



- (51) International Patent Classification:
D06F 39/14 (2006.01)
- (21) International Application Number:
PCT/EP2015/057041
- (22) International Filing Date:
31 March 2015 (31.03.2015)
- (25) Filing Language: English
- (26) Publication Language: English
- (71) Applicant: **ARCELIK ANONIM SIRKETI** [TR/TR]; E5
Ankara Asfalti Uzeri, Tuzla, 34950 Istanbul (TR).
- (72) Inventors: **YILDIRIM, Salih**; E5 Ankara Asfalti Uzeri,
Tuzla, 34950 Istanbul (TR). **KARACA, Sema**; E5 Ankara
Asfalti Uzeri, Tuzla, 34950 Istanbul (TR). **METIN, Ergin**;
E5 Ankara Asfalti Uzeri, Tuzla, 34950 Istanbul (TR).
CETINKAYA, Bugra; E5 Ankara Asfalti Uzeri, Tuzla,
34950 Istanbul (TR).
- (81) Designated States (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,

BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG,
MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,
PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC,
SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

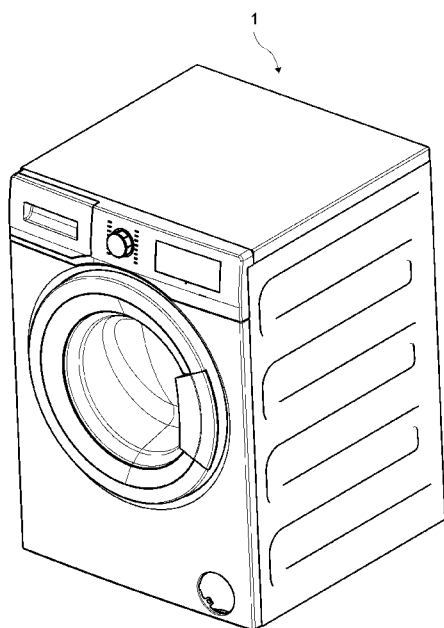
- (84) Designated States (*unless otherwise indicated, for every
kind of regional protection available*): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ,
TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU,
TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE,
DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU,
LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,
SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: LAUNDRY WASHING MACHINE WITH AN IMPROVED FRONT DOOR MOUNTING MECHANISM

Fig. 1



(57) Abstract: The present invention relates to a laundry washing machine (1) having an outer frame (10) with a front door (4) mounting mechanism. The present invention more particularly relates to a laundry washing machine (1) comprising a cabinet having a front wall (3), an upper door (6) and a main body (2). The laundry washing machine (1) further comprises a front door (4) allowing access into a drum for loading or unloading laundry, the front door (4) being openable by means of a handle (28) mounted to an outer frame (10) of the front door (4).

Description**LAUNDRY WASHING MACHINE WITH AN IMPROVED FRONT DOOR
MOUNTING MECHANISM**

- [0001] The present invention relates to a laundry washing machine having an outer ring with a front door mounting mechanism.
- [0002] Laundry washing machines comprise a rotary drum in which cloth items are placed and accessible via a front door and a motor providing the rotary drum to be driven by means of a pulley mechanism; or alternatively, a direct driving system can be employed. In short, laundry washing machines have front doors typically allowing access into the rotatable drum for loading and unloading the laundry to be washed and/or dried.
- [0003] A front door of a laundry washing machine basically comprises an inner frame, an outer frame and a handle. The mounting of the front door is typically performed by using various connection elements such as screws being fitted into visible areas of the front door, which in turn leads to longer mounting durations and an elevated overall cost associated with the number of additional individual components such as the connection elements.
- [0004] Furthermore, during the mounting process, the connection elements may potentially damage the sensitive areas having coated or dyed outer surface portions directly noticeable to the user. Other components on the inner frame surfaces may additionally be subject to dirt accumulation near the connection elements on the inner frame surface, such areas being also visible to the user may as such cause hygiene concerns on the part of the users.
- [0005] The above-mentioned problems caused by the usage of conventional connection elements are solved by way of utilizing a mounting mechanism with tabs on the inner side. According to the mounting mechanism, the number of necessary connection elements to assemble the parts of the front door to each other is reduced, thus mounting durations and manufacturing schemes are optimized so as to reduce the overall manufacturing costs.
- [0006] Since a supplementary element having a sensitive surface coating or dye,

can be damaged by using additional connection elements, the proposed mounting mechanism prevents surface damage to the supplementary element. The outer ring is mountable and dismountable much easier according to the mounting mechanism of the invention, simultaneously ensuring an undamaged surface character for the supplementary element to be associated with a higher quality product.

- [0007] The feature of the mounting mechanism eliminating the visible connection elements on the inner ring is an additional advantage in the respect that the dirt that can accumulate around the connection elements on the inner frame surface directed to the inner part of the laundry washing machine does not cause hygiene concerns. The connection elements utilized for the mounting of the inner ring are structured so as not to be readily visible to the end-user.
- [0008] The above-mentioned mounting mechanism can be designed so as to make use of various connection elements in different structural forms, which may substantially affect mounting efficiency as well as the perceived build quality of a laundry washing machine front door and therefore the laundry washing machine itself on the part of end-users.
- [0009] An outer frame of the front door can be mounted to the inner components by means of different connection structures. The outer frame is the visible outer portion, on which a handle is mounted and the other components of the front door are mounted from the inside of the outer door. An inner frame and a supplementary element are utilized as the components of the front door that form an assembly with the outer frame by which the mounting duration, component costs and the quality of the connection between the cooperating parts of the assembly are improved.
- [0010] Therefore, a more efficient manner of providing a rigid mounting mechanism with an improved internal structure of involved cooperating components is desirable so that the outer ring of the laundry washing machine can be mounted to the front door in a sturdy manner with a better quality so as to avoid damage to areas with surface sensitivity.
- [0011] The present invention therefore proposes a laundry washing machine with a cost-efficient and high quality structure front door outer frame mounting

mechanism.

- [0012] A prior art publication in the technical field of the present invention may be referred to as WO2013189859 among others, disclosing a laundry treatment device comprising a laundry treatment chamber, a machine housing enclosing the laundry treatment chamber and having an opening for loading/unloading the laundry treatment chamber with laundry, and a door assembly supported at the machine housing for closing/opening the laundry opening. The door assembly comprises a first and a second component attachable or attached to each other by at least one snap-fit connector. The one snap-fit connector comprises one first engaging element arranged at the first component of the door assembly, and at least one second engaging element arranged at the second component of the door assembly. The second engaging element is adapted to engage with the first engaging element to attach the first component to the second component. The snap-fit connector further comprises a forcing element for forcing the first engaging element in engagement with the second engaging element for forcing the second engaging element in engagement with the first engaging element.
- [0013] The present invention provides a laundry washing machine in which a front door mounting mechanism is obtainable by means of an inter-engaging structure free of connection elements, thereby avoiding damage to areas having surface sensitivity as defined by the characterizing features in Claim 1 and subsequent Claims.
- [0014] Primary object of the present invention is hence to provide a laundry washing machine having an improved, practically mountable mounting mechanism.
- [0015] The invention proposes a laundry washing machine with a front door having an inner frame and a supplementary element connected to an outer frame. The supplementary element is interposed between the outer frame and the inner frame and the outer frame is rotatably mounted to the supplementary element while a decorative region of the supplementary element remains uncovered and free of any connection structures. The inner frame and the supplementary element are connectible by means of

connection elements hidden by the outer frame in the fixed position of the same.

[0016] The outer frame has a plurality of outer frame tabs enclosingly engaging with the supplementary element in a fixed manner. A plurality of peripherally located engaging elements of the supplementary element therefore effectuates inter-connection with the outer frame in an enclosed manner.

[0017] Further, a plurality of outer frame inner tabs enters into a first opening section of a longitudinal recess of the supplementary element for locking of the outer frame therewith. The outer frame is rotatably dismountable relative to the supplementary element by moving the outer frame inner tabs from the first opening sections to the larger second opening sections of the longitudinal recesses.

[0018] Accompanying drawings are given solely for the purpose of exemplifying a laundry washing machine, whose advantages over prior art were outlined above and will be explained in brief hereinafter.

[0019] The drawings are not meant to delimit the scope of protection as identified in the claims nor should they be referred to alone in an effort to interpret the scope identified in the claims without recourse to the technical disclosure in the description of the present invention.

[0020] Fig. 1 demonstrates a general perspective view of a laundry washing machine according to the present invention.

[0021] Fig. 2 demonstrates a general perspective view of the laundry washing machine with unassembled components according to the present invention.

[0022] Fig. 3a and 3b respectively demonstrate general perspective views of the laundry washing machine front door components and handle components according to the present invention.

[0023] Fig. 4a demonstrates a front view together with a cross-sectional view of the front door components along line A-A and Fig. 4b demonstrates an enlarged view of detail X as shown in Fig. 4a according to the present invention.

[0024] Fig. 5 demonstrates a front view of a supplementary element with a

plurality of mounting structures facing the inner face of an outer frame according to the present invention.

[0025] Fig. 6 demonstrates an inner view of the outer frame with a plurality of mounting structures facing the front face of the supplementary element according to the present invention.

[0026] Fig. 7 demonstrates an inner view of the supplementary element with a plurality of mounting structures effecting fixation thereof to the outer frame as well as the inner frame according to the present invention.

[0027] Fig. 8 demonstrates a perspective view of the supplementary element according to the present invention.

1. Laundry washing machine
2. Main body
3. Front wall
4. Front door
5. Control display
6. Upper door
7. Hinge
8. Inner frame
9. Supplementary element
10. Outer frame
11. Inner handle element
12. Outer handle element
13. Handle pin
14. Hook
15. Hook spring
16. Hook pin
17. Outer frame tab
18. Tab support
19. First opening section
20. Second opening section
21. Connection element housing
22. Outer frame inner tab
23. Engaging element

- 24. Rib support
- 25. Concealed tab support
- 26. Concealed supplementary tab
- 27. Supplementary rib portion
- 28. Handle
- 29. Longitudinal recess
- 30. Decorative region
- 31. Rib portion ending

[0028] The present invention relates to a laundry washing machine (1) with drying function, comprising a rotary drum, in which the laundry to be placed and an electric motor rotating the drum. A front wall (3) and an upper door (6) together with a main body

(2) portion constitute the 6-sided cabinet of the laundry washing machine (1). A control display (5) is situated on the upper portion of the front wall (3), allowing initiation of various functions associated with the laundry washing machine (1). A front door (4) mounted to the front wall (3) by means of a hinge (7), typically allows access into the drum for loading or unloading laundry.

[0029] The front door (4) of the laundry washing machine (1) is conventionally openable by way of using a handle (28) which is mounted to the front door (4). The handle (28) consists of an outer handle element (12) and an inner handle element (11). Furthermore, the handle (28) is equipped with a handle pin (13), a hook (14), a hook spring (15) and a hook pin (16), these components allowing the outer handle element (12) and the inner handle element (11) to be assembled to each other such that the handle (28) is operable to open the front door (4).

[0030] An inner frame (8) and a supplementary element (9) are the two parts connected to an outer frame (10), all three components being interconnected to form the front door (4). The supplementary element (9) is positioned between the outer frame (10) and the inner frame (8). The inner frame (8) and the supplementary element (9) are connected to each other by utilizing screw-like connection elements, which are mounted through connection element housings (21), located on the supplementary

element (9), thereby ensuring that the connection elements are mounted in a manner concealed behind the outer frame (10) so as to provide an outer appearance free of connection elements.

- [0031] An outer frame tab (17) and an outer frame inner tab (22) are provided to effectuate the mounting of the outer frame (10) to the supplementary element (9) without any additional elements. The outer frame tab (17) positioned on the inner side of the outer frame (10) proximate the peripheral edges thereof functions as a component preventing the outer frame (10) from unfastening thanks to the connection with an engaging element (23) located on the supplementary element (9). A tab support (18) in the form of a contact edge is disposed on the outermost end line of the engaging element (23), performing as a fixation structure pressing on the outer frame tab (17) in engagement therewith in an enclosed manner.
- [0032] The outer frame inner tab (22) positioned radially closer to the inner side center of the outer frame (10) with respect to the outer frame tab (17), effects locking of the outer frame (10) with a longitudinal recess (29) of the supplementary element (9), the longitudinal recess (29) comprising a first opening section (19) and a second opening section (20) as will be delineated below.
- [0033] Once the outer frame (10) is mounted to the supplementary element (9) in a mounting direction perpendicular to the planes defined by any of the two components, the outer frame inner tab (22) settles into the first opening section (19), which is the longer and narrower division of the longitudinal recess (29), so that the outer frame (10) is prevented from detaching from the first opening section (19) in the mounting direction. In order for unmounting the outer frame (10), the latter is rotated a certain amount relative to the supplementary element (9) so that the outer frame inner tab (22) is displaced from its initial position in the first opening section (19) to a new position in the second opening section (20), which is the larger division of the longitudinal recess (29). Depending on the relative positions of the first opening section (19) and the second opening section (20), the direction of the rotation of the outer frame (10) can be clockwise or counter-clockwise. After the outer frame (10) is rotated, it is releasable

from the supplementary element (9) in the mounting direction; the outer frame tab (17) concurrently disconnects from the engaging element (23).

[0034] The rotation of the outer frame (10) for the unmounting operation as mentioned above therefore also causes the outer frame tab (17) to release from the engaging element (23) because they lose their aligned positions along the peripheral line.

[0035] A concealed supplementary tab (26) on the outer face of the supplementary element (9) is provided to support the fixation of the outer frame (10); the concealed supplementary tab (26) becomes non-visible to the user after mounting the handle (28). The concealed supplementary tab (26) is fixedly engaged with a concealed tab support (25) on the inner face of the outer frame (10). The concealed supplementary tab (26) is in engaging relation with the concealed tab support (25) in the fixedly mounted position of the outer frame inner tabs (22) of the outer frame (10) in the first opening sections (19) of the supplementary element (9). During unmounting of the outer frame (10), firstly the concealed supplementary tab (26) is released from the concealed tab support (25) and the outer frame (10) is then rotatable such that the outer frame inner tabs (22) are releasable from the longitudinal recesses (29).

[0036] Further, a supplementary rib portion (27) is provided on the supplementary element (9), the supplementary rib portion (27) extending peripherally with a protruding side on the rear face of the supplementary element (9). It is formed as a peripheral cavity on the front side of the supplementary element (9). It functions as a peripheral aligning and centering structure during mounting of the outer frame (10) to the supplementary element (9) and a rib portion ending (31) thereof closest to the handle (28) region cooperates with a rib support (24) on the inner face of the outer frame (10), functioning as a control element to restrict further rotation of the outer frame (10) relative to the supplementary element (9) during the unmounting process.

[0037] In summary, the present invention proposes a laundry washing machine (1) comprising a cabinet having a front wall (3), an upper door (6) and a main body (2). The laundry washing machine (1) further comprises a front

door (4) allowing access into a drum for loading or unloading laundry, the front door (4) being openable by means of a handle (28) mounted to an outer frame (10) of the front door (4).

[0038] In one embodiment of the present invention, an inner frame (8) and a supplementary element (9) are connected to the outer frame (10), the supplementary element (9) being positioned between the outer frame (10) and the inner frame (8) such that the outer frame (10) is rotatably mountable to be fixedly secured to the supplementary element (9).

Therefore, the invention ensures that the outer frame (10) is conveniently rotatably mountable and dismountable to and from the supplementary element (9) whereby the operator can practically configure the relative position of the outer frame (10) while rotating the same and lock it in the correct position.

[0039] In a further embodiment of the present invention, the supplementary element (9) comprises a decorative region (30) uncovered by the outer frame (10) in the fixedly secured position thereof to the supplementary element (9). Therefore, in the fixedly secured position of the outer frame (10), the decorative region (30), which can be applied a special surface coating, is not subject to any physical interaction with the outer frame (10) so that the latter is fixedly attachable without any interference with the decorative region (30), thereby not involving any mechanical connection elements/parts (10) associated with the decorative region (30).

[0040] In a further embodiment of the present invention, the inner frame (8) and the supplementary element (9) are mounted to each other by means of connection elements extending through connection element housings (21) located on the supplementary element (9).

[0041] In a further embodiment of the present invention, the connection element housings (21) of the supplementary element (9) are located behind the outer frame (10) in a concealed manner in the fixedly secured position thereof.

[0042] In a further embodiment of the present invention, a plurality of outer frame tabs (17) positioned on the inner side of the outer frame (10) proximate the peripheral edges thereof are provided to connect the outer frame (10) to

the supplementary element (9).

- [0043] In a further embodiment of the present invention, the outer frame tabs (17) are formed as extensions inwardly projecting from a peripheral flange portion of the outer frame (10), the peripheral flange portion extending in a direction perpendicular to the plane of the outer frame (10).
- [0044] In a further embodiment of the present invention, a plurality of engaging elements (23) peripherally located on the supplementary element (9) and extending in the direction of the inner frame (8) in engaging relation with the outer frame tabs (17) are provided to effectuate inter-connection of the outer frame (10) with the supplementary element (9).
- [0045] In a further embodiment of the present invention, a tab support (18) in the form of a contact edge is disposed on the outermost end line of the engaging element (23) pressing on the outer frame tab (17) in engagement therewith in an enclosed manner. Therefore, the outermost end line of the engaging elements (23) contacting the outer frame tabs (17) at their inner sides ensures that the peripheral region of the supplementary element (9) is engaged with the outer frame (10) in an enclosed manner. The fact that the peripheral region of the outer frame (10) encloses the peripheral region of the supplementary element (9) by means of the outer frame tabs (17) provides a uniform, robust and mechanically rigid inter-connection throughout the peripheral lines of the two parts.
- [0046] In a further embodiment of the present invention, a plurality of outer frame inner tabs (22) extending in a direction perpendicular to the plane of the outer frame (10) towards the supplementary element (9) effect locking of the outer frame (10) with a longitudinal recess (29) of the supplementary element (9).
- [0047] In a further embodiment of the present invention, the longitudinal recess (29) comprises a first opening section (19) and a second opening section (20), the first and second opening sections (19, 20) having different widths in radial directions.
- [0048] In a further embodiment of the present invention, the outer frame (10) is mountable to the supplementary element (9) in a mounting direction

perpendicular to the outer frame (10) plane such that the outer frame inner tabs (22) settle into the first opening sections (19) in an engaged manner.

[0049] In a further embodiment of the present invention, the outer frame (10) is rotatably dismountable relative to the supplementary element (9) such that the outer frame inner tabs (22) are displaced from a position in the first opening sections (19) to a position in the second opening sections (20).

[0050] In a further embodiment of the present invention, the first opening sections (19) are longer along the peripheral line compared to the second opening sections (20). According to the invention, the first opening sections (19) that are narrower in radial directions can receive the outer frame inner tabs (22) in peripherally different positions. The final position of the outer frame inner tabs (22) is determined by the concealed supplementary tab (26) cooperating with the concealed tab support (25) and the rib portion ending (31) cooperating with the rib support (24). The fact that the outer frame inner tabs (22) are slightly movable along the peripheral line of the first opening sections (19) being longer therefore provides an ease of mounting and unmounting when configuring the relative position of the outer frame (10). On the other hand, when unmounting the same, a second opening section (20) neighboring the first opening section (20) provides a fixed area larger in width, thereby allowing easy removal of the outer frame inner tabs (22).

[0051] In a further embodiment of the present invention, a concealed supplementary tab (26) is provided on the outer face of the supplementary element (9) to be fixedly engaged with a concealed tab support (25) on the inner face of the outer frame (10) in the mounted position of the outer frame inner tabs (22) in the first opening sections (19).

[0052] In a further embodiment of the present invention, a supplementary rib portion (27) is provided on the supplementary element (9), the supplementary rib portion (27) extending peripherally with a protruding side on the rear face of the supplementary element (9) and having a rib portion ending (31) cooperating with a rib support (24) on the inner face of the outer frame (10).

[0053] The mechanism of the present invention therefore provides a solution for

the surface damage problem of the decorative region (30) and provides that the outer frame (10) is practically mountable in a fixedly engaged manner without interfering with the decorative region (30).

Claims

1. A laundry washing machine (1) comprising a cabinet having a front wall (3), an upper door (6) and a main body (2), the laundry washing machine (1) further comprising a front door (4) allowing access into a drum for loading or unloading laundry, the front door (4) being openable by means of a handle (28) mounted to an outer frame (10) of the front door (4), **characterized in that** an inner frame (8) and a supplementary element (9) are connected to the outer frame (10), the supplementary element (9) being positioned between the outer frame (10) and the inner frame (8) such that the outer frame (10) is rotatably mountable to be fixedly secured to the supplementary element (9).
2. A laundry washing machine (1) as in Claim 1, **characterized in that** the supplementary element (9) comprises a decorative region (30) uncovered by the outer frame (10) in the fixedly secured position thereof to the supplementary element (9).
3. A laundry washing machine (1) as in Claim 2, **characterized in that** the inner frame (8) and the supplementary element (9) are mounted to each other by means of connection elements extending through connection element housings (21) located on the supplementary element (9).
4. A laundry washing machine (1) as in Claim 3, **characterized in that** the connection element housings (21) of the supplementary element (9) are located behind the outer frame (10) in a concealed manner in the fixedly secured position thereof.
5. A laundry washing machine (1) as in Claim 4, **characterized in that** a plurality of outer frame tabs (17) positioned on the inner side of the outer frame (10) proximate the peripheral edges thereof are provided to connect the outer frame (10) to the supplementary element (9).
6. A laundry washing machine (1) as in Claim 5, **characterized in that** the outer frame tabs (17) are formed as extensions inwardly projecting from a peripheral flange portion of the outer frame (10), the peripheral flange portion extending in a direction perpendicular to the plane of the outer frame (10).
7. A laundry washing machine (1) as in Claim 6, **characterized in that** a plurality of engaging elements (23) peripherally located on the supplementary element (9) and extending in the direction of the inner frame (8) in engaging relation

with the outer frame tabs (17) are provided to effectuate inter-connection of the outer frame (10) with the supplementary element (9).

8. A laundry washing machine (1) as in Claim 7, **characterized in that** a tab support (18) in the form of a contact edge is disposed on the outermost end line of the engaging element (23) pressing on the outer frame tab (17) in engagement therewith in an enclosed manner.
9. A laundry washing machine (1) as in any one of the preceding claims, **characterized in that** a plurality of outer frame inner tabs (22) extending in a direction perpendicular to the plane of the outer frame (10) towards the supplementary element (9) effect locking of the outer frame (10) with a longitudinal recess (29) of the supplementary element (9).
10. A laundry washing machine (1) as in Claim 9, **characterized in that** the longitudinal recess (29) comprises a first opening section (19) and a second opening section (20), the first and second opening sections (19, 20) having different widths in radial directions.
11. A laundry washing machine (1) as in Claim 10, **characterized in that** the outer frame (10) is mountable to the supplementary element (9) in a mounting direction perpendicular to the outer frame (10) plane such that the outer frame inner tabs (22) settle into the first opening sections (19) in an engaged manner.
12. A laundry washing machine (1) as in Claim 11, **characterized in that** the outer frame (10) is rotatably dismountable relative to the supplementary element (9) such that the outer frame inner tabs (22) are displaced from a position in the first opening sections (19) to a position in the second opening sections (20).
13. A laundry washing machine (1) as in Claim 10, 11 or 12, **characterized in that** the first opening sections (19) are longer along the peripheral line compared to the second opening sections (20).
14. A laundry washing machine (1) as in Claim 13, **characterized in that** a concealed supplementary tab (26) is provided on the outer face of the supplementary element (9) to be fixedly engaged with a concealed tab support (25) on the inner face of the outer frame (10) in the mounted position of the outer frame inner tabs (22) in the first opening sections (19).
15. A laundry washing machine (1) as in Claim 14, **characterized in that** a supplementary rib portion (27) is provided on the supplementary element (9),

the supplementary rib portion (27) extending peripherally with a protruding side on the rear face of the supplementary element (9) and having a rib portion ending (31) cooperating with a rib support (24) on the inner face of the outer frame (10).

Fig. 1

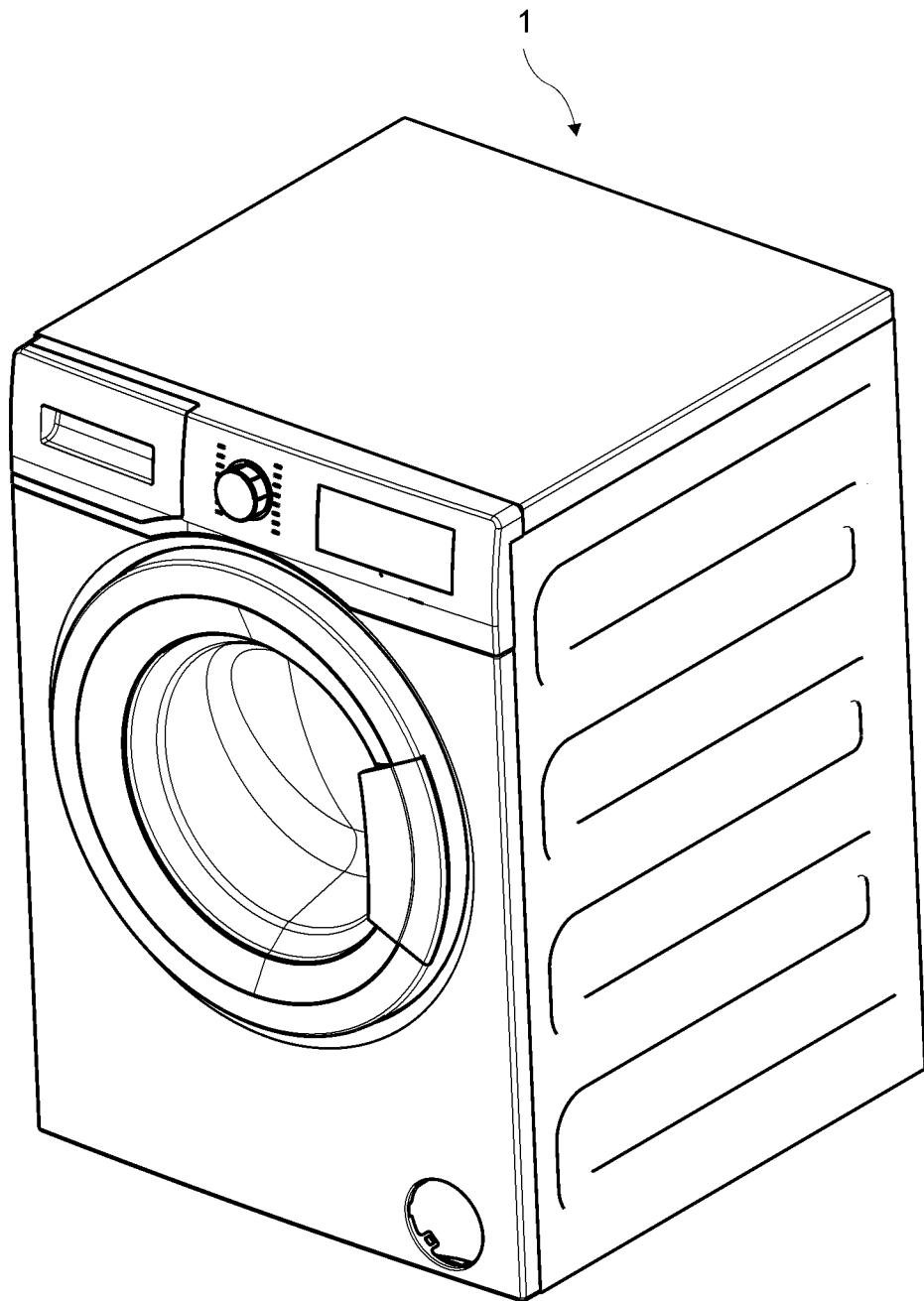


Fig. 2

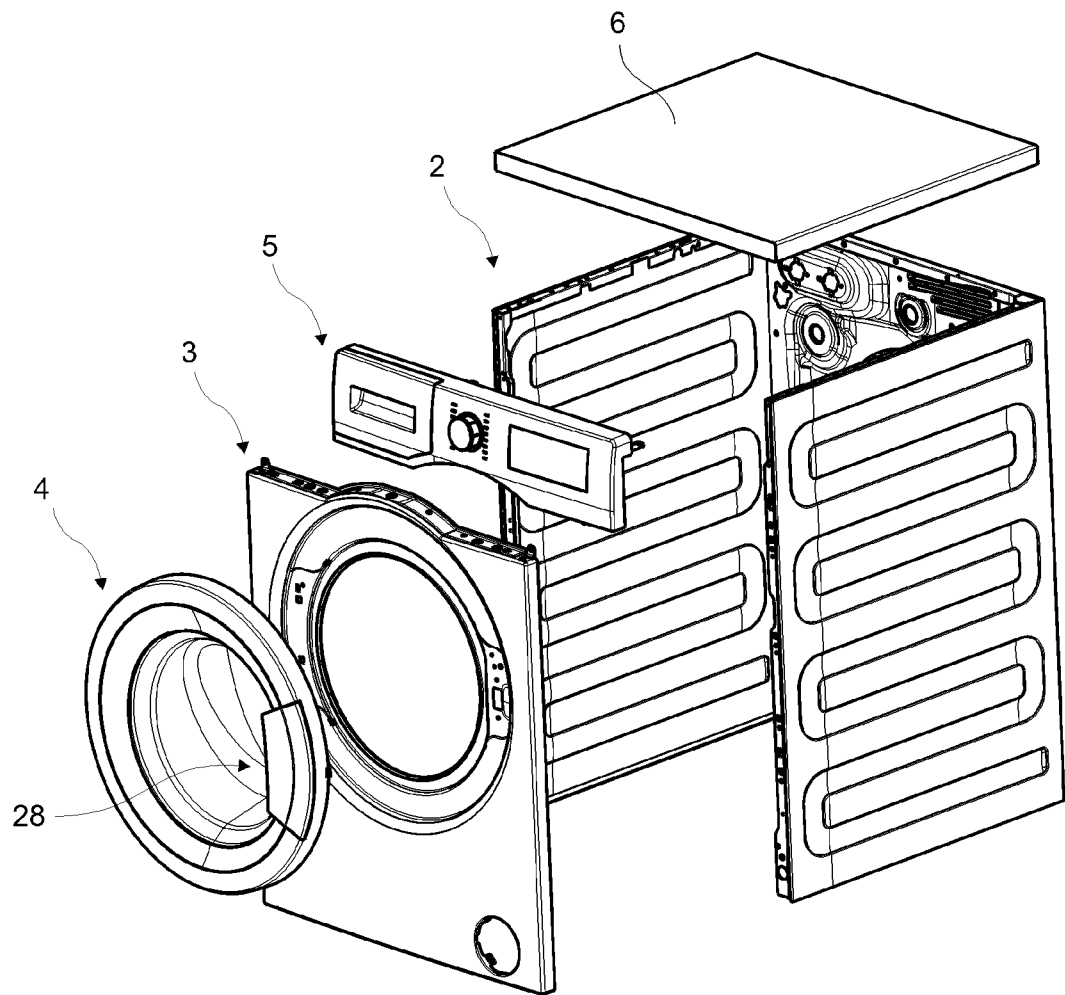


Fig. 3a

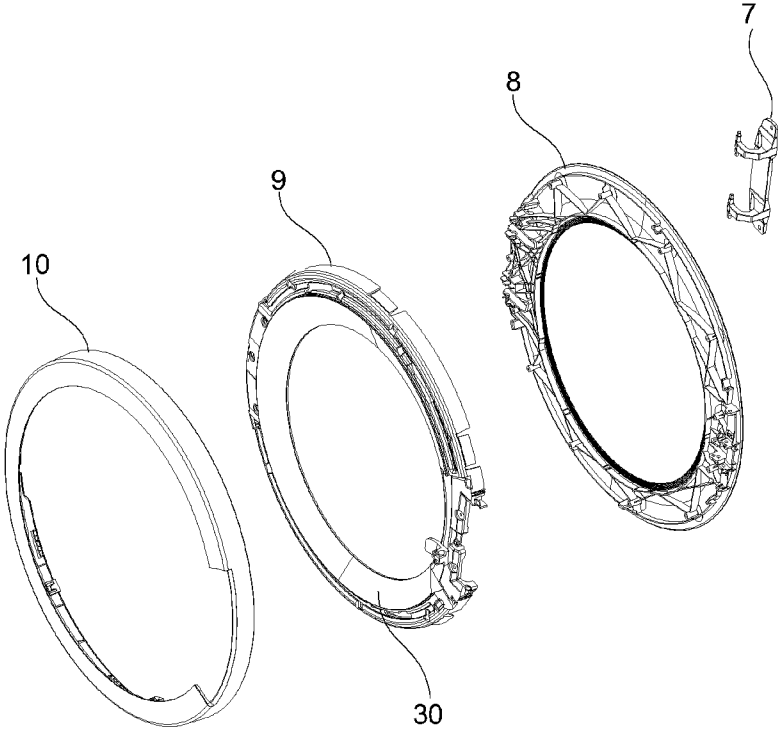


Fig. 3b

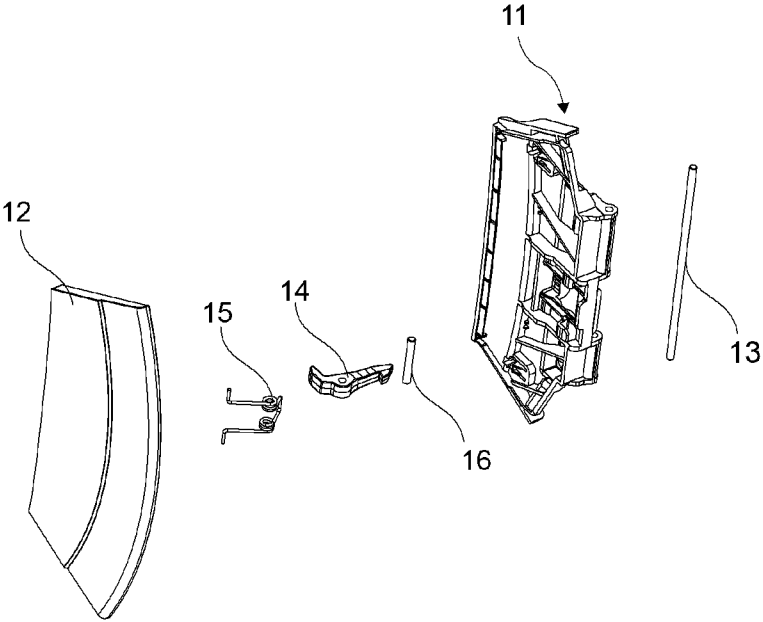


Fig. 4a

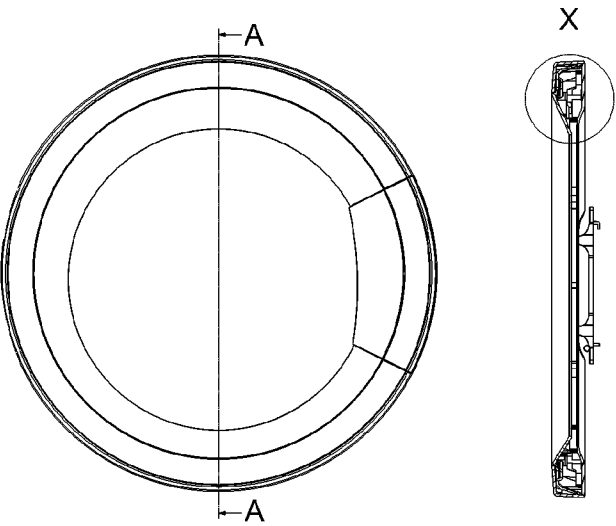


Fig. 4b

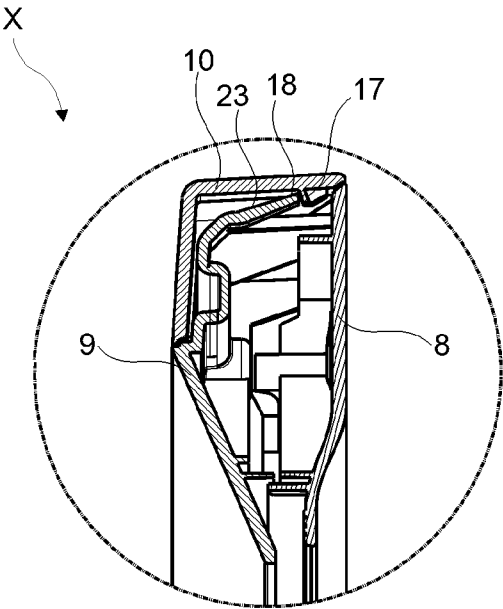


Fig. 5

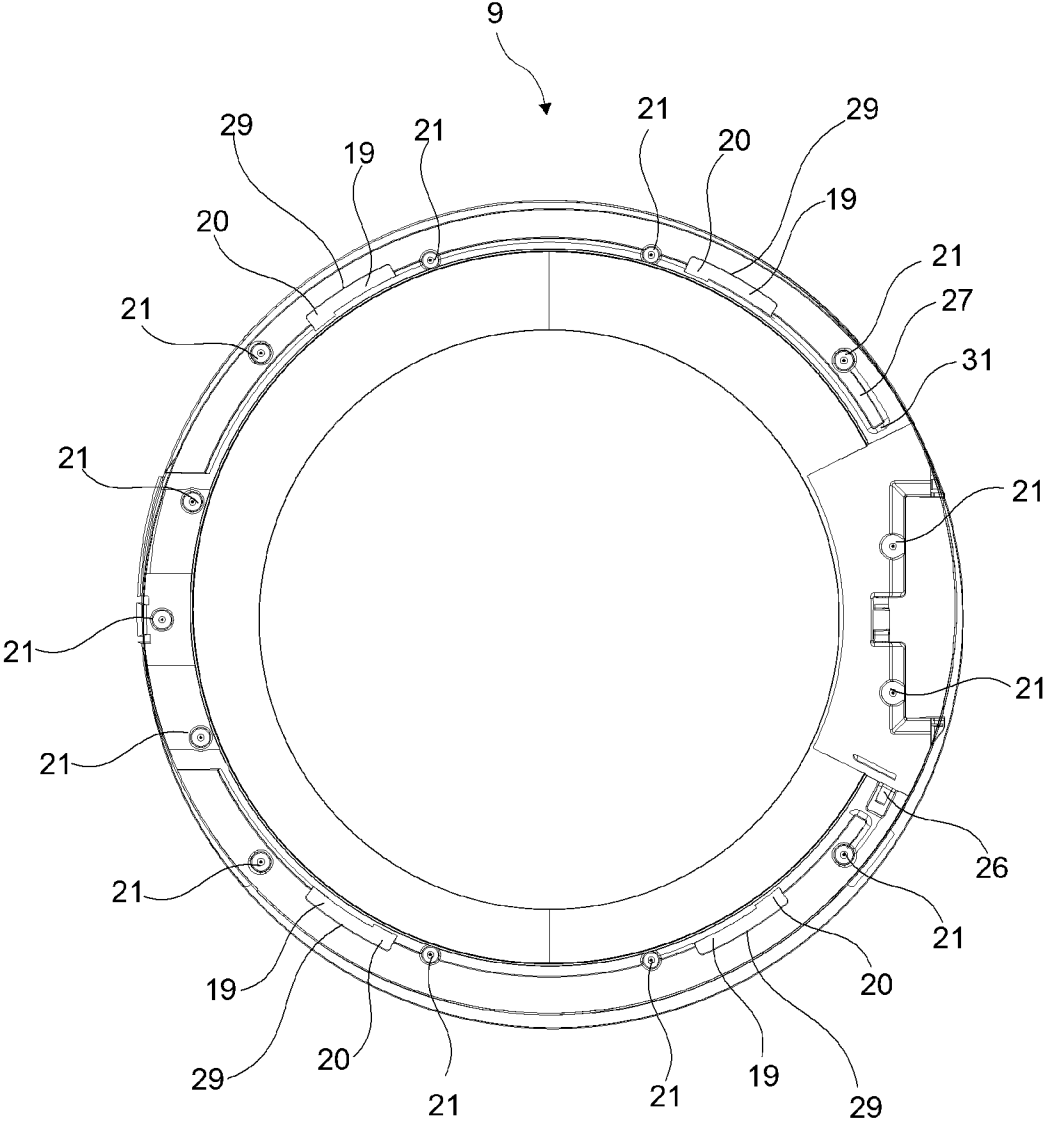


Fig. 6

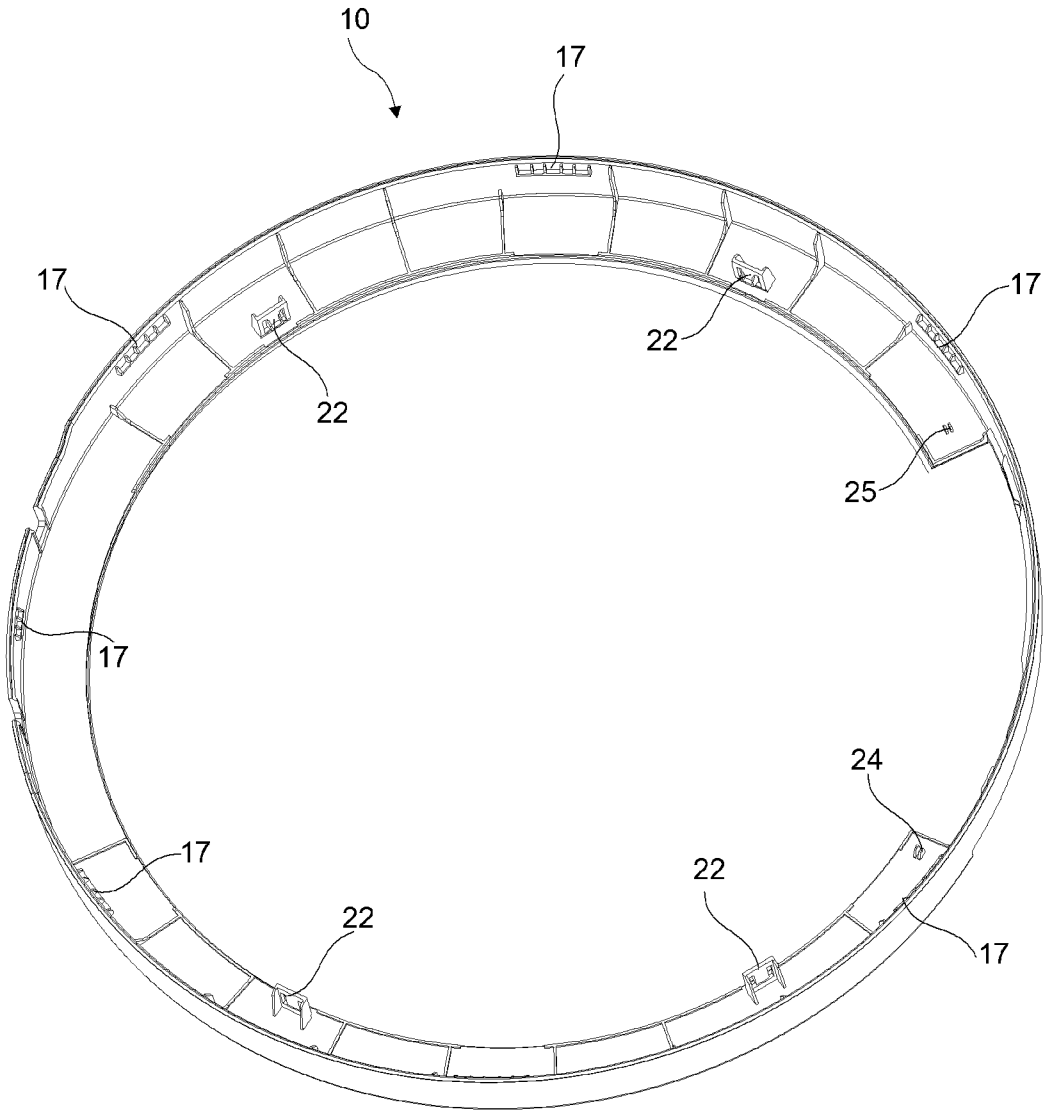


Fig. 7

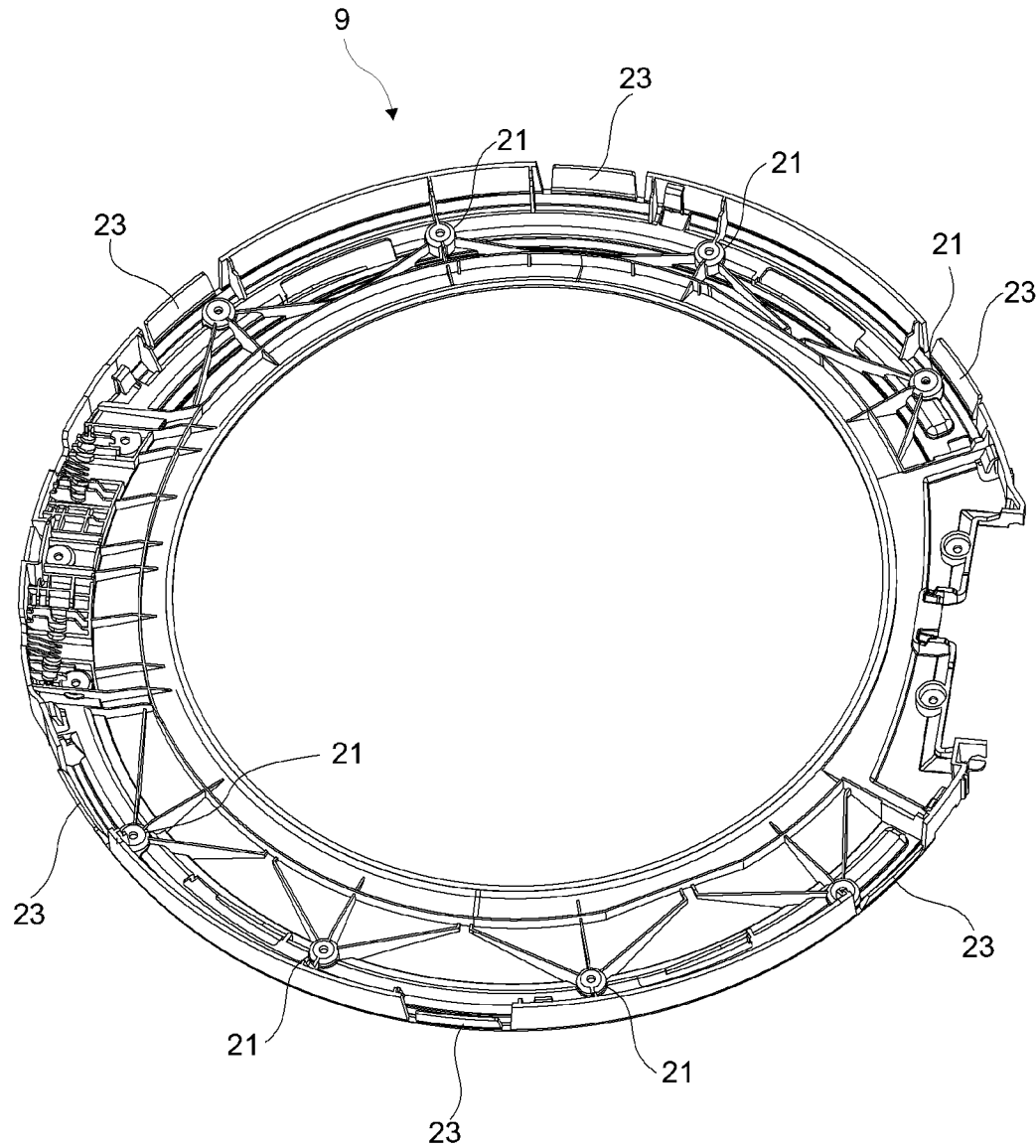
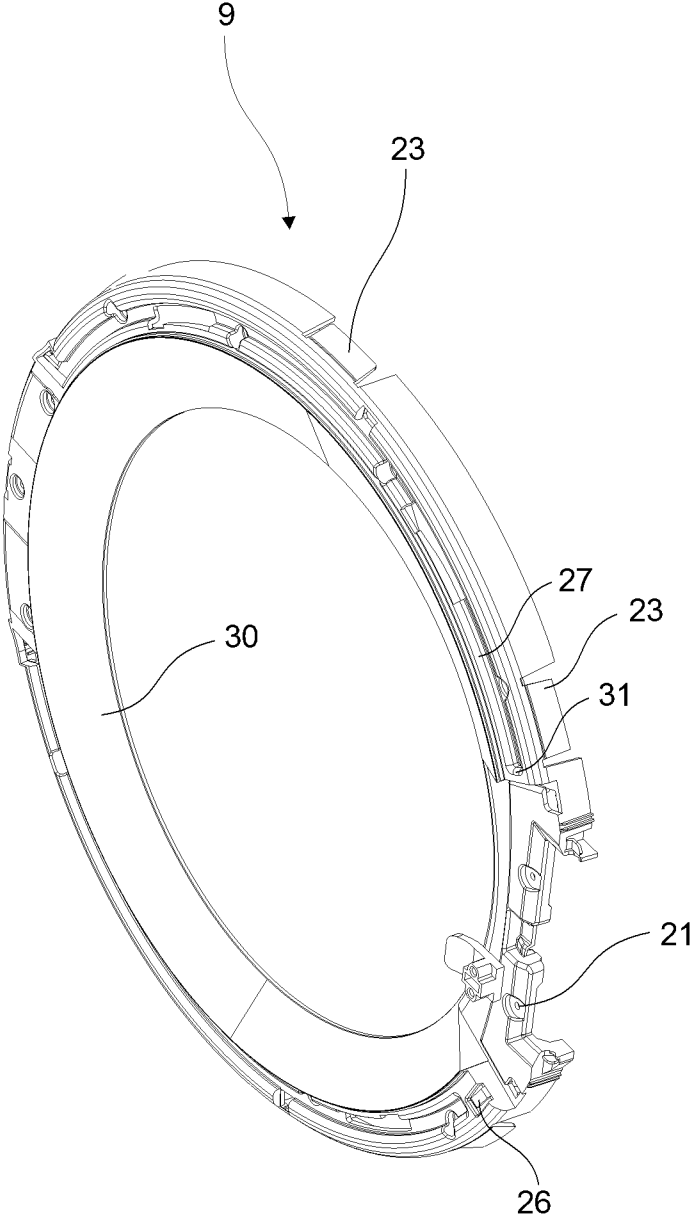


Fig. 8



INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2015/057041

A. CLASSIFICATION OF SUBJECT MATTER
 INV. D06F39/14
 ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 D06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/046964 A1 (BOLLMANN ANDREAS [DE]) 13 March 2003 (2003-03-13)	1-4,9-14
A	the whole document	5-8,15
X	EP 2 738 299 A1 (MIELE & CIE [DE]) 4 June 2014 (2014-06-04)	1,9
A	the whole document	2-8, 10-15
X	EP 2 824 233 A1 (SAMSUNG ELECTRONICS CO LTD [KR]) 14 January 2015 (2015-01-14)	1,9
A	the whole document	2-8, 10-15
X	DE 10 2011 078920 A1 (BOSCH SIEMENS HAUSGERAETE [DE]) 17 January 2013 (2013-01-17)	1,9
A	the whole document	2-8, 10-15



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

11 May 2015

Date of mailing of the international search report

20/05/2015

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040,
 Fax: (+31-70) 340-3016

Authorized officer

Jezierski, Krzysztof

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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