to put the fingers deep enough into the recess 5 in order to provide a proper force on the door 2 in order to open the door 2. The handle area according to the invention is formed as the recess 5 which may also be formed in the cover 15 which in turn may be made of PMMA-material, or, for instance, other transparent materials such as PC, SAN, combinations thereof or the like. Preferably, the surface of the recess 5 in the cover 15 may directly correspond to the recess 5 of the door body 13 in order to provide a smooth surface transition between both elements during an opening process.

[0053] The handle area in the door body 13 may be represented by a pocket created using a slider in an injection mould. The slider may move radially inside the tool and may be driven by a mechanical angled mechanism.

[0054] The above described embodiment is determined only to more distinctly describe the invention and is not intended for limitation of the invention. Consequently, functions and components may be modified without departing from the scope of the invention. The advantages and features described in connection with the door 2 may also be applied to the household appliance 1 according to the invention and the inventive method and reverse. So, especially, device features may be allocated to method features and reverse.

Reference Characters

[0055]

- | | |
|---|-----------------|
| 1 | washing machine |
| 2 | door |
| 3 | opening |
| 4 | hinge |
| 5 | recess |
| 6 | belt |
| 7 | washing drum |
| 8 | driver |
| 9 | power cord |

10 control cord
 11 control unit
 12 display
 13 door body
 14 design ring
 15 cover
 16 undercut
 17 horizontal centre line
 18 vertical centre line
 19 glass member
 20 grasping area
 21 non-grasping area
 22 sealing ring
 23 finger
 24 aperture
 25 rear frame
 26 pin
 27 hook
 28 hinge bush
 29 hinge element
 30 hinge pin
 31 mounting group
 32 housing
 33 opening

Claims

1. A door (2) for closing an opening (3) of a housing (32) of a household appliance (1) for laundry care, the housing (32) having an inner space (7) that can be accessed through the opening (3) in order to allow laundry items to be inserted into the inner space (7) for the purpose of treating them by the household appliance (1) and/or to allow the laundry items to be removed from the inner space (7), the door (2) comprising:

a door body (13) being adapted to be hinged to the housing (32), wherein the door body (13) has a recess (5) in order to provide a handle for a user,

characterized in that

at least a major portion of the recess (5) is formed above a horizontal centre line (17) of the door body (13), the horizontal centre line (17) being defined in a status, in which the door body (13) is hinged to the housing (32).

2. The door according to claim 1, **characterized in that** the recess (5) is shaped as a quarter segment of a toroid.
3. The door according to claim 1 or 2, **characterized in that** an outer circumference of the door body (13) is substantially circular.
4. The door according to anyone of the preceding

claims, **characterized in that** the recess (5) is provided with an undercut (16).

5. The door according to claim 4, **characterized in that** the undercut (16) projects radially outwardly inside the door body (13).

6. The door according to claim 4 or 5, **characterized in that** dimensions of the undercut (16) vary such that a depth of the undercut (16) is larger at a position close to the horizontal centre line (17) than the depth of the undercut (16) at a position close to a vertical centre line (18) defined in a status, in which the door body (13) is hinged to the housing (32).

7. The door according to anyone of the claims 4 to 6, **characterized in that** a cover (15) is fixed to the door body (15), the cover (15) having an aperture (24) adapted to the recess (5) of the door body (13) such that the recess (5) is partially covered by the cover (15) in order to form the undercut (16).

8. The door according to anyone of the preceding claims, **characterized in that** the recess (5) is arranged close to the circumference of the door body (13).

9. The door according to anyone of the preceding claims, **characterized in that** the shape of the recess (5) is adapted to correspond to the circumference of the door body (13).

10. The door according to anyone of the preceding claims, **characterized in that** the door body (13) is provided with a circumferential sealing member (22) in order to provide a sealing of the opening (3) when the door body (13) is arranged inside the opening (3) in order to close the door (2).

11. The door according to anyone of the preceding claims, **characterized in that** the door body (13) is provided with a glass member (19), wherein the glass member (19) is directed to the inner space (7) of the housing (32) in the closed position of the door (2).

12. A household appliance (1) for laundry care, the household appliance (1) comprising:

a housing (32);
 an inner space (7) provided inside the housing (32), wherein the inner space (7) is adapted to receive the laundry; and
 an opening (3) provided in the housing (32) in order to allow the inner space (7) to be accessed via said opening (3);
characterized by
 a door (2) according to anyone of the preceding

claims.

13. A method for manufacturing a door (2) for closing an opening (3) of a housing (32) of a household appliance (1) for laundry care, the housing (32) having an inner space (7) that can be accessed through the opening (3) in order to allow laundry items to be inserted into the inner space (7) for the purpose of treating them by the household appliance (1) and/or to allow the laundry items to be removed from the inner space (7), the method comprising:

providing a door body (13) being adapted to be hinged to the housing (32); and
 providing the door body (13) with a recess (5) in order to allow a user to grasp the door (2);
characterized in that
 forming at least a major portion of the recess (5) above a horizontal centre line (17) of the door body (13), the horizontal centre line (17) being defined in a status, in which the door body (13) is hinged to the housing (32).

14. The method according to claim 13, **characterized in that** the recess (5) is provided with an undercut (16).

15. The method according to claim 13 or 14, **characterized in that** the recess (5) is shaped as a quarter segment of a toroid.

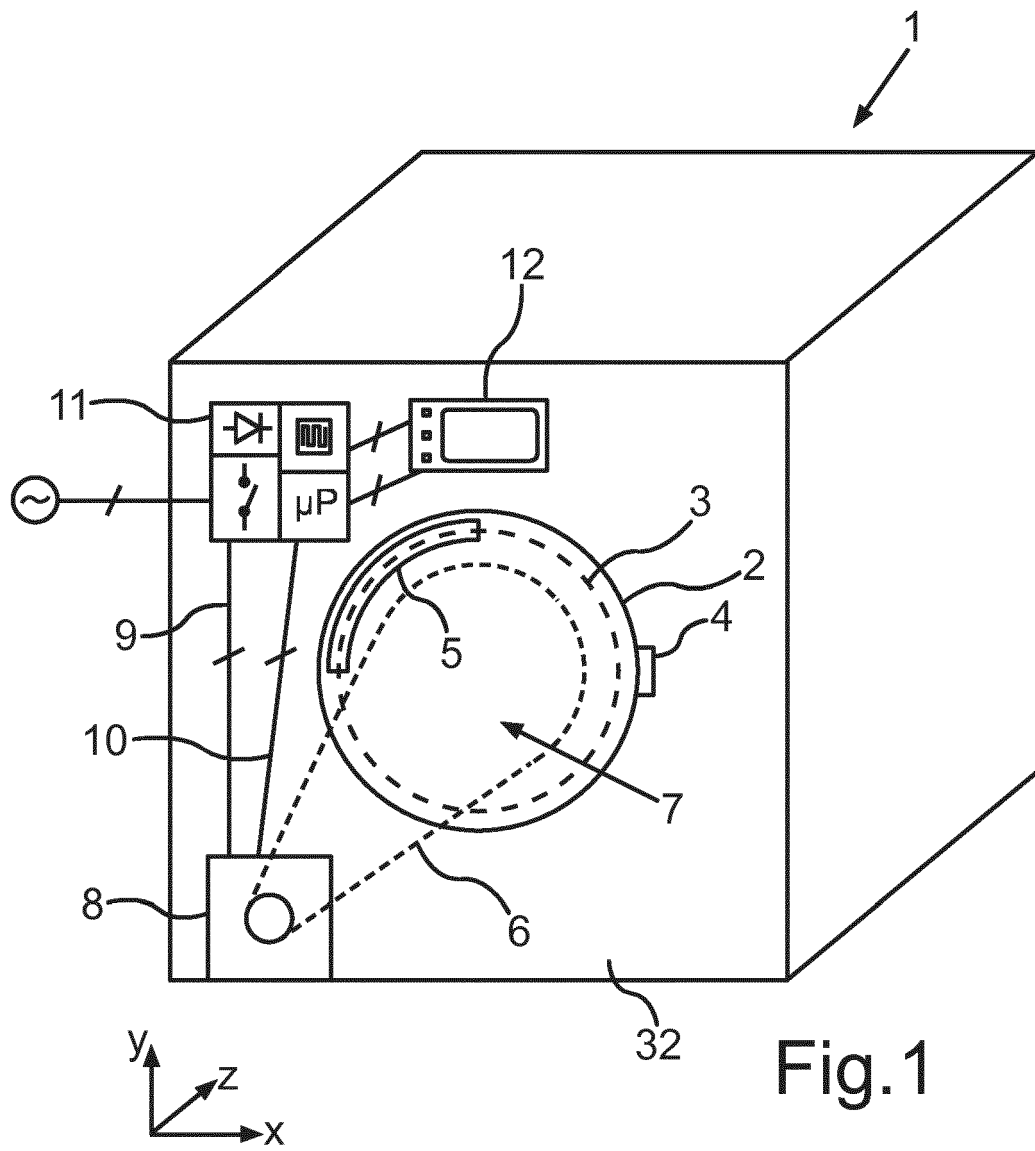
35

40

45

50

55



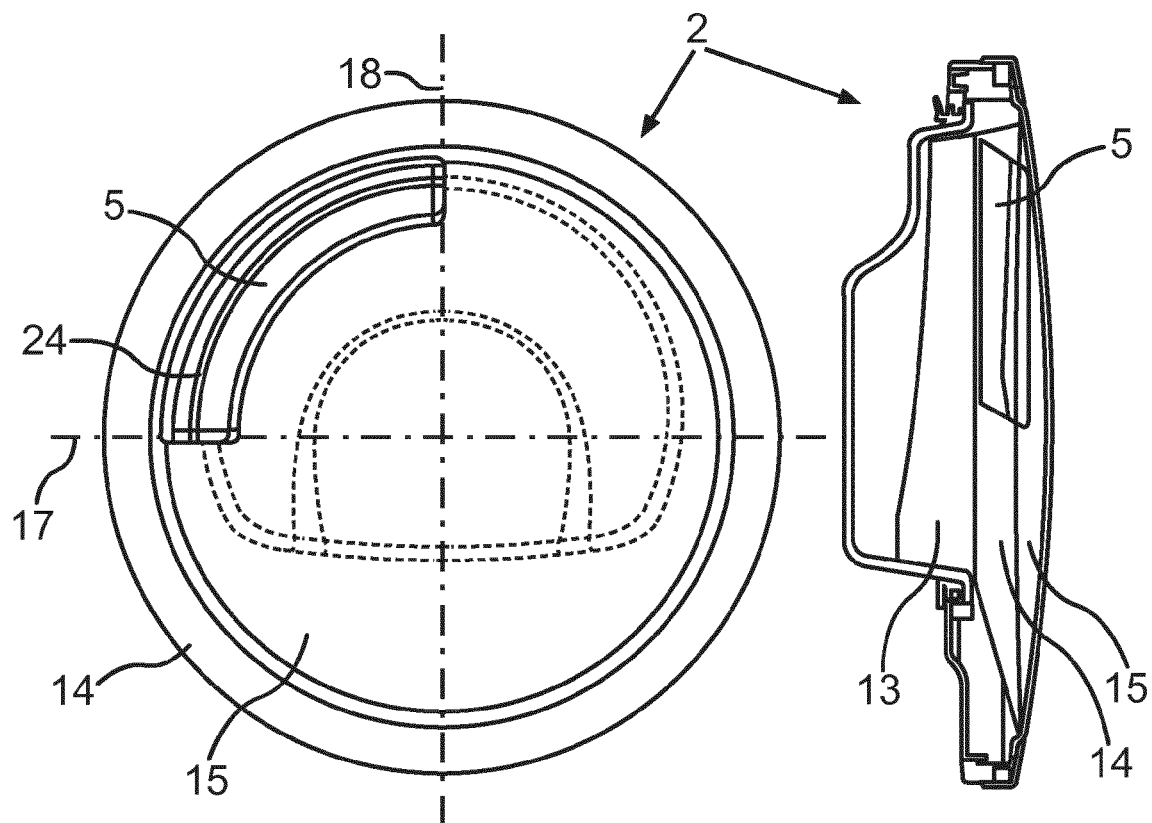


Fig.2

Fig.3

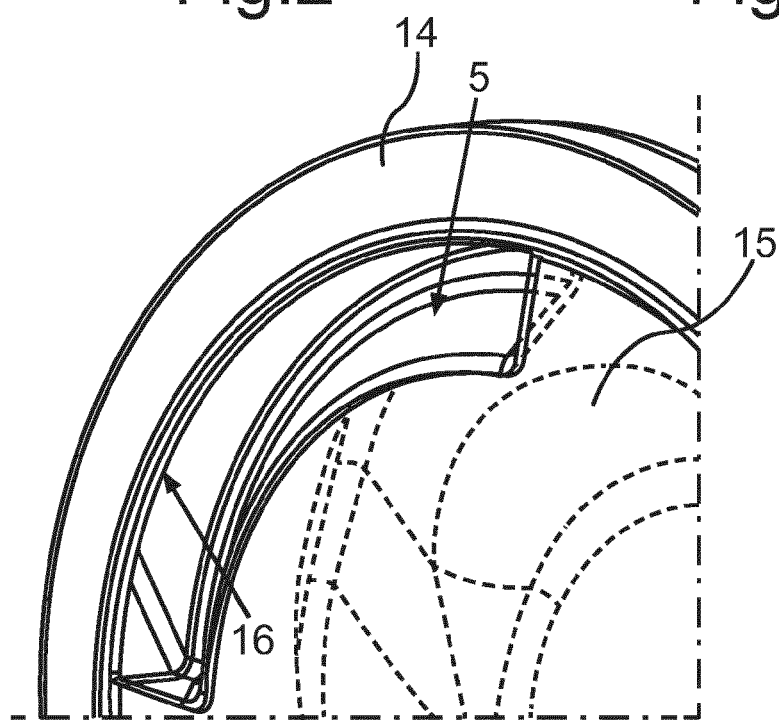


Fig.4

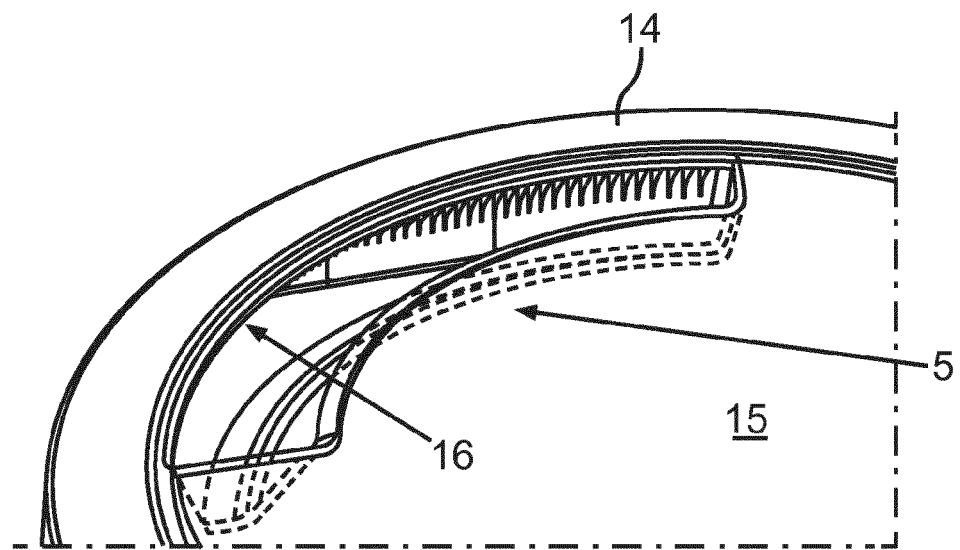


Fig.5

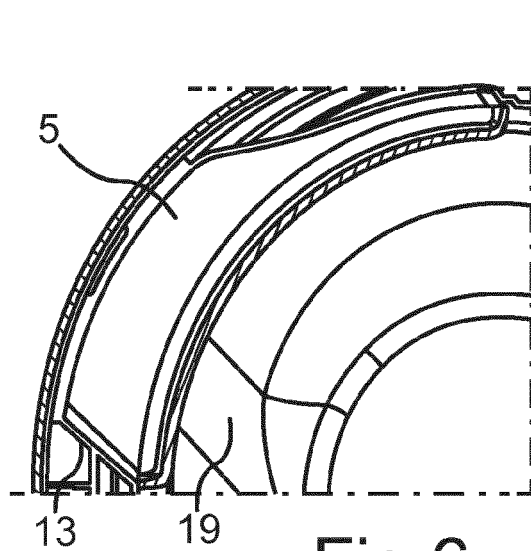


Fig.6

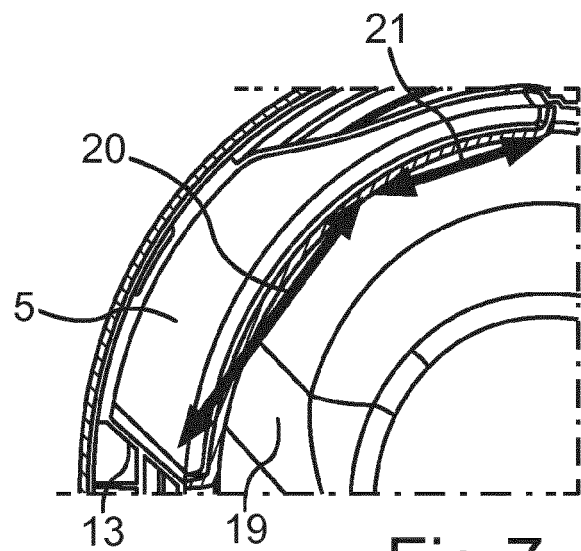


Fig.7

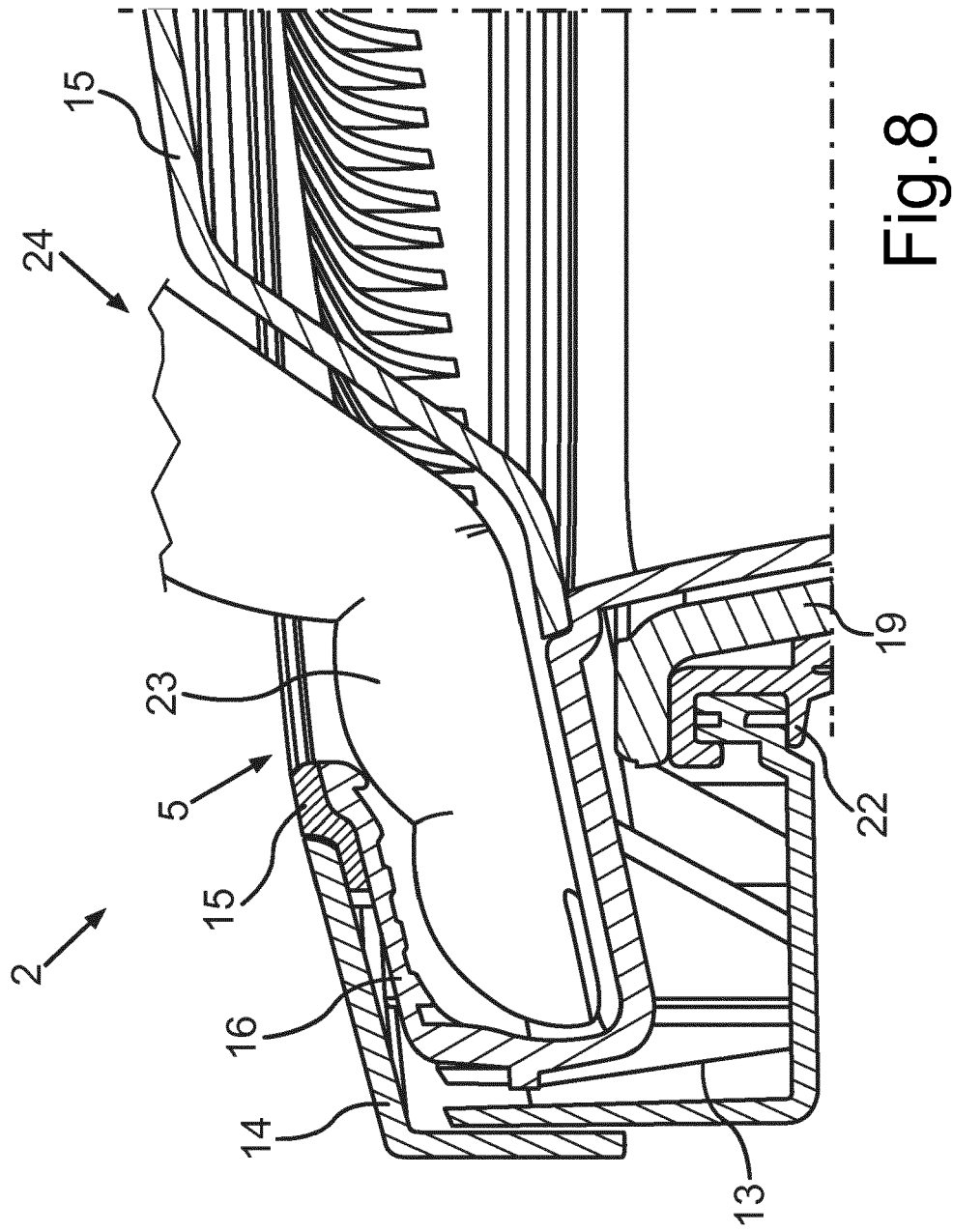


Fig. 8

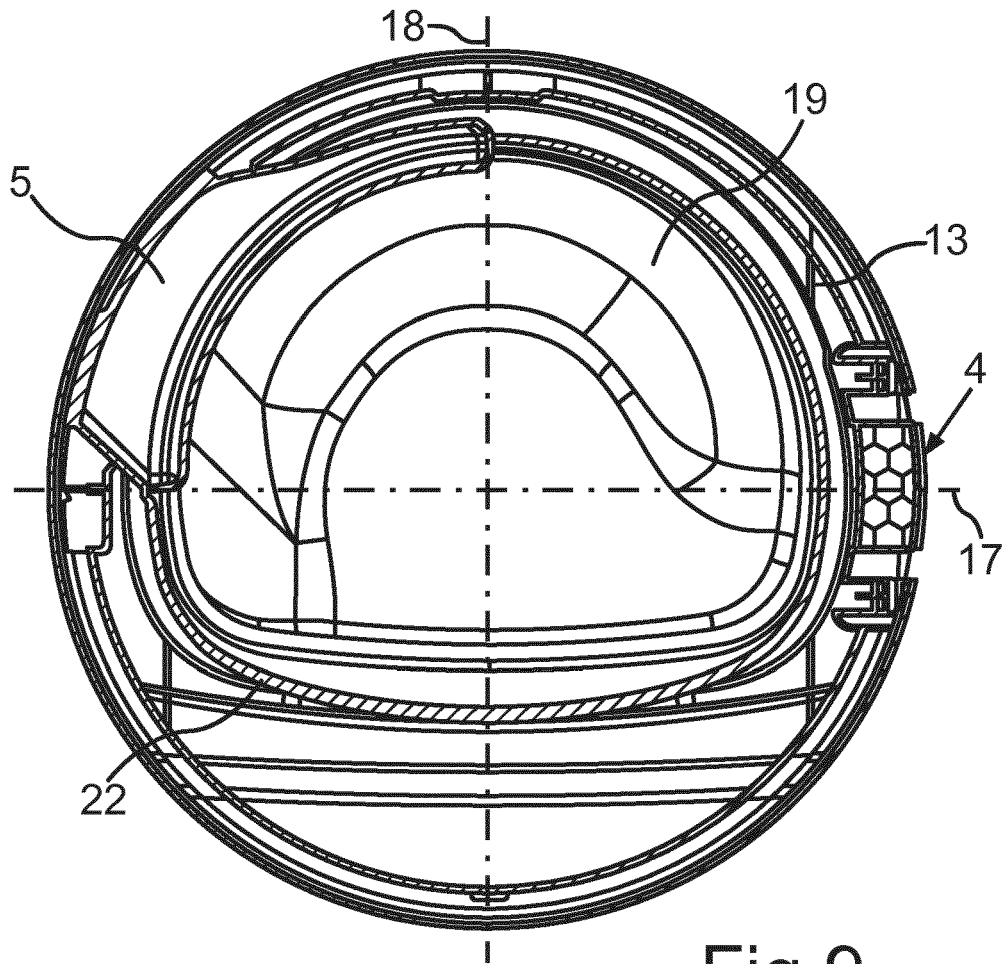


Fig.9

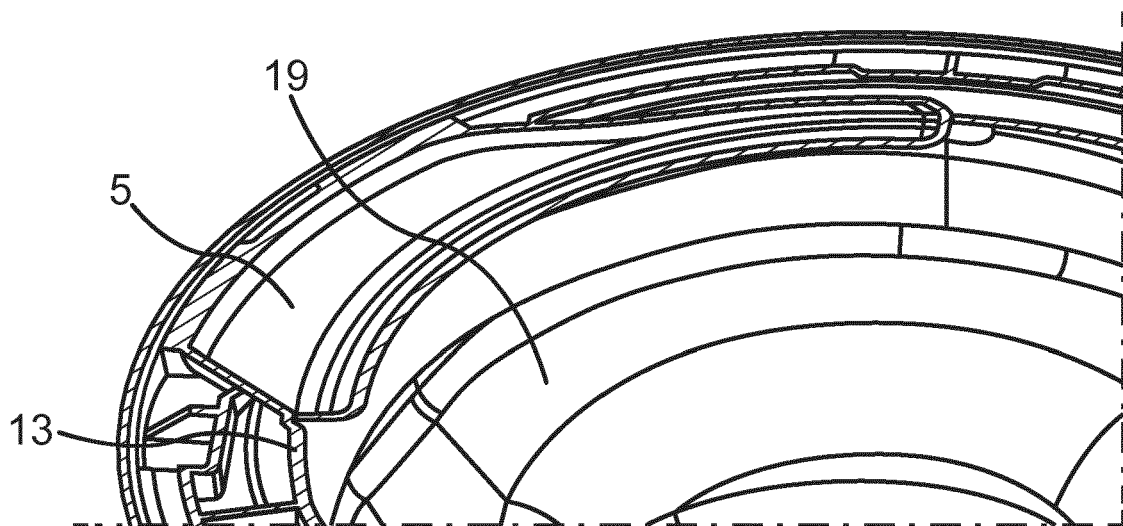


Fig.10

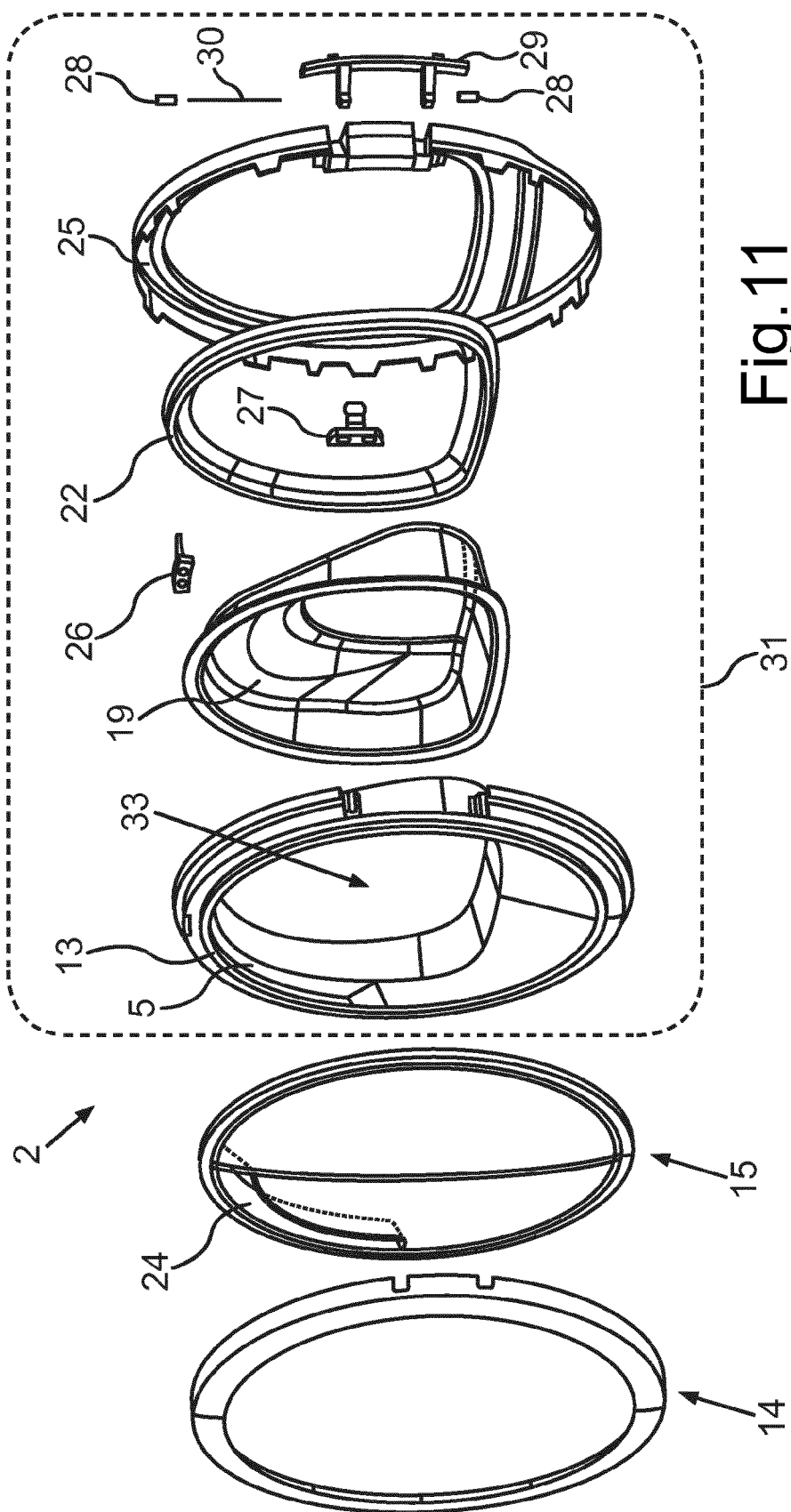


Fig. 11



EUROPEAN SEARCH REPORT

Application Number
EP 14 18 4748

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2012/217851 A1 (BAE SANGHUN [KR] ET AL) 30 August 2012 (2012-08-30)	1,4,5,7, 12-14	INV. D06F39/14
Y	* paragraph [0049] - paragraph [0053]; figure 10 *	2,3, 8-11,15	
Y	* paragraph [0059] - paragraph [0061]; figure 11 *		
Y	----- US 2013/232810 A1 (COXON DAVID JOHN [US] ET AL) 12 September 2013 (2013-09-12) * paragraph [0020] - paragraph [0025]; figure 1 * * paragraph [0033] - paragraph [0040]; figure 4 *	2,3, 8-11,15	
X	----- US 2012/161594 A1 (KIM KIHYUK [KR] ET AL) 28 June 2012 (2012-06-28) * paragraph [0096] - paragraph [0098]; figure 3 *	1,12,13	
A	----- US 2011/023559 A1 (SCHOENE OLIVER [US]) 3 February 2011 (2011-02-03) * paragraph [0097] - paragraph [0105]; figures 5A-5C *	1-15	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 31 October 2014	Examiner Sabatucci, Arianna
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 14 18 4748

5

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

31-10-2014

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2012217851 A1	30-08-2012	US 2012217851 A1	30-08-2012
		WO 2012115467 A2	30-08-2012

US 2013232810 A1	12-09-2013	NONE	

US 2012161594 A1	28-06-2012	US 2012161594 A1	28-06-2012
		WO 2012087057 A2	28-06-2012

US 2011023559 A1	03-02-2011	CA 2709439 A1	30-01-2011
		US 2011023559 A1	03-02-2011

15

20

25

30

35

40

45

50

55

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

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 2455536 A1 [0002]