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(54) **FAN ASSEMBLY FOR COOKING OVEN WITH IMPROVED ENERGY CONSUMPTION**

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(72) Inventors:
• **ARSLANTEKIN, Ihsan**
34950 Istanbul (TR)
• **TARIMTORU, Merih**
34950 Istanbul (TR)
• **OZKOK, Altan**
34950 Istanbul (TR)

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(73) Proprietor: **Arçelik Anonim Sirketi**
34445 Istanbul (TR)

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Description

[0001] The present invention relates to a fan assembly suitable for use in a household appliance, in particular a cooking oven.

[0002] During the cooking process usually a large amount of heat is generated inside the cooking chamber. Therefore, a cooking oven is generally provided with a ventilation unit which has a fan assembly for discharging the hot air to the outside. The overall cost of the cooking oven and the energy efficiency of the cooking oven are also influenced by the ventilation unit, in particular by the fan assembly. In general, a prior art fan assembly has a motor and a metal fan which is releasably connectable to the shaft of the motor by a thread connection. The shaft usually has a flange and a thread at its free end. The free end of the shaft usually has a D-shaped cross section. The hub of the fan usually has a mating D-shaped bore for receiving the free end of the shaft. When assembling the prior art fan assembly, the free end of the shaft is penetrated through the bore until the hub is seated onto the flange. Subsequently, a resilient ring and a nut are fixed onto the thread of the free end of the shaft which protrudes through the hub. German patent application DE 32 23 284 A1 discloses a fan assembly which comprises a motor having a shaft, a fan having a blade and a hub, wherein the hub has a central bore for supporting the shaft. The shaft has a snap-fit connector and the hub has a counterpart snap-fit connector which are configured to mutually engage and secure the hub against relative axial displacement with respect to the shaft.

[0003] A drawback of the prior art fan assembly is that it renders the production, the assembly and the maintenance labor and cost intensive. Moreover, due to the complicated assembly there is a risk that the component parts to be assembled are not correctly connected. In addition, the bulky and heavy structure of the prior art fan assembly requires a comparatively powerful motor with a relatively large package. However, such motor increases the energy consumption and reduces the utilizable volume of the cooking oven. Thus, the ventilation performance of the cooking oven is degraded.

[0004] An objective of the present invention is to provide a fan assembly and a cooking oven having the same which overcomes the aforementioned drawbacks of the prior art in a cost effective way and which is relatively small sized and light weight and which enables an improved production, assembly and maintenance and which also enables an improved energy consumption and ventilation performance.

[0005] This objective has been achieved by the fan assembly as defined in claim 1 and the cooking oven as defined in claim 11. Further achievements have been attained by the subject-matters respectively defined in the dependent claims.

[0006] In the fan assembly of the present invention, the shaft comprises a snap-fit connector and the hub

comprises a counterpart snap-fit connector which mutually engage and secure the hub against relative axial displacement with respect to the shaft. In the fan assembly of the present invention, the shaft further comprises at least one anchoring rib and the hub comprises a mating sleeve which clamps the surface of the bore against each anchoring rib of the shaft and secures the hub against relative rotation with respect to the shaft.

[0007] In an embodiment, the snap fit connectors respectively comprise a locking notch formed into the shaft and at least one locking claw formed onto a corresponding resilient supporting arm of the hub, which do not interfere with the clamping sleeve. As the shaft is inserted through the hub, the locking claws ride on the shaft and snap-fit into the locking notch. Thereby the fan is secured against relative axial displacement with respect to the shaft. In a version of this embodiment, the locking notch is circular shaped.

[0008] In another version of this embodiment, the locking notch and the supporting arms are freely accessible in the assembled state. Thereby, the fan can be easily disassembled from the motor for maintenance by dislodging the locking claws out of the locking notch.

[0009] According to the invention, each anchoring rib has a sharp protruding edge which is integrally formed onto the shaft. The protruding edge can be formed onto the shaft by a suitable metal working process such as forging. In the clamped state each edge remains wedged inside a corresponding mating groove carved by the edge itself during the clamping. Thereby, the fan can be further secured against relative rotation with respect to the shaft.

[0010] In another embodiment, the hub is rendered flexible by a gap. Thereby, the hub can be more effectively clamped by the sleeve onto the shaft.

[0011] In a version of this embodiment, the hub has a stopper which restricts the downwards movement of the sleeve. Thereby, the sleeve can be held at its position.

[0012] In another version of this embodiment, the hub is cylindrical-shaped and the mating sleeve is ring-shaped.

[0013] In another embodiment, each anchoring rib extends substantially straight along the shaft.

[0014] In another embodiment, the shaft has a plurality of anchoring ribs some of which are inclined in opposite directions relative to the others in order to improve the grip between the shaft and the hub.

[0015] In another embodiment, the fan is made of a plastic material. Thereby, the fan is rendered light weight and the torque can be reduced.

[0016] The present invention also provides a cooking oven comprising a ventilation unit which has the fan assembly according to the present invention.

[0017] In another embodiment, an aperture is formed into the duct of the ventilation unit. The fan is immersed through the aperture into the duct. The aperture is also fluidly connected with the control unit. Thereby, the control unit can be effectively ventilated via the duct and the temperature of the thermally sensitive electrical compo-

nents of the control unit can be kept well below the safety limit to prevent a breakdown. During the cooking process usually a large amount of steam is generated inside the cooking chamber. A satisfactory completion of the cooking process requires the steam inside the cooking chamber to be effectively exhausted to the outside. In the present invention the duct is also fluidly connected to the cooking chamber via an openable/closable chimney. Thereby, the hot humid air inside cooking chamber can also be effectively discharged to the outside.

[0018] In another embodiment, the door is also cooled by the ventilation unit. Thereby, the temperature of the door, in particular the handle and the glass pane can be kept well below dangerous temperature limits to protect the user from skin burns and scalding.

[0019] With the present invention, particularly by virtue of the snap-fit connectors, the anchoring rib and the clamping sleeve, the need for utilizing a thread connection, in particular the need for forming a thread and a flange on the shaft and forming the mating D-shaped structures on the shaft and the hub have been completely obviated. With the present invention, the fan assembly has been structurally simplified and the number of components has been reduced. Thereby, the cost for production, assembly and maintenance has been reduced. With the present invention, the fan assembly has been rendered relatively small sized and light weight. Thereby, the ventilation performance and the energy efficiency have been improved. With the present invention the consumer satisfaction can be increased. In addition with the present invention, particularly by virtue of the anchoring rib and the clamping sleeve, the connection between the shaft and the hub has been further improved and the risk of slippage has been eliminated even at comparatively high rotational speeds and high torques. Thereby, the ventilation process can be reliably conducted and the cooking oven can be prevented from breakdown and causing any hazards to the customer by its hot parts.

[0020] Additional advantages of the fan assembly of the present invention and the cooking oven of the present invention will become apparent with the detailed description of the embodiments with reference to the accompanying drawings in which:

Figure 1 - is a schematic partial perspective view of a cooking oven which has a fan assembly according an embodiment of the present invention.

Figure 2 - is a schematic front perspective view of the fan assembly according to an embodiment of the present invention,

Figure 3 - is a schematic rear perspective view of the fan assembly of Fig. 2,

Figure 4 - is a schematic partial vertical sectional view of the fan assembly of Fig. 2,

Figure 5 - is a schematic front perspective view of the fan of Fig. 2, prior to assembling with the motor,

Figure 6 - is a schematic rear perspective view of the fan of Fig. 2, prior to assembling with the motor,

Figure 7 - is a schematic front perspective view of the motor of Fig. 2, prior to assembling with the fan, Figure 8 - is a schematic enlarged view of the detail A of Fig. 7,

Figure 9 - is a schematic vertical cross sectional view of the shaft of Fig. 8.

[0021] The reference signs appearing on the drawings relate to the following technical features.

[0022]

1. Fan assembly
2. Cooking oven
3. Motor
4. Shaft
5. Fan
6. Blade
7. Hub
8. Bore
- 9a. Connector
- 9b. Connector
10. Rib
- 10a. Edge
11. Sleeve
12. Notch
13. Claw
14. Arm
15. Gap
16. Stopper
17. Wall
18. Slit
19. Ventilation unit
20. Duct
21. Aperture
22. Frame

[0023] The fan assembly (1) is suitable for use in a household appliance (2), in particular a cooking oven (2). The fan assembly (1) comprises a motor (3) which has a shaft (4) and a fan (5) which has a blade (6) and a hub (7). The hub (7) has a central bore (8) for supporting the shaft (4) (Fig. 1 to 9).

[0024] In the fan assembly (1) of the present invention, the shaft (4) has a snap-fit connector (9a). The hub (7) has a counterpart snap-fit connector (9b) which engages with the snap-fit connector (9a) of the shaft (4) so as to secure the hub (7) against relative axial displacement with respect to the shaft (4). In the fan assembly (1) of the present invention, in addition, the shaft (4) has one or more than one anchoring rib (10). The hub (7) has a mating sleeve (11) for clamping the surface of the bore (8) against each anchoring rib (10) of the shaft (4) so as to secure the hub (7) against relative rotation with respect to the shaft (4).

[0025] In an embodiment, the snap-fit connector (9a) has a locking notch (12) which is formed into the circumferential surface of shaft (4). In this embodiment, the counterpart snap-fit connector (9b) has one or more than

one locking claw (13) for snap-fitting into the locking notch (12) as the shaft (4) is inserted into the bore (8). In addition, the counterpart snap-fit connector (9b) also has one or more than one resilient supporting arm (14). Each locking claw (13) is formed on the corresponding supporting arm (14). Each supporting arm (14) is formed onto the hub (7) and extends in an axial direction of the shaft (4). In the inserted state each locking claw (13) remains snap-fitted inside the locking notch (12) and secures the fan (5) against relative axial displacement with respect to the shaft (4).

[0026] In another embodiment, the locking notch (12) is located between the free end of the shaft (4) and the anchoring rib (10). In addition, each supporting arm (14) is located on the free end of the hub (7) which is averted from the motor (3).

[0027] In another embodiment, the hub (7) has two supporting arms (14) which are diametrically opposed to each other.

[0028] According to the invention, each anchoring rib (10) has a sawtooth shaped edge (10a) which is integrally formed onto the circumferential surface of the shaft (4) and protrudes a predetermined distance from the shaft (4). Each edge (10a) carves a mating groove into the inner surface of the bore (8) as the shaft (4) is inserted and clamped in the bore (8). In the clamped state each edge (10a) remains wedged inside the corresponding mating groove and secures the fan (5) against relative rotation with respect to the shaft (4).

[0029] In another embodiment, the fan assembly (1) comprises a gap (15) for rendering the hub (7) flexible. The gap (15) is formed into the hub (7). The sleeve (10) is clamped onto the hub (7) at the level of the gap (15).

[0030] In another embodiment, the fan assembly (1) comprises a stopper (16) for blocking a forward movement of the sleeve (11). The stopper (16) is formed onto the hub (7) at the level of the gap (15).

[0031] In another embodiment, the hub (7) comprises a cylindrical-shaped wall (17) which defines the bore (8). In this embodiment, the gap (15) comprises two diametrically opposing slits (18) formed into the cylindrical-shaped wall (17). In this embodiment, the sleeve (10) is ring-shaped and mates with the cylindrical-shaped wall (17).

[0032] In another embodiment, each anchoring rib (10) extends straight along the axial direction of the shaft (4).

[0033] In another embodiment, the shaft (4) has four anchoring ribs (10) which are evenly spaced around the axis of the shaft (4). Two of the anchoring ribs (10) are inclined towards the clockwise direction. The other two anchoring ribs (10) are inclined towards the anti-clockwise direction.

[0034] In another embodiment, the fan (5) is a single piece of plastic material which is heat resistant.

[0035] The cooking oven (2) comprises a casing which encloses a cooking chamber for cooking food, a door for accessing the cooking chamber, a heater unit for heating the interior of the cooking chamber, a control unit which

has a user-interface and a ventilation unit (19) for discharging hot air to the outside. The control unit controls the operation of the heater unit, the user-interface and the ventilation unit (Fig. 1 to 9).

[0036] In the cooking oven (2) of the present invention the ventilation unit (19) comprises the fan assembly (1).

[0037] In another embodiment, the ventilation unit (19) further comprises a duct (20) for conveying the hot humid air to the outside. The duct (20) is disposed on and fluidly connected to the cooking chamber. The ventilation unit (19) further comprises an aperture (21) for immersing the fan (5) of the fan assembly (1) into the duct (20). The aperture (21) is formed into the duct (20) and is fluidly connected to a region in the proximity of the control unit.

The ventilation unit (19) further comprises a frame (22) for retaining the motor (3) of the fan assembly (1). The frame (22) is detachably mountable around the aperture (21).

[0038] In another embodiment, the ventilation unit (19) is further configured to ventilate the door. In this embodiment, the duct (20) is fluidly connected to one or more than one region in the proximity of the door.

[0039] With the present invention, particularly by the snap fit connection and the clamping connection the structure of the fan assembly (1) has been simplified. Thereby, the need for utilizing the prior art thread connection has been obviated. With the present invention, the cost for production, assembly and maintenance of the fan assembly has been reduced. With the present invention, particularly the diameter of the shaft (4), the weight of the fan (5), the wattage of the motor (3) and the size of the motor (3) package have been substantially reduced. Thereby, the ventilation performance and the energy efficiency have also been improved. With the present invention the consumer satisfaction can be increased.

Claims

1. A fan assembly (1) for use in a household appliance (2), in particular a cooking oven (2), the fan assembly (1) comprising
 - a motor (3) which has a shaft (4) and
 - a fan (5) which has a blade (6) and a hub (7), wherein the hub (7) has a central bore (8) for supporting the shaft (4),
 - the shaft (4) which has a snap-fit connector (9a) and the hub (7) has a counterpart snap-fit connector (9b) which are configured to mutually engage and secure the hub (7) against relative axial displacement with respect to the shaft (4),

characterized in that

 - the shaft (4) has one or more than one anchoring rib (10) and the hub (7) has a mating sleeve (11) configured to clamp the surface of the bore (8) against each anchoring rib (10) of the shaft

(4) and secure the hub (7) against relative rotation with respect to the shaft (4),

wherein each anchoring rib (10) has a sawtooth shaped edge (10a) which is integrally formed onto the circumferential surface of the shaft (4) and protrudes a predetermined distance from the shaft (4), wherein each edge (10a) carves a mating groove into the inner surface of the bore (8) as the shaft (4) is inserted and clamped in the bore (8) and in the clamped state each edge (10a) remains wedged inside the corresponding mating groove and secures the fan (5) against relative rotation with respect to the shaft (4).

2. The fan assembly (1) according to claim 1, characterized in that

- the snap-fit connector (9a) has a locking notch (12) which is formed into the circumferential surface of shaft (4) and

- the counterpart snap-fit connector (9b) has one or more than one locking claw (13) configured to snap-fit into the locking notch (12) as the shaft (4) is inserted into the bore (8) and one or more than one resilient supporting arm (14), wherein each locking claw (13) is formed on the corresponding supporting arm (14) and wherein each supporting arm (14) is formed onto the hub (7) and extends in the axial direction of the shaft (4) and in the inserted state each locking claw (13) remains snap-fitted inside the locking notch (12) and secures the fan (5) against relative axial displacement with respect to the shaft (4).

3. The fan assembly (1) according to claim 2, characterized in that the locking notch (12) is located between the free end of shaft (4) and the anchoring rib (10) and each supporting arm (14) is located on the free end of the hub (7) which is averted from the motor (3).

4. The fan assembly (1) according to claim 2 or 3, characterized in that the hub (7) has two supporting arms (14) which are diametrically opposed to each other.

5. The fan assembly (1) according to any one of claims 1 to 4, characterized in that a gap (15) configured to render the hub (7) flexible, wherein the gap (15) is formed into the hub (7) and wherein the sleeve (10) is clamped onto the hub (7) at the level of the gap (15).

6. The fan assembly (1) according to claim 5, characterized in that a stopper (16) configured to block a forward movement of the sleeve (10), wherein the stopper (16) is formed onto the hub (7) at the level

of the gap (15).

7. The fan assembly (1) according to claim 5 or 6, characterized in that the hub (7) comprising a cylindrical-shaped wall (17) which defines the bore (8) and the gap (15) comprising two diametrically opposing slits (18) formed into the cylindrical-shaped wall (17), wherein the sleeve (11) is ring-shaped and mates with the cylindrical-shaped wall (17).

8. The fan assembly (1) according to any one of claims 1 to 7, characterized in that each anchoring rib (10) extends straight along the axial direction of the shaft (4).

9. The fan assembly (1) according to any one of claims 1 to 8, characterized in that the shaft (4) has four anchoring ribs (10) which are evenly spaced around the axis of the shaft (4), wherein two of the anchoring ribs (10) are inclined towards the clockwise direction and the other two anchoring ribs (10) are inclined towards the anti-clockwise direction.

10. The fan assembly (1) according to any one of claims 1 to 9, characterized in that the fan (5) is a single piece of plastic material.

11. A cooking oven (2), in particular a built-in type cooking oven (2) comprising

- a casing which encloses a cooking chamber for cooking food,
- a door for accessing the cooking chamber,
- a heater unit for heating the interior of the cooking chamber,
- a control unit which has a user-interface and
- a ventilation unit (19) for discharging hot air to the outside, wherein the control unit controls the heater unit, the user-interface and the ventilation unit,

characterized in that

the ventilation unit (19) comprising the fan assembly (1) as defined in any one of claims 1 to 10.

12. The cooking oven (2) according to claim 11, characterized in that

- a duct (20) for conveying the hot humid air to the outside, wherein the duct (20) is disposed on and fluidly connected to the cooking chamber,
- an aperture (21) for immersing the fan (5) of the fan assembly (1) into the duct (20), wherein the aperture (21) is formed into the duct (20) and is fluidly connected to a region in the proximity of the control unit and
- a frame (22) for retaining the motor (3) of the

fan assembly (1), wherein the frame (22) is detachably mountable around the aperture (21).

13. The cooking oven (2) according to claim 12, **characterized in that** the ventilation unit (19) is further configured to ventilate the door, wherein the duct (20) is fluidly connected to one or more than one region in the proximity of the door.

Patentansprüche

1. Eine Lüftereinrichtung (1), für die Verwendung in einem Haushaltsgerät (2), insbesondere in einem Ofen (2), umfasst

- einen Motor (3), der einen Schaft (4) aufweist und
- einen Lüfter (5), der eine Klinge (6) und eine Nabe (7) aufweist, wobei die Nabe (7) eine zentrale Bohrung (8) zur Lagerung des Schafts (4) aufweist,
- der Schaft (4), der einen Schnappverbinder (9a) und die Nabe (7) hat, hat einen Gegen-schnappverbinder (9b), der so konfiguriert ist, damit die Nabe (7) gegenseitig in Eingriff gebracht wird und gegen eine relative axiale Verschiebung in Bezug auf den Schaft (4) zu sichern, gekennzeichnet ist sie durch
- den Schaft (4), der eine oder mehrere Verankerungsrippen (1), die Nabe (7) hat eine Gegen-Verankerungskrippe (11), die so konfiguriert ist, dass sie die Oberfläche der Bohrung (8) gegen jede Verankerungsrippe (10) des Schafts (4) klemmt und die Nabe (7) gegen eine Relativedrehung zum Schaft (4) sichern,

wobei jede Verankerungsrippe (10) eine sägezahn-förmige Kante (10a) aufweist, die einstückig an die Umfangsfläche des Schafts (4) eingeformt ist und einen vorbestimmten Abstand von dem Schaft (4) vorsteht, wobei jede Kante (10a) eine Passnut in die Innenfläche der Bohrung (8) einschneidet, wenn der Schaft (4) in die Bohrung (8) eingesetzt und eingeklemmt wird und im eingeklemmten Zustand jede Kante (10a) innerhalb dessen eingeklemmt bleibt und somit führt der entsprechende Passnut dazu, dass der Lüfter (5) gegen Relativedrehung gegenüber der Welle (4) gesichert wird.

2. Eine Lüftereinrichtung (1), wie in Anspruch 1 aufgeführt, ist **gekennzeichnet durch**

- den Schnappverbinder (9a), der einen Verriegelungskerb (12) aufweist, der in die Mantelfläche des Schafts (4) eingeformt ist und
- den Gegenüber-Schnappverbinder (9b), der

eine oder mehrere Verriegelungsklauen (13) aufweist, die so konfiguriert sind, dass sie in die Verriegelungskerbe (12) einschnappen können, wenn der Schaft (4) in die Bohrung (8) eingeführt wird und eine oder mehrere federnde Stützarme (14), wobei jede Verriegelungsklaue (13) am entsprechenden Stützarm (14) ausgebildet ist; wobei jeder Stützarm (14) an der Nabe (7) angebracht ist und sich in der axialen Richtung des Schaftes (4) erstreckt; wobei im eingesetzten Zustand bleibt jede Verriegelungsklaue (13) in dem Verriegelungskerb (12) eingerastet und sichert den Lüfter gegen eine axiale Relativverschiebung zu dem Schaft (4).

3. Eine Lüftereinrichtung (1), wie in Anspruch 2 aufgeführt, ist **dadurch gekennzeichnet, dass** die Verriegelungskerbe (12) sich zwischen dem freien Ende des Schaftes (4) und der Verankerungsrippe (10) befindet und dass jeder Stützarm (14) sich am freien Ende der vom Motor (3) abgewandten Nabe (7) befindet.

4. Eine Lüftereinrichtung (1), wie in Anspruch 2 oder 3 aufgeführt, ist **dadurch gekennzeichnet, dass** die Nabe (7) zwei Stützarme (14) besitzt, die sich diametral gegenüberliegend sind.

5. Eine Lüftereinrichtung (1), wie in einem der vorher aufgeführten Ansprüche, ist **dadurch gekennzeichnet, dass** ein Spalt (15) konfiguriert ist, damit die Nabe (7) flexibel wird, wobei der Spalt (15) in die Nabe (7) eingeformt ist, wobei die Verankerungskrippe (10) in der Höhe des Spaltes (15) auf die Nabe (7) geklemmt ist.

6. Eine Lüftereinrichtung (1), wie in Anspruch 5 aufgeführt, ist **dadurch gekennzeichnet, dass** ein Anschlag (16) konfiguriert ist, um eine Vorwärtsbewegung der Verankerungskrippe (10) zu blockieren, wobei der Anschlag (16) in der Höhe des Spaltes (15) auf die Nabe (7) geformt ist.

7. Eine Lüftereinrichtung (1), wie in Anspruch 5 oder 6 aufgeführt, ist **dadurch gekennzeichnet, dass** die Nabe (7) eine zylindrische Wand (17) aufweist, die die Bohrung (8) definiert, und der Spalt (15) zwei diametral gegenüberliegende Schlitze (18) aufweist, die in die zylinderförmige Wand (17) eingeformt, wobei die Verankerungskrippe (11) ringförmig ist und mit der zylinderförmigen Wand (17) zusammenpassend ist.

8. Eine Lüftereinrichtung (1), wie in den Ansprüchen 1 bis 7 aufgeführt, ist **dadurch gekennzeichnet, dass** sich jede Verankerungskrippe (10) geradlinig entlang der axialen Richtung des Schafts (4) erstreckt.

9. Eine Lüftereinrichtung (1), wie in den Ansprüchen 1 bis 8 aufgeführt, ist **dadurch gekennzeichnet, dass** der Schaft (4) vier Verankerungskrippen (10) aufweist, die um die Achse des Schaftes (4) gleichmäßig beabstandet sind, wobei zwei dieser Verankerungskrippen (1) gegen den Uhrzeigersinn und die anderen zwei Verankerungskrippen (10) gegen den Uhrzeigersinn geneigt sind.
10. Eine Lüftereinrichtung (1), wie in den Ansprüchen 1 bis 9 aufgeführt, ist **dadurch gekennzeichnet, dass** der Lüfter (5) als ein Einzelstück Kunststoffmaterial ausgebildet ist.
11. Ein Backofen (2), insbesondere ein Einbau-Backofen (2) umfasst,
- ein Gehäuse, das einen Garraum zum Garen von Lebensmitteln umschließt,
 - eine Tür, die den Zugang zum Garraum ermöglicht,
 - eine Heizeinheit für die Beheizung des Innenraums des Garraums,
 - eine Steuereinheit, die eine Benutzerschnittstelle aufweist und
 - eine Lüftungseinheit (19) für die Abführung von heißer Luft nach außen, wobei die Steuereinheit die Heizeinheit, die Benutzerschnittstelle und die Lüftungseinheit steuert,
- gekennzeichnet ist es durch, die Lüftungseinheit (19), die die Lüftereinrichtung (1) umfasst, die in den Ansprüchen 1 bis 10 aufgeführt ist.
12. Der Backofen (2), wie in Anspruch 11 aufgeführt, ist **gekennzeichnet durch**
- einen Kanal (20) für das Weiterleiten der heißen und feuchten Luft nach außen, wobei der Kanal (20) am Backofen angeordnet und fluidisch mit diesem verbunden ist,
 - eine Öffnung (21) zum Eintauchen des Lüfters (5) der Lüftereinrichtung (1) in den Kanal (20), wobei die Öffnung (21) in den Kanal (20) ausgebildet ist und eine Fluidverbindung mit einem Bereich in der Nähe der Steuereinheit steht und
 - einen Rahmen (22) zum Halten des Motors (3) der Lüftereinrichtung (1), wobei der Rahmen (22) abnehmbar um die Öffnung (21) montierbar ist.
13. Der Backofen (2), wie in Anspruch 12 aufgeführt, ist **dadurch gekennzeichnet, dass** die Lüftungseinheit (19) zugleich für das Lüften der Tür konfiguriert ist, wobei der Kanal (20) mit einem oder mehreren Bereichen in der Nähe der Tür fluidisch verbunden ist.

Revendications

1. Un ensemble de ventilateur (1) destiné à être utilisé dans un appareil électroménager (2), en particulier dans un four de cuisson (2), l'ensemble de ventilateur (1) comprenant
- un moteur (3) qui présente un arbre (4) et
 - un ventilateur (5) qui comporte une lame (6) et un moyeu (7), dont le moyeu (7) comporte un alésage central (8) pour supporter l'arbre (4),
 - l'arbre (4) qui comporte un connecteur à encliquetage (9a) et le moyeu (7) possède un connecteur à encliquetage homologue (9b) lesquels sont destinés à s'engager mutuellement et à sécuriser le moyeu (7) contre le déplacement axial relatif par rapport à l'arbre (4),
- caractérisé en ce que**
- l'arbre (4) comporte une ou plusieurs nervure(s) d'ancrage (10) et le moyeu (7) comporte un manchon d'accouplement (11) conçu pour serrer la surface de l'alésage (8) contre chaque nervure d'ancrage (10) de l'arbre (4) et sécuriser le moyeu (7) contre la rotation relative par rapport à l'arbre (4),
- dans lequel chaque nervure d'ancrage (10) présente un bord en forme de dent de scie (10a) qui est intégralement formé sur la surface circonférentielle de l'arbre (4) et qui fait saillie d'une distance prédéterminée à partir de l'arbre (4), où chaque bord (10a) forme une rainure d'accouplement dans la surface interne de l'alésage (8) lorsque l'arbre (4) est inséré et serré dans l'alésage (8) et à l'état serré, chaque bord (10a) reste coincé à l'intérieur de la rainure d'accouplement correspondante et sécurise le ventilateur (5) contre la rotation relative par rapport à l'arbre (4).
2. Un ensemble de ventilateur (1) selon la revendication 1, **caractérisé en ce que**
- le connecteur à encliquetage (9a) présente une encoche d'arrêt (12) qui est formée dans la surface circonférentielle de l'arbre (4) et
 - le connecteur à encliquetage homologue (9b) comporte une ou plusieurs griffes de verrouillage (13) configurées pour s'encliquer dans l'encoche d'arrêt (12) lorsque l'arbre (4) est inséré dans l'alésage (8) et un ou plusieurs bras porteurs résilients (14), où chaque griffe de verrouillage (13) est formée sur le bras porteur correspondant (14) et dans lequel chaque bras porteur (14) est formé sur le moyeu (7) et s'étend dans la direction axiale de l'arbre (4) et, à l'état inséré, chaque griffe de verrouillage (13) reste encliquetée dans l'encoche d'arrêt (12) et sécurise le ventilateur (5) contre le déplacement axial

relatif par rapport à l'arbre (4).

3. L'ensemble de ventilateur (1) selon la revendication 2, **caractérisé en ce que** l'encoche d'arrêt (12) est située entre l'extrémité libre de l'arbre (4) et la nervure d'ancrage (10) et chaque bras porteur (14) est situé sur l'extrémité libre du moyeu (7) qui est éloignée du moteur (3). 5
4. L'ensemble de ventilateur (1) selon la revendication 2 ou 3, **caractérisé en ce que** le moyeu (7) présente deux bras porteurs (14) qui sont diamétralement opposés entre eux. 10
5. L'ensemble de ventilateur (1) selon l'une quelconque des revendications 1 à 4, **caractérisé en ce que** un écart (15) configuré afin de rendre le moyeu (7) flexible, dans lequel l'écart (15) est formé dans le moyeu (7) et dans lequel le manchon (10) est serré sur le moyeu (7) au niveau de l'écart (15). 15
6. L'ensemble de ventilateur (1) selon la revendication 5, **caractérisé en ce que** un butoir (16) est configuré pour bloquer un mouvement avant du manchon (10), dans lequel le butoir (16) est formé sur le moyeu (7) au niveau de l'écart (15). 25
7. L'ensemble du ventilateur (1) selon la revendication 5 ou 6, **caractérisé en ce que** le moyeu (7) comprend une paroi de forme cylindrique (17) qui définit l'alésage (8) et **en ce que** l'écart (15) comprend deux fentes diamétralement opposées (18) formées dans la paroi de forme cylindrique (17), dans lequel le manchon (11) est de forme annulaire et s'accouple à la paroi de forme cylindrique (17). 30
8. L'ensemble de ventilateur (1) selon l'une quelconque des revendications 1 à 7, **caractérisé en ce que** chaque nervure d'ancrage (10) s'étend en ligne droite dans la direction axiale de l'arbre (4). 35
9. L'ensemble de ventilateur (1) selon l'une quelconque des revendications 1 à 8, **caractérisé en ce que** l'arbre (4) comporte quatre nervures d'ancrage (10) lesquelles sont espacées à intervalles réguliers autour de l'axe de l'arbre (4), où deux des nervures d'ancrage (10) sont inclinées dans le sens des aiguilles d'une montre et les deux autres nervures d'ancrage (10) sont inclinées dans le sens contraire des aiguilles d'une montre. 40
10. L'ensemble de ventilateur (1) selon l'une quelconque des revendications 1 à 9, **caractérisé en ce que** le ventilateur (5) est une seule pièce en matière plastique. 45
11. Un four de cuisson (2), en particulier un four de cuisson de type intégré (2) comprenant 50

- un boîtier qui renferme une chambre de cuisson pour cuire les aliments,
- une porte pour accéder à la chambre de cuisson,
- une unité de chauffage pour chauffer l'intérieur de la chambre de cuisson,
- une unité de contrôle dotée d'une interface utilisateur et
- une unité de ventilation (19) pour décharger l'air chaud vers l'extérieur, où l'unité de contrôle commande l'unité de chauffage, l'interface utilisateur et l'unité de ventilation,

caractérisé en ce que

l'unité de ventilation (19) comprend l'ensemble de ventilateur (1) tel que défini dans l'une quelconque des revendications 1 à 10.

12. Un four de cuisson (2) selon la revendication 11, **caractérisé en ce que** 20

- un conduit (20) pour transmettre l'air chaud humide vers l'extérieur, où le conduit (20) est disposé sur et reliée par fluide à la chambre de cuisson,
- une ouverture (21) pour immerger le ventilateur (5) de l'ensemble de ventilateur (1) dans le conduit (20), où l'ouverture (21) est formée dans le conduit (20) et est reliée par fluide à une région à proximité de l'unité de contrôle et
- un cadre (22) pour retenir le moteur (3) de l'ensemble de ventilateur (1), où le cadre (22) peut être monté de manière amovible autour de l'ouverture (21).

13. Un four de cuisson (2) selon la revendication 12, **caractérisé en ce que** l'unité de ventilation (19) est en outre configurée pour ventiler la porte, dans lequel le conduit (20) est reliée par fluide à une ou plusieurs régions à proximité de la porte. 35

Fig. 1

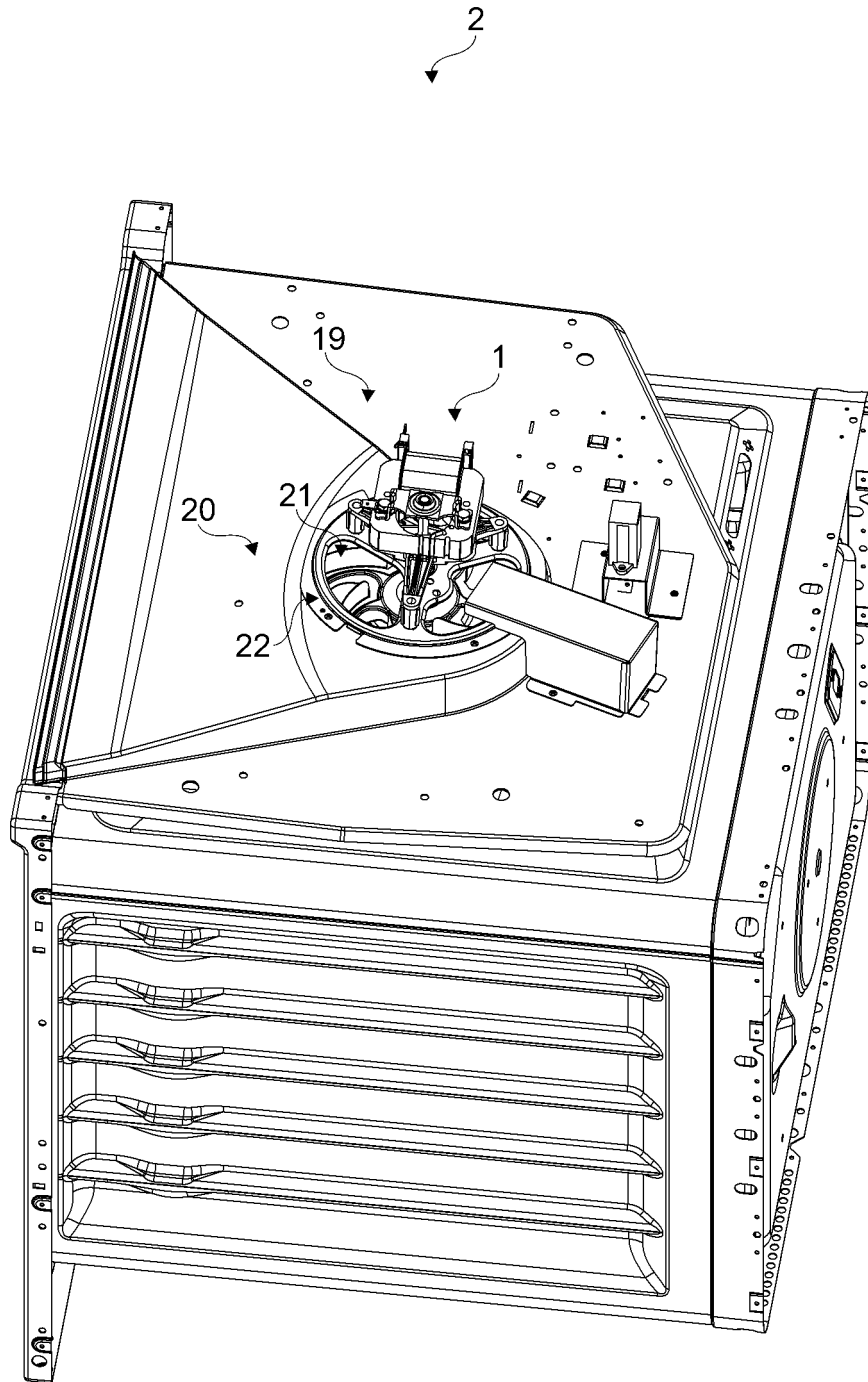


Fig. 2

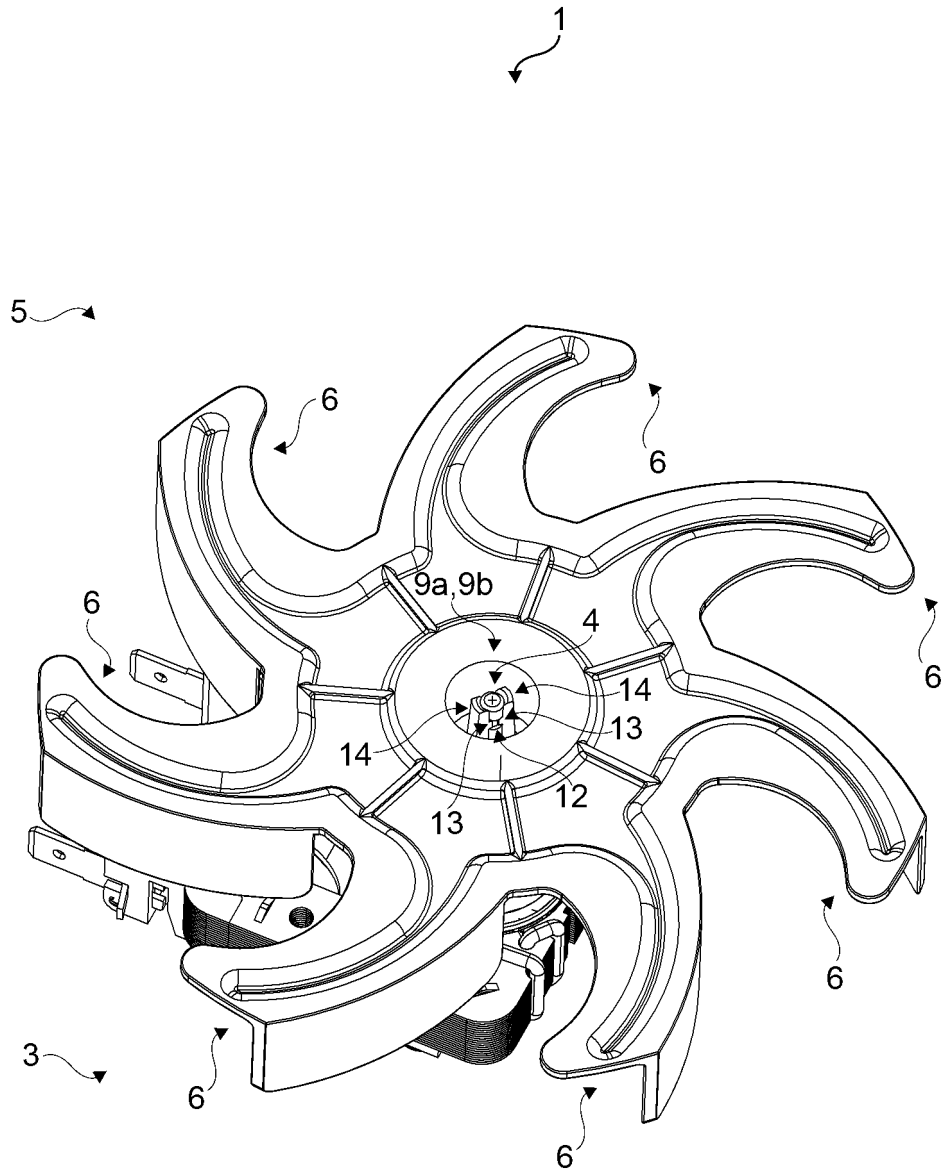


Fig. 3

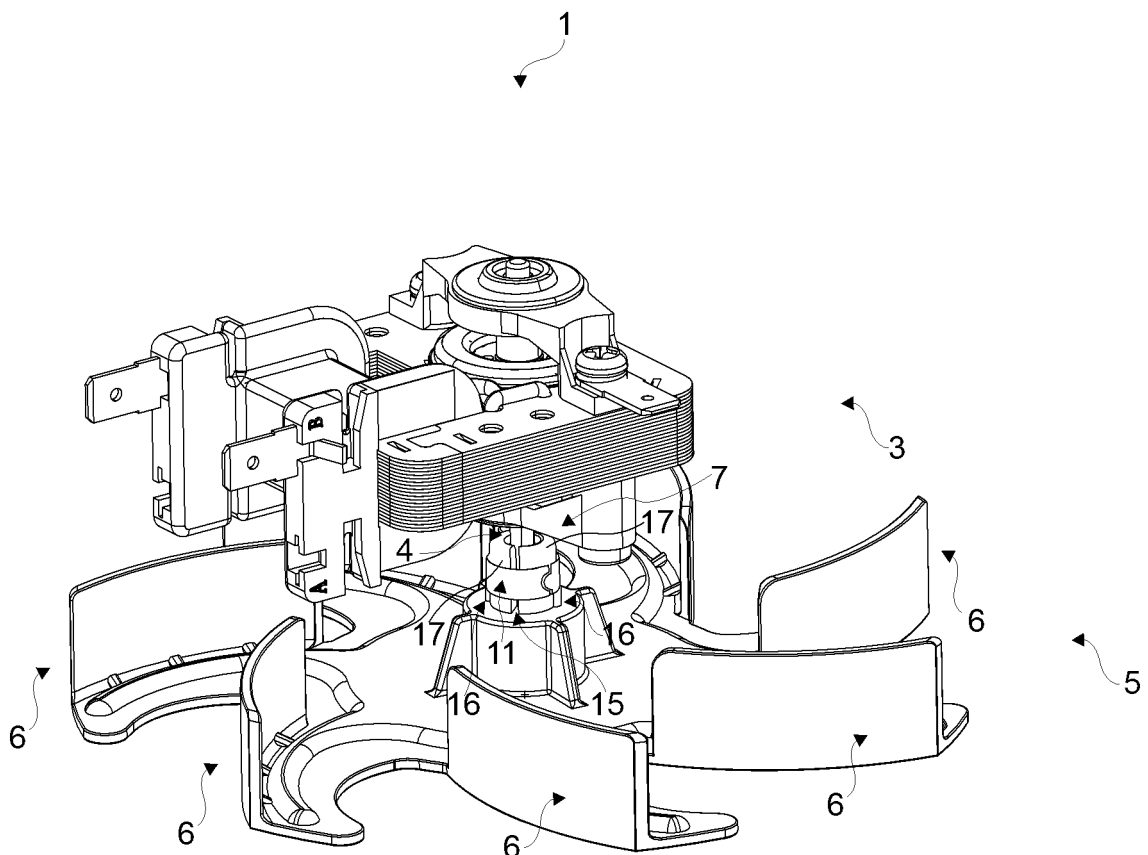


Fig. 4

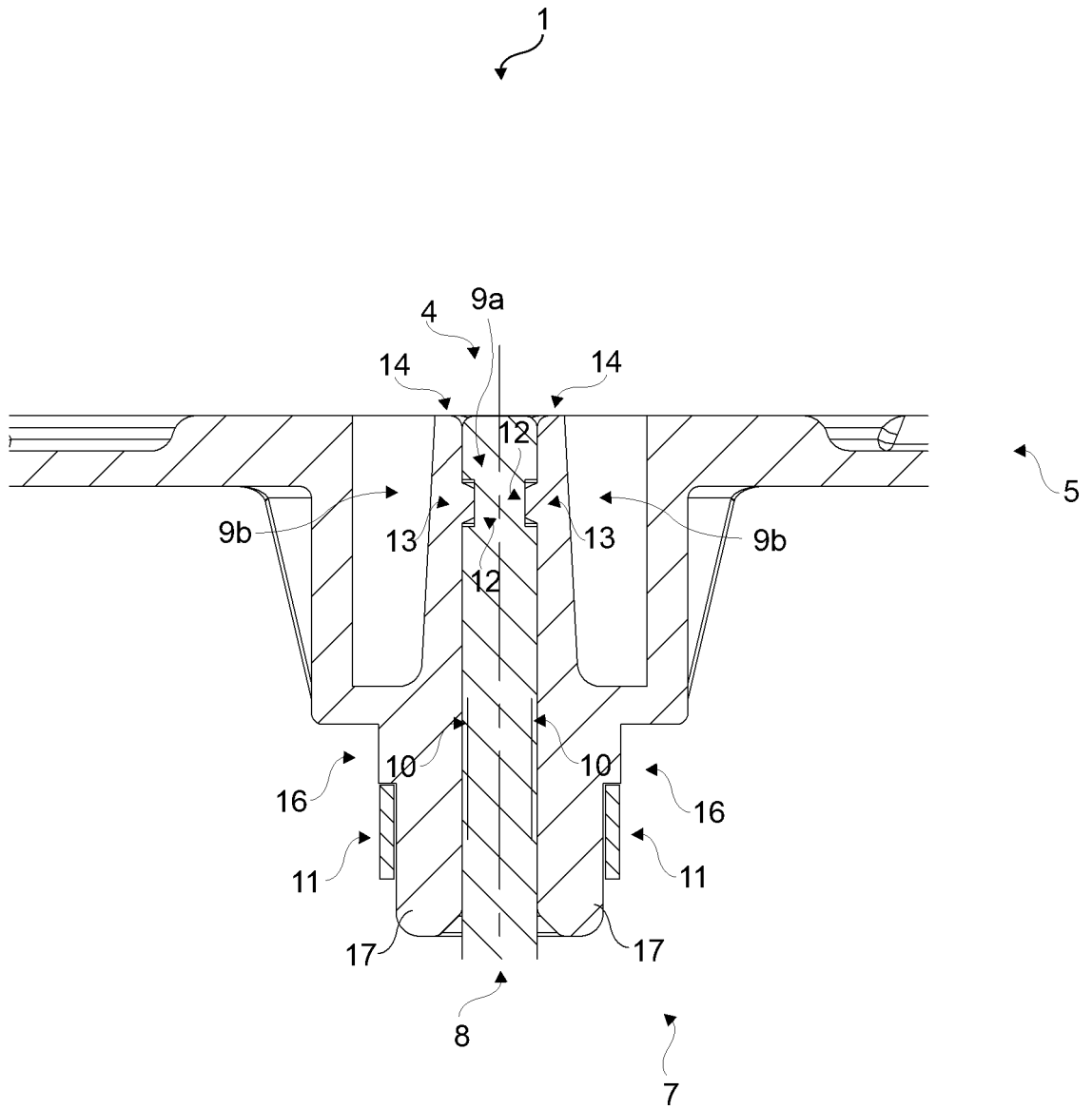


Fig. 5

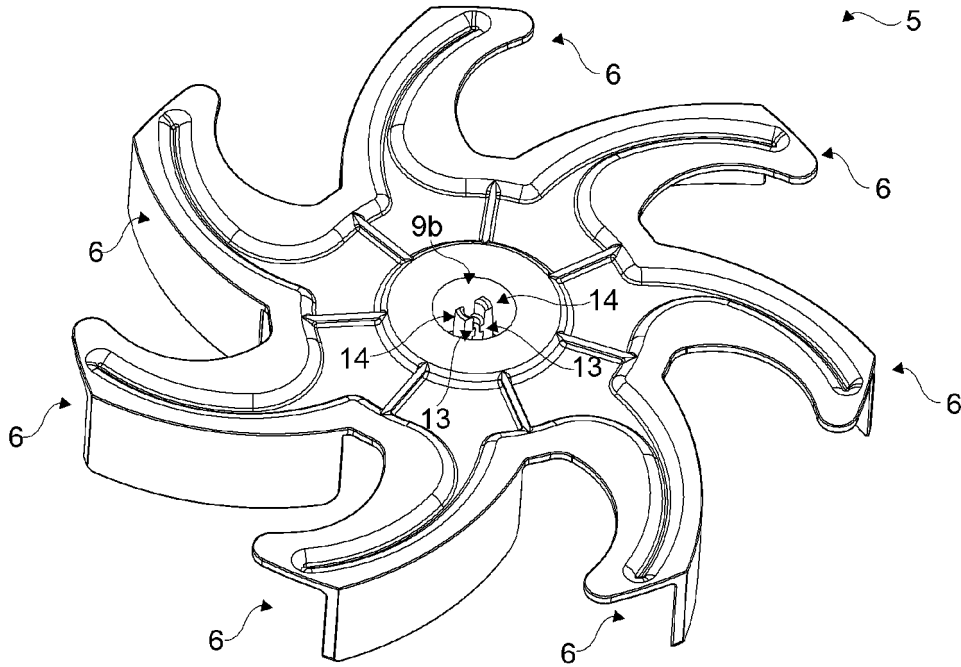


Fig. 6

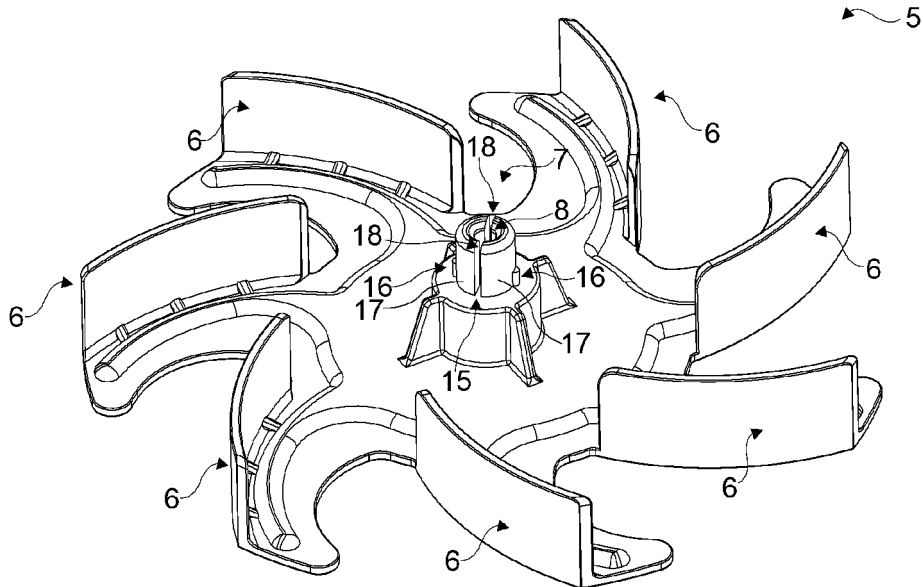


Fig. 7

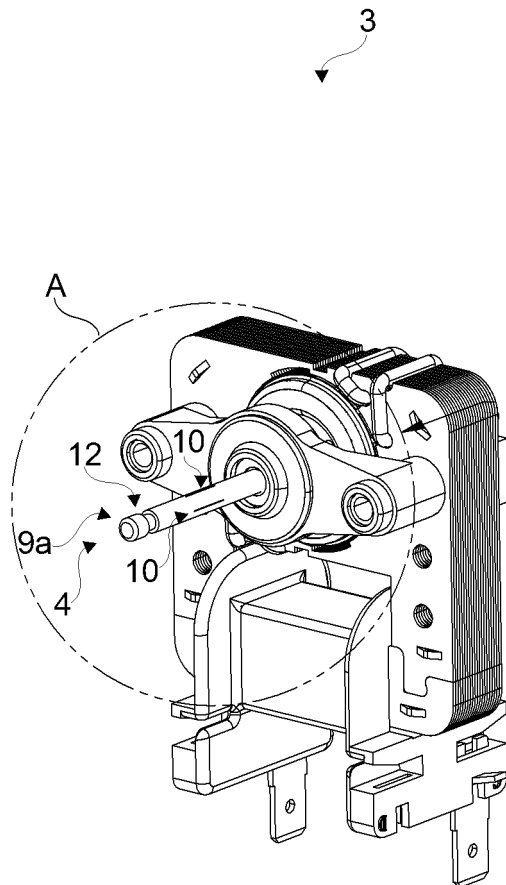


Fig. 8

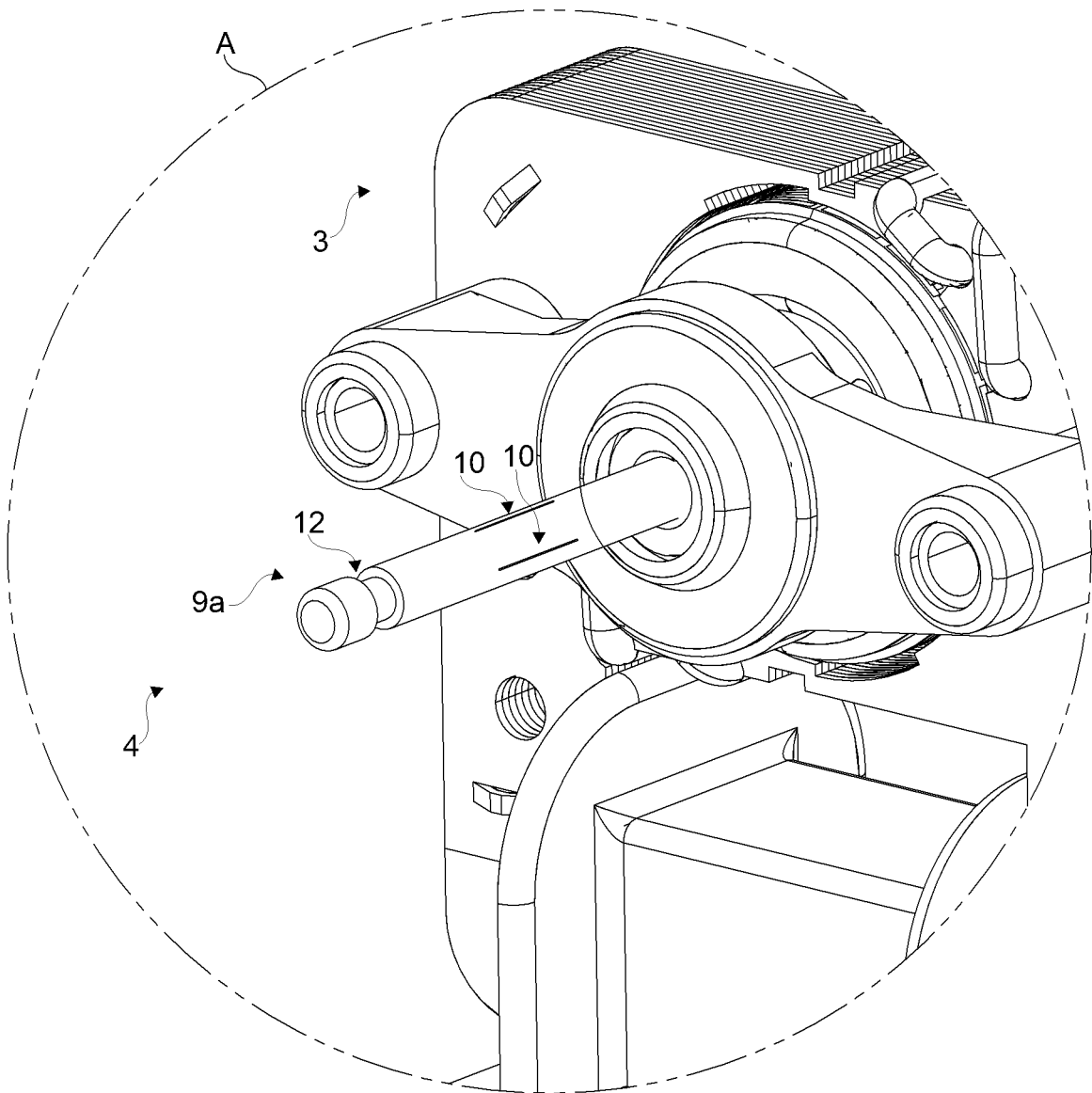
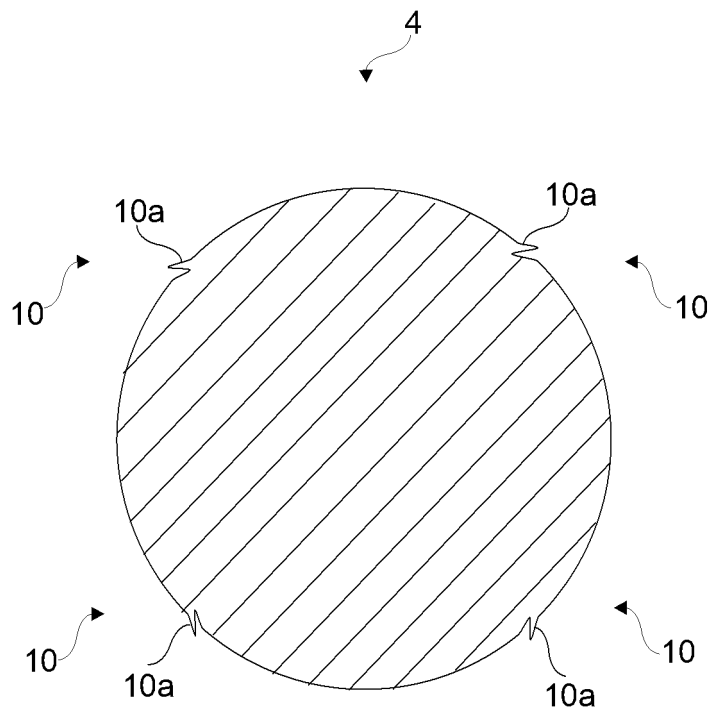


Fig. 9



REFERENCES CITED IN THE DESCRIPTION

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