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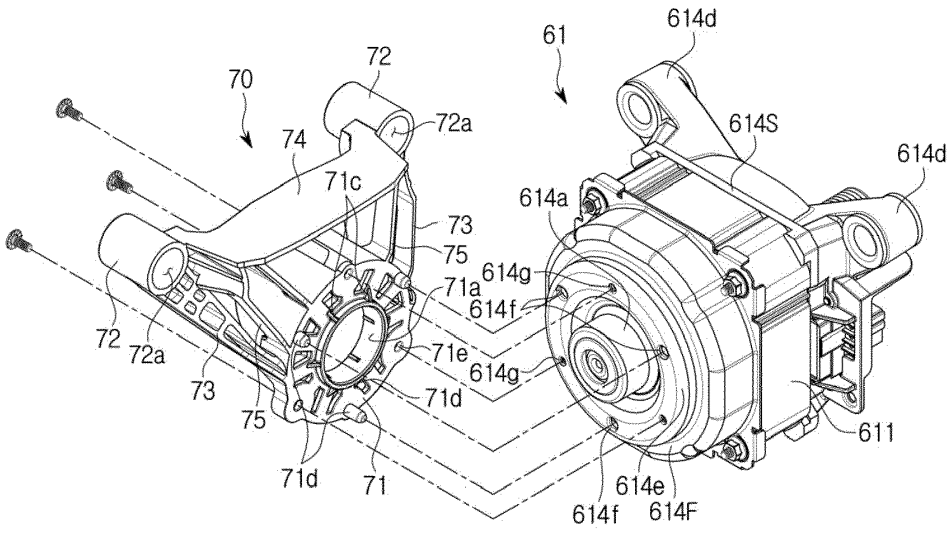
(54) **DRUM TYPE WASHING MACHINE**

(57) Disclosed herein is a drum type washing machine which includes a driving motor (61) which generates a rotational force for rotating a rotating tub (30) and a fixing bracket (70) for fixing the driving motor (61) to a reservoir. Here, a case (614) of the driving motor (61) is formed of a metal material and the fixing bracket (70) is formed of a resin material, thereby efficiently emitting heat generated by the driving motor (61) while the driving motor (61) is reduced in weight to easily store and install the driving motor (61).

FIG. 2



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Description

BACKGROUND

1. Field

[0001] Embodiments of the present invention relate to a drum type washing machine in which a rotating tub receives a rotational force from a driving motor and rotates.

2. Description of the Related Art

[0002] Generally, washing machines are apparatuses which include a reservoir which stores water and a rotating tub rotatably installed in the reservoir. Here, the rotating tub in which laundry is accommodated rotates inside the reservoir, thereby washing the laundry.

[0003] Recently, among washing machines described above, there are drum type washing machines in which a rotation shaft of a rotating tub is disposed in an approximately horizontal direction to allow laundry to be pulled upward according to rotation of a rotating tub and to drop, thereby washing the laundry due to head thereof.

[0004] Also, in drum type washing machines described above, there are direct connection drum type washing machines in which a rotation shaft of a driving motor is directly connected to a rear side of a rotating tub to directly transfer a rotational force of the driving motor to the rotating tub and belt drum type washing machines in which a rotating tub receives the rotational force generated by a driving motor transferred through a driving pulley, a driven pulley, and a belt and rotates.

[0005] In belt drum type washing machines, the driving motor is fixed to a reservoir, the driving pulley is installed at a driving shaft of the driving motor, and the driven pulley is installed at a rotation shaft of the rotating tub. Also, the belt is wound on the driving pulley and the driven pulley and transfers the rotational force from the driving pulley to the driven pulley.

SUMMARY

[0006] Therefore, it is an aspect of the present invention to provide a drum type washing machine capable of smoothly discharging heat generated in a driving motor and reducing a weight of the driving motor to be easily stored and installed.

[0007] Additional aspects of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

[0008] In accordance with one aspect of the present invention, a drum type washing machine includes a reservoir which contains water, a rotating tub rotatably installed in the reservoir, a driving apparatus which generates a rotational force for rotating the rotating tub, and at least one fixing bracket for fixing the driving motor to the reservoir. Here, the driving apparatus includes the driving motor which generates the rotational force. Also, the driving motor includes a case forms an exterior thereof. Also, the case is formed of a metal material. Also, the fixing bracket is formed of a resin material and fixed to the case.

[0009] The fixing bracket may include a motor fixing portion fixed to the case, a pair of reservoir fixing portions fixed to the reservoir, a pair of first frame portions which connect the motor fixing portion with the pair of reservoir fixing portions, respectively, and a second frame portion which mutually connects the pair of reservoir fixing portions.

[0010] The fixing bracket may include a plurality of supporting ribs for reinforcing the strength thereof.

[0011] The plurality of supporting ribs may include a plurality of first supporting ribs which provide support in a space between the motor fixing portion and the pair of reservoir fixing portions and a plurality of second supporting ribs which provide support in a space between the motor fixing portion and the second frame portion.

[0012] The plurality of supporting ribs may include a plurality of third supporting ribs which are formed in an X shape and provide support in the space between the motor fixing portion and the second frame portion.

[0013] The driving motor may include a stator, a rotor which interacts with the stator and rotates, a driving shaft which is fixed to the rotor and rotates together with the rotor, and a pair of bearings which rotatably support the driving shaft.

[0014] The case may include a bearing installation portion in which the pair of bearings are installed, a shaft installation hole which is provided in one side of the case, through which one end of the driving shaft passes and protrudes therefrom, and a bracket installation groove which has an annular shape concavely provided outside the bearing installation portion. Also, the fixing bracket may include a mounting hole into which the bearing installation portion is mounted therein and an extended rib which extends from a portion adjacent to the mounting hole in an annular shape and supports a surface of the bearing installation portion therein.

[0015] The drum type washing machine may further include a plurality of reinforcing ribs which extend outward from the extended rib in a radial direction and are spaced apart in a circumferential direction.

[0016] At least one step portion stepped in an annular shape around the bearing installation portion may be provided at one surface of the case to which the fixing bracket is fixed.

[0017] The at least one step portion may include a plurality of stepped portions sequentially provided in a radial direction around the bearing installation portion.

[0018] The fixing bracket may include temporary assembly protrusions which protrude from the motor fixing portion toward the case. Also, the case may include temporary assembly holes into which the temporary assembly protrusions are inserted.

[0019] The fixing bracket and the case may include

first fastening holes and second fastening holes which are provided at mutually corresponding positions, to which fastening members are fastened, respectively.

[0020] The temporary assembly protrusions and the first fastening holes may be alternately provided in a circumferential direction. Also, the temporary assembly holes and the second fastening holes may be alternately provided in the circumferential direction.

[0021] The case may include a first case which supports one side of the stator and a second case which supports the other side of the stator. Also, the fixing bracket may be fixed to the first case. Also, the second case may include a fixing portion which is fixed to the reservoir.

[0022] The case may include a first case which supports one side of the stator and the rotor and a second case which supports the other side of the stator and the rotor. Also, the fixing bracket may include a first fixing bracket and a second fixing bracket installed in the first case and the second case, respectively.

[0023] A drum type washing machine in accordance with one embodiment of the present invention includes a reservoir which contains water, a rotating tub rotatably installed in the reservoir, a driving motor which generates a rotational force for rotating the rotating tub, and at least one fixing bracket for fixing the driving motor to the reservoir.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] These and/or other aspects of the invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

FIG. 1 is a schematic diagram of a washing machine in accordance with one embodiment of the present invention;

FIG. 2 is an exploded perspective view of a driving motor and a fixing bracket applied to the washing machine in accordance with one embodiment of the present invention;

FIG. 3 is a cross-sectional view of the driving motor and the fixing bracket applied to the washing machine in accordance with one embodiment of the present invention;

FIG. 4 is a rear view of the fixing bracket applied to the washing machine in accordance with one embodiment of the present invention;

FIG. 5 is a perspective view of a driving motor applied to a washing machine in accordance with another embodiment of the present invention; and

FIG. 6 is an exploded perspective view of a driving motor and a fixing bracket applied to a washing machine in accordance with still another embodiment of the present invention.

DETAILED DESCRIPTION

[0025] Hereinafter, a drum type washing machine in accordance with one embodiment of the present invention will be described with reference to the attached drawings.

[0026] The drum type washing machine in accordance with one embodiment of the present invention, as shown in FIG. 1, includes a housing 10 which forms an exterior, a reservoir 20 installed inside the housing 10 while being suspended to store water, and a rotating tub 30 rotatably installed in the reservoir 20.

[0027] An inlet 10a is provided at a front of the housing 10 to introduce laundry into the rotating tub 30. Through holes 20a and 30a corresponding to the inlet 10a are provided in fronts of the reservoir 20 and the rotating tub 30, respectively. A door 11 is installed at the front of the housing 10 to open or close the inlet 10a.

[0028] A water supply apparatus 40 for supplying water to the reservoir is disposed at an upper inside of the housing 10, and a drainage apparatus 50 for outwardly discharging washing water used for washing is disposed at a lower inside of the housing 10.

[0029] The water supply apparatus 40 includes a water supply pipe 41 connected to an external water supply source, a water supply valve 42 disposed at the water supply pipe 41 to open and close the water supply pipe 41, a detergent supply unit 43 which mixes water transferred through the water supply pipe 41 with a detergent, and a washing water supply pipe 44 which connects the detergent supply unit 43 with the reservoir 20 and guides the water and detergent to the reservoir 20.

[0030] The drainage apparatus 50 includes a drainage pipe 51 which is connected to a bottom of the reservoir 20 and guides the washing water used in the reservoir 20 to be discharged outside the washing machine and a drainage pump 52 disposed at the drainage pipe 51 to allow the washing water to be discharged outside through the drainage pipe 51.

[0031] The rotating tub 30 has a hollow cylindrical shape. A plurality of through holes 30b are provided in an outer circumferential surface of the rotating tub 30 to allow the water to pass. Lifters 30c are disposed on an inner circumferential surface of the rotating tub 30 while being spaced apart in a circumferential direction to lift laundry in the rotating tub 30 upward. Also, a rotation shaft 31 which receives a rotational force and allows the rotating tub 30 to rotate in the reservoir 20 is coupled to a rear surface of the rotating tub 30. The rotation shaft 31 is rotatably installed at a rear surface of the reservoir 20, and a rear end of the rotation shaft 31 passes through the rear surface of the reservoir 20 and protrudes from a rear side of the reservoir 20.

[0032] Also, the drum type washing machine includes

a driving apparatus 60 which generates power to rotate the rotating tub 30.

[0033] The driving apparatus 60 includes a driving motor 61 which generates a rotational force, a driving pulley 62 installed at a rear end of a driving shaft 613 of the driving motor 61, which will be described below, and a driven pulley 63 which is installed at the rear end of the rotation shaft 31 and receives a rotational force from the driving pulley 62 through a belt 64.

[0034] The driving motor 61, as shown in FIGS. 2 and 3, includes a stator 611, a rotor 612 which is rotatably installed in the stator 611 and rotates while interacting with the stator 611, and the driving shaft 613 which is installed in a center of the rotor 612 and rotates together with the rotor 612. The driving pulley 62 described above is installed at the rear end of the driving shaft 613.

[0035] Also, the driving motor 61 includes cases 614F and 614S which form an exterior of the driving motor 61 and support the stator 611 and one pair of bearings 615 which are installed in each of the cases 614F and 614S and rotatably support both sides of the driving shaft 613.

[0036] The cases 614F and 614S include a first case 614F fixed to cover one side of the stator 611 and a second case 614S fixed to cover the other side of the stator 611. Bearing installation portions 614a which have hollow cylindrical shapes in which the bearings 615 described above are installed are provided in central portions of the first case 614F and the second case 614S. A shaft installation hole 614b which allows the rear end of the driving shaft 613 to pass through the second case 614S and to protrude from a rear side thereof is provided in a center of the second case 614S. Also, a bracket installation groove 614c concavely formed in an annular shape outside the bearing installation portion 614a, in which a fixing bracket 70 is installed, is provided in the first case 614F.

[0037] The driving motor 61 is installed on and fixed to an outer surface of the reservoir 20. To fix the driving motor 61 to the reservoir 20, the fixing bracket 70 is fixed to one side of the driving motor 61 and fixing portions 614d which integrally extend from the case 614S are provided at the other side of the driving motor 61.

[0038] The fixing bracket 70 is fixed to the first case 614F, and the fixing portions 614d are integrally extended from the second case 614S. Also, the first and second cases 614F and 614S are formed of a metal material and the fixing bracket 70 is formed of a resin material.

[0039] Accordingly, the emission of heat generated by the driving motor 61 is smoothly performed through the cases 614F and 614S formed of a metal. Since the driving motor 61 can be stored while being not coupled with the fixing bracket 70, it is easy to store the driving motor 61. Even though the fixing bracket 70 is fixed to the driving motor 61, since the fixing bracket 70 is formed of a relatively lightweight resin material rather than metal, the driving motor 61 may be simply installed.

[0040] The fixing bracket 70 includes a motor fixing portion 71 fixed to the first case 614F, a pair of reservoir fixing portions 72 fixed to an outer surface of the reservoir 20, a pair of first frame portions 73 which connect the pair of reservoir fixing portions 72 with the motor fixing portion 71, and a second frame portion 74 which connects the two reservoir fixing portions 72 with each other.

[0041] The motor fixing portion 71 includes a mounting hole 71 a into which a bearing installation portion 614a provided in the first case 614F is mounted to allow an outer circumferential surface of the bearing installation portion 614a of the first case 614F to be supported by an inner circumferential surface of the mounting hole 71 a. Also, the motor fixing portion 71 includes an extended rib 71 b which is integrally extended from a portion adjacent to the mounting hole 71 a in an annular shape and enters in the bracket installation groove 614c to support an outer surface of the bearing installation portion 614a and a plurality of reinforcing ribs 71 c which extend from the extended rib 71 b in a radial direction and are spaced apart in a circumferential direction. The extended ribs 71 b forms the mounting hole 71 a together with the motor fixing portion 71 to provide an effect of extending a length of the mounting hole 71 a. Accordingly, the bearing installation portion 614a of the first case 614F may be stably mounted into and supported by the mounting hole 71 a formed by the motor fixing portion 71 and the extended ribs 71 b.

[0042] Also, a step portion 614e formed in an annular shape around the bearing installation portion 614a is provided at one surface of the first case 614F to which the motor fixing portion 71 of the fixing bracket 70 is fixed.

[0043] The two reservoir fixing portions 72 include fastening holes 72a to which fastening members are fastened, respectively. Also, although not shown in the drawings, buffering members for reducing the transfer of vibrations generated during an operation of the drum type washing machine may be installed at the fastening holes 72a in the two reservoir fixing portions 72, respectively.

[0044] The first frame portions 73, as shown in FIG. 4, are formed to have thicknesses which taper from the reservoir fixing portions 72 to the motor fixing portion 71. The second frame portion 74 is formed in a plate shape curved toward the motor fixing portion 71.

[0045] Also, the fixing bracket 70 includes supporting ribs 75, 76, and 77 which allow the components of the fixing bracket 70 described above to be mutually supported to increase the strength of the fixing bracket 70. The supporting ribs 75, 76, and 77 include a plurality of first supporting ribs 75 which are provided in an approximately triangular space formed between the first frame portions 73 and the second frame portion 74 and provide support in a space between the motor fixing portion 71 and the pair of reservoir fixing portions 72, a plurality of second supporting ribs 76 which provide support in a space between the motor fixing portion 71 and the second frame portion 74, and a plurality of third supporting ribs 77 which have an X shape and provide support in the space between the motor fixing portion 71 and the second frame portion 74. The third supporting ribs 77 comprise at least two portions which intersect to form an X shape.

[0046] Also, as shown in FIGS. 2 and 3, a plurality of temporary assembly protrusions 71 d which protrude toward the first case 614F are provided at the motor fixing portion 71 and a plurality of temporary assembly holes 614f which are provided at positions corresponding to the plurality of temporary assembly protrusions 71 d to allow the plurality of temporary assembly protrusions 71d to be respectively inserted thereinto are provided in the first case 614F.

[0047] Also, first fastening holes 71e and second fastening holes 614g are provided in the motor fixing portion 71 and the first case 614F in mutually corresponding positions, respectively, to allow the motor fixing portion 71 of the fixing bracket 70 to be fixed to the first case 614F using fastening members.

[0048] Accordingly, the fixing bracket 70 is temporarily assembled with the first case 614F by inserting the temporary assembly protrusions 71d into the temporary assembly holes 614f and then fastening members are fastened to the first fastening holes 713 and the second fastening holes 614g, thereby fixing the fixing bracket 70 to the first case 614F.

[0049] In the embodiment, the temporary assembly protrusions 71 d and the first fastening holes 71e are alternately provided at the motor fixing portion 71 in a circumferential direction and the temporary assembly holes 614f and the second fastening holes 614g are alternately provided in the first case 614F in a circumferential direction.

[0050] In the embodiment, although one step portion 614e is shown as being provided, this is merely an example and not limited thereto. In another embodiment shown in FIG. 5, in a driving motor 61', a plurality of step portions 614e may be sequentially formed outside in a radial direction around the bearing installation portion 614a.

[0051] Also, in the embodiment, one side of the driving motor 61 is fixed to the reservoir 20 through the fixing bracket 70 coupled with the first case 614F and the other side thereof is coupled with the reservoir 20 through the fixing portions 614d integrally provided at the second case 614S but this is not limited thereto. As still another embodiment shown in FIG. 6, a first fixing bracket 70A is coupled with a first case 614F' of a driving motor 61" and a second fixing bracket 70B may be fixed to a second case 614S' to allow the driving motor 61" to be fixed to the reservoir 20 through the first fixing bracket 70A and the second fixing bracket 70B.

[0052] As is apparent from the above description, since a case of a driving motor is formed of a metal and a fixing bracket is formed of a resin material, the emission of heat generated by the driving motor can be easily performed, and since a weight of the driving motor is greatly reduced due to the fixing bracket formed of the resin material, it can be easily stored and installed.

[0053] Although a few embodiments of the present invention have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles of the invention, the scope of which is defined in the claims and their equivalents.

Claims

1. A drum type washing machine comprising:

a reservoir (20) which contains water;
a rotating tub (30) rotatably installed in the reservoir (20);
a driving apparatus (60) which generates a rotational force for rotating the rotating tub (30); and
at least one fixing bracket (70) for fixing the driving motor to the reservoir (20),
wherein the driving apparatus (60) comprises the driving motor (61) which generates the rotational force,
the driving motor (61) comprises a case (614) for forming an exterior thereof,
the case (614) is formed of a metal material, and the fixing bracket (70) is formed of a resin material and fixed to the case (614).

2. The drum type washing machine of claim 1, wherein the fixing bracket (70) comprises:

a motor fixing portion (71) fixed to the case (614);
a pair of reservoir fixing portions (72) fixed to the reservoir (20);
a pair of first frame portions (73) which connect the motor fixing portion (71) with the pair of reservoir fixing portions (72), respectively; and
a second frame portion (74) which mutually connects the pair of reservoir fixing portions (72).

3. The drum type washing machine of claims 1 or 2, wherein the fixing bracket (70) comprises a plurality of supporting ribs (75, 76, 77) for reinforcing the strength thereof.

4. The drum type washing machine of claim 3, wherein the plurality of supporting ribs (75, 76, 77) comprise a plurality of first supporting ribs (75) which provide support in a space between the motor fixing portion (71) and the pair of reservoir fixing portions (72) and a plurality of second supporting ribs (76) which provide support in a space between the motor fixing portion (71) and the second frame portion (74).

5. The drum type washing machine of claim 4, wherein the plurality of supporting ribs (75, 76, 77) comprise a plurality of third supporting ribs (77) which are formed in an X shape and provide support in the space between the motor fixing portion (71) and the second frame portion (74).

6. The drum type washing machine of any one of the previous claims, wherein the driving motor (61) comprises:

a stator (611);
a rotor (612) which interacts with the stator (611) and rotates;
a driving shaft (613) which is fixed to the rotor (612) and rotates together with the rotor (612); and
a pair of bearings (615) which rotatably support the driving shaft (613).

7. The drum type washing machine of claim 6, wherein the case (614) comprises:

a bearing installation portion (614a) in which the pair of bearings (615) are installed;
a shaft installation hole (614b) which is provided in one side of the case (614), through which one end of the driving shaft (613) passes and protrudes therefrom; and
a bracket installation groove (614c) which has an annular shape concavely provided outside the bearing installation portion (614a), and
wherein the fixing bracket (70) comprises:

a mounting hole (71 a) into which the bearing installation portion (614a) is mounted; and
an extended rib (71 b) which extends from a portion adjacent to the mounting hole (71 a) in an annular shape and supports a surface of the bearing installation portion (614a) therein.

8. The drum type washing machine of claim 7, further comprising a plurality of reinforcing ribs (71c) which extend outward from the extended rib (71b) in a radial direction and are spaced apart in a circumferential direction.

9. The drum type washing machine of claim 7 or 8, wherein at least one step portion (71 e) stepped in an annular shape around the bearing installation portion (614a) is provided at one surface of the case (614) to which the fixing bracket (70) is fixed.

10. The drum type washing machine of claim 9, wherein the at least one step portion (71 e) comprises a plurality of stepped portions (614e) sequentially provided in a radial direction around the bearing installation portion (614a).

11. The drum type washing machine of any one of the previous claims, wherein the fixing bracket (70) comprises temporary assembly protrusions (71 d) which protrude from the motor fixing portion (71) toward the case (614), and
the case (614) comprises temporary assembly holes (614f) into which the temporary assembly protrusions (71 d) are inserted.

12. The drum type washing machine of any one of the previous claims, wherein the fixing bracket (70) and the case (614) comprise first fastening holes (71 e) and second fastening holes (614g) which are provided at mutually corresponding positions, to which fastening members are fastened, respectively.

13. The drum type washing machine of claim 12, wherein the temporary assembly protrusions (71d) and the first fastening holes (614g) are alternately provided in a circumferential direction, and
the temporary assembly holes (614f) and the second fastening holes (614g) are alternately provided in the circumferential direction.

14. The drum type washing machine of any one of the previous claims, wherein the case (614) comprises:

a first case (614F) which supports one side of the stator (611) and a second case (614S) which supports the other side of the stator (611),
wherein the fixing bracket (70) is fixed to the first case (614F), and
wherein the second case (614S) comprises a fixing portion (72) which is fixed to the reservoir (20).

15. The drum type washing machine of any one of the previous claims 1 to 13, wherein the case (614) comprises a first case (614F) which supports one side of the stator (611) and the rotor (612) and a second case (614S) which supports the other side of the stator (611) and the rotor (612), and
wherein the fixing bracket (70) comprises a first fixing bracket (70A) and a second fixing bracket (70B) installed in the first case (614F') and the second case (614S'), respectively.

FIG. 1

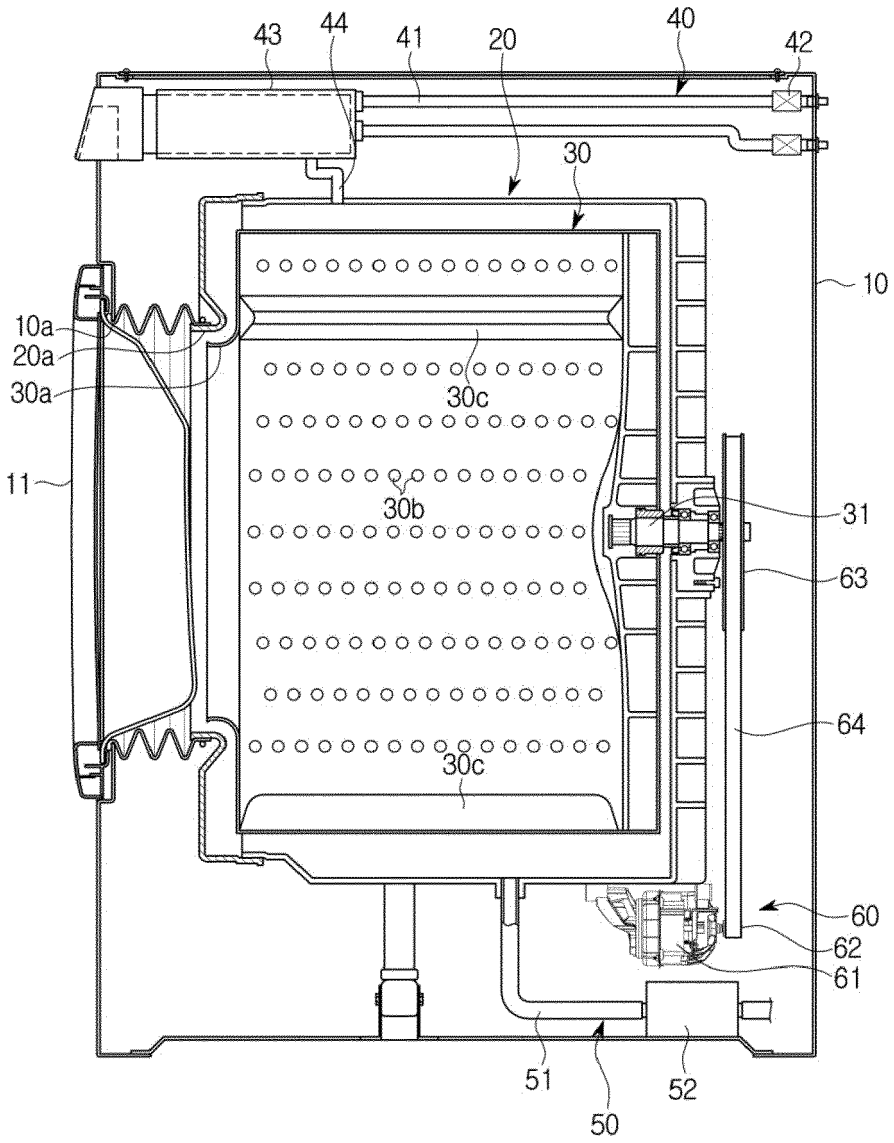
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FIG. 2

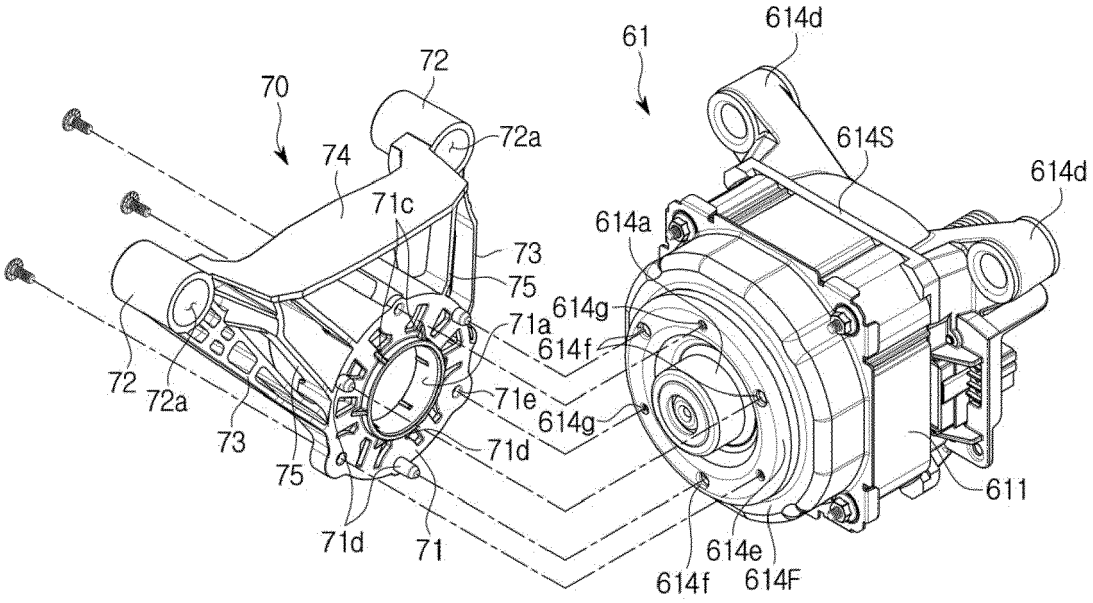
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FIG. 3

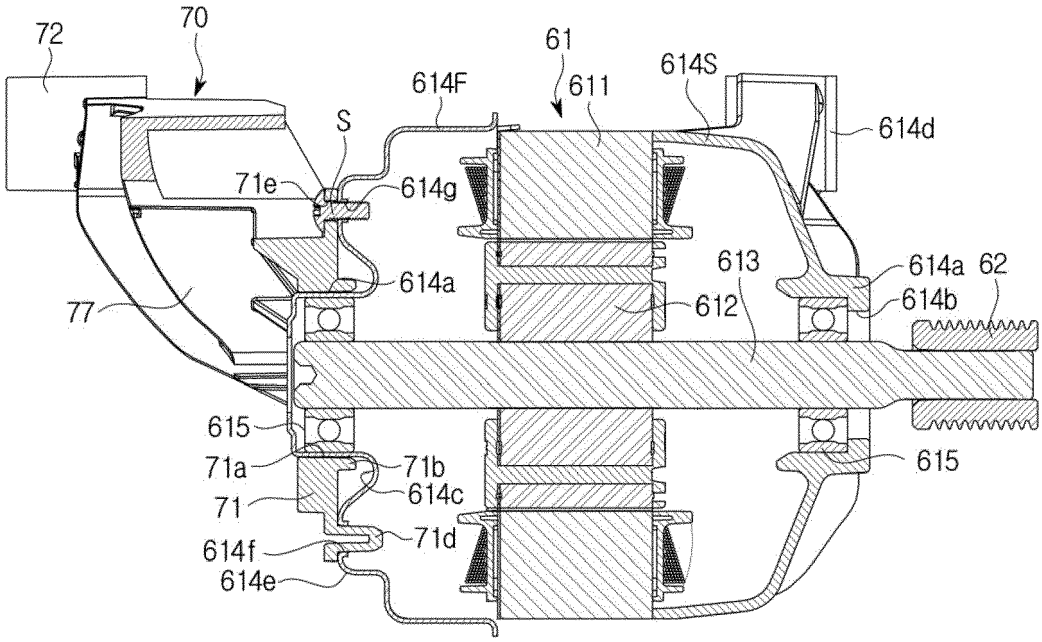
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FIG. 4

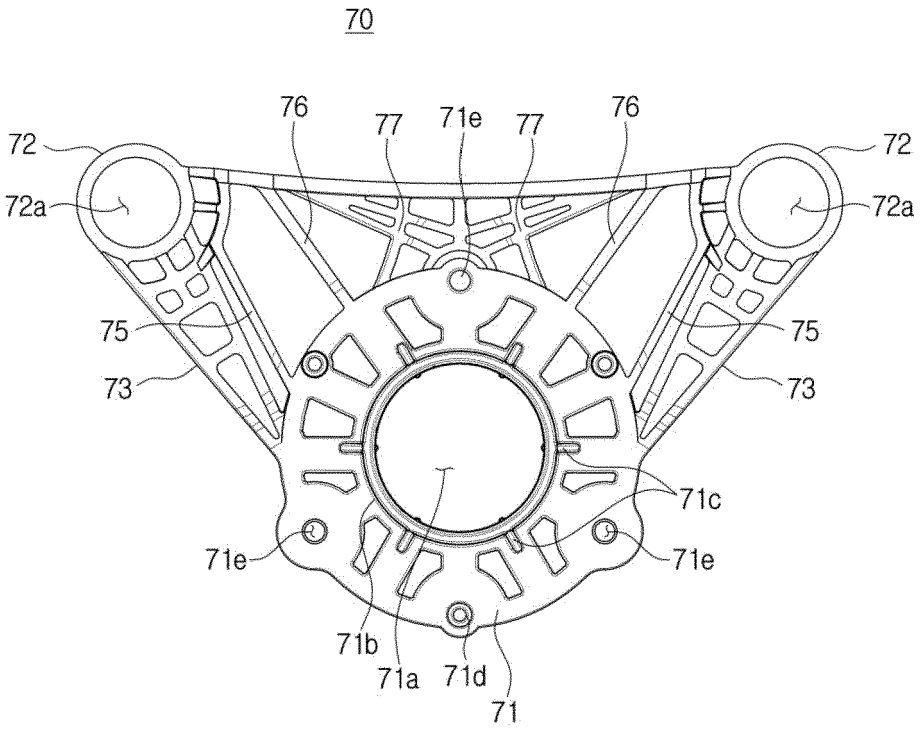
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FIG. 5

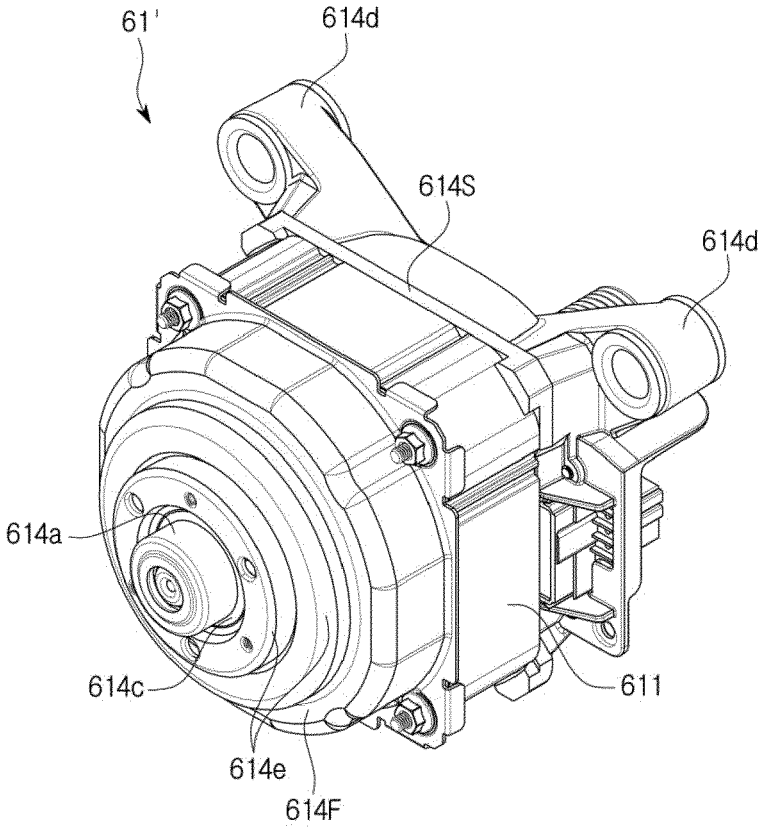
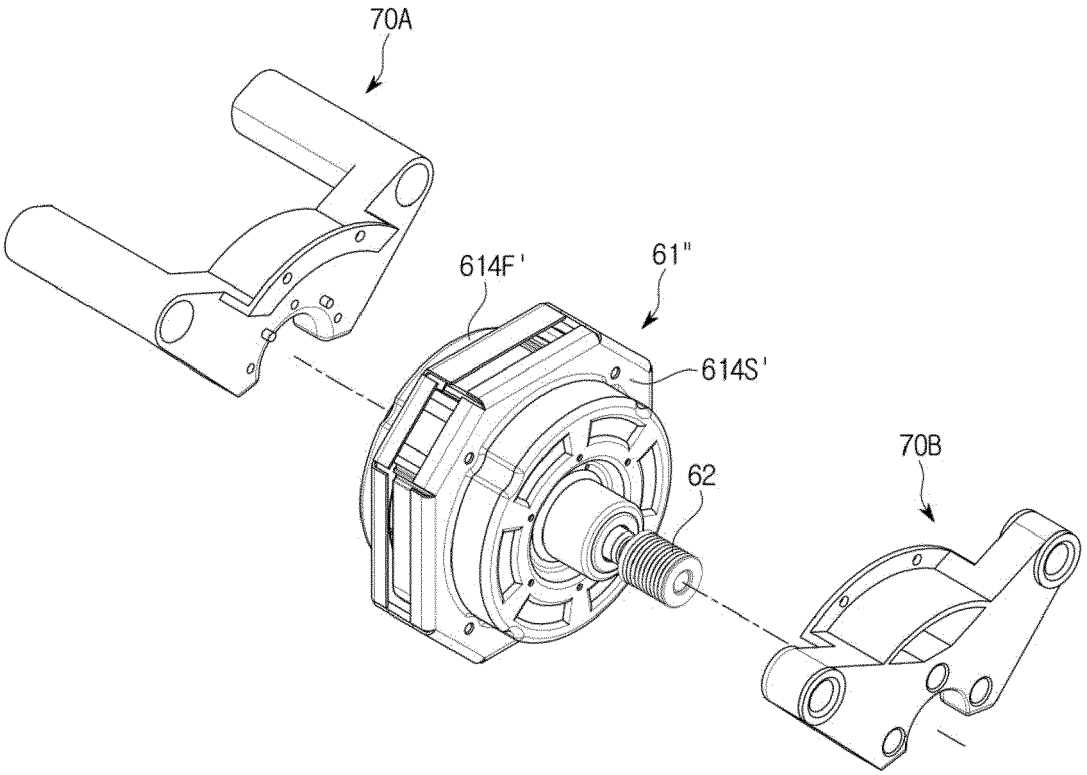


FIG. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 16 15 8351

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	DE 10 2010 062822 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 14 June 2012 (2012-06-14) * paragraph [0002] - paragraph [0064]; claim 12; figures 1, 2a, 2b *	1-15	INV. D06F37/20
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A	DE 10 2011 083652 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 28 March 2013 (2013-03-28) * figures 2,5 *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 July 2016	Spitzer, Bettina

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 16 15 8351

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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13-07-2016

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