(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 922 856 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
15.12.2021 Bulletin 2021/50

(51) Int Cl.:
F04D 13/06 *(2006.01)* ***F04D 29/62*** *(2006.01)*
F04D 29/42 *(2006.01)*

(21) Application number: **21174327.3**

(22) Date of filing: **18.05.2021**

(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
Designated Validation States:
KH MA MD TN

(30) Priority: **11.06.2020 CN 202021062556 U**

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

(72) Inventors:
- **Li, Guojie**
  Nanjing, 210046 (CN)
- **Yu, Jian**
  Suqian, 223600 (CN)
- **Wang, Junyang**
  Nanjing, 210046 (CN)

(54) **MOTOR, PUMP AND HOUSEHOLD APPLIANCE**

(57) A motor (10), including: a machine body (12); and a casing (14), including a housing (16) accommodating the machine body (12) inside, and a first connector (18) and a second connector (20) extending outward from the housing (16), where flexibility of the first connector (18) is greater than that of the second connector (20). The present utility model also relates to a pump (50) and a household appliance (100) that include the motor (10) and a household appliance (100) including the pump (50).

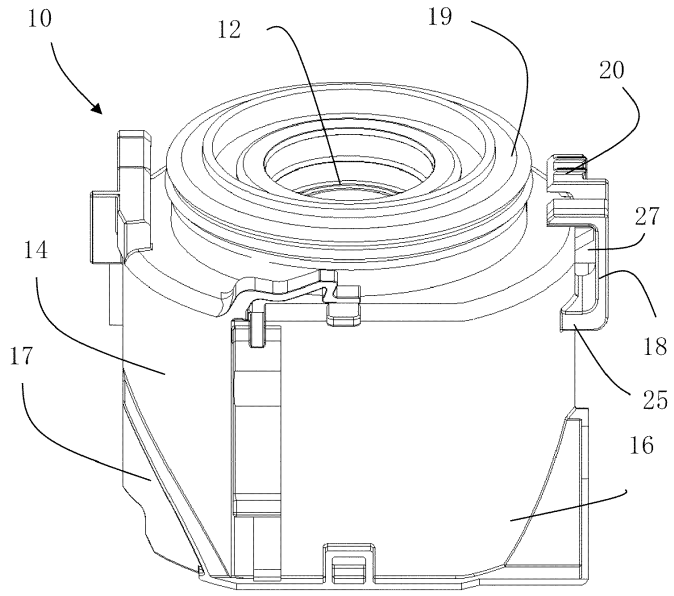

FIG. 1

EP 3 922 856 A1

Description

BACKGROUND

Technical Field

[0001] The present utility model relates to a motor, a pump, and a household appliance.

Related Art

[0002] Existing motors are generally used in combination with another element such as a pump case. However, in processes such as transportation, storage, and use, the motor may separate from the another element, which affects performance and a service life of the motor. Consequently, a pump or a household appliance, such as a washing machine or a dishwasher, including the motor is unsatisfactory.

SUMMARY

[0003] An objective of the present utility model is to provide an improved motor, pump, and household appliance.

[0004] For the foregoing objective, an aspect of embodiments of the present utility model relates to a motor, including: a machine body; and a casing, including a housing accommodating the machine body inside, and a first connector and a second connector extending outward from the housing, where flexibility of the first connector is greater than that of the second connector.

[0005] In this way, the first connector and the second connector can be configured to bond the motor to another element, such as a pump case, for use. In processes such as transportation, storage, and use, if the motor has a tendency to separate from the another element, the first connector may alleviate most, if not all, of the displacement between the motor and the another element, and the second connector absorbs the remaining displacement, if any, to reduce or eliminate a possibility that the motor separates from the another element because the first connector and the second connector are broken and out of service separately, simultaneously, or totally, so that the motor has a prolonged service life and improved performance.

[0006] Optionally, the casing includes a shoulder, the first connector and the second connector respectively include a first joint portion and a second joint portion, and a first distance of the first joint portion relative to the shoulder is less than a second distance of the second joint portion relative to the shoulder.

[0007] In this way, after the first connector may alleviate most, if not all, of the displacement between the motor and the another element, the second connector absorbs the remaining displacement, if any, to reduce or eliminate a possibility that the motor separates from the another element because the first connector and the second connector are broken and out of service separately, simultaneously, or totally, so that the motor has a prolonged service life and improved performance.

[0008] Optionally, the first joint portion and the second joint portion are separately disposed opposite to the shoulder.

[0009] In this way, the first joint portion and the second joint portion can be configured to bond the motor to another element, such as a pump case, for use.

[0010] Optionally, a first height of the first connector is greater than a second height of the second connector.

[0011] In this way, the flexibility of the first connector can be greater than that of the second connector.

[0012] Optionally, the first connector and the second connector respectively include a first middle portion and a second middle portion alternating with the housing, and the first height and the second height are respectively a height of the first middle portion and a height of the second middle portion.

[0013] In this way, the flexibility of the first middle portion of the first connector can be greater than that of the second middle portion of the second connector.

[0014] Optionally, the second connector includes a reinforcing rib.

[0015] In this way, the second connector has relatively high strength, thereby reducing or eliminating a possibility that the second connector is damaged or broken.

[0016] Another aspect of the embodiments of the present utility model relates to a pump, including the motor described above.

[0017] In this way, the first connector and the second connector can be configured to bond the motor to another element, such as a pump case, for use. In processes such as transportation, storage, and use, if the motor has a tendency to separate from the another element, the first connector may alleviate most, if not all, of the displacement between the motor and the another element, and the second connector absorbs the remaining displacement, if any, to reduce or eliminate a possibility that the motor separates from the another element because the first connector and the second connector are broken and out of service separately, simultaneously, or totally, so that the motor and the pump have prolonged service lives and improved performance.

[0018] Optionally, the pump includes a pump case, where the pump case includes an engagement portion bonded to the first connector.

[0019] In this way, the pump case and the motor can be bonded to each other reliably and firmly.

[0020] Optionally, the engagement portion is spaced apart from the second connector.

[0021] In this way, after the first connector is deformed to some extent, the second connector can be bonded to the engagement portion, to absorb the remaining displacement, if any, between the motor and the pump case.

[0022] Optionally, the first connector includes a limiting portion, and the engagement portion includes a step portion engaged with the limiting portion.

[0023] Engagement between the limiting portion and the step portion may be beneficial to mutual positioning when the pump case is bonded to the motor.

[0024] Optionally, the engagement portion is located between the first connector and the housing.

[0025] In this way, the first connector and the housing can position the engagement portion between the first connector and the housing.

[0026] Still another aspect of the embodiments of the present utility model relates to a household appliance, including the pump described above.

[0027] In this way, the first connector and the second connector can be configured to bond the motor to another element, such as a pump case, for use. In processes such as transportation, storage, and use, if the motor has a tendency to separate from the another element, the first connector may alleviate most, if not all, of the displacement between the motor and the another element, and the second connector absorbs the remaining displacement, if any, to reduce or eliminate a possibility that the motor separates from the another element because the first connector and the second connector are broken and out of service separately, simultaneously, or totally, so that the motor, the pump, and the household appliance have prolonged service lives and improved performance.

[0028] Still another aspect of the embodiments of the present utility model relates to a household appliance, including the motor described above.

[0029] In this way, the first connector and the second connector can be configured to bond the motor to another element, such as a pump case, for use. In processes such as transportation, storage, and use, if the motor has a tendency to separate from the another element, the first connector may alleviate most, if not all, of the displacement between the motor and the another element, and the second connector absorbs the remaining displacement, if any, to reduce or eliminate a possibility that the motor separates from the another element because the first connector and the second connector are broken and out of service separately, simultaneously, or totally, so that the motor and the household appliance are prolonged service lives and improved performance.

[0030] Optionally, the household appliance is a dishwasher or a washing machine.

[0031] In this way, the first connector and the second connector can be configured to bond the motor to another element, such as a pump case, for use. In processes such as transportation, storage, and use, if the motor has a tendency to separate from the another element, the first connector may alleviate most, if not all, of the displacement between the motor and the another element, and the second connector absorbs the remaining displacement, if any, to reduce or eliminate a possibility that the motor separates from the another element because the first connector and the second connector are broken and out of service separately, simultaneously, or totally, so that the motor and the dishwasher or the washing machine have prolonged service lives and improved performance.

[0032] If technical conditions permit, the subject matter claimed by any independent claim in this application can be combined with a single subject matter or a combination of a plurality of subject matters claimed by any dependent claims to form a novel subject matter.

[0033] The present utility model is further described below with reference to the accompanying drawings. Same or similar reference numerals are used in the figures to denote same or similar elements in different embodiments, and descriptions of the same or similar elements in different embodiments, as well as descriptions of elements, features, and effects in the related art may also be omitted.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034]

FIG. 1 is a schematic perspective view of a motor according to an embodiment of the present utility model;

FIG. 2 is a schematic partial enlarged view of the motor in FIG. 1;

FIG. 3 is a schematic perspective view of a pump including the motor in FIG. 1;

FIG. 4 is a schematic partial cross-sectional view of the pump in FIG. 3;

FIG. 5 is a schematic partial enlarged cross-sectional view of the pump in FIG. 3; and

FIG. 6 is a schematic partial cross-sectional view of a household appliance including the pump in FIG. 3.

DETAILED DESCRIPTION

[0035] FIG. 1 is a schematic perspective view of a motor according to an embodiment of the present utility model. As shown in FIG. 1, an aspect of the embodiments of the present utility model relates to a motor 10, including: a machine body 12; and a casing 14, including a housing 16 accommodating the machine body 12 inside, and a first connector 18 and a second connector 20 extending outward from the housing 16, where flexibility of the first connector 18 is greater than that of the second connector 20.

[0036] In this way, the first connector 18 and the second connector 20 can be configured to bond the motor 10 to another element, such as a pump case, for use. In processes such as transportation, storage, and use, if the motor 10 has a tendency to separate from the another element, the first connector 18 may alleviate most, if not all, of the displacement between the motor 10 and the another element, and the second connector absorbs 20

the remaining displacement, if any, to reduce or eliminate a possibility that the motor 10 separates from the another element because the first connector 18 and the second connector 20 are broken and out of service separately, simultaneously, or totally, so that the motor 10 has a prolonged service life and improved performance.

[0037] The motor 10 may be configured to receive electric energy, output kinetic energy, and provide power by using the machine body 12. The casing 14 may support and protect the machine body 12.

[0038] In processes such as transportation, storage, and use, if the motor 10 has a tendency to separate from the another element, since the first connector 18 has relatively large flexibility, the first connector can alleviate a relatively large displacement between the motor 10 and the another element without being broken and out of service. If the displacement between the motor 10 and the another element reaches or exceeds an upper limit of a range of the first connector 18 can bear, the second connector 20 may absorb the extra displacement, to prevent the first connector 18 from being broken and out of service. Even the first connector 18 is broken and out of service, the second connector 20 can still maintain the bonding between the motor 10 and the another element, so that a possibility that the motor 10 separates from the another element is reduced or eliminated, the motor 10 has a prolonged service life and improved performance.

[0039] Unless otherwise specified, "inner" and "outer" in this specification may be used relative to a center of the motor 10. For example, when two are compared, the one close to the center of the motor 10 is an inner one, and the one far away from the center of the motor 10 is an outer one.

[0040] FIG. 2 is a schematic partial enlarged view of the motor in FIG. 1. Referring to FIG. 2, optionally, the casing 14 includes a shoulder 22, the first connector 18 and the second connector 20 respectively include a first joint portion 24 and a second joint portion 26, and a first distance D1 of the first joint portion 24 relative to the shoulder 22 is less than a second distance D2 of the second joint portion 26 relative to the shoulder 22.

[0041] In this way, after the first connector 18 may alleviate most, if not all, of the displacement between the motor 10 and the another element, the second connector 20 absorbs the remaining displacement, if any, to reduce or eliminate a possibility that the motor 10 separates from the another element because the first connector 18 and the second connector 20 are broken and out of service separately, simultaneously, or totally, so that the motor 10 has a prolonged service life and improved performance.

[0042] The first joint portion 24 and the second joint portion 26 may be bonded to the another element respectively. The first joint portion 24 may be bonded to the another element first, and after the first connector 18 is deformed, the second joint portion 26 is then bonded to the another element, to implement segmented bonding, thereby reducing or eliminating a fracture or failure risk.

[0043] Optionally, the first joint portion 24 and the second joint portion 26 are separately disposed opposite to the shoulder 22.

[0044] In this way, the first joint portion 24 and the second joint portion 26 can be configured to bond the motor 10 to another element, such as a pump case, for use.

[0045] The first joint portion 24 and the second joint portion 26 may be a tail end of the first connector 18 and a tail end of the second connector 20 respectively. The first connector 18 and the second connector 20 may be hook-shaped respectively, and the first joint portion 24 and the second joint portion 26 may respectively be hook portions extending parallel to the shoulder 22. The first distance D1 and the second distance D2 may be a distance of the first joint portion 24 and a distance of the second joint portion 26 to the shoulder 22 respectively in a direction parallel to an axial direction of the motor 10.

[0046] The housing 16 may be substantially cylindrical and include a main body portion 17, a head portion 19 located above the main body portion 17 and of which a size is smaller than that of the main body portion 17, and the shoulder 22 connecting the main body portion 17 and the head portion 19. The first distance D1 and the second distance D2 may respectively be a distance between a lower surface of the first joint portion 24 and an upper surface of the shoulder 22 opposite thereto and a distance between the second joint portion 26 and the upper surface of the shoulder 22 opposite thereto. Unless otherwise explicitly indicated, "upper" and "lower" in this specification are used relative to a direction shown in the accompanying drawing.

[0047] FIG. 3 is a schematic perspective view of a pump including the motor in FIG. 1. As shown in FIG. 3, optionally, a first height H1 of the first connector 18 is greater than a second height H2 of the second connector 20.

[0048] In this way, the flexibility of the first connector 18 can be greater than that of the second connector 20.

[0049] Optionally, the first connector 18 and the second connector 20 respectively include a first middle portion 28 and a second middle portion 30 alternating with the housing 16, and the first height H1 and the second height H2 are respectively a height of the first middle portion 28 and a height of the second middle portion 30.

[0050] In this way, the flexibility of the first middle portion 28 of the first connector 18 can be greater than that of the second middle portion 30 of the second connector 20.

[0051] The first middle portion 28 and the second middle portion 30 may extend along a direction parallel to the axial direction of the motor 10, and the first height H1 and the second height H2 may be a height of the first middle portion 28 and a height of the second middle portion 30 along the direction parallel to the axial direction of the motor 10.

[0052] The first connector 18 and the second connector 20 may respectively include a first extending portion

25 (FIG. 1) and a second extending portion 27 (FIG. 1) radially extending outward from the housing 16, the first middle portion 28 and the second middle portion 30 extending upward from the first extending portion 25 and the second extending portion 27, and the first joint portion 24 and the second joint portion 26 radially extending inward from the first middle portion 28 and the second middle portion 30. Due to the existence of the first extending portion 25 and the second extending portion 27, the first middle portion 28 and the second middle portion 30 alternate with the housing 16. The first extending portion 25 may be located below the shoulder 22. The first joint portion 24 and the second joint portion 26 may be located above the shoulder 22.

[0053] Optionally, the second connector 20 includes a reinforcing rib 32.

[0054] In this way, the second connector 20 has relatively high strength, thereby reducing or eliminating a possibility that the second connector 20 is damaged or broken.

[0055] Another aspect of the embodiments of the present utility model relates to a pump 50, including the motor 10 described above.

[0056] In this way, the first connector 18 and the second connector 20 can be configured to bond the motor 10 to another element, such as a pump case, for use. In processes such as transportation, storage, and use, if the motor 10 has a tendency to separate from the another element, the first connector 18 may alleviate most, if not all, of the displacement between the motor 10 and the another element, and the second connector absorbs 20 the remaining displacement, if any, to reduce or eliminate a possibility that the motor 10 separates from the another element because the first connector 18 and the second connector 20 are broken and out of service separately, simultaneously, or totally, so that the motor 10 and the pump 50 have prolonged service lives and improved performance.

[0057] The pump 50 may be configured to process fluids such as water (not shown in the figure). The motor 10 may help to provide power for the fluids such as water.

[0058] FIG. 4 is a schematic partial cross-sectional view of the pump in FIG. 3. Referring to FIG. 4, optionally, the pump 50 includes a pump case 52, where the pump case 52 includes an engagement portion 54 bonded to the first connector 18.

[0059] In this way, the pump case 52 and the motor 10 can be bonded to each other reliably and firmly.

[0060] The motor 10 may help the fluids, such as water, to flow from an inlet 53 of the pump case 52 to an outlet 55.

[0061] Optionally, the engagement portion 54 is spaced apart from the second connector 20.

[0062] In this way, after the first connector 18 first bonded to the engagement portion 54 is deformed to some extent, the second connector 20 can be then bonded to the engagement portion 54, to absorb the remaining displacement between the motor 10 and the pump case 52.

[0063] In some embodiments, for example, in a case that a temperature is lower than 0 degree, if the pump case 52 includes a liquid such as water, the liquid may be frozen and expand, causing the pump case 52 and the motor 10 to move toward directions of separating from each other. The first connector 18 may maintain sufficient elasticity while maintaining specific resistance during the movement, and after a specific distance at which no fracture may occur is moved, the second connector 20 is engaged with the pump case 52, to absorb expansion displacement of the liquid within an elastic deformation distance range of the second connector 20, so that in a solidification and expansion process of the liquid, the pump case 52 and the motor 10 maintain a reliable connection, to ensure normal working of the pump 50.

[0064] Optionally, the first connector 18 includes a limiting portion 56, and the engagement portion 54 includes a step portion 58 engaged with the limiting portion 56.

[0065] Engagement between the limiting portion 56 and the step portion 58 may be beneficial to mutual positioning when the pump case 52 is bonded to the motor 10. The step portion 58 may help to prevent the limiting portion 56 from moving, for example, to the left and the bottom in FIG. 4, to further prevent the motor 10 from moving, for example, to the left and the bottom in FIG. 4 relative to the pump case 52.

[0066] FIG. 5 is a schematic partial enlarged cross-sectional view of the pump in FIG. 3. As shown in FIG. 5, optionally, the engagement portion 54 is located between the first connector 18 and the housing 16.

[0067] In this way, the first connector 18 and the housing 16 can position the engagement portion 54 between the first connector and the housing.

[0068] The engagement portion 54 may be a flange radially outward from at a lower part of the pump case 52. When the pump case 52 is bonded to the motor 10, the lower part of the pump case 52 abuts between the head portion 19 and the first connector 18 and between the head portion 19 and the second connector 20, which may help to prevent the pump case 52 and the motor 10 from moving relative to each other in a left-right direction shown in FIG. 5 or in a radial direction of the housing 16. The engagement portion 54 extends into a space among the first connector 18, the second connector 20, and the shoulder 22, and abuts against the shoulder 22 and the first joint portion 24, which may help to prevent the pump case 52 and the motor 10 from moving relative to each other in an up-down direction shown in FIG. 5 or in an axial direction of the housing 16.

[0069] There may be a sealing ring 53 between the head portion 19 and the pump case 52, to improve the sealing between the motor 10 and the pump case 52.

[0070] FIG. 6 is a schematic partial cross-sectional view of a household appliance including the pump in FIG. 3. Referring to FIG. 6, another aspect of the embodiments of the present utility model relates to a household appliance 100, including the pump 50 described above.

[0071] In this way, the first connector 18 and the second connector 20 can be configured to bond the motor

10 to another element, such as a pump case, for use. In processes such as transportation, storage, and use, if the motor 10 has a tendency to separate from the another element, the first connector 18 may alleviate most, if not all, of the displacement between the motor 10 and the another element, and the second connector absorbs 20 the remaining displacement, if any, to reduce or eliminate a possibility that the motor 10 separates from the another element because the first connector 18 and the second connector 20 are broken and out of service separately, simultaneously, or totally, so that the motor 10, the pump 50, and the household appliance 100 have prolonged service lives and improved performance.

[0072] Still another aspect of the embodiments of the present utility model relates to a household appliance 100, including the motor 10 described above.

[0073] In this way, the first connector 18 and the second connector 20 can be configured to bond the motor 10 to another element, such as a pump case, for use. In processes such as transportation, storage, and use, if the motor 10 has a tendency to separate from the another element, the first connector 18 may alleviate most, if not all, of the displacement between the motor 10 and the another element, and the second connector absorbs 20 the remaining displacement, if any, to reduce or eliminate a possibility that the motor 10 separates from the another element because the first connector 18 and the second connector 20 are broken and out of service separately, simultaneously, or totally, so that the motor 10 and the household appliance 100 have prolonged service lives and improved performance.

[0074] Optionally, the household appliance 100 is a dishwasher or a washing machine.

[0075] In this way, the first connector 18 and the second connector 20 can be configured to bond the motor 10 to another element, such as a pump case, for use. In processes such as transportation, storage, and use, if the motor 10 has a tendency to separate from the another element, the first connector 18 may alleviate most, if not all, of the displacement between the motor 10 and the another element, and the second connector absorbs 20 the remaining displacement, if any, to reduce or eliminate a possibility that the motor 10 separates from the another element because the first connector 18 and the second connector 20 are broken and out of service separately, simultaneously, or totally, so that the motor 10 and the dishwasher or the washing machine have prolonged service lives and improved performance.

[0076] Referring to FIG. 6, the household appliance 100 may include a cavity 102, a base 104 supporting the cavity 102, and a trough 106 installed in the cavity 102. The cavity 102 may receive an item (not shown in the figure) that needs to be washed.

[0077] The pump 50 may be a fluid discharge pump of the household appliance 100, be installed in the trough 106, and discharge fluids after washing in the cavity 102 through an inlet 108 of the trough 106 to an outlet 110 of the trough 106, to discharge the fluids out of the household appliance 100.

[0078] The various specific implementations described above and shown in the accompanying drawings are only used to illustrate the present utility model, but are not all of the present utility model. Any variation made by a person of ordinary skill in the art to the present utility model within the scope of the basic technical concept of the present utility model shall fall within the protection scope of the present utility model.

Claims

1. A motor (10), **characterized by** comprising:

a machine body (12); and
a casing (14), comprising a housing (16) accommodating the machine body (12) inside, and a first connector (18) and a second connector (20) extending outward from the housing (16), wherein flexibility of the first connector (18) is greater than that of the second connector (20).

2. The motor (10) according to claim 1, **characterized in that** the casing (14) comprises a shoulder (22), the first connector (18) and the second connector (20) respectively comprise a first joint portion (24) and a second joint portion (26), and a first distance (D1) of the first joint portion (24) relative to the shoulder (22) is less than a second distance (D2) of the second joint portion (26) relative to the shoulder (22).

3. The motor (10) according to claims 1 or 2, **characterized in that** the first joint portion (24) and the second joint portion (26) are separately disposed opposite to the shoulder (22).

4. The motor (10) according to any of the preceding claims, **characterized in that** a first height (HI) of the first connector (18) is greater than a second height (H2) of the second connector (20).

5. The motor (10) according to any of the preceding claims, **characterized in that** the first connector (18) and the second connector (20) respectively comprise a first middle portion (28) and a second middle portion (30) alternating with the housing (16), and the first height (HI) and the second height (H2) are respectively a height of the first middle portion (28) and a height of the second middle portion (30).

6. The motor (10) according to any of the preceding claims, **characterized in that** the second connector (20) comprises a reinforcing rib (32).

7. A pump (50), **characterized by** comprising the motor (10) according to any one of claims 1 to 6.

8. The pump (50) according to claim 7, **characterized by** comprising a pump case (52), wherein the pump case (52) comprises an engagement portion (54) bonded to the first connector (18).

9. The pump (50) according to claims 7 or 8, **characterized in that** the engagement portion (54) is spaced apart from the second connector (20).

10. The pump (50) according to any of claims 7 to 9, **characterized in that** the first connector (18) comprises a limiting portion (56), and the engagement portion (54) comprises a step portion (58) engaged with the limiting portion (56).

11. The pump (50) according any of claims 7 to 10, **characterized in that** the engagement portion (54) is located between the first connector (18) and the housing (16).

12. A household appliance (100), comprising the pump (50) according to any one of claims 7 to 11 and/or the motor (10) according to any one of claims 1 to 6.

14. The household appliance (100) according to claim 12 or 13, **characterized in that** the household appliance (100) is a dishwasher or a washing machine.

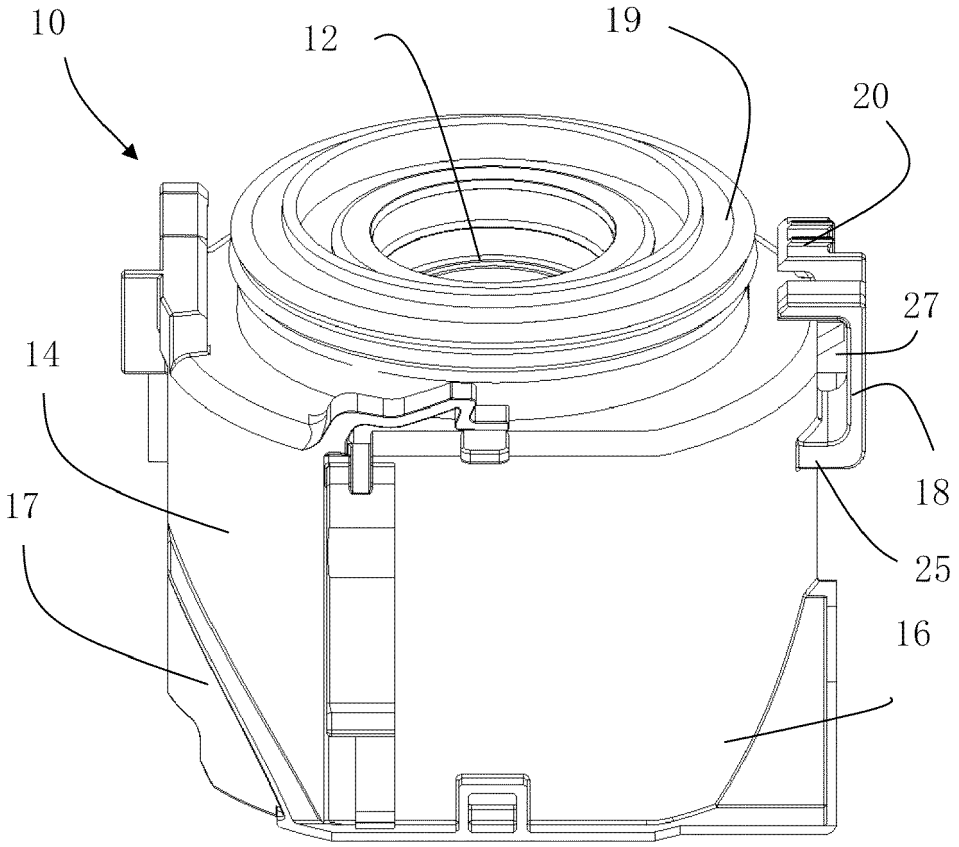

FIG. 1

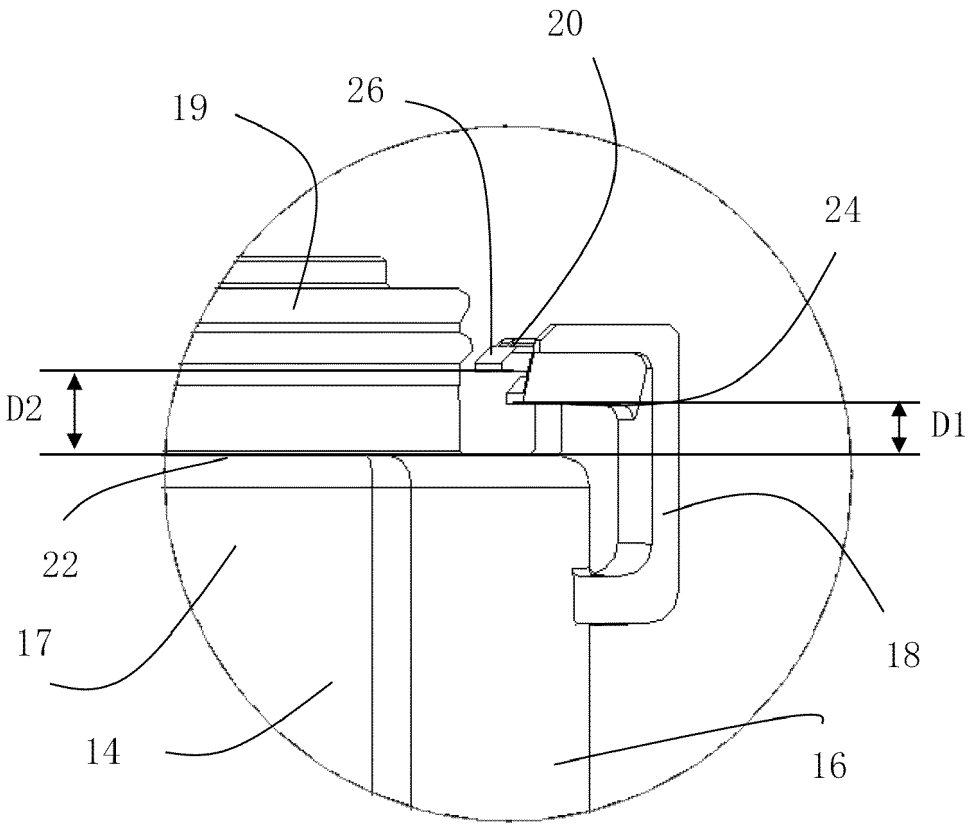

FIG. 2

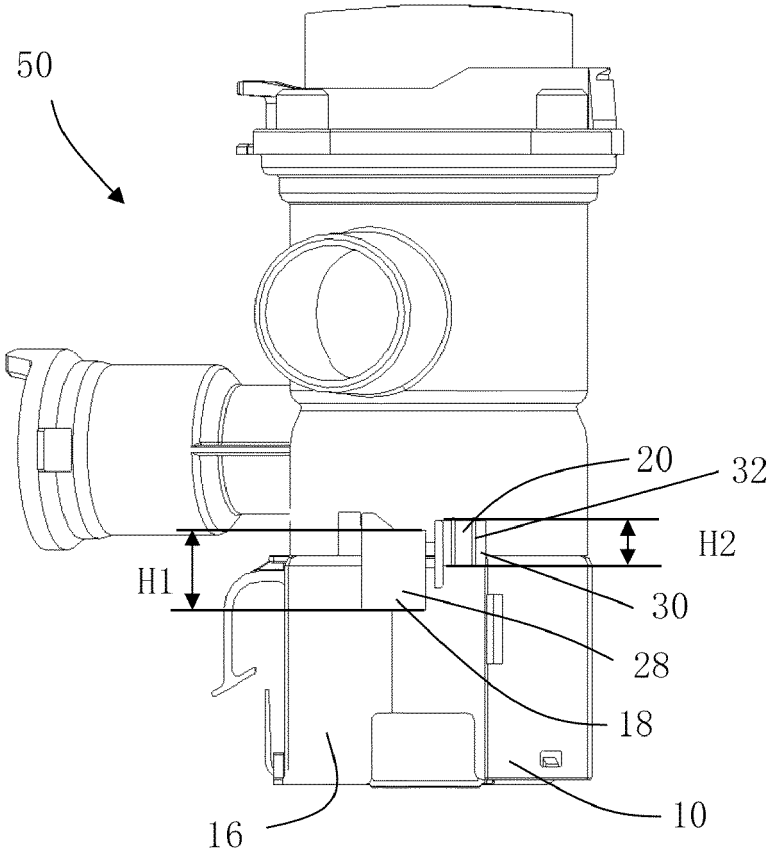

FIG. 3

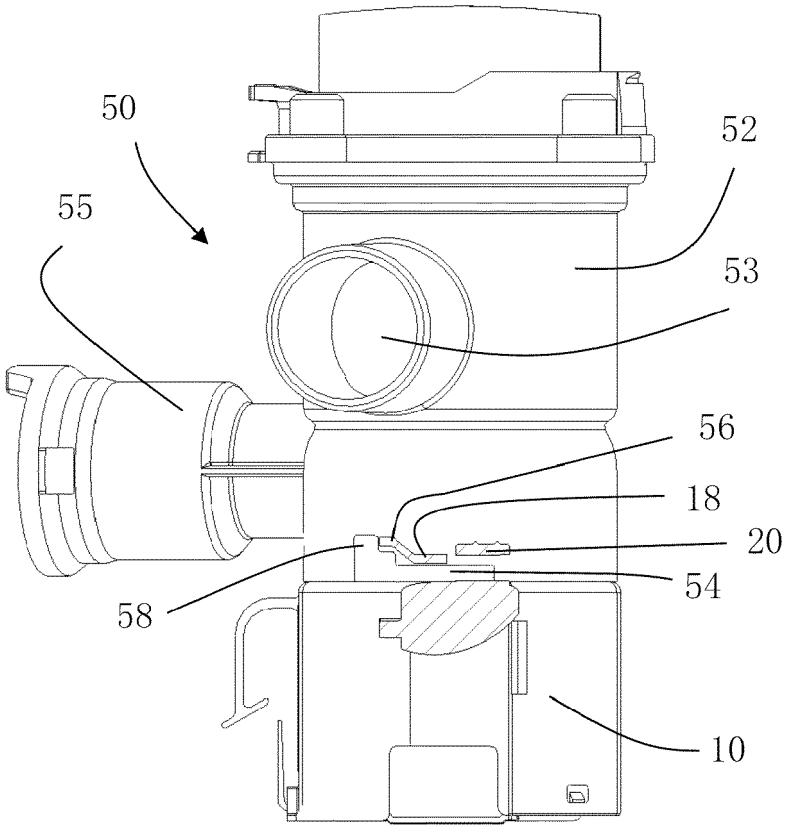

FIG. 4

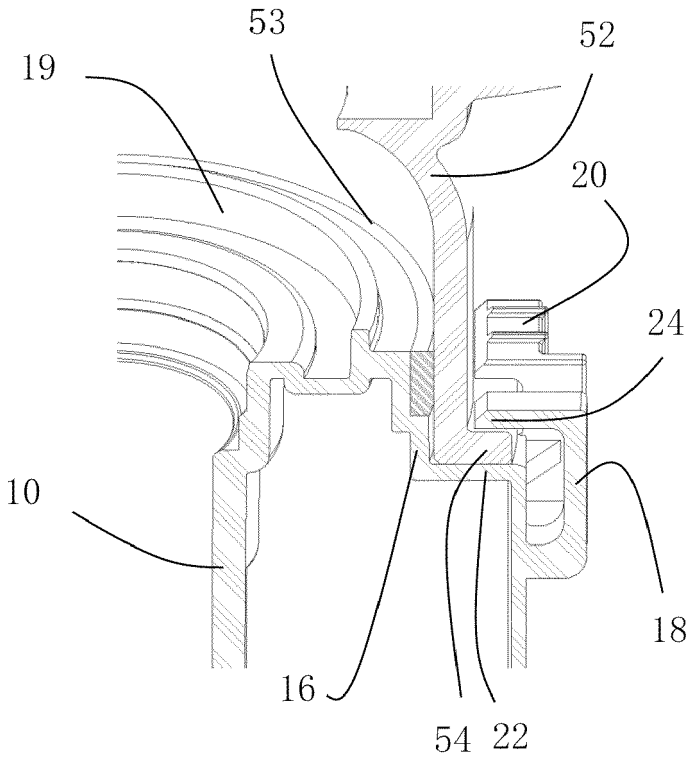

FIG. 5

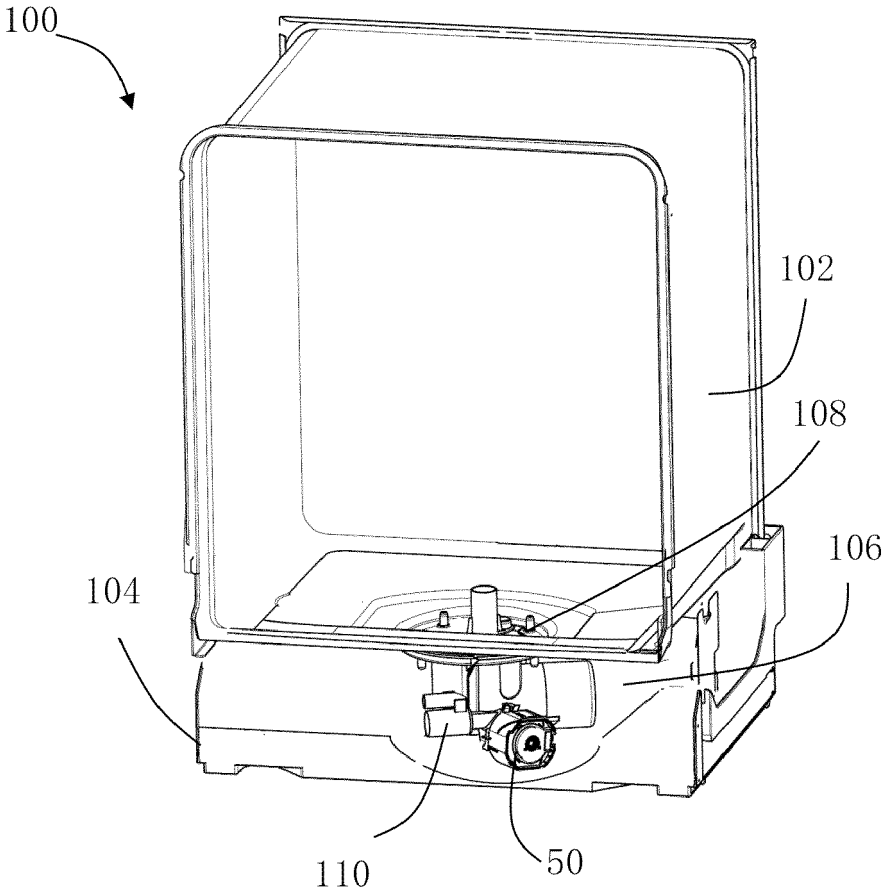

FIG. 6

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 21 17 4327

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 Y	DE 20 2009 003756 U1 (COPRECITEC SL [ES]) 25 June 2009 (2009-06-25) * abstract * * paragraph [0007] - paragraph [0026] * * figures *	1-8,11, 12,14 10	INV. F04D13/06 F04D29/62 F04D29/42
X	US 2016/169232 A1 (LI MIN [CN]) 16 June 2016 (2016-06-16) * abstract * * paragraph [0017] - paragraph [0057] * * figures *	1-12,14	
X	CN 205 064 297 U (ZHONGSHAN FUDI ELC APPLIANCE CO LTD) 2 March 2016 (2016-03-02) * paragraph [0002] * * paragraph [0013] - paragraph [0020] * * figures *	1-12,14	
X A	US 2014/234141 A1 (HOSHI HIDEO [JP] ET AL) 21 August 2014 (2014-08-21) * abstract * * paragraph [0030] - paragraph [0103] * * figures *	1,3-12, 14 2	TECHNICAL FIELDS SEARCHED (IPC) F04D
Y A	KR 100 819 921 B1 (CHUNG SUK CO LTD [KR]) 8 April 2008 (2008-04-08) * paragraph [0035] - paragraph [0106] * * figures *	10 1-9,11, 12,14	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	26 October 2021	Kolby, Lars

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 21 17 4327

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.

26-10-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 202009003756 U1	25-06-2009	DE 202009003756 U1	25-06-2009
		ES 1067534 U	16-05-2008
		IT TO20090034 U1	18-09-2009
US 2016169232 A1	16-06-2016	BR 102015030895 A2	23-08-2016
		CN 105697389 A	22-06-2016
		EP 3032723 A2	15-06-2016
		JP 2016116444 A	23-06-2016
		KR 20160071349 A	21-06-2016
		US 2016169232 A1	16-06-2016
CN 205064297 U	02-03-2016	NONE	
US 2014234141 A1	21-08-2014	BR 112013006692 A2	07-06-2016
		CN 103080557 A	01-05-2013
		EP 2674624 A1	18-12-2013
		JP 5372267 B2	18-12-2013
		JP WO2012108475 A1	03-07-2014
		US 2014234141 A1	21-08-2014
		US 2015110652 A1	23-04-2015
		WO 2012108475 A1	16-08-2012
KR 100819921 B1	08-04-2008	NONE	

EPO FORM P0459

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