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

1130 Brussel (BE)

(72) Inventors:

• **Barro, Paolo**
33080 Porcia (PN) (IT)

• **Colin, Igor**
33080 Porcia (PN) (IT)

(74) Representative: **Nardoni, Andrea et al**

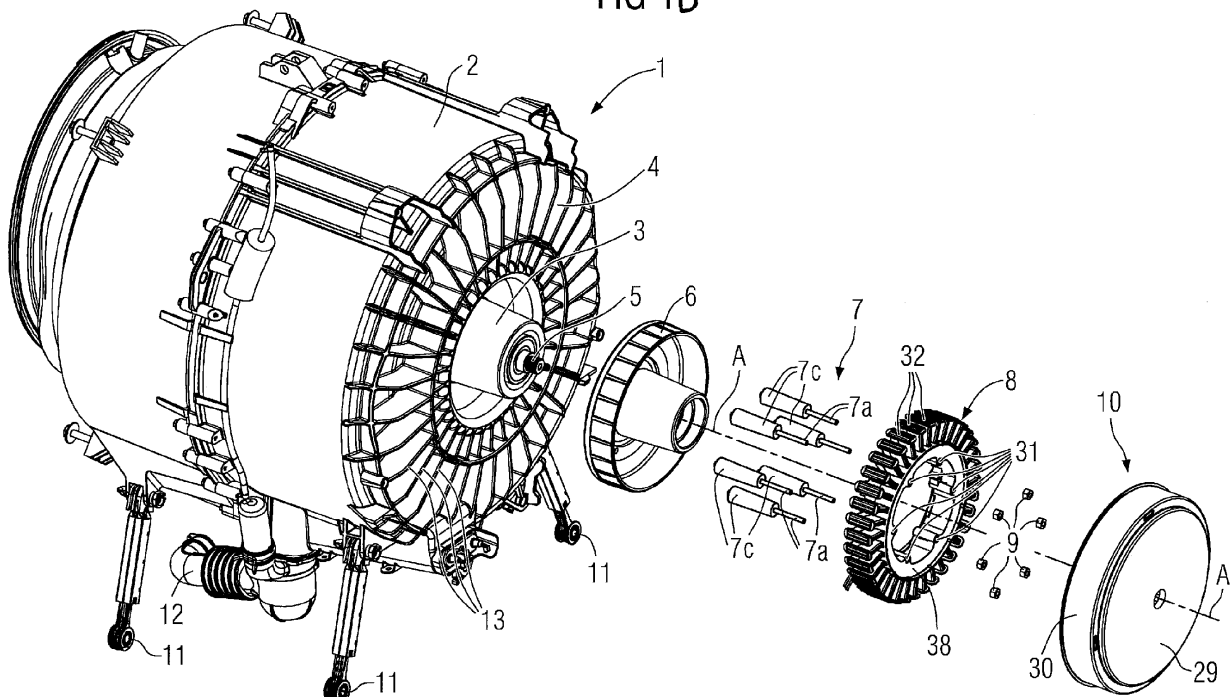
Electrolux Italia S.p.A.
Corso Lino Zanussi, 30
33080 Porcia (PN) (IT)

(54) **Laundry machine**

(57) The present invention is related to a laundry machine (100) provided with a laundry treatment unit (1) comprising: a tub (2), provided with a back wall (4), containing a rotary drum (16); a hub (6), fixed to the back wall (4), supporting a shaft (5) which is provided for supporting and rotating the rotary drum (16); a drive mechanism (400) provided for driving the rotary drum (16) via the shaft (5), the drive mechanism (400) comprising a stator (8). A plurality of distance pins (7, 70, 37, 191) is fixed to the hub (6), wherein the stator (8) is fixed to the plurality of distance pins (7, 70) and wherein the distance pins (7, 70, 37, 191) fix the stator (8) in a defined distance from the hub (6).

anism (400) provided for driving the rotary drum (16) via the shaft (5), the drive mechanism (400) comprising a stator (8). A plurality of distance pins (7, 70, 37, 191) is fixed to the hub (6), wherein the stator (8) is fixed to the plurality of distance pins (7, 70) and wherein the distance pins (7, 70, 37, 191) fix the stator (8) in a defined distance from the hub (6).

FIG 1B



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Description

[0001] The present invention relates to a laundry machine (e.g. a washing machine or a washer/drier machine), provided with a laundry treatment unit comprising a direct drive arrangement.

[0002] Known laundry machines such as washing machines or washing machines with drying function (also called washer-driers) usually have a laundry treatment unit which is built in a housing of the laundry machine and connected to operation means for operating the laundry treatment unit. Such a laundry treatment unit comprises a tub, wherein a drum is rotatably arranged within the tub and wherein laundry to be washed is placed within said drum. For rotating the drum a motor is usually provided in a region below or laterally to the tub, being connected to the drum by means of a belt for driving said drum.

[0003] As an alternative to the belt driven drum it is possible to use a so called "direct drive motor" for driving the drum. The stator of the direct drive motor is fixed to the rear wall of the tub of the laundry machine, and the rotor of this motor is directly connected to the shaft rotating the drum, so as to be able to rotate this shaft (and therefore the drum) without using a further mechanical transmission device (e.g. a belt pulley system).

[0004] The document US 6,681,602 B2 discloses a washing machine including a washing tub having a plastic injection-molded rear wall with a shaft mounted in the rear wall. A laundry drum is connected to the shaft in a rotationally fixed manner. A drive mechanism is connected to the drum for driving the drum, the drive mechanism has a stator support part. The rear wall is plastic injected molded around the stator support part for rotationally fixing the stator support part to the rear wall of the tub.

[0005] Disposed on the rear wall of the washing tub is a drive mechanism. The drive mechanism includes a rotor of a bell-shaped form that, like the laundry drum, is connected to the shaft in a rotationally fixed manner. To produce the connection between the rotor and the shaft, a screw is provided, the screwing of the rotor on the shaft being fixed in rotation by positive fitting through an adapted connection.

[0006] However the mounting process of the known direct drive solutions is not considered as satisfyingly easy, because of the plurality of steps that have to be carried out by a worker to assembly the tub and the driving means. In particular, distances, gaps, tolerances and positions for electric and/or magnetic means have to be met precisely. A complicated assembling process is a source of defects in this case.

[0007] It is the aim of the present invention to provide a laundry machine provided with a laundry treatment unit, comprising a direct driven drum, having a simple structure which allows an easy and fast assembly of the direct drive motor to the washing tub.

[0008] It is a further object of the present invention to enable and to provide a stable and precise fixation of a

stator component of the direct drive motor to the washing tub.

[0009] Applicant has found that by a laundry machine provided with a laundry treatment unit comprising a tub with a hub fixed to its back wall for supporting a shaft rotating a drum, the laundry treatment unit comprising a plurality of distance pins fixed between the hub and the stator for fixing the stator in a defined distance from the hub, the laundry treatment unit can be assembled in a very easy and quick way.

[0010] For solving the above described problems a laundry treatment unit according to the invention provides that a plurality of distance pins is fixed to the hub, wherein the stator is fixed to the plurality of distance pins and wherein the distance pins fix the stator in a defined distance from the hub.

[0011] Advantageously the stator is not arranged in direct contact, but in a defined distance to the hub. Mounting the stator in a defined distance from the hub allows an easier assembling process, being more ergonomically for the worker.

[0012] According to a further embodiment of the invention the distance pins are detachably fixed to the hub and the stator is detachably fixed to the distance pins.

[0013] When the distance pins are detachably fixed to the hub, it is very easy to change the driving method for the laundry treatment unit. This means that the distance pins can be left away and a belt drive can be mounted to the laundry treatment unit. Alternatively, the distance pins can be attached to the hub, e.g. by screwing them thereto. Then the laundry treatment unit can have a direct drive. Further, it is very easy to mount and to demount the stator when it is detachably fixed to the distance pins.

[0014] In a further embodiment of the invention the back wall comprises at least one enclosure which encloses the hub at least partially and/or the back wall comprises at least one protrusion which encloses and supports at least one distance pin.

[0015] In such a configuration the hub can be very rigidly fixed to the tub and the vibrations from the driven drum and the rotating shaft can be absorbed and damped by the tub. When the distance pins are enclosed by a protrusion, additional rigidity and stiffness is provided, making the arrangement more stable.

[0016] In a further embodiment of the invention, a plurality of above mentioned distance pins is supported by a pin element.

[0017] Advantageously the said hub and/or the tub forms a cylindrical forming (or body) comprising a sleeve and a positioning element providing a seat for the pin element, this pin element being fixedly arranged on the sleeve.

[0018] Preferably the positioning element comprises a block step formed between a cylindrical base of the cylindrical forming and the sleeve.

[0019] A pin element having a plurality of distance pins can be easily mounted to the tub. Further the pin element can be fixed very rigid on the sleeve. Advantageously,

if the cylindrical base is made of the plastic material of the tub and the sleeve is formed by the hub, the sleeve and the block step provide a very rigid and stable seat for the pin element.

[0020] In a further embodiment of the invention the plurality of distance pins (comprising for example six distance pins) are arranged regularly distanced from each other, circumferentially and concentrically around the rotational axis of the shaft.

[0021] In such configuration, a very stable and rigid arrangement is provided, serving as a stiff support for the stator.

[0022] In a further embodiment of the invention at least one, preferably all, the distance pins comprise a thread section, a second fixing section and a distance section, wherein the distance section is arranged in between the first fixing section and the second fixing section; preferably the longitudinal extension of the distance section determines the distance between the stator and the hub. Thus, it is possible to screw the pin to the hub or the pin element until the distance section abuts thereto. Then, the stator can be screwed to the distance pins, being arranged in a defined distance to the hub. The distance between stator and hub is thereby predetermined by the distance sections of the distance pins.

[0023] According to a further embodiment of the invention the pin element comprises a ring plate which can be screwed to the sleeve by means of a thread provided on the inner side of the ring plate.

[0024] Advantageously, if the ring plate of the pin element has a thread for being screwed to the sleeve, the ring plate of the pin element can be mounted very easily and in a predetermined position.

[0025] According to a further embodiment of the invention the pin element comprises a plurality of cantilevers each supporting at least one distance pin.

[0026] Advantageously, in such configuration the pin element can be provided as pre-assembled component. Further the pins can be provided shorter, therefore providing more rigidity.

[0027] In a further embodiment of the invention the hub can be fixed to said pin element by means of a bayonet joint.

[0028] Thus, it is very easy to mount the pin element to the hub and to the tub. No screw connections between the pin element and the hub are in this case needed. The mounting process can be very quick and reliable.

[0029] According to a further embodiment of the invention the ring plate abuts in a mounted position to the block step.

[0030] Thus, the pin element has a stable seat in a predetermined position. The worker has to screw the pin element until it stops at the block step. No further steps have to be carried out by the worker to measure or to place the pin element in its intended position.

[0031] The invention will be described in further detail with reference to the drawings, in which

FIG 1A schematically illustrates a lateral cross section of a laundry machine according to the invention;

5 FIG 1B illustrates an exploded perspective view of a laundry treatment unit of a laundry machine according to the invention;

10 FIG 2 illustrates an exploded sectional view of the laundry treatment unit of FIG 1B;

FIG 3 illustrates a detailed sectional view of a direct drive assembled to a tub wall of the laundry treatment unit according to FIG 1B;

15 FIG 4 illustrates a perspective view of the laundry treatment unit of the previous Figures in a semi-assembled state;

20 FIG 5 illustrates an exploded perspective view of a laundry treatment unit of a laundry machine according to an alternative embodiment of the invention;

25 FIG 6 illustrates a sectional view of the hub and the drive mechanism of the laundry treatment unit of a laundry machine according to a further embodiment of the invention, in a pre-assembled state;

30 FIG 7 illustrates a sectional view of the hub of the laundry treatment unit of a laundry machine according to a still further embodiment of the invention.

35 **[0032]** It has to be pointed out that the exploded views show only the components of the embodiments. The assembly process cannot be concluded from the exploded views as will be further explained below.

40 **[0033]** FIG 1A schematically illustrates a lateral cross section of a laundry machine 100 according to the invention.

[0034] The laundry machine 100 illustrated in Figure 1A is a washing machine of the front loading type; it is however clear that the invention can be applied as well to a top-loading washing machine and to a washer/drier, both of the front loading and top loading type.

[0035] Advantageously the laundry machine 100 comprises a housing 110 containing a laundry treatment unit 1 comprising a washing tub 2 (or simply tub), preferably supported by coils, not illustrated, and dampers 11, fixed to the housing 110.

45 **[0036]** Tub 2 enclosed a rotary drum 16 (or simply drum), wherein laundry can be loaded to be submitted to a washing process (or also to a drying process in the case of a washer/drier). The drum 16 is provided, for its rotation, with a shaft 5, protruding from its back surface, rotatably supported by a hub 6 (provided with bearings,

not illustrated) fixed to the back wall 4 of the tub 2; preferably the hub 6 is fixed to the 2 by an at least partial over-injection of the tub 2 on the hub 6.

[0037] Advantageously the hub 6 is provided with a sleeve 35, which will be better described in the following, which is substantially perpendicular to the back wall 4 of the tub and which is substantially coaxial, in the assembled condition, to the shaft 5.

[0038] Laundry machine 100 preferably comprises a water inlet circuit 120, adapted to take in the tub 2 a washing liquid (e.g. water and water mixed with washing/rinsing products), and a water draining circuit 130, adapted to drain the washing liquid from the tub 2.

[0039] Laundry machine 1 may comprise also further electronic and mechanical devices (control units, level sensors, etc), which will not be described in detail.

[0040] FIG 1B illustrates an exploded perspective view of a laundry treatment unit 1 comprising a direct driven rotary drum. The laundry treatment unit 1 comprises a tub 2 which has a back wall 4, preferably provided with enforcement ribs 13. The back wall 4 is also advantageously provided with a cylindrical forming (or body) 3 which is arranged in a central position of the back wall 4; preferably the ribs 13 are arranged concentrically around the cylindrical forming 3. Further the ribs preferably extend longitudinally in a radial direction. The tub 2 is advantageously made of a plastic material in an injection moulding process.

[0041] Dampers 11 or other support structures for supporting the laundry treatment unit 1 on a base plate of the machine housing 110 are advantageously provided. Further a drainage duct 12 (which is part of the water draining circuit 130) for draining the washing liquid from inside the tub 2 is advantageously arranged on a bottom side of the tub 2.

[0042] Advantageously the hub 6 is provided for being connected to a plurality of distance pins 7. Advantageously, each of the distance pins 7 has a first fixing section 7a, preferably threaded, a second fixing section 7b and a distance section 7c. A ring-shaped stator 8 of an electric motor is provided having a plurality of poles 32. The poles 32 are distributed circumferentially around the center of the stator 8. Fastening holes 31 are advantageously provided on a fastening portion 38 of the stator 8 for fastening the stator 8 to the distance pins 7. Corresponding screw nuts 9, or other fixing devices, are advantageously used to fix or to fasten the stator 8 to the distance pins 7. The electric motor comprises also a rotor 10 having preferably an end wall 29 and a circumferential wall.

[0043] FIG 2 illustrates an exploded sectional view of the laundry treatment unit 1 comprising a direct driven rotary drum 16. The drum 16 is arranged inside the tub 2 and fixedly connected to a shaft 5, advantageously by means of a drum cap or spider 17. The shaft 5 is advantageously rotatably supported by an outer bearing 14 and an inner bearing 15. The back wall 4 preferably comprises reinforcement ribs 13 for providing structural rigidity. Ad-

vantageously, the cylindrical forming 3 has an inner surface 3a and an outer surface 3b having a sleeve-like shape. Further the back wall 4 has an enclosure 18 (i.e. a part of its body over-injected on at least part of the hub 6, so as to at least partially enclosing it and fixing it to the hub 6) for fixing the hub 6 to the tub 2. Linking beams 19 can be advantageously provided for connecting the back wall 4 with the cylindrical forming 3. These linking beams 19 can be partially omitted and engage into fastening recesses 22 of the hub 6.

[0044] It is underlined that in Fig.2, in order to better show each component, the hub 6 has been represented as separated from the tub 2, but it is clear that in the actual embodiment the tub 2 is over-injected on the hub 6, so that the latter is advantageously at least partially enclosed by, and fixed to, the tub 2, as illustrated for example in Fig.3.

[0045] The hub 6 preferably comprises an inner shell 24 and an outer shell 23, both advantageously integrally formed with a base plate 25. At least one fastening recess 22 is preferably formed in the base plate 25 of the hub 6. The inner shell 24 is formed as a cylindrical bushing or sleeve and the interior surface of the inner shell 24 preferably forms one inner bearing seat 21 and one outer bearing seat 20.

[0046] The stator 8 has fastening holes 31 which are provided in a fastening portion 38 of the stator 8 and in which the first fixing section 7a of the distance pins 7 can be inserted. Windings 26 are wound around the poles 32 for providing a rotating magnetic field for driving the rotor 10. Advantageously, the rotor 10 has an end wall 29 and a circumferential wall 30. Magnets 27 are arranged circumferentially along the circumferential wall 30 and fixedly attached to the circumferential wall 30 for being drawn by the rotating magnetic field and, thus, for drawing or pushing the rotor 10 into rotation. Further, the end wall 29 preferably comprises a fastening section 28 for fastening the shaft 5 thereto. When the rotor 10 is moved, the shaft 5 is rotated together with the drum 16.

[0047] FIG 3 illustrates a detailed sectional view of a direct drive assembled to the back wall 4 of the tub 2. The hub 6 is arranged in its seat within the cylindrical forming 3. The inner shell 24 of the hub 6 advantageously abuts to the inner surface 3a of the cylindrical forming 3. The outer shell 23 and base plate 25 of the hub 6 are advantageously enclosed by the enclosure 18. Thus, the hub 6 is rigidly fixed to the tub 2.

[0048] Inner and outer bearing 14, 15 are placed in the inner and outer bearing seats 21, 20 of the inner shell 24 of the hub 6. Thus, the shaft 5 is rotatably supported via the inner and outer bearing 14, 15 on the hub 6.

[0049] The distance pins 7 are plugged with their second fixing sections 7b to the fastening recesses 22. The second fixing sections 7b can be attached to the fastening recess 22, e.g. in a force fitting or shrink fitting manner, or they can be provided with a thread end, screwed to correspondingly threaded fastening recesses 22; however second fixing sections 7b can be fixed to respective

recesses by other fixing means (for example snap fittings, bayonet fixing, etc.). Shortened linking beams 19 can extend into the fastening recess 22 from a side opposite to the distance pin 7 and, thus, additionally secure the position of the hub 6 relative to the tub 2. The distance sections 7c are advantageously in contact to the base plate 25 of the hub 6. The stator 8 is fastened to the distance pins 7, preferably by means of the screw nuts 9 which are screwed to a threaded portion, preferably the edge portion, of the first fixing sections 7a; however the first fixing portion may be fixed to the stator 8 by other suitable fixing means, for example snap fittings, bayonet fixing, etc.).

[0050] The circumferential wall 30 is preferably arranged in such a way that the magnets 27 are arranged adjacent to the poles 32 with the windings 26 and that the radial distance between the magnets 27 and the poles 32 is minimal when the rotor 10 rotates.

[0051] The shaft 5 is attached to the fastening section 28 of the end wall 29 of the rotor 10 and can be fixed thereto, preferably by means of a screw (not shown). The distance pins 7 are preferably made of a metal and are advantageously made as rigid as possible. Further the tolerances for the distance pins 7 are defined as small as possible.

[0052] FIG 4 illustrates a perspective view of the laundry treatment unit 1 comprising a direct driven rotary drum 16 in a semi-assembled state. The stator 8 has already been fixed to the distance pins 7, and thereby to the back wall 4 of the tub 2. In this state, the poles 32 are arranged concentrically around a rotational axis A of the shaft 5. The rotor 10 is prepared for being attached to the laundry treatment unit 1 in this state.

[0053] In the case of repair or maintenance, the rotor 10 can be detached from the shaft 5 and removed. Then, the screw nuts 9 can be released and the stator 8 can be removed. Therefore it is very easy to change the stator 8 and/or the rotor 10 in the case of damage.

[0054] Moreover, being kept distanced from the tub 2 by the pins 7, the stator 8, and in particular its windings and poles can be more effectively reached by air during its functioning, so that a better cooling of the motor can be obtained.

[0055] FIG 5 illustrates an exploded perspective view of a laundry treatment unit 1 comprising an alternative embodiment for attaching the stator 8.

[0056] The cylindrical forming 3 advantageously comprises a sleeve 35 and a positioning element providing a seat for a pin element 39, which will be better described in the following.

[0057] Advantageously the cylindrical forming 3 comprises a cylindrical base 34 which is preferably connected to the sleeve 35 by a block step 33, which in this advantageous embodiment is or comprises the positioning element, which is oriented perpendicular to cylindrical base 34 and sleeve 35. Cylindrical base 34 can be advantageously made of plastic by the injection moulding process forming the tub 2.

[0058] Sleeve 35 is advantageously part of the hub 6, and is preferably partially or totally embedded in the plastic material of the tub 2.

[0059] A ring-shaped base plate 36 is provided, to which pins 37 are detachably or non-detachably fixed. Base plate 36 and pins 37 can be integrally formed, e.g. from metal, or alternatively as separate parts, and they should preferably be dimensioned and designed as rigid as possible.

[0060] The base plate 36 is formed and dimensioned such that it can be plugged on the sleeve 35 and it is stopped on the block step 33, there being placed in its final position. The base plate 36 has to be fixed in this final position on the sleeve 35, e.g. by a screw connection to the cylindrical base 3 or a stable force fitting connection, or by a bayonet fixation, or by other fixation means.

[0061] In this position, the stator 8 can be plugged on the pins 37 and fastened thereto, for example by screw nuts 9 screwed on the free end, advantageously threaded, of the pins 37. However the stator 8 can be fixed to the pins 37 by other suitable means, for example by force fittings, snap-fittings, etc.

[0062] Thus, the stator 8 is rigidly fastened to the cylindrical forming 3 by means of the base plate 36 and the pins 27. In a final step the rotor 10 is mounted to the laundry treatment unit 1 by connecting and fixing (preferably screwing) it to the shaft 5. The rotor 10 is then concentrically positioned relative to the stator 8.

[0063] FIG 6 illustrates a sectional view of a hub 6 and a drive unit of a laundry treatment unit 1 in a pre-assembled state. The hub 6 is in fixed connection to the tub 2, the tub 2 is shown only partially. The hub 6 comprises a base plate 25 connecting an outer shell 23 and an inner shell 24. The outer shell 23 is advantageously completely enclosed by the enclosure 180 which means that the outer shell 23 is enclosed by plastic material of the tub 2. The inner shell 24 abuts to the hub 6. Further the hub 6 is arranged concentrically to the rotational axis A of the shaft 5.

[0064] Fastening recesses 22 are provided in the base plate 25 of the hub 6. The distance pins 70 comprise first fixing sections 70a, preferably threaded, second fixing sections 70b, and distance sections 70c. The second fixing section 70b is arranged in the fastening recess 22. The second fixing section 70b can be fixed to the fastening recess, e.g. by a form fit connection or by a shrink fit connection, or by screwing (provided that both second fixing sections and recesses 22 are threaded) or in any other way to receive a fix and stable connection between distance pin 70 and hub 6.

[0065] The enclosure 180 advantageously has protrusions 181 which form a sleeve or a bushing in which the distance section 70c can be inserted. The protrusions 181 which enclose at least a part of the distance section 70c provide additional structural rigidity for the distance pins 70 effecting against buckling and/or bending forces.

[0066] The stator 8 advantageously comprises fastening portions 38 having fastening holes 31, through which

the fastening pins 70 can extend. The stator 8 is plugged on the distance pins 70 in direction of the arrows.

[0067] A first end of the distance section 70c is directed towards the stator 8 and advantageously abuts against the fastening portion 38 of the stator 8 in a final position of the stator 8. A second end of the distance section 70c is directed to the back wall 4 of the tub 2 and abuts to the base plate 25 of the hub 6. Thus, the stator 8 is fixed in a certain distance from the base plate of the hub 6.

[0068] The rotor 10 is shown in its final position relative to the stator 8. The magnets 27 are provided on the circumferential wall 30 of the stator 10 are arranged in a defined distance to the poles 32 and the windings 26.

[0069] FIG 7 illustrates a sectional view of a hub 6 in a further alternative embodiment. The hub 6 comprises an outer shell 23 and an inner shell 24. The tub 2 comprises an enclosure 185 which encloses the outer shell 23. Further the enclosure 185 has a contact wall 185a being in contact to the inner shell 24 of the hub 6. A cantilever 190 is provided which protrudes in a radial direction relative to a rotational axis A. A short pin 191 is fixedly connected to the cantilever 190. A plurality of cantilevers 190 can be provided on a threaded collar or on a ring plate, such as the ring plate 36, wherein the collar can be screwed onto the hub 6. The short pin 191 can be provided with or without a thread. When the short pin 191 has no thread, the stator 8 can be fixed thereto, e.g. by means of bayonet fixation.

Claims

1. Laundry machine (100) provided with a laundry treatment unit (1) comprising:

- a tub (2), provided with a back wall (4), containing a rotary drum (16),
- a hub (6), fixed to said back wall (4), supporting a shaft (5) which is provided for supporting and rotating said rotary drum (16),
- a drive mechanism (400) provided for driving said rotary drum (16) via said shaft (5), said drive mechanism (400) comprising a stator (8),

characterized in that

a plurality of distance pins (7, 70, 37, 191) is fixed to said hub (6), wherein said stator (8) is fixed to said plurality of distance pins (7, 70, 37, 191) and wherein said distance pins (7, 70) fix said stator (8) in a defined distance from said hub (6).

2. Laundry machine (100) according to claim 1, wherein said distance pins (7, 70, 37, 191) are detachably fixed to said hub (6) and said stator (8) is detachably fixed to said distance pins (7, 70).
3. Laundry machine (100) according to one of the preceding claims, wherein said back wall (4) comprises

at least one enclosure (180) which encloses said hub (6) at least partially.

4. Laundry machine (100) according to one of the preceding claims, wherein said back wall (4) comprises at least one protrusion (181) which encloses and supports at least one distance pin (7, 70).
5. Laundry machine (100), according to claim 1 or 2, wherein a plurality of said distance pins (37, 191) is supported by a pin element (39).
6. Laundry machine (100), according to claim 5, wherein said hub (6) and/or said tub (2) forms a cylindrical forming (3) comprising a sleeve (35) and a positioning element providing a seat for said pin element (39), said pin element (39) being fixedly arranged on said sleeve (35).
7. Laundry machine (100) according to one claim 6, wherein said positioning element comprises a block step (33) formed between a cylindrical base (34) of said cylindrical forming (3) and said sleeve (35).
8. Laundry machine (100) according to one of the preceding claims, **characterized in that** said plurality of distance pins (7, 70, 37, 191) are arranged, when associated to said tub (2), regularly distanced from each other, circumferentially and concentrically around a rotational axis (A) of said shaft (5).
9. Laundry machine (100) according to one of the preceding claims, **characterized in that** at least one, preferably all, of said distance pins (7, 70, 37, 191) comprises a first fixing section (7a), a second fixing section (7b) and a distance section (7c), wherein the distance section (7c) is arranged in between the first fixing section (7a) and the second fixing section (7b) and wherein the longitudinal extension of the distance section (7c) determines the distance between said stator (8) and said hub (6).
10. Laundry machine (100) according to claim 6 or one of the claims 7 to 9 referred back to claim 6, **characterized in that** said pin element (39) comprises a ring plate (36) which can be screwed to the sleeve (35), the latter being externally screwed, by means of a thread provided on the inner side of the ring plate (36).
11. Laundry machine (100) according to claim 5 or one of the claims 6 to 10 referred back to claim 5, wherein said pin element (37) comprises a plurality of cantilevers (190) each supporting at least one distance pin (191).
12. Laundry machine (100) according to claim 5 or one of the claims 6 to 10 referred back to claim 5, wherein

said hub (8) can be fixed to said pin element (37) by means of a bayonet joint.

- 13.** Laundry machine (100) according to claim 6 or one of the claims 7 to 12 referred back to claim 6, wherein said ring plate (36) abuts in a mounted position to said block step (33). 5

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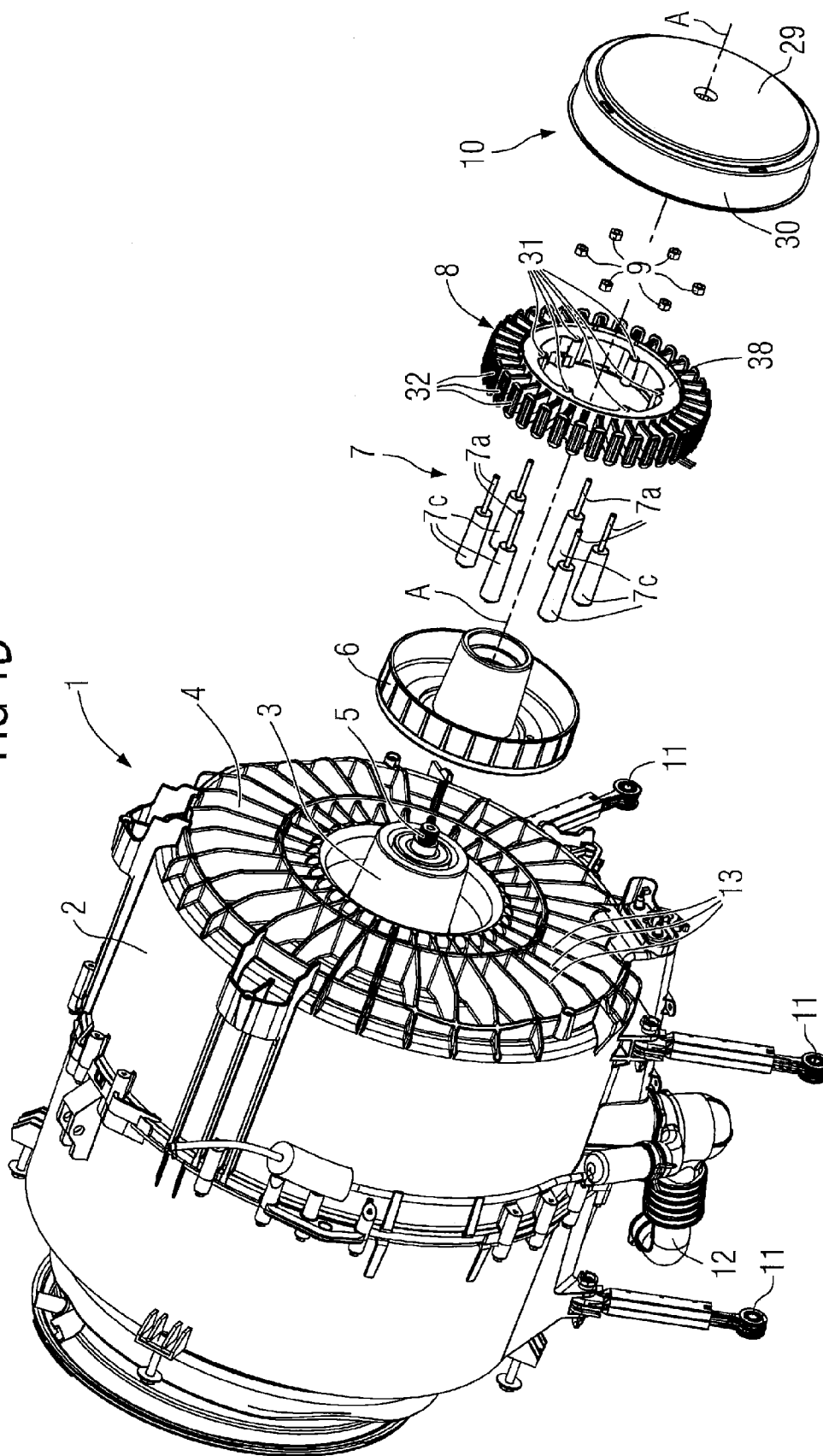
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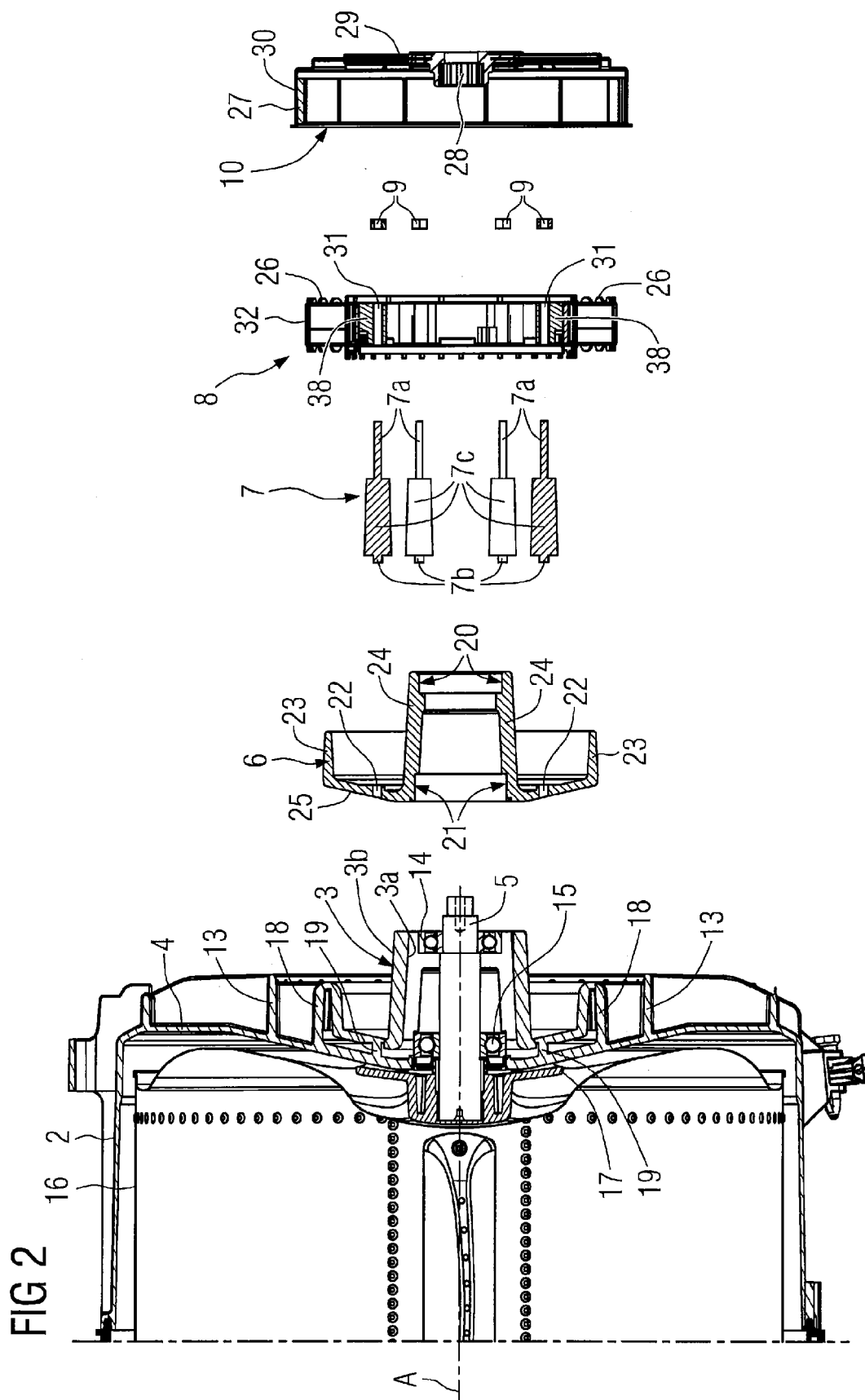
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FIG 1B





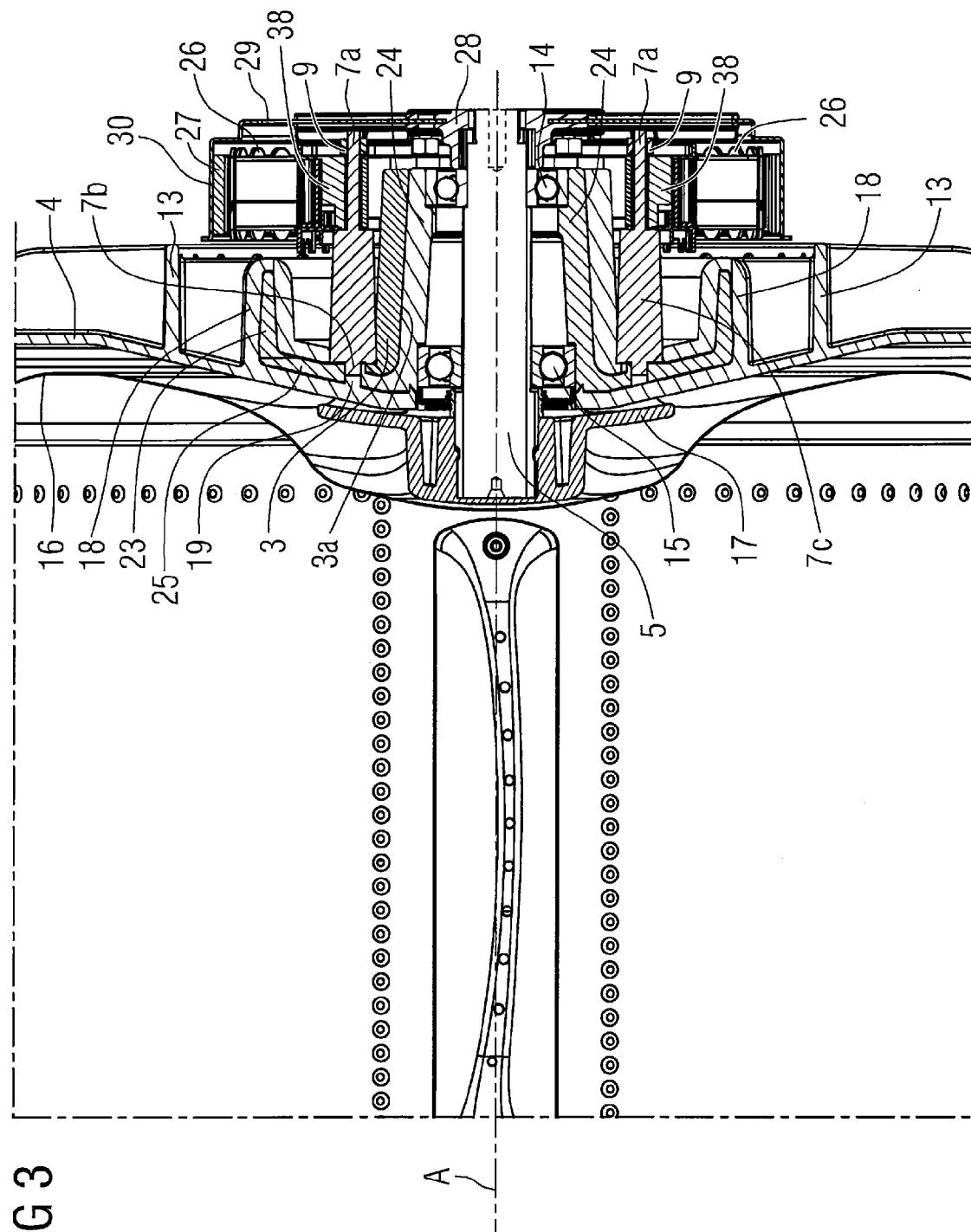
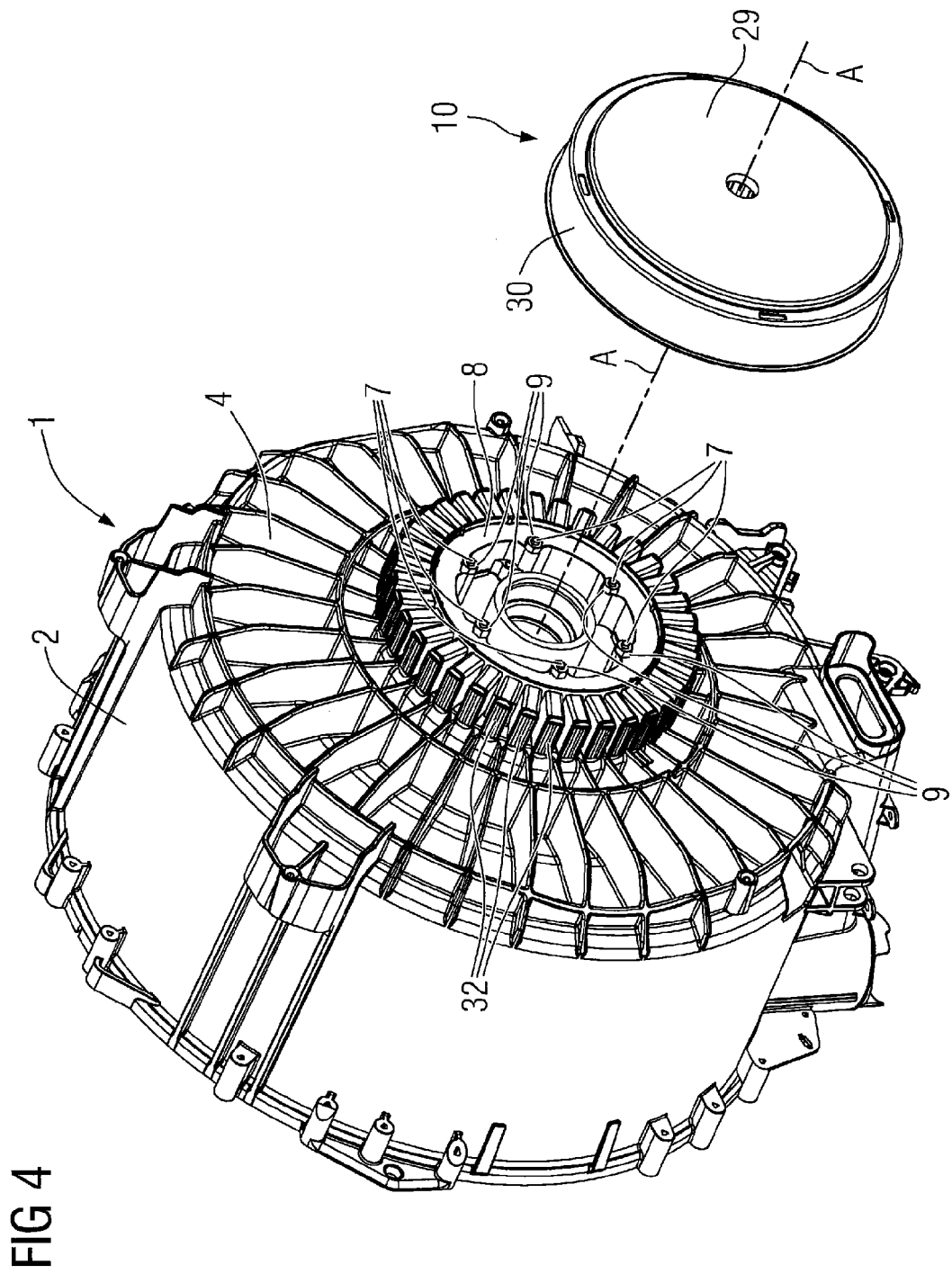


FIG 3



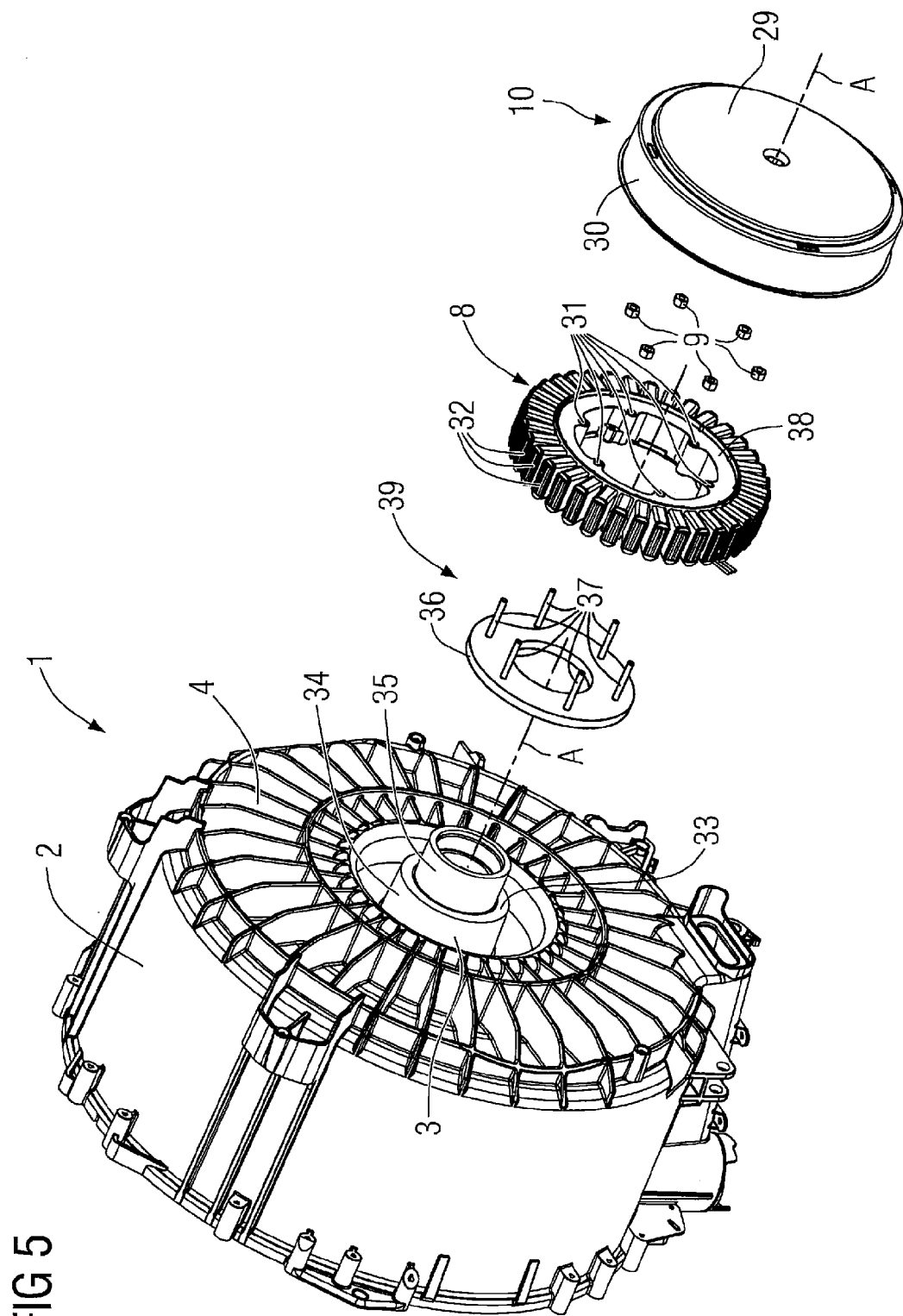
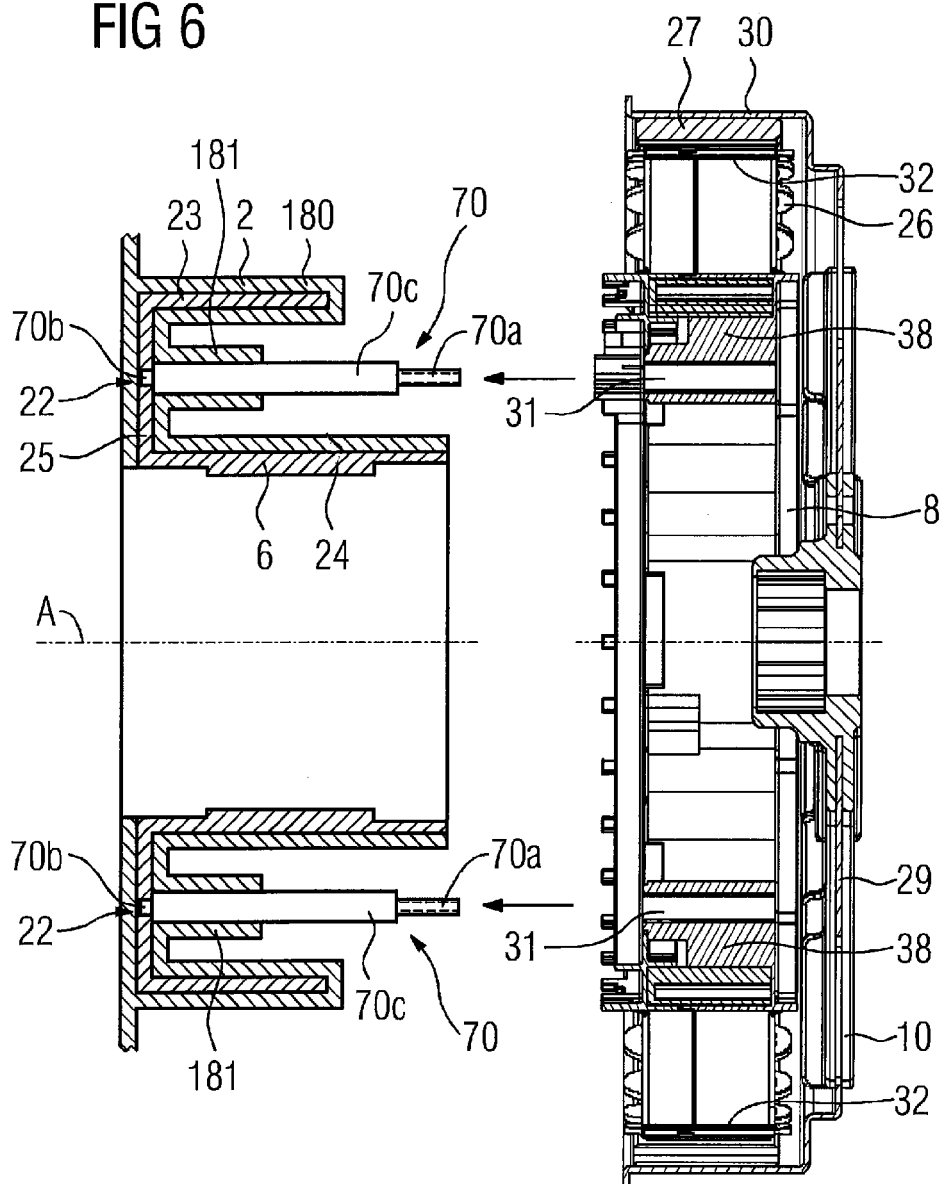
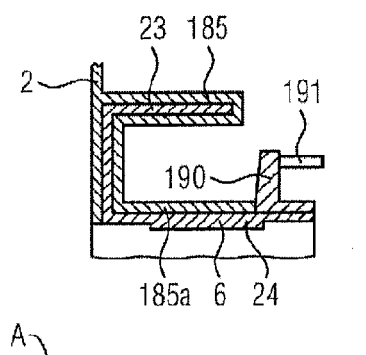
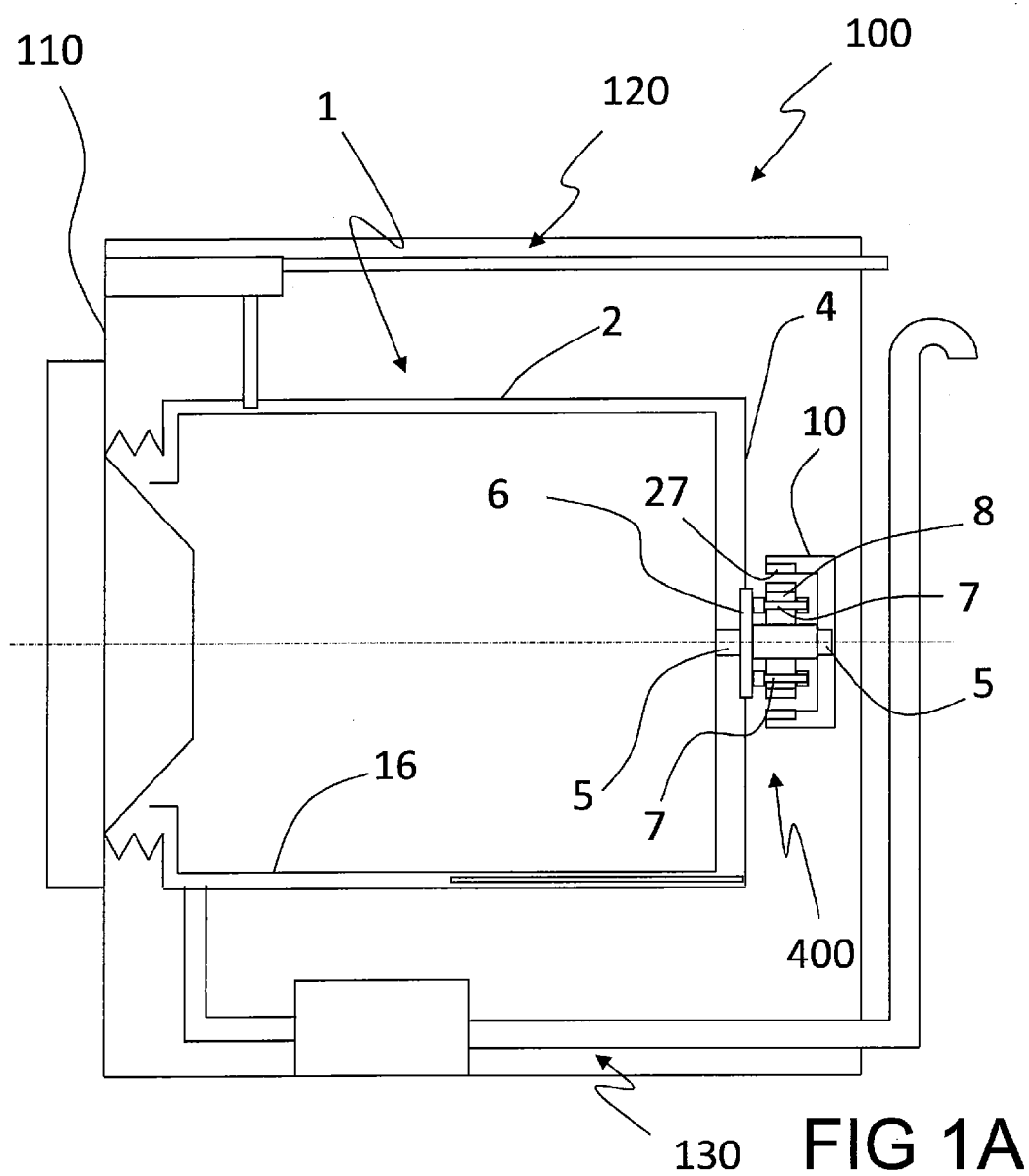


FIG 6







EUROPEAN SEARCH REPORT

Application Number
EP 12 17 0653

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,D	US 6 681 602 B2 (HEYDER REINHARD [DE] ET AL) 27 January 2004 (2004-01-27) * column 4, line 6 - column 4, line 64; figure 1 *	1	INV. D06F37/30 D06F37/20
A	US 2009/211312 A1 (AHN IN GEUN [KR] ET AL) 27 August 2009 (2009-08-27) * paragraph [0063] - paragraph [0087]; figure 5 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			D06F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 3 April 2013	Examiner 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			

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EPO FORM 1503 03/82 (P04/C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 17 0653

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03-04-2013

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