



(12)

EUROPEAN PATENT APPLICATION

- (43)

Date of publication:
03.05.2017 Bulletin 2017/18
- (51)

Int Cl.:
D06F 58/26 (2006.01)
D06F 25/00 (2006.01)
- (21)

Application number: 15192286.1
- (22)

Date of filing: 30.10.2015
- (51)

Int Cl.:
D06F 58/20 (2006.01)

<div>(84)</div> <div>Designated Contracting States: AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR Designated Extension States: BA ME Designated Validation States: MA</div>	<div>(71)</div> <div>Applicant: Whirlpool EMEA S.p.A 20016 Pero (MI) (IT)</div> <div>(72)</div> <div>Inventor: PAOLINI, William 63857 Amandola (FM) (IT)</div> <div>(74)</div> <div>Representative: Baroni, Matteo et al Metroconsult S.r.l. Foro Buonaparte, 51 20121 Milano (IT)</div>
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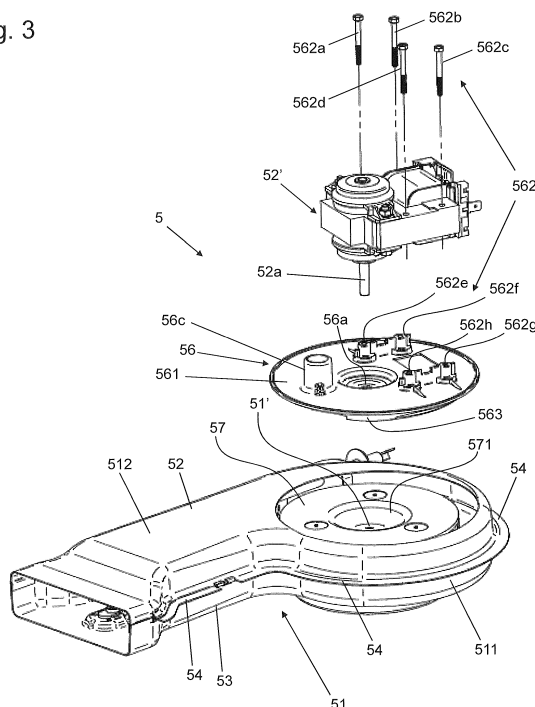
BLOWING UNIT FOR A HOUSEHOLD APPLIANCE ADAPTED TO PERFORM AT LEAST A DRYING CYCLE, SUCH AS A WASHING/DRYING MACHINE OR A DRYING MACHINE, AND HOUSEHOLD APPLIANCE ADAPTED TO PERFORM AT LEAST A DRYING CYCLE, SUCH AS A WASHING/DRYING MACHINE OR A DRYING MACHINE, COMPRISING SAID BLOWING UNIT

(57)

Blowing unit adapted to be part of a drying system (10) of a household appliance (1) configured to perform at least a drying cycle, wherein said blowing unit (5) comprises: a casing (51) made of metallic material; an impeller (59) rotatably mounted in said casing (51); an electric motor (52') mounted on said casing and adapted

to drive said impeller (59) in rotation; a magnetic shielding (56) interposed between said electric motor (52') and said casing (51). A household appliance adapted to perform at least a drying cycle, comprising said blowing unit (5), is also disclosed.

Fig. 3



Description

FIELD OF THE INVENTION

[0001] The present invention refers to a blowing unit for a household appliance adapted to perform at least a drying cycle, such as a washing/drying machine or a drying machine. The present invention also refers to a household appliance adapted to perform at least a drying cycle, such as a washing/drying machine or a drying machine provided with said blowing unit.

PRIOR ART

[0002] Drying machines and washing/drying machines comprise a rotating drum in which the items to be dried are placed. The drum is rotatably mounted in a tub. To perform the drying through a recirculation line, the air is extracted from the tub, treated and reintroduced therein. The recirculation line includes:

- a condenser that causes the condensation of the moisture contained in the air extracted from the tub (such moisture is transferred to the air by the linen whilst it is drying);
- a blowing unit that moves the air along the recirculation line; the blowing unit typically comprises a fan (or impeller) and a casing, in which the fan is rotatably mounted; the fan is driven in rotation by a respective motor, mounted to the casing;
- an element that heats the air before reintroducing it into the tub.

[0003] The casing is usually made of metal, such as for example stainless steel or aluminum.

[0004] The Applicant has noted that the magnetic properties of such metallic material cause negative effects on the operation of the motor associated to the impeller.

[0005] In fact, the motor is typically an electric motor; the interaction between stator and rotor, which generates the rotary movement imparted to the impeller, is thus based on electromagnetic induction. Such interaction is influenced by the magnetic behavior of the casing, which causes a decrease in the motor performance. In particular, the Applicant has noted that this influence causes a reduction of the motor speed.

SUMMARY OF THE INVENTION

[0006] It is an object of the present invention to provide a household appliance adapted to perform at least a drying cycle wherein the performance of the blowing unit is increased.

[0007] In particular, it is an object of the present invention to provide a household appliance adapted to perform at least a drying cycle wherein the performance of the motor which drive in rotation the impeller of the blowing unit is increased.

[0008] These and further objects are substantially achieved by a blowing unit and by a household appliance as described in the appended claims.

[0009] The basic idea of the present invention is to provide a suitable magnetic shielding between the metallic casing and the motor associated to the impeller.

[0010] According to one aspect, the invention refers to a blowing unit adapted to be part of a drying system of a household appliance configured to perform at least a drying cycle, wherein said blowing unit comprises:

- a. a casing made of metallic material;
- b. an impeller rotatably mounted in said casing;
- c. an electric motor mounted on said casing and adapted to drive said impeller in rotation;
- d. a magnetic shielding interposed between said electric motor and said casing. Preferably said electric motor has an output shaft associated with said impeller to drive the latter in rotation, said magnetic shielding having a through hole in which said output shaft is inserted.

[0011] Preferably said casing has a through hole in which said output shaft is inserted.

[0012] Preferably the through hole of the magnetic shielding and the through hole of the casing substantially face each other.

[0013] Preferably said casing has a housing wherein said magnetic shielding is mounted. Preferably the through hole of said casing is substantially formed at a geometric center of said housing.

[0014] Preferably said magnetic shielding comprises a discoid element made of magnetic insulating material.

[0015] Preferably the through hole of said magnetic shielding is substantially formed at a geometric center of said discoid element.

[0016] Preferably said magnetic shielding has an opening for air discharge, said opening being preferably provided on said discoid element.

[0017] Preferably said blowing unit further comprises connection elements for fixing said electric motor on said magnetic shielding.

[0018] Preferably said casing comprises a first semi-shell and a second semi-shell which are mutually joined to form said casing.

[0019] Preferably said metallic material is metal-sheet.

[0020] Preferably said blowing unit further comprises a heating element mounted inside said casing, preferably in said conduit.

[0021] According to a further aspect, the invention refers to a household appliance adapted to perform at least a drying cycle, said appliance comprising:

- a. a tub in which a drum is rotatably mounted;
- b. a drying system, having an inlet for receiving wet air from said tub and an outlet for providing dried air to said tub, said drying system comprising a blowing unit according to any one of the preceding claims to

promote an air flow inside said drying system.

[0022] Preferably said drying system further comprises a condenser adapted to receive a flow of wet air from said tub and to make it condense and obtain dried air, said appliance further comprising a connection conduit adapted to guide the flow of dried air to said tub, wherein said blowing unit is interposed between said condenser and said connection conduit.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] Some examples of preferred and advantageous embodiments are described for purely illustrative and non limiting purposes, with reference to the attached drawings, in which:

figure 1 shows a block diagram of a household appliance according to the invention;

figure 2 shows a perspective view of a portion of the household appliance of figure 1; figure 3 shows an exploded perspective view of a detail of figure 2; figure 4 shows a plan view of the detail shown in figure 3;

figure 5 shows a sectional view of the detail shown in figures 2-3 according to plane X-X of figure 4.

DETAILED DESCRIPTION OF THE INVENTION

[0024] In the accompanying drawings, 1 indicates a household appliance adapted to perform at least a drying cycle.

[0025] The appliance 1 can be a drying machine, adapted to dry linen and/or clothes previously washed by a different machine.

[0026] The appliance 1 can also be a washer-drier, namely a machine capable of both washing and drying linen and/or clothes. In this case, the appliance 1 is also adapted to perform at least a washing cycle.

[0027] The appliance 1 (figure 1) comprises a drum 2 which can rotate and which is intended to house the items to be dried.

[0028] The appliance 1 comprises a tub 3, in which the drum 2 is rotatably mounted.

[0029] Advantageously the appliance 1 comprises a drying system 10 which has an inlet 10a for receiving wet air from the tub 3 and an outlet 10b for providing dried air to be inserted back into the tub 3. This allows the air rich in moisture (following contact with the items to be dried contained in the drum 2 placed in the tub 3) to be taken and reintroduced into the same tub 3 after being dried and heated.

[0030] Preferably the appliance 1 further comprises a connection conduit 6 adapted to guide the flow of dried air from the outlet 10b of the drying system 10 to the tub 3.

[0031] Preferably, the connection conduit 6 is associated to an annular shaped gasket 7, arranged around the loading opening 7a of the tub 3 and provided with a

passage to let the dried air reach the inside of the same tub 3.

[0032] In a preferred embodiment, the connection conduit 6 is made of an elastomeric material, e.g. the same material as the annular gasket 7.

[0033] In a preferred embodiment, the connection conduit 6 and the annular gasket 7 are made in one piece.

[0034] The drying system 10 comprises a condenser 4 that receives a gaseous fluid containing particles of vapor from said tub 3 and that causes at least partial condensation thereof.

[0035] Preferably the inlet 10a of the drying system 10 coincides with the inlet of the condenser 4. The operation of the condenser 4 is per se known and will not be disclosed in further detail. The drying system 10 preferably comprises a filter (not shown), associated with the inlet of the condenser 4, so as to intercept fluff and avoid propagation thereof in the subsequent components of the drying system 10.

[0036] The drying system 10 comprises a blowing unit 5, arranged downstream of said condenser 4 according to the direction of the air, i.e. the air coming from the tub 3 flows through the condenser 4 first, and then it flows through the blowing unit 5.

[0037] Preferably, the blowing unit 5 is interposed between the condenser 4 and the connection conduit 6.

[0038] Preferably the blowing unit 5 (figures 2-5) comprises casing 51 and an impeller 59 rotatably mounted into said casing 51 so as to promote the flow of air.

[0039] The casing 51 is made of metal, preferably of sheet metal.

[0040] The sheet metal of the casing 51 is preferably steel. In particular it is a type of steel for moulding. By way of non-limiting example the sheet metal can be aluminum- or zinc-coated or electro-galvanized. In a particular embodiment the sheet metal may be aluminum.

[0041] Preferably the sheet metal of the casing 51 has a thickness of less than 1 millimeter, in particular less than 0.8 mm. The reduced thickness of the sheet metal allows a light structure to be created but which can at the same time provide maximum resistance to strain.

[0042] Advantageously the casing 51 comprises a scroll 511 which surrounds the impeller 59 and a conduit 512 which extends from said scroll 511. Preferably the scroll 511 is interposed between the condenser 4 and the conduit 512. Advantageously the conduit 512 houses a heating element 58, e.g. an electrical element, for heating the air before it flows into said connection conduit 6 and is fed back into the tub 3.

[0043] Preferably the blowing unit 5 is of the centrifugal type.

[0044] The casing 51 preferably comprises, and is in particular can be made of, a first semi-shell 52 and a second semi-shell 53.

[0045] Preferably the first semi-shell 52 defines an upper portion of the casing 51 whereas the second semi-shell 53 defines a lower position of the same casing 51.

[0046] Preferably, the first and the second semi-shell

52, 53 are connected to each other by a seaming. The seaming allows a fast and cheap connection to be obtained, potentially even without the need to use additional interposed gaskets (which would certainly be necessary if, for example, the two semi-shells were connected through threaded connections). Preferably the casing 51 is provided with a perimetral flange 54, for example formed by said seaming.

[0047] An example of how a two semi-shell casing can be made is disclosed in European patent publication EP 2 725 131 A1, in the name of the same Applicant.

[0048] The structure of the casing 51 according of the present invention can be the same as the casing disclosed in said European patent publication.

[0049] The impeller 59 can be realized as a fan, mounted inside the casing 51.

[0050] The impeller 59 is driven in rotation by a respective electric motor 52'.

[0051] Preferably the electric motor 52' has an output shaft 52a, associated with said impeller 59 to drive the latter in rotation.

[0052] In particular, the impeller 59 can be fitted on said output shaft 52a (figure 5).

[0053] According to the invention, the blowing unit 5 is provided with a magnetic shielding 56 interposed between the electric motor 52' and the casing 51.

[0054] Preferably, the magnetic shielding 56 is made of magnetic shielding material, such as for example plastic material.

[0055] Advantageously, due to the presence of the magnetic shielding 56 the metallic structure of the casing 51 does not negatively affect the performances of the electric motor 52'.

[0056] Preferably the casing 51 has a housing 57 wherein the magnetic shielding 56 is mounted. The housing 57 has preferably a shape that is complementary to the shape of the magnetic shielding 56, in particular complementary to the perimetral profile and lower surface of the magnetic shielding 56.

[0057] Preferably the magnetic shielding 56 comprises a discoid element 561 made of magnetic shielding material. For example, the discoid element can be made of plastic material.

[0058] The magnetic shielding 56 is mounted on the casing 51, preferably on the first semi-shell 52 of the casing 51.

[0059] The constraint between the magnetic shielding 56 and the casing 51 can be obtained by any suitable fixing technique such as, for example, a threaded connection, a snap connection, a bayonet coupling, etc..

[0060] Preferably the magnetic shielding 56 has a through hole 56a in which the output shaft 52a of the electric motor 52' is inserted.

[0061] In particular, the through hole 56a of the magnetic shielding 56 is formed in a geometric center of the discoid element 561.

[0062] Preferably the discoid element 561 is provided with a tapered protrusion 563, extending downward to-

wards the casing 51.

[0063] Preferably the housing 57 has a recess 571 for housing said tapered protrusion 563. In particular, the recess 571 has a shape that is complementary to the shape of the tapered protrusion 563.

[0064] Preferably, the tapered protrusion 563 is provided around the through hole 56a of the shielding 56.

[0065] Preferably the casing 51 has a through hole 51' in which the output shaft 52a is inserted.

[0066] Preferably, the through hole 51' of the casing 51 is formed on the first semi-shell 52.

[0067] Preferably the through hole 51' of the casing 51 is substantially formed at a geometric center of the housing 57.

[0068] Preferably, the recess 571 is provided around the through hole 51' of the casing 51.

[0069] Preferably, the through hole 56a of the magnetic shielding 56 and the through hole 51' of the casing 51 substantially face each other.

[0070] Accordingly, the output shaft 52a of the electric motor 52' passes through the magnetic shielding 56 first, then through the casing 51, and finally it engages the impeller 59. Preferably the magnetic shielding 56 has an opening 56b for air discharge.

[0071] In particular, the opening 56b can be provided on the discoid element 561.

[0072] Advantageously, the opening 56b is associated to a discharge conduit 56c, extending from the discoid element 561 away from the casing 51.

[0073] The task of the opening 56b and the respective discharge conduit 56c is to provide a discharge path to the air when, in a washer-drier, water is loaded in the tub 3 and the air present therein needs to be evacuated, so as to free volume for the incoming water.

[0074] Preferably the blowing unit 5 further comprises connection elements 562 for fixing the electric motor 52' on the magnetic shielding 56, in particular on the discoid element 561.

[0075] The connection elements 562 can comprise:

one or more screws 562a-562d;

one or more respective threaded seats 562e-562h.

It is to be noted that connection elements different from the ones disclosed and shown herein can be employed without departing from the scope of the present invention.

[0076] In operation, after the items to be dried are arranged into the drum 2, the latter is rotated according to preset program(s) and the drying system 10 is operated so as to withdraw wet air from the tub 3 through inlet 10a and provide dried hot air at the outlet 10b. In particular, the wet air flowing through the inlet 10a is first condensed by condenser 4; then the air passes through the blowing unit 5: the impeller 59 first, and then the conduit 512. In the conduit 512 the air is also heated by heating element 58. The dried and heated air is then fed back into the tub 3 through the connection conduit 6.

Claims

1. Blowing unit adapted to be part of a drying system (10) of a household appliance (1) configured to perform at least a drying cycle, wherein said blowing unit (5) comprises:
 - a. a casing (51) made of metallic material;
 - b. an impeller (59) rotatably mounted in said casing (51);
 - c. an electric motor (52') mounted on said casing and adapted to drive said impeller (59) in rotation;
 - d. a magnetic shielding (56) interposed between said electric motor (52') and said casing (51).
2. Blowing unit according to claim 1 wherein said electric motor (52') has an output shaft (52a) associated with said impeller (59) to drive the latter in rotation, said magnetic shielding (56) having a through hole (56a) in which said output shaft (52a) is inserted.
3. Blowing unit according to claim 1 or 2 wherein said casing (51) has a through hole (51') in which said output shaft (52a) is inserted.
4. Blowing unit according to claims 2 and 3 wherein the through hole (56a) of the magnetic shielding (56) and the through hole (51') of the casing (51) substantially face each other.
5. Blowing unit according to any one of the preceding claims wherein said casing (51) has a housing (57) wherein said magnetic shielding (56) is mounted.
6. Blowing unit according to claims 3 and 5 wherein the through hole (51') of said casing (51) is substantially formed at a geometric center of said housing (57).
7. Blowing unit according to any one of the preceding claims wherein said magnetic shielding (56) comprises a discoid element (561) made of magnetic insulating material.
8. Blowing unit according to claim 7 and any one of the preceding claims when depending on claim 2 wherein the through hole (56a) of said magnetic shielding (56) is substantially formed at a geometric center of said discoid element (561).
9. Blowing unit according to any one of the preceding claims wherein said magnetic shielding (56) has an opening (56b) for air discharge, said opening being preferably provided on said discoid element (561).
10. Blowing unit according to any one of the preceding claims further comprising connection elements (562) for fixing said electric motor (52') on said magnetic shielding (56).
11. Blowing unit according to any one of the preceding claims wherein said casing (51) comprises a first semi-shell (52) and a second semi-shell (53) which are mutually joined to form said casing (51).
12. Blowing unit according to any one of the preceding claims wherein said metallic material is metal-sheet.
13. Blowing unit according to any one of the preceding claims further comprising a heating element (58) mounted inside said casing (51).
14. Household appliance adapted to perform at least a drying cycle, said appliance (1) comprising:
 - a. a tub (3) in which a drum (2) is rotatably mounted;
 - b. a drying system (10), having an inlet (10a) for receiving wet air from said tub (3) and an outlet (10b) for providing dried air to said tub (3), said drying system (10) comprising a blowing unit (5) according to any one of the preceding claims to promote an air flow inside said drying system (10).
15. Household appliance according to claim 11 wherein said drying system (10) further comprises a condenser (4) adapted to receive a flow of wet air from said tub (3) and to make it condense and obtain dried air, said appliance (1) further comprising a connection conduit (6) adapted to guide the flow of dried air to said tub (3), wherein said blowing unit (5) is interposed between said condenser (4) and said connection conduit (6).

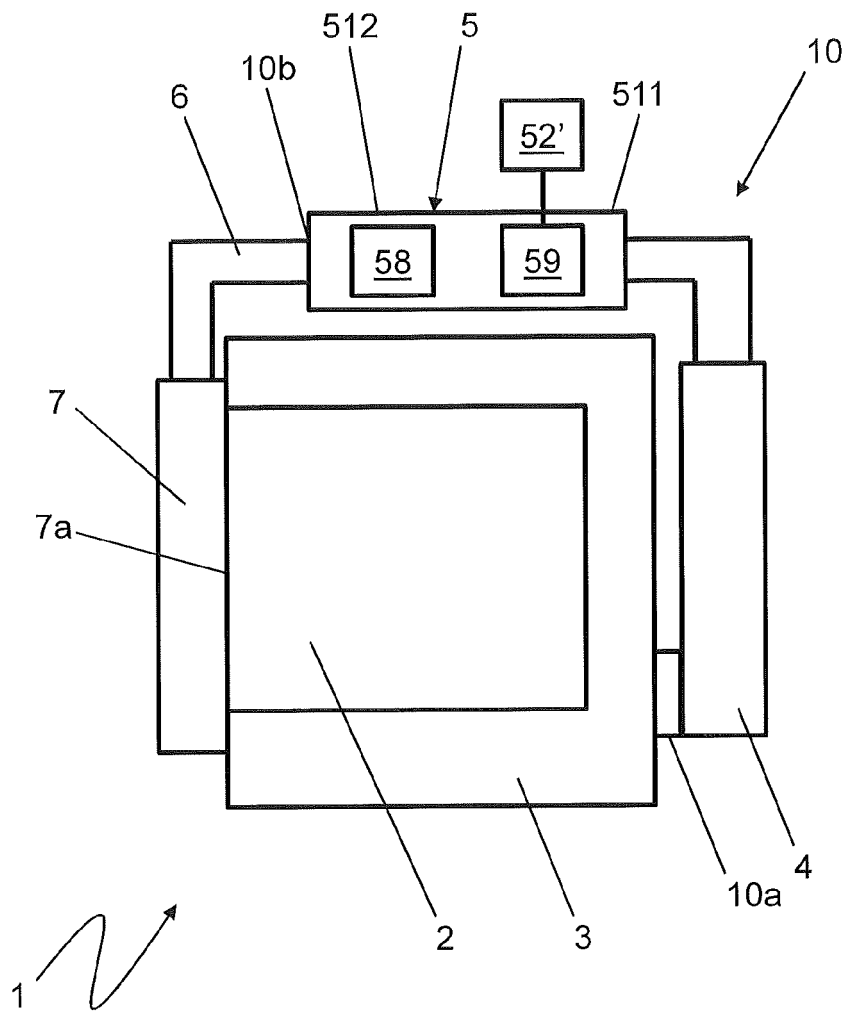


Fig. 1

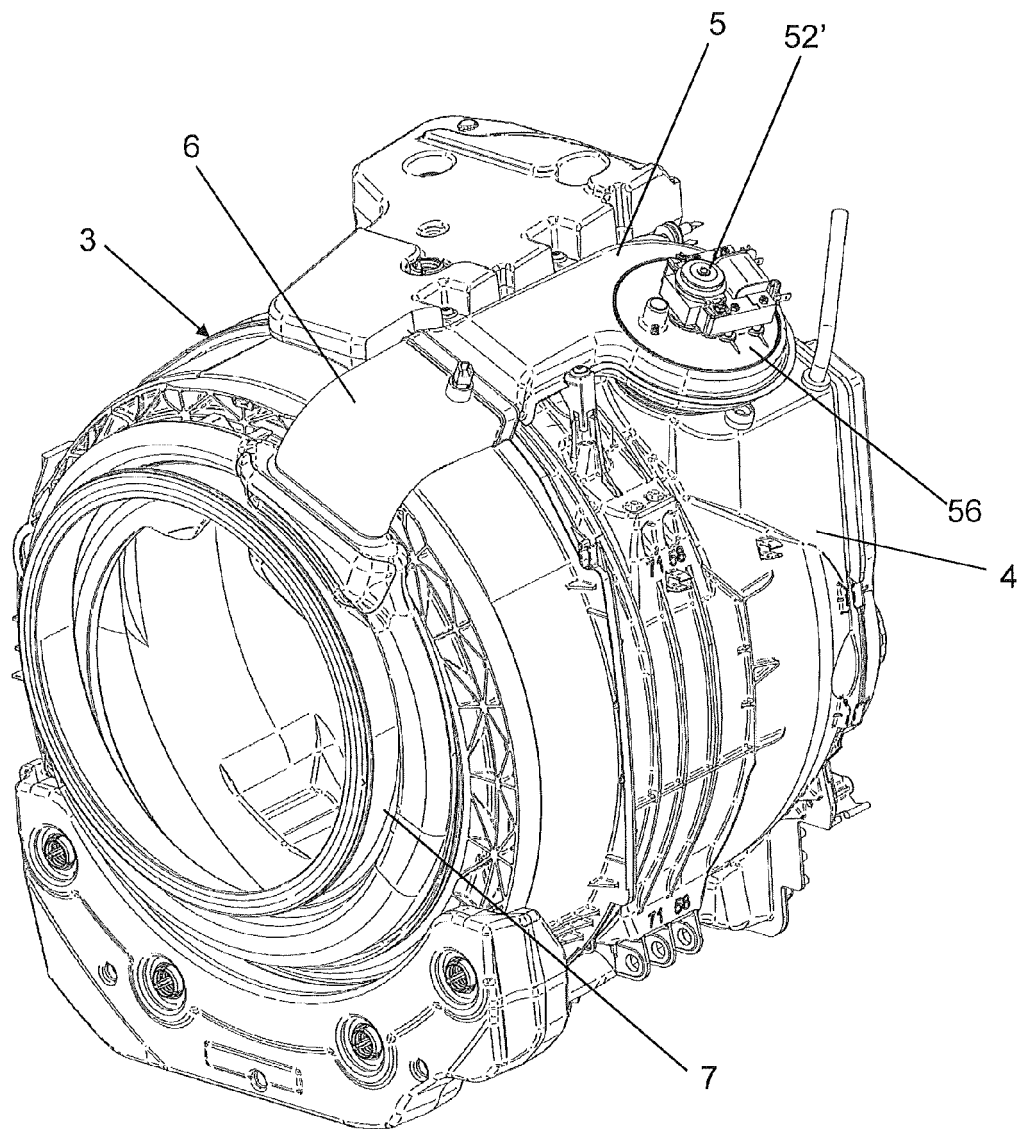


Fig. 2

Fig. 3

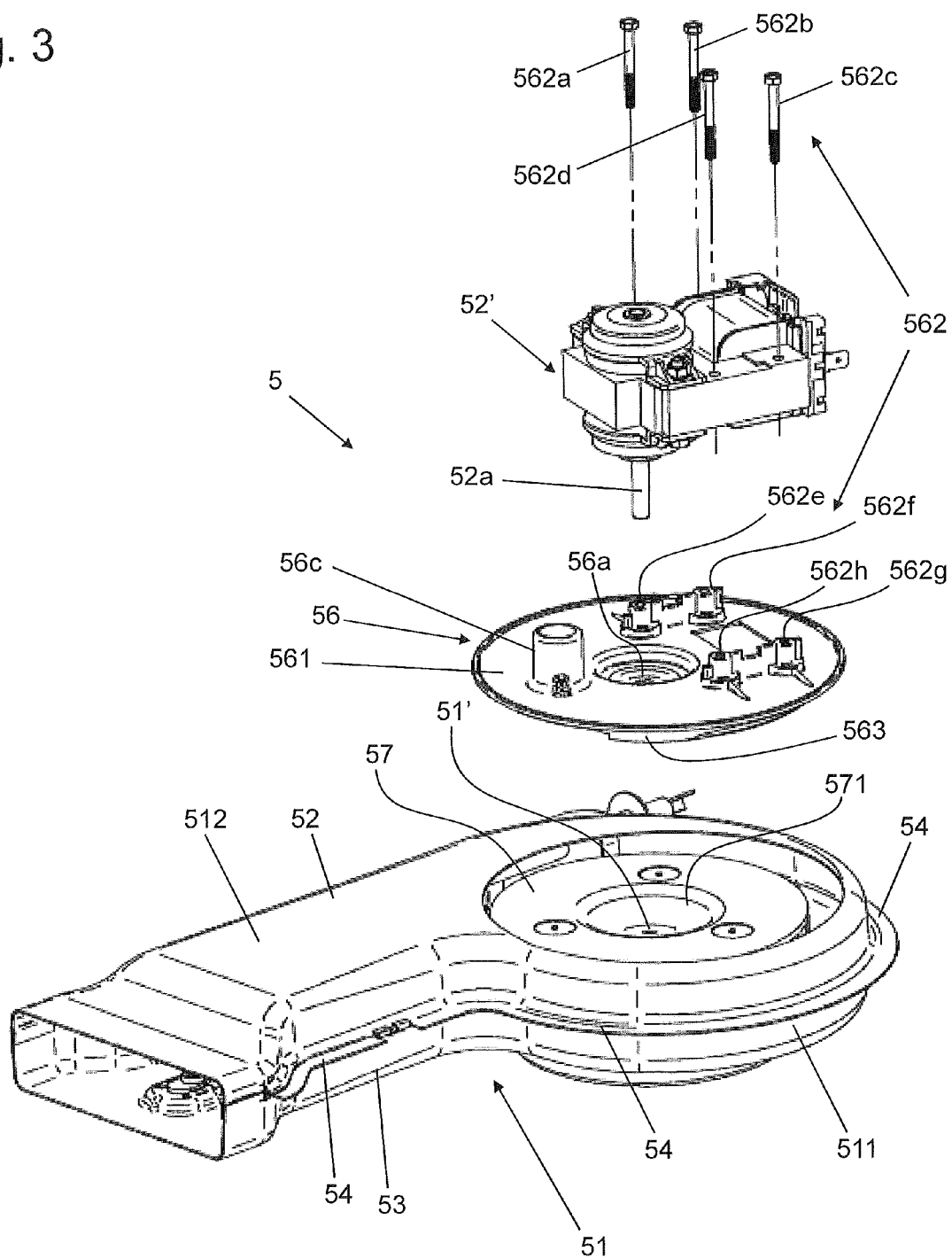


Fig. 4

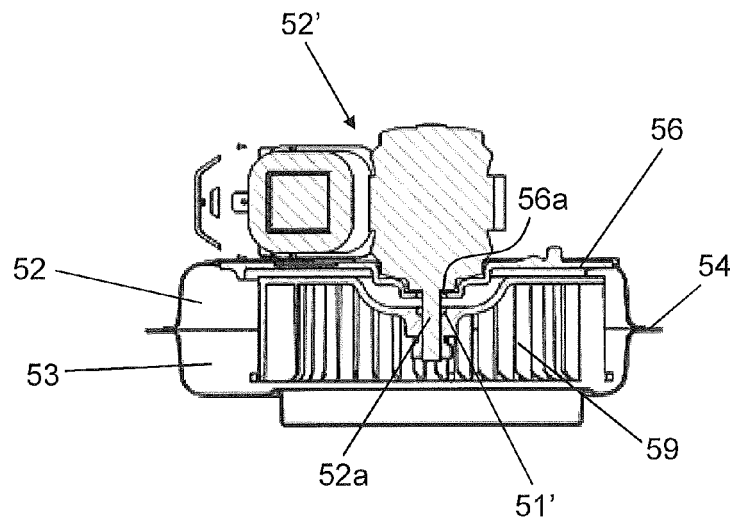
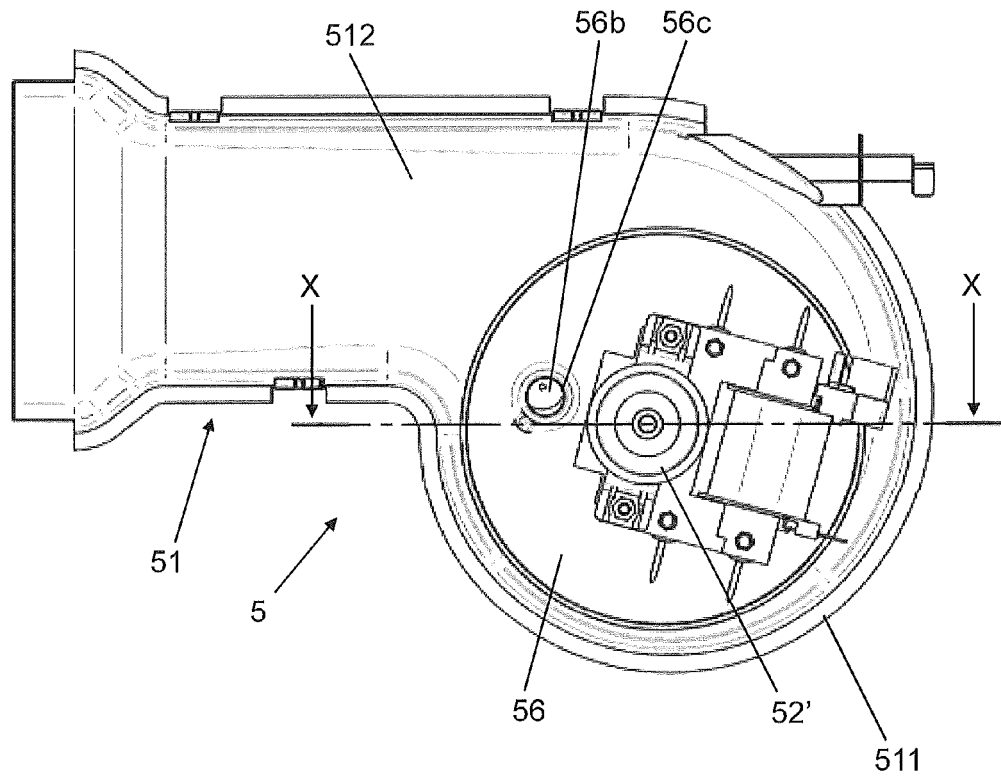


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 15 19 2286

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 4 March 2016	Examiner Bermejo, Marco
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 15 19 2286

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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04-03-2016

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

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