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

(11) **EP 2 159 313 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
03.03.2010 Bulletin 2010/09

(21) Application number: **08163339.8**

(22) Date of filing: **29.08.2008**

(51) Int Cl.:
D06F 37/02 *(2006.01)* ***D06F 37/30*** *(2006.01)*
D06F 1/02 *(2006.01)*

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

(71) Applicant: **Electrolux Home Products Corporation N.V.**
1930 Zaventem (BE)

(72) Inventors:
- **Breese, Kevin**
  31020 San Fior (IT)
- **Zanello, Fabio**
  33170 Pordenone (IT)
- **Cusinato, Adriano**
  33080 Porcia (IT)
- **Trani, Antonio**
  33080 Porcia (IT)
- **Gandelli, Marco**
  33080 Porcia (IT)
- **Patel, Vijay**
  33080 Porcia (IT)
- **Bortolotti, Paolo**
  33170 Pordenone (IT)

(74) Representative: **Nardoni, Andrea et al**
Electrolux Italia S.p.A.
Corso Lino Zanussi, 30
33080 Porcia (PN) (IT)

(54) Laundry washing/drying machine

(57) Laundry washing/drying machine (1) comprising a casing (2) and at least one revolving element (6; 21) which is fixed in axially rotating manner inside the machine casing (2) for rotating about a given rotation axis (L, R); the revolving element (6, 21) being provided with a supporting shaft (10, 22) which projects from the revolving element main body (13, 14) coaxial to said rotation axis (L, R), and is fitted in axially rotating manner into a corresponding supporting hub (11, 23) present in the machine casing (2); said supporting hub (11, 23) having a central hole and the supporting shaft (10, 21) engaging the central hole of said supporting hub (11, 23) so as form, inside the latter, a cylindrical interspace (14) which is filled with a magneto-rheological fluid having lubricant properties; the supporting hub (11, 23) also having a magnetic-field source (16, 26) capable of generating a magnetic field which restrains the magneto-rheological fluid inside said cylindrical interspace (14).

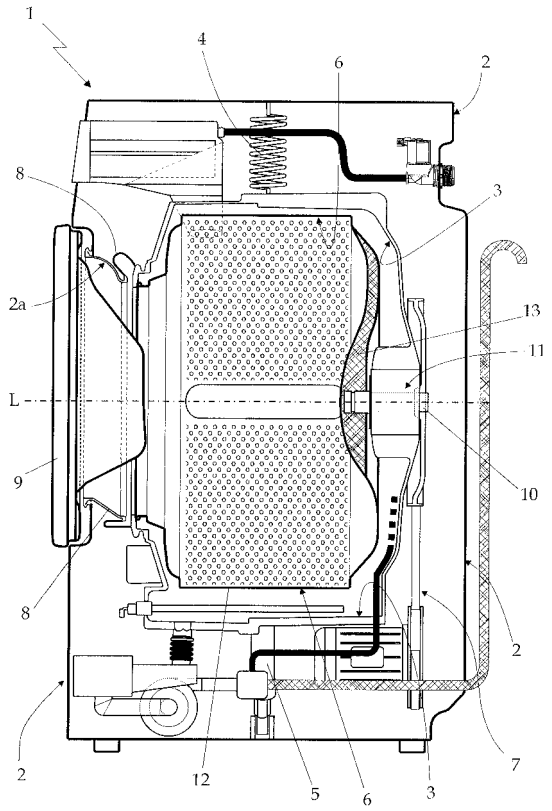

Fig. 1

EP 2 159 313 A1

Description

[0001] The present invention relates to a laundry washing/drying machine.

[0002] More specifically, the present invention relates to a front-loading home laundry washing machine, to which the following description refers purely by way of example.

[0003] As is known, front-loading home laundry washing machines generally comprise a substantially parallelepiped-shaped outer box casing resting on the floor; a substantially bell-shaped washing tub which is suspended in floating manner inside the casing by means of a number of coil springs and shock-absorber, directly facing a laundry loading and unloading opening formed in the front face of the casing; a door hinged to the front face of the casing to rotate to and from a rest position in which the door closes the opening in the front face of the casing to seal the washing tub; a revolving drum for housing the laundry to be washed, and which is housed inside the washing tub to rotate about its longitudinal axis; and an electric motor for rotating the revolving drum about its longitudinal axis inside the washing tub.

[0004] More specifically, the revolving drum is connected to the washing tub via a supporting shaft or pin which projects from the bottom of the revolving drum coaxial to the rotation axis of the drum, and is fitted in axially rotating manner into a corresponding supporting hub present on the bottom wall of the washing tub. A number of annular gaskets and ball-bearings are also interposed between the hub or bush and the supporting shaft to avoid water leakage and to reduce the starting torque to be supplied by the electric motor.

[0005] It is the aim of the present invention to further reduce the starting torque to be supplied by the electric motor, thus allowing a downsizing of the electric motor and a reduction of electricity consumption of the laundry washing machine.

[0006] According to the present invention, there is provided a home laundry washing/drying machine as claimed in Claim 1 and preferably, though not necessarily, in any one of the dependent Claims.

[0007] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

- Figure 1 shows a side view, with parts in section and parts removed for clarity, of a front-loading laundry washing/drying machine in accordance with the teachings of the present invention;
- Figure 2 shows a section view of a portion of the Figure 1 laundry washing machine;
- Figure 3 shows a section view of a different embodiment of the Figure 2 portion of the laundry washing machine;
- Figure 4 shows a side view, with parts in section and parts removed for clarity, of a second embodiment of the front-loading laundry washing/drying machine in accordance with the teachings of the present invention.

[0008] With reference to Figure 1, number 1 indicates as a whole a laundry washing/drying machine comprising a preferably, though not necessarily, parallelepiped-shaped outer box casing 2 resting on the floor; a substantially bell-shaped washing tub 3 suspended in floating manner inside casing 2 via a suspension system comprising a number of coil springs 4 (only one shown in Figure 1) preferably, though not necessarily, combined with one or more vibration dampers 5 (only one shown in Figure 1); a substantially bell-shaped revolving drum 6 for housing the laundry to be washed and/or dried, and which is fixed in axially rotating manner inside washing tub 3 for rotating about its longitudinal axis L; and an electric motor assembly 7 for rotating, on command, revolving drum 6 about its longitudinal axis L inside washing tub 3.

[0009] In particular, in the example shown, laundry washing/drying machine 1 is a front-loading home washing machine 1, and washing tub 3 is suspended in floating manner inside casing 2, with the front opening of washing tub 3 directly faced to a laundry loading and unloading opening 2a formed in the front face of casing 2. Revolving drum 6, in turn, is housed into washing tub 3 so as that its longitudinal axis L is oriented substantially horizontally, and coincides with the longitudinal axis of washing tub 3.

[0010] More specifically, the front opening of washing tub 3 is connected to opening 2a on the front face of casing 2 via a cylindrical elastic-deformable bellows 8, and washing machine 1 is also provided with a door 9 which is hinged to the front face of casing 2 to rotate to and from a rest position in which door 4 closes opening 2a of casing 2 to seal washing tub 3.

[0011] With reference to Figures 1 and 2, revolving drum 6 is provided with a supporting shaft or pin 10 which projects from the bottom wall of drum 6 coaxial to the drum longitudinal axis L, and is fitted in axially rotating manner into a corresponding supporting hub 11 which is located on the bottom wall of washing tub 3, coaxial to longitudinal axis L of revolving drum 6.

[0012] More specifically, in the example shown, supporting hub 11 is integral to the bottom wall of washing tub 3, and is provided with a central through hole extending coaxial to the longitudinal axis L of revolving drum 6. Whereas revolving drum 6 comprises a cylindrical bell-shaped rigid container 12 having at least its cylindrical lateral wall perforated, or at any rate permeable to water, to permit water entry into drum 6; a three-arm cross spider 13 rigidly fixed to the bottom wall of container 12 coaxially to axis L; and shaft or pin 10 which is rigidly fixed to, and projects from, the centre of cross spider 13 towards the bottom wall of washing tub 3, coaxially to longitudinal axis L.

[0013] In particular, with reference to Figures 1 and 2, shaft 10 extends through the central through hole of sup-

porting hub 11 so as to project outside of washing tub 3, and the distal end of shaft 10 is mechanically coupled to a corresponding pulley of electric motor assembly 7.

[0014] Differently from known laundry washing/drying machines, shaft 10 engages the central through hole of supporting hub 11 so as form, inside hub 11, a substantially cylindrical interspace 14 which extends coaxial to longitudinal axis L, surrounding shaft 10, and is completely filled with a magneto-rheological fluid having lubricant properties, i.e. an oil or grease having magnetic particles in suspension.

[0015] In addition to the above, supporting hub 11 also comprises a magnetic-field source which is capable of generating a magnetic field which restrains the magneto-rheological fluid inside cylindrical interspace 14.

[0016] More specifically, the magnetic-field source is capable of generating a magnetic field which restrains the magneto-rheological fluid evenly distributed inside cylindrical interspace 14.

[0017] In particular, in the example shown, shaft 10 and supporting hub 11 are dimensioned to form a cylindrical interspace 14 having preferably, though not necessarily, a less than 1 millimeter thickness, whereas the magneto-rheological fluid restrained in cylindrical interspace 14 is a Perfluoropolyether (PFPE) oil based magneto-rheological fluid, such as the Magneferfluid SBPS62 produced by the UK company Liquid Research, or a Hydrocarbon oil based magneto-rheological fluid, such as the Magneferfluid U-4SGHS by the UK company Liquid Research.

[0018] With reference to Figures 1 and 2, in the example shown supporting hub 11 comprises a cylindrical supporting bush 15 which is integral to the bottom wall of washing tub 3, and is coaxial to longitudinal axis L of revolving drum 6; a cylindrical-shaped magnetic-field source 16 which is housed into cylindrical bush 15, coaxial to axis L, so as to surround the central through hole of hub 11, and it is structured to generate, into cylindrical interspace 14, a radially oriented magnetic filed which restrains the magneto-rheological fluid within interspace 14, evenly distributed around shaft 10; and preferably, though not necessarily, a main annular retaining gasket (not shown) which is fixed to the bush axial end directly facing revolving drum 6, and fits to shaft 10 to avoid any water leakage into the central through hole of cylindrical bush 15, i.e. into the central through hole of hub 11.

[0019] In particular, with reference to Figure 2, in the example shown, magnetic-field source 16 comprises a cylindrical sleeve or jacket 17 made of plastic or composite material and which extends within cylindrical bush 15 coaxial to axis L, so as to surround shaft 10 and define the central through hole of hub 11; a number of ring-shaped permanent magnets 18 which are housed into cylindrical bush 15 and are fitted onto cylindrical jacket 17, one adjacent to the other and coaxial to axis L, so as surround jacket 17, i.e. the central through hole of hub 11; and a number of spacer annular washers 19 made of plastic or composite material, each of which is fitted onto cylindrical jacket 17 coaxial to axis L, between two consecutive ring-shaped permanent magnets 18.

[0020] The ring-shaped permanent magnets 18 are made preferably, though not necessarily, of AlNiCo (i.e. Alloy, Nickel and Cobalt), TICoNAL (i.e. Titanium, Cobalt, Nickel and Alloy) or NdFeB (i.e. Neodymium, Iron and Boron), and are structured to generate, into cylindrical interspace 14, a radially oriented magnetic filed which restrains the magneto-rheological fluid within interspace 14, evenly distributed around shaft 10.

[0021] With reference to Figure 2, magnetic-field source 16 is preferably, though not necessarily, also provided with two annular retaining washers or gaskets 20 made of plastic or composite material, which are fixed into bush 15, coaxial to axis L and at both axial ends of cylindrical jacket 17, to keep permanent magnets 18 and annular washers 19 side by side on jacket 17.

[0022] In addition to the above, each retaining washer or gasket 20 preferably, though not necessarily, also fits to shaft 10 to avoid any leakage of magneto-rheological fluid from cylindrical interspace 14.

[0023] In other words, in the example shown cylindrical interspace 14 is delimited by shaft 10, cylindrical jacket 17, and the two retaining washers or gaskets 20; and the magneto-rheological fluid within interspace 14 avoids, like a traditional ball bearing, any radial movement of shaft 10 within the central through hole of hub 11.

[0024] With reference to Figure 3, in a different embodiment, magnetic-field source 16 of supporting hub 11 is replaced by a cylindrical-shaped magnetic-field source 26 which comprises a cylindrical sleeve or jacket 27 made of plastic or composite material and which extends within cylindrical bush 15 coaxial to axis L, so as to surround shaft 10 and define the central through hole of hub 11; one or more series (four in the example shown) of annularly-distributed electromagnets, each of which is formed by a number of radially-oriented electromagnets 28 which, alike the radially-oriented electromagnets of the stator of a standard asynchronous electric-motor, are housed into cylindrical bush 15 uniformly angularly distributed around axis L, so as surround cylindrical jacket 27, i.e. the central through hole of hub 11; and an electric power unit (not shown) for supplying, on command, electric energy to the induction coils 28a of all electromagnets 28.

[0025] Each electromagnet 28 is radially oriented so as to generate, into cylindrical interspace 14 and when the corresponding induction coil 28a is supplied with electric current, a radially oriented magnetic filed which restrains the magneto-rheological fluid within interspace 14, evenly distributed around shaft 10.

[0026] Also in this second embodiment, therefore, the magneto-rheological fluid within interspace 14 avoids, like a traditional ball bearing, any radial movement of shaft 10 within the central through hole of hub 11.

[0027] With reference to Figure 3, in the example shown, magnetic-field source 26 is preferably, though not necessarily, provided also with two additional axially-

oriented and annular-shaped electromagnets 29 which are fitted onto cylindrical jacket 27, on opposite sides of the annularly-distributed and radially-oriented group of electromagnets 28. Each electromagnet 29 is coaxial with cylindrical jacket 27 and is designed to generate, into cylindrical interspace 14 and when the corresponding induction coils 29a are supplied with electric current, a magnetic filed which is substantially parallel to the drum longitudinal axis L, so as to push the magneto-rheological fluid within cylindrical interspace 14, towards the centre of interspace 14 so to avoid any axial displacement of shaft 10 within the central through hole of hub 11.

[0028] In other words, in Figure 3 embodiment, the magneto-rheological fluid within interspace 14 avoids any axial displacement of shaft 10 within the central through hole of hub 11 and therefore it operates also like a traditional thrust bearing interposed between shaft 10 and cylindrical bush 15.

[0029] Preferably, though not necessarily, magnetic-field source 26 also comprises two annular retaining washers or gaskets 30 made of plastic or composite material, which are fixed into cylindrical bush 15, coaxial to axis L and at both axial ends of cylindrical jacket 27, to keep the annularly-distributed and radially-oriented group of electromagnets 28 and the axially-oriented electromagnets 29 side by side on jacket 27.

[0030] Each retaining washer or gasket preferably, though not necessarily, also fits to shaft 10 to avoid any leakage of magneto-rheological fluid from cylindrical interspace 14.

[0031] General operation of laundry washing/drying machine 1 is clearly inferable from the above description, with no further explanation required.

[0032] The particular structure of supporting hub 11 has lots of advantages. The permanent presence of a lubricanting liquid, i.e. the magneto-rheological fluid having lubricant properties, between shaft 10 and cylindrical bush 15 allows a drastic reduction of the starting torque requested for starting rotation of revolving drum 6.

[0033] The reduction of starting torque value, in turn, allows the downsizing of the asynchronous motor of electric motor assembly 7 and the reduction of electricity consumption of the laundry washing/drying machine.

[0034] Clearly, changes may be made to laundry washing/drying machine 1 as described herein without, however, departing from the scope of the present invention.

[0035] For example, an auxiliary cylindrical-shaped magnetic-field source may be incorporated into shaft 10 for generating, into cylindrical interspace 14, a radially-oriented magnetic filed which is opposite to that generated by magnetic-field source 16 or 26, thus shaft 10 is magnetically suspended within the central through hole of hub 11.

[0036] More specifically, a number of ring-shaped permanent magnets 18 may be fitted also on shaft 10, so that each permanent magnets 18 on jacket 17 is directly faced to a corresponding ring-shaped permanent magnet 18 on shaft 10. Thus both the magneto-rheological fluid within interspace 14 and the magnetic interaction between the magnetic fields generated by the magnetic-field source 16 and the auxiliary magnetic-field source on shaft 10 avoid, like a traditional ball bearing, any radial movement of shaft 10 within the central through hole of hub 11.

[0037] In combination with any one of the embodiments disclosed above, supporting hub 11 may also comprise one or more traditional annular ball bearings or thrust bearings interposed between shaft 10 and cylindrical bush 15, preferably, though not necessarily, outside of interspace 14, so to avoid any radial movement or axial displacement of shaft 10 within the central through hole of hub 11.

[0038] With reference to Figure 4, in a different embodiment laundry washing/drying machine 1 is a laundry dryer and it lacks washing tub 3 and washing-tub suspension system. In which case, the bell-shaped revolving drum 6 rests horizontally inside casing 2 with its front opening directly faced to opening 2a, on a number of horizontal supporting rollers 21 which are fitted to casing 2 to let revolving drum 6 freely rotate about its longitudinal axis L.

[0039] At least one of these supporting rollers 21 is provided with a protruding shaft or pin 22 which projects from the roller cylindrical main body coaxial to a rotation axis R substantially parallel to drum longitudinal axis L, and is fitted in axially rotating manner into a corresponding supporting hub 23 on machine casing 2.

[0040] Likewise in supporting hub 11, shaft or pin 22 engages the central through hole of supporting hub 23 so as form, inside supporting hub 23, a cylindrical interspace which extends coaxial to rotation axis R, surrounding shaft 22, and is completely filled with a magneto-rheological fluid having lubricant properties, i.e. an oil or grease having magnetic particles in suspension. Supporting hub 23, in turn, is provided with a magnetic-field source which is capable of generating a magnetic field which restrains the magneto-rheological fluid inside the cylindrical interspace realized into hub 23, preferably, though not necessarily, evenly distributed inside the latter.

[0041] Structure of supporting hub 23 is almost identical to structure of supporting hub 11.

Claims

1. Laundry washing/drying machine (1) comprising a casing (2) and at least one revolving element (6; 21) which is fixed in axially rotating manner inside the machine casing (2) for rotating about a given rotation axis (L, R); the revolving element (6, 21) being provided with a supporting shaft (10, 22) which projects from the revolving element main body (12, 13) coaxial to said rotation axis (L, R), and is fitted in axially rotating manner into a corresponding supporting hub

(11, 23) present in the machine casing (2); the laundry washing/drying machine (1) being **characterized in that** the supporting shaft (10, 22) engages the central hole of said supporting hub (11, 23) so as form, inside the latter, an interspace (14) which is filled with a magneto-rheological fluid having lubricant properties; the supporting hub (11, 23) also comprising a magnetic-field source (16, 26) capable of generating a magnetic field which restrains the magneto-rheological fluid inside said interspace (14).

2. Laundry washing/drying machine as claimed in Claim 1, wherein said magnetic-field source (16, 26) is capable of generating a magnetic field which restrains the magneto-rheological fluid evenly distributed inside said interspace (14).

3. Laundry washing/drying machine as claimed in Claim 2, wherein said supporting hub (11, 23) comprises a supporting bush (15) and the magnetic-field source (16, 26) is a substantially cylindrical-shaped magnetic-field source (16, 26) which is housed into said supporting bush (15) coaxial to said rotation axis (L, R).

4. Laundry washing/drying machine as claimed in Claim 3, wherein said supporting hub (11, 23) comprises a cylindrical jacket (17, 27) extending within the supporting bush (15), coaxial to said rotation axis (L, R), so as to surround the shaft (10, 22) and delimit the central hole of said supporting hub (11, 23); said interspace (14) being delimited by the shaft (10, 22) and said cylindrical jacket (17, 27).

5. Laundry washing/drying machine as claimed in Claim 4, wherein said supporting hub (11, 23) also comprises two annular retaining gaskets (20, 30) which are fitted to the shaft (10), on both axial ends of the cylindrical jacket (17, 27), to avoid any leakage of magneto-rheological fluid from the interspace (14).

6. Laundry washing/drying machine as claimed in Claim 3, 4 or 5, wherein said magnetic-field source (16) comprises at least one substantially annular-shaped permanent magnet (18) which is housed into the supporting bush (15) so as to surround the central hole of said supporting hub (11, 23), and which is structured to generate, into the interspace (14), a radially oriented magnetic filed which restrains the magneto-rheological fluid within said interspace (14).

7. Laundry washing/drying machine as claimed in Claims 4 and 6, wherein said magnetic-field source (16) comprises a number of ring-shaped permanent magnets (18) fitted onto the cylindrical jacket (17) one adjacent to the other, so as surround said jacket (17); and a number of spacer annular washers (19) each of which is fitted on the cylindrical jacket (17) between two consecutive ring-shaped permanent magnets (18).

8. Laundry washing/drying machine as claimed in Claim 3, 4 or 5, wherein said magnetic-field source (26) comprises at least one group of radially-oriented electromagnets (19) which are housed into the supporting bush (12, 23) angularly distributed around the central hole of said supporting hub (11, 23), and which are structured to generate, into the interspace (14), a radially-oriented magnetic filed which restrains the magneto-rheological fluid within said interspace (14); the magnetic-field source (26) being also provided with an electric power unit for supplying, on command, electric energy to said electromagnets (19).

9. Laundry washing/drying machine as claimed in Claim 8, wherein said magnetic-field source (26) also comprises two additional annular-shaped electromagnets (29) which are placed coaxial to the rotation axis (L, R) of said shaft (10), on opposite sides of said group of annularly-distributed and radially-oriented electromagnets (28), and each of which is structured to generate, into the interspace (14), a magnetic filed which is substantially parallel to said rotation axis (L, R).

10. Laundry washing/drying machine as claimed in any one of the foregoing Claims, wherein it comprises a substantially bell-shaped washing tub (3) housed into the machine casing (2); said revolving element (6; 21) consisting in a substantially bell-shaped drum (6) for housing the laundry to be washed and/or dried, and which is fixed in axially rotating manner inside the washing tub (3) for rotating about its longitudinal axis (L); the supporting shaft (10) projecting from the bottom wall of said bell-shaped drum (6) coaxial to the drum longitudinal axis (L), and said supporting hub (11) being realized into said washing tub (3).

11. Laundry washing/drying machine as claimed in Claim 10, wherein said supporting hub (11) also comprises a main annular retaining gasket, which is fixed to the bush axial end facing said bell-shaped drum (6), and fits to said supporting shaft (10) to avoid any water leakage into the central hole of said supporting hub (11, 23).

12. Laundry washing/drying machine as claimed in anyone of Claims 1 to 10, wherein it comprises a substantially bell-shaped drum (6) for housing the laundry to be washed and/or dried, and which rests horizontally inside the machine casing (2) on a number of horizontal supporting rollers (21) which are fitted

to the machine casing (2) to let said bell-shaped drum (6) freely rotate about its longitudinal axis (L); said revolving element (6; 21) consisting in at least one of said supporting rollers (21).

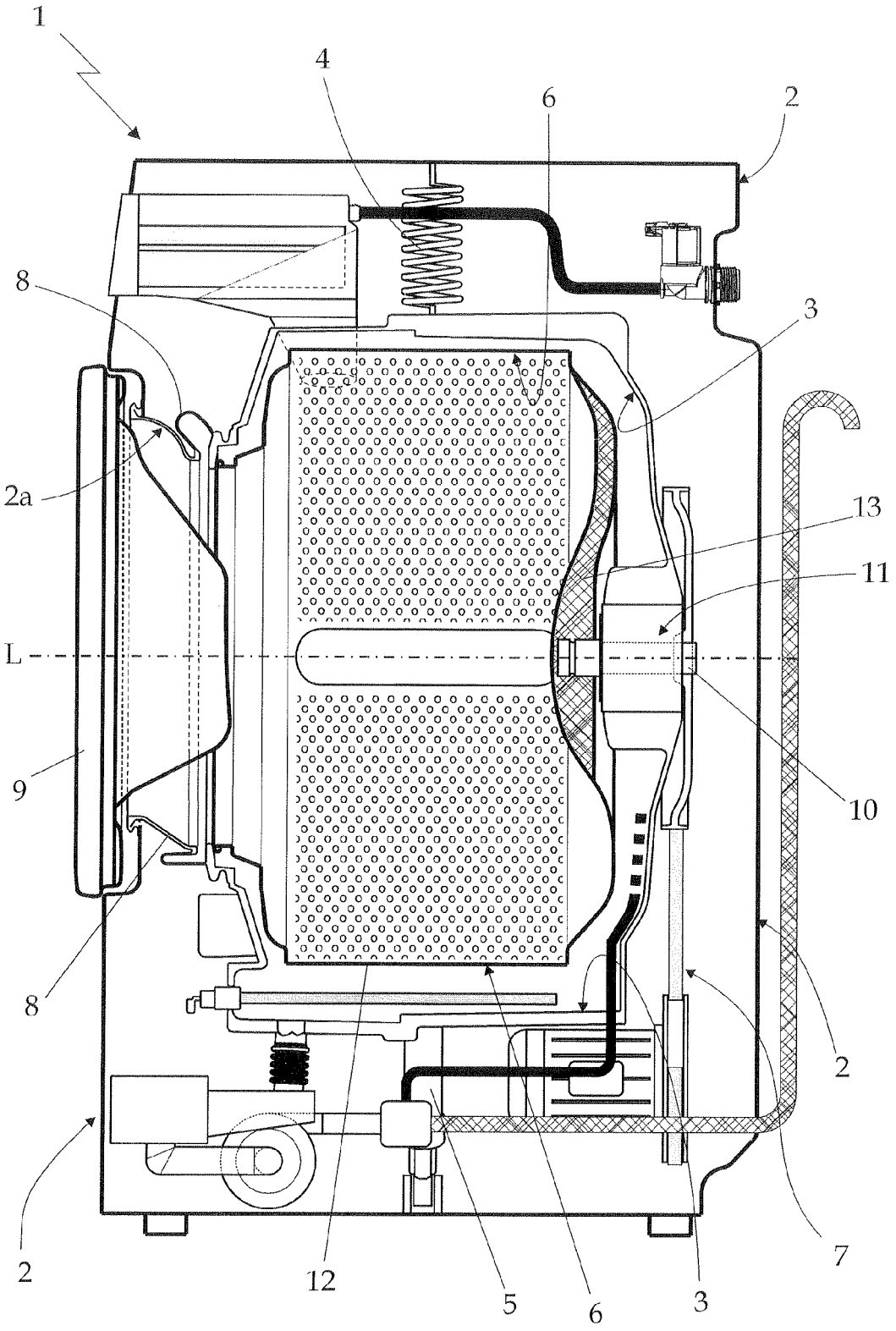

Fig. 1

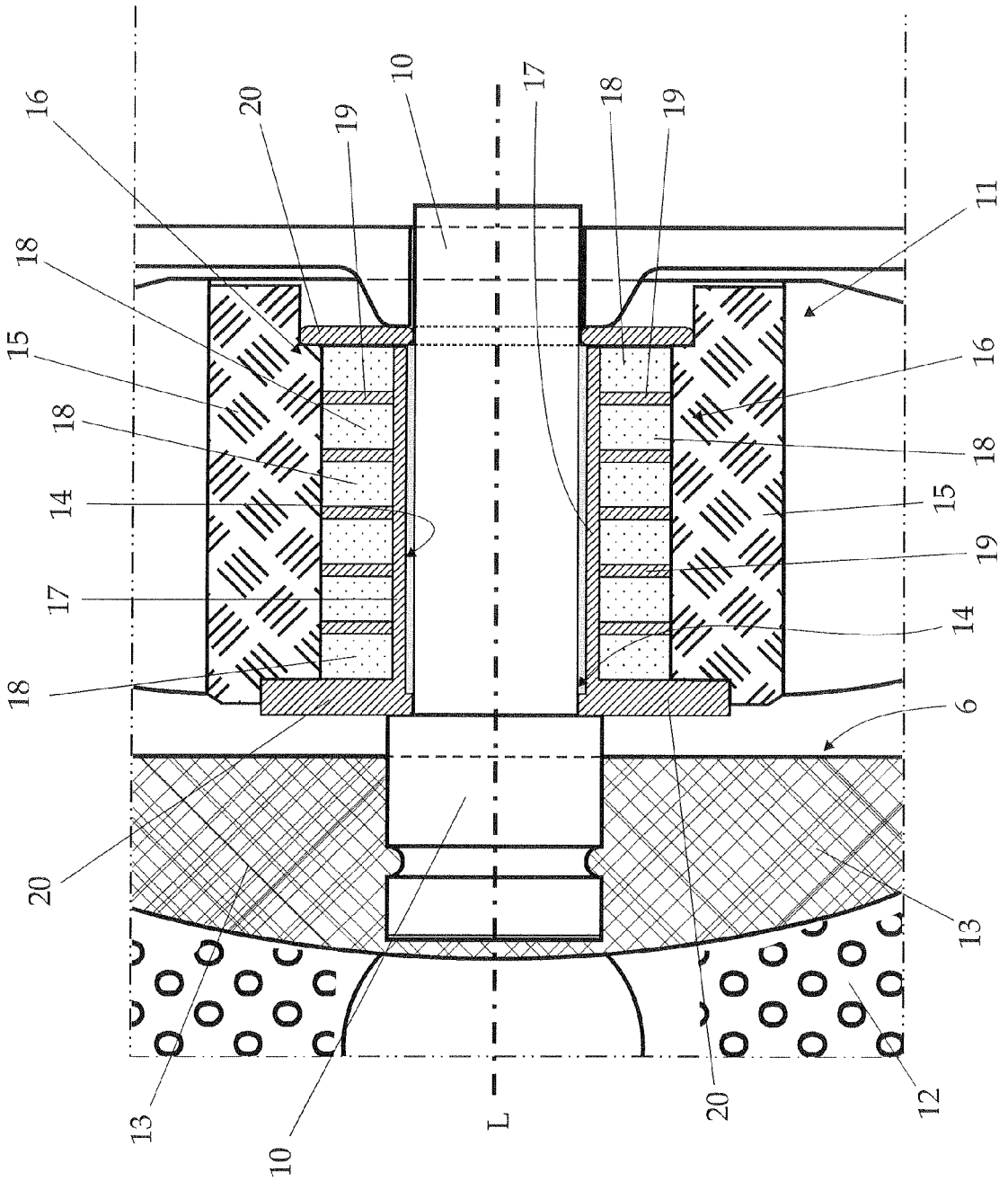
16
20
19
10
17
18
19
11
18
15
16
18
18
14
15
19
17
14
18
6
20
13
13
10
L
20
12

Fig. 2

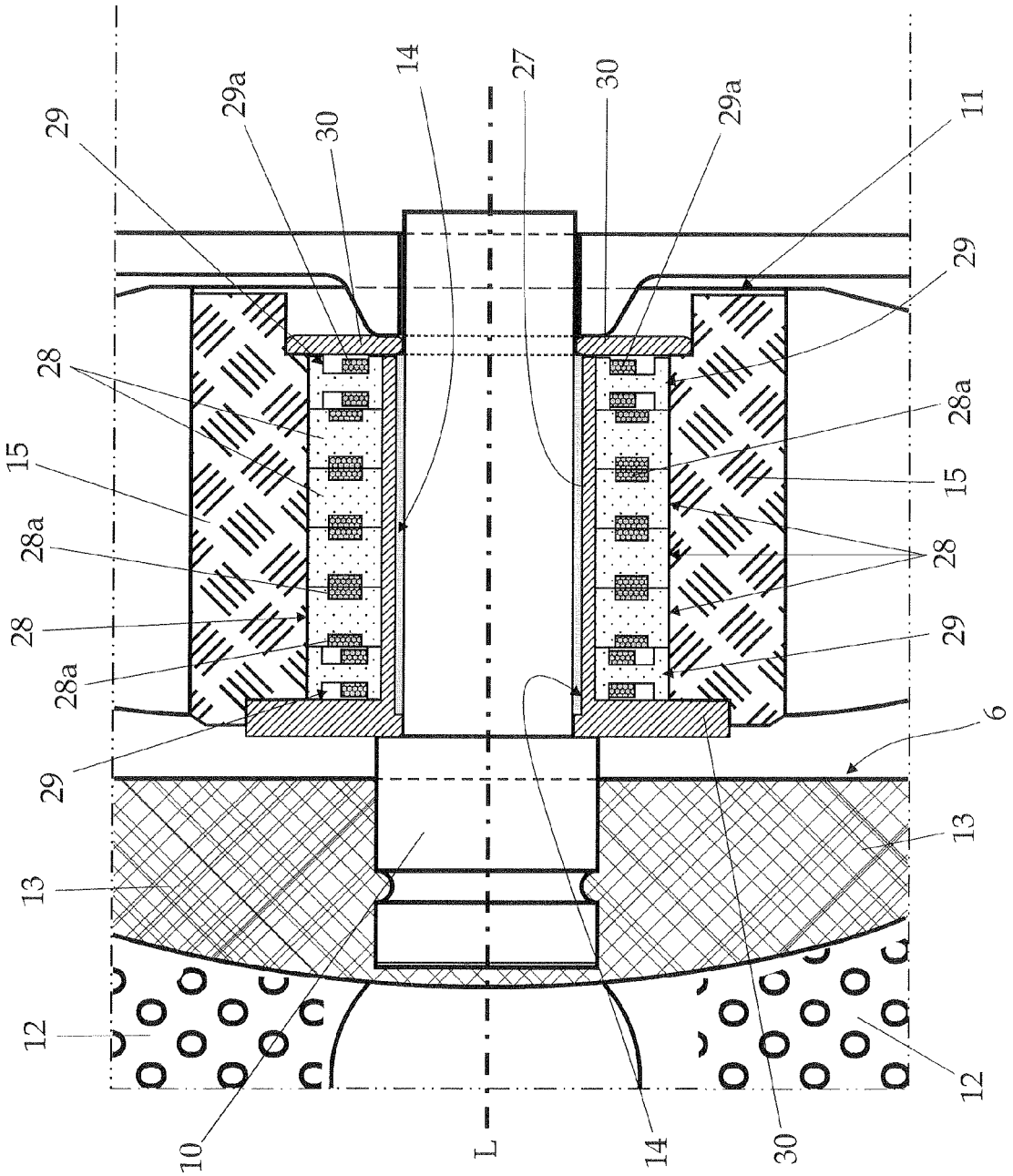
29
29a
30
14
27
30
29a
11
29
28
28a
15
15
28
28a
28
29
29
6
13
13
12
12
10
L
14
30

Fig. 3

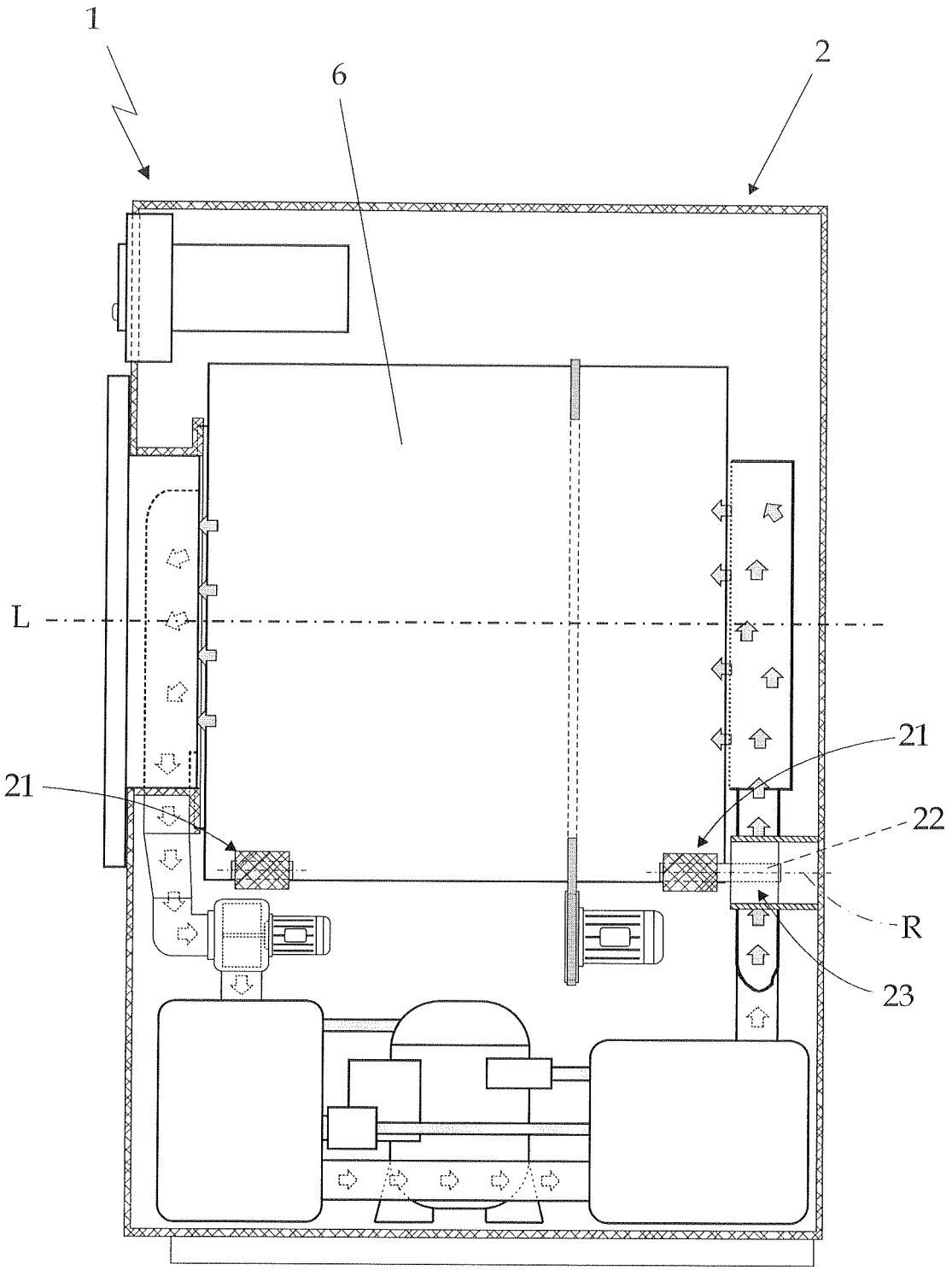

Fig. 4

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 08 16 3339

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 0 878 574 B (ELECTROLUX ZANUSSI ELETTRODOME [IT]) 19 June 2002 (2002-06-19) * paragraph [0014] - paragraph [0021]; figure 2 *	1,12	INV. D06F37/02 D06F37/30 D06F1/02
A	US 6 151 930 A (CARLSON J DAVID [US]) 28 November 2000 (2000-11-28) * column 2, line 9 - column 3, line 56; figures 3-7,14-19,22,24 *	1,12	
A	EP 1 635 084 A (FLUDICON GMBH [DE]) 15 March 2006 (2006-03-15) * paragraph [0009] - paragraph [0016]; figures 1-3 *	1,12	
A	US 6 269 925 B1 (BRUNKEN GERD [DE]) 7 August 2001 (2001-08-07) * column 2, line 14 - column 3, line 31; figure 1 *		
A	US 4 992 190 A (SHTARKMAN EMIL M [US]) 12 February 1991 (1991-02-12) * column 6, line 54 - column 7, line 57; figures 1,2 *	1,12	TECHNICAL FIELDS SEARCHED (IPC) D06F F16F F16D H01F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	18 February 2009	Fachin, Fabiano

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 08 16 3339

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.

18-02-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0878574 B	19-06-2002	DE 69806100 D1	25-07-2002
		DE 69806100 T2	12-12-2002
		EP 0878574 A1	18-11-1998
		ES 2178795 T3	01-01-2003
		IT PN970029 A1	16-11-1998
		JP 10323489 A	08-12-1998
		US 5907880 A	01-06-1999
US 6151930 A	28-11-2000	AU 1122699 A	17-05-1999
		DE 69829686 D1	12-05-2005
		DE 69829686 T2	22-09-2005
		EP 1025373 A1	09-08-2000
		JP 2002502942 T	29-01-2002
		WO 9922162 A1	06-05-1999
		US 6202806 B1	20-03-2001
		US 6340080 B1	22-01-2002
		US 6394239 B1	28-05-2002
EP 1635084 A	15-03-2006	DE 102004043281 A1	09-03-2006
US 6269925 B1	07-08-2001	DE 19831754 A1	03-02-2000
		ES 2167164 A1	01-05-2002
		FR 2781267 A1	21-01-2000
		GB 2340918 A	01-03-2000
		JP 3220117 B2	22-10-2001
		JP 2000074097 A	07-03-2000
US 4992190 A	12-02-1991	NONE	

EPO FORM P0459

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