

(19)



(11)

EP 4 019 686 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:

06.09.2023 Bulletin 2023/36

(51) International Patent Classification (IPC):

D06F 25/00 ^(2006.01) **D06F 39/06** ^(2006.01)
D06F 37/42 ^(2006.01) **D06F 39/02** ^(2006.01)
D06F 58/04 ^(2006.01)

(21) Application number: **21210128.1**

(52) Cooperative Patent Classification (CPC):

(22) Date of filing: **24.11.2021**

D06F 39/06; D06F 25/00; D06F 37/42; D06F 39/02; D06F 58/04

(54) **A LAUNDRY WASHER-DRYER WITH IMPROVED OPERATIONAL SAFETY**

WASCH-TROCKENMASCHINE MIT VERBESSERTER BETRIEBSSICHERHEIT

MACHINE À LAVER-SÉCHER À SÉCURITÉ DE FONCTIONNEMENT AMÉLIORÉE

(84) 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

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(30) Priority: **28.12.2020 TR 202021981**

(43) Date of publication of application:

29.06.2022 Bulletin 2022/26

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EP 4 019 686 B1

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Description

[0001] The present invention relates to a laundry washer-dryer with improved operational safety.

[0002] In laundry washer-dryers, the laundry is washed in a washing tub which receives the detergent loaded into the detergent compartment and the mains water. In the drying process, which is started after the washing process, the air in the tub is taken into a drying air duct and the air which is dehumidified and heated in the drying air duct is sent back to the tub. One of the problems encountered in the state-of-the-art washer-dryers is that the foam formed as a result of using water with detergent in the washing process reaches the drying air duct through the air inlet. The foam of which the volume increases especially as a result of the use of intensive detergent can rise in the drying air duct and overflow from the openings of the drying air duct and reach electrical circuits and electronic components, causing safety weaknesses such as corrosion, short circuit, even fire.

[0003] In the state of the art Japanese Patent Application No. JP2006136601, a washer-dryer is disclosed, wherein the foam is prevented from getting into contact with electrical components. Further relevant prior art may be found in documents EP0870859A1, EP2110473A2 and EP2202341A2.

[0004] The aim of the present invention is the realization of a laundry washer-dryer of which the operational safety is improved.

[0005] The laundry washer-dryer realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, comprises a body; a housing which is provided on the body, which receives a detergent dispenser, wherein cleaning agents are loaded, and which opens into the tub so as to allow the delivery of the cleaning agents into the tub; a flushing unit which is disposed in the housing and which supplies water into the housing; a tub wherein a drum, in which the laundry is loaded, is rotated; a drying air duct which has an air inlet and an air outlet both opening into the tub such that the air taken from the tub is passed through the drying air duct so as to be sent back to the tub, and wherein a fan which provides the circulation of the air is disposed; an opening which is provided on the drying air duct; a flow port which is provided on the housing and which opens into the housing; and a delivery line which extends between the flow port and the opening and which connects the drying air duct and the housing. The delivery line provides the delivery of both air and foam between the drying air duct and the housing. Thus, the delivery line ensures the communication between the tub and the outer environment so as to prevent the air from being trapped in the tub and to safely discharge the foam filling into the drying air duct.

[0006] In an embodiment of the present invention, the air duct has a fan housing which is disposed at the upper side of the tub and which receives the fan, and the opening is arranged on the fan housing. Thus, the opening is

enabled to remain above the water level in the tub such that the delivery line is prevented from being filled with water.

[0007] In another embodiment of the present invention, the flow port is positioned on the flushing unit which is located on the ceiling of the housing. The foam flowing in the delivery line passes through the flow port arranged on the ceiling of the housing by the effect of gravity so as to pour onto the base of the housing. Thus, the port is prevented from getting clogged while avoiding the backflow of the foam.

[0008] According to the present invention, the port is positioned so as to face a gap remaining between the dispenser and the housing when the dispenser is inside the housing, and the foam is enabled to pour into the gap. Thus, the foam is prevented from filling into the dispenser, from mixing with other cleaning agents such as softener, etc. and from causing erroneous dosing.

[0009] In another embodiment of the present invention, the flow port has an inlet end which receives the foamy water coming from the delivery line, an outlet end for delivering the foamy water into the housing, and a chamber which is positioned between the inlet end and the outlet end and which receives the water coming from the inlet end. By means of the chamber, the flow of the foam at the outlet end is facilitated.

[0010] In another embodiment of the present invention, at least one dampening means is positioned on the flow path of the foam composed of the opening, the delivery line and the flow port, which extends between the air duct and the housing. Thus, the foam is dampened before being poured into the housing, preventing an undesired accumulation in the housing.

[0011] In an embodiment of the present invention, the dampening means has a porous sieve form. This embodiment is advantageous in that the dampening means provides efficient air permeability.

[0012] By means of the present invention, the excessive foam is transferred into the housing and is prevented from overflowing from the drying air duct.

[0013] The laundry washer-dryer realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

Figure 1 - is the partial schematic view of the laundry washer-dryer related to an embodiment of the present invention.

Figure 2 - is the partial view of the laundry washer-dryer related to another embodiment of the present invention, showing the tub, the air duct, the housing and the delivery line.

Figure 3 - is the partial cross-sectional view of the laundry washer-dryer related to another embodiment of the present invention.

Figure 4 - is the top partial cross-sectional view showing the flow port in the laundry washer-dryer related to another embodiment of the present invention.

Figure 5 - is the sideways partial cross-sectional view

of the housing and the dispenser showing the flow port in the laundry washer-dryer related to another embodiment of the present invention.

[0014] The elements illustrated in the figures are numbered as follows:

1. Laundry washer-dryer
2. Body
3. Tub
4. Housing
5. Flushing unit
6. Dispenser
7. Fan
8. Drying air duct
9. Air inlet
10. Air outlet
11. Opening
12. Flow port
13. Delivery line
14. Fan housing
15. Inlet end
16. Outlet end
17. Chamber
18. Dampening means
19. Intermediate line
20. Condenser
21. Heater

B: Gap

[0015] The laundry washer-dryer (1) comprises a body (2); a tub (3) wherein the washing and drying processes are performed; a housing (4) which is provided on the body (2), which receives a detergent dispenser (6) suitable for loading detergent, and which has a flushing unit (5) which supplies water into the dispenser (6); and a drying air duct (8) which has an air inlet (9) which receives the air from the tub (3) and an air outlet (10) which delivers the air into the tub (3), and wherein a fan (7) which provides the circulation of the drying air is disposed. By means of an intermediate line (19), the housing (4) is connected to the tub (3) and opens to the outer environment. The dispenser (6) suitable for loading detergent therein is placed into the housing (4). A flushing unit (5) which supplies water into the dispenser (6) in the housing (4) is disposed in the housing (4). By means of the water supplied from the flushing unit (5) into the dispenser (6), the detergent in the dispenser (6) is swept and transferred into the housing (4), and then delivered from the housing (4) into the tub (3) by means of the intermediate line (19). The laundry in a drum which is rotated in the tub (3) is washed in the water with detergent received into the tub (3). During the drying process, the air is circulated in the drying air duct (8). The air sucked from the air inlet (9) by means of the fan (7) is passed through a condenser (20), which is disposed on the drying air duct (8), which

extends almost all along the rear wall of the tub (3) and which condenses the drying air, and the air dehumidified at the condenser (20) is passed over a heater (21), which is provided in the drying air duct (8), and is blown onto the laundry through the air outlet (10) by means of the fan (7).

[0016] The laundry washer-dryer (1) of the present invention comprises an opening (11) which is provided on the drying air duct (8); a flow port (12) which is provided on the housing (4) and which opens into the housing (4); and at least one delivery line (13) which is connected to the flow port (12) at one end and to the opening (11) at the other end and which provides fluidical connection between the housing (4) and the drying air duct (8). The opening (11) allows the intake/output of fluid, in other words air and fluid. The flow port (12) is configured as a passage which allows the intake/output of air into/from the housing (4). The delivery line (13) is connected between the flow port (12) and the opening (11). Thus, the drying air duct (8) opening into the tub (3) and the housing (4) opening to the outer environment (4) are connected to each other by means of the delivery line (13) in fluidical connection. In case the foam forming during the washing process excessively rises in the drying air duct (8), at least some of the foam exits through the opening (11) and fills into the delivery line (13) and then flows into the housing (4) through the flow port (12). Thus, the excessive foam is enabled to be at least partially discharged into the housing (4) from the drying air duct (8).

[0017] In an embodiment of the present invention, the drying air duct (8) has a fan housing (14) which receives the fan (7), and the opening (11) is provided on the fan housing (14). The drying air duct (8) has a fan housing (14) which is positioned after the condenser (20) in the direction of the air flow and wherein the fan (7) is mounted. The fan housing (14) is located just after the condenser (20) which extends almost all along the rear wall of the tub (3), and the opening (11) is positioned on the fan housing (14). Thus, by positioning the opening (11) at the upper side, almost at the top, of the drying air duct (8), the foam is enabled to be discharged into the housing (4) if the same rises to a critical level such as the fan (7) level in the drying air duct (8). Consequently, the foam accumulation in the housing (4) is decreased.

[0018] In another embodiment of the present invention, the flow port (12) is provided on the flushing unit (5). The flow port (12) is positioned on the flushing unit (5), which is disposed on the ceiling of the housing (4), so as to remain above the dispenser (6). Thus, the flow port (12) is prevented from being blocked. Moreover, the connection of the delivery line (13) to the flow port (12) is facilitated.

[0019] According to the present invention, a gap (B) between the dispenser (6) and the housing (4) is provided in the housing (4), and the flow port (12) opens into the gap (B). When the dispenser (6) is in the housing (4), the gap (B) remains between the housing (4) wall and one side of the dispenser (6). For ease of placement, the gap

(B) is preferably positioned between the rear surface of the dispenser (6) and the rear wall of the housing (4). The flow port (12) is positioned on the flushing unit (5) so as to face the base of the housing (4) through the gap (B). The foam coming from the delivery line (13) flows into the gap (B) through the flow port (12) and pours directly into the housing (4) without filling into the dispenser (6). Thus, any accumulation on the dispenser (6) surface is prevented.

[0020] In another embodiment of the present invention, the flow port (12) has an inlet end (15) connected to the delivery line (13), an outlet end (16) opening into the housing (4), and a chamber (17) between the inlet end (15) and the outlet end (16). The foam coming through the inlet end (15) fills into the chamber (17) and flows into the housing (4) through the outlet end (16) provided on the base of the chamber (17). The chamber (17) widens the flow path between the inlet end (15) and the outlet end (16) and facilitates the flow of the foam through the outlet end (16).

[0021] In another embodiment of the present invention, the delivery line (13) at least partially extends in an inclined manner in the vertical plane. The delivery line (13) extends in an inclined manner in the vertical plane such that the fluid therein flows towards the flow port (12) by the effect of the gravity. Thus, the fluid is prevented from accumulating in the delivery line (13) and clogging the delivery line (13). Consequently, the air communication between the housing (4) and the drying air duct (8) is prevented from being interrupted.

[0022] In another embodiment of the present invention, the dampening means (18) can be positioned on the opening (11), the delivery line (13) or the flow port (12). In a preferred version of this embodiment, the dampening means (18) is positioned on the opening (11). Thus, the amount of fluid delivered into the housing (4) is decreased. In another preferred version of this embodiment, the dampening means (18) is positioned on the flow port (12), especially in the chamber (17). Thus, the foam is dampened before being poured into the housing (4), decreasing accumulation of residues and foam in the housing (4).

[0023] In another embodiment of the present invention, at least one dampening means (18) which dampens the foam is disposed at least one of the opening (11), the flow port (12) and the delivery line (13). Thus, the foam is dampened before being delivered into the housing (4).

[0024] In another embodiment of the present invention, the dampening means (18) is in the form of a porous sieve. The dampening means (18) preferably has a sieve form with wide pores such that while the foamy water passes through the dampening means (18), the foam hits the pores and bursts. By means of the simple structure of the dampening means (18) in the porous sieve form, ease of application is provided.

[0025] By means of the present invention, fluidical connection between the drying air duct (8) and the housing (4) is provided, ensuring the safe discharge of the foam

and air in the drying air duct (8). Thus, the operational safety of the laundry washer-dryer is improved.

5 Claims

1. A laundry washer-dryer (1) **comprising** a body (2); a tub (3) wherein the washing and drying processes are performed; a housing (4) which is provided on the body (2), which receives a detergent dispenser (6) suitable for loading detergent, and which has a flushing unit (5) which supplies water into the dispenser (6); and a drying air duct (8) which has an air inlet (9) which receives the air from the tub (3) and an air outlet (10) which delivers the air into the tub (3), and wherein a fan (7) which provides the circulation of the drying air is disposed, an opening (11) which is provided on the drying air duct (8); a flow port (12) which is provided on the housing (4) and which opens into the housing (4); and at least one delivery line (13) which is connected to the flow port (12) at one end and to the opening (11) at the other end and which provides fluidical connection between the housing (4) and the drying air duct (8), **characterized by** a gap (B) which remains in the housing (4) between the dispenser (6) and the housing (4) when the dispenser (6) is inside the housing (4), and the flow port (12) which opens into the gap (B).
2. A laundry washer-dryer (1) as in Claim 1, **characterized by** a fan housing (14) which is provided on the drying air duct (8) and which receives the fan (7), and the opening (11) which is provided on the fan housing (14).
3. A laundry washer-dryer (1) as in Claim 1 or 2, **characterized by** the flow port (12) which is provided on the flushing unit (5).
4. A laundry washer-dryer (1) as in any one of the above claims, **characterized by** the flow port (12) which has an inlet end (15) connected to the delivery line (13), an outlet end (16) opening into the housing (4), and a chamber (17) between the inlet end (15) and the outlet end (16).
5. A laundry washer-dryer (1) as in any one of the above claims, **characterized by** the delivery line (13) which at least partially extends in an inclined manner in the vertical plane.
6. A laundry washer-dryer (1) as in any one of the above claims, **characterized by** at least one dampening means (18) which is in the form of a porous sieve and which dampens foam and which is disposed at least one of the opening (11), the flow port (12) and the delivery line (13).

Patentansprüche

1. Wäschewasch-Trockner (1) **umfassend** einen Körper (2); eine Wanne (3), in der die Wasch- und Trocknungsvorgänge durchgeführt werden; ein Gehäuse (4), das an dem Körper (2) vorgesehen ist, das einen Waschmittelspender (6) aufnimmt, der zum Einfüllen von Waschmittel geeignet ist, und das eine Spüleinheit (5) aufweist, die Wasser in den Spender (6) liefert; und einen Trocknungsluftkanal (8), der einen Lufteinlass (9), der die Luft aus der Wanne (3) aufnimmt, und einen Luftauslass (10), der die Luft in die Wanne (3) abgibt, aufweist, und wobei ein Gebläse (7) angeordnet ist, das für die Umwälzung der Trocknungsluft sorgt, eine Öffnung (11), die an dem Trocknungsluftkanal (8) vorgesehen ist; eine am Gehäuse (4) vorgesehene Strömungsöffnung (12), die in das Gehäuse (4) mündet; und mindestens eine Förderleitung (13), die einerseits mit der Strömungsöffnung (12) und andererseits mit der Öffnung (11) verbunden ist und eine strömungstechnische Verbindung zwischen dem Gehäuse (4) und dem Trocknungsluftkanal (8) herstellt, **gekennzeichnet durch** einen Spalt (B), der im Gehäuse (4) zwischen dem Spender (6) und dem Gehäuse (4) verbleibt, wenn sich der Spender (6) im Gehäuse (4) befindet, und die Strömungsöffnung (12), die in den Spalt (B) mündet.
2. Wäschewasch-Trockner (1), wie in Anspruch 1 aufgeführt, **dadurch gekennzeichnet, dass** ein am Trocknungsluftkanal (8) vorgesehene Gebläsegehäuse (14), das das Gebläse (7) aufnimmt, und die am Gebläsegehäuse (14) vorgesehene Öffnung (11).
3. Wäschewasch-Trockner (1), wie in Anspruch 1 oder 2 aufgeführt, **dadurch gekennzeichnet, dass** die an der Spüleinheit (5) vorgesehene Strömungsöffnung (12).
4. Wäschewasch-Trockner (1), wie in einem der vorstehenden Ansprüche aufgeführt, **dadurch gekennzeichnet, dass** den Strömungsöffnung (12), der ein mit der Förderleitung (13) verbundenes Einlassende (15), ein in das Gehäuse (4) mündendes Auslassende (16) und eine Kammer (17) zwischen dem Einlassende (15) und dem Auslassende (16) aufweist.
5. Wäschewasch-Trockner (1), wie in einem der vorstehenden Ansprüche aufgeführt, **dadurch gekennzeichnet, dass** die Förderleitung (13) zumindest teilweise in der vertikalen Ebene schräg verläuft.
6. Wäschewasch-Trockner (1), wie in einem der vorstehenden Ansprüche aufgeführt, **dadurch gekennzeichnet, dass** mindestens ein als poröses Sieb ausgebildetes, schaumdämpfendes Dämp-

fungsmittel (18), das an mindestens einer der Öffnungen (11), der Strömungsöffnung (12) und der Förderleitung (13) angeordnet ist.

Revendications

1. Un lave-linge séchant (1) **comprenant** un corps (2) ; une baignoire (3) dans laquelle les processus de lavage et de séchage sont effectués ; un boîtier (4) qui est prévu sur le corps (2), qui reçoit un distributeur de détergent (6) approprié pour charger le détergent, et qui a une unité de rinçage (5) qui fournit de l'eau dans le distributeur (6) ; et un conduit d'air de séchage (8) qui a une entrée d'air (9) qui reçoit l'air de la baignoire (3) et une sortie d'air (10) qui délivre l'air dans la baignoire (3), et dans lequel un ventilateur (7) qui assure la circulation de l'air de séchage est disposé, une ouverture (11) qui est prévue sur le conduit d'air de séchage (8) ; un orifice d'écoulement (12) situé sur le boîtier (4) et qui débouche dans le boîtier (4) ; et au moins une conduite de refoulement (13) qui est reliée à l'orifice d'écoulement (12) à une extrémité et à l'ouverture (11) à l'autre extrémité et qui assure une connexion fluide entre le boîtier (4) et le conduit d'air de séchage (8), **caractérisée par** un espace (B) qui reste dans le boîtier (4) entre le distributeur (6) et le boîtier (4) lorsque le distributeur (6) est à l'intérieur du boîtier (4), et par l'orifice d'écoulement (12) qui s'ouvre dans l'espace (B).
2. Un lave-linge séchant (1) selon la déclaration 1, **caractérisé par** un boîtier de ventilateur (14) qui est prévu sur le conduit d'air de séchage (8) et qui reçoit le ventilateur (7), et l'ouverture (11) qui est prévue sur le boîtier de ventilateur (14).
3. Un lave-linge séchant (1) selon la déclaration 1 ou 2, **caractérisé par** l'orifice d'écoulement (12) qui est prévu sur l'unité de rinçage (5).
4. Un lave-linge séchant (1) selon l'une quelconque des déclarations précédentes, **caractérisé par** l'orifice d'écoulement (12) qui présente une extrémité d'entrée (15) reliée à la conduite de refoulement (13), une extrémité de sortie (16) débouchant dans le boîtier (4), et une chambre (17) entre l'extrémité d'entrée (15) et l'extrémité de sortie (16).
5. Un lave-linge séchant (1) selon l'une quelconque des déclarations précédentes, **caractérisé par** la conduite de refoulement (13) qui s'étend au moins partiellement de manière inclinée dans le plan vertical.
6. Un lave-linge séchant (1) selon l'une quelconque des déclarations précédentes, **caractérisé par** au moins un moyen d'amortissement (18) qui se présente sous la forme d'un tamis poreux et qui amortit la

mousse et qui est disposé au moins au niveau de l'ouverture (11), de l'orifice d'écoulement (12) et de la conduite de refoulement (13).

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Figure 1

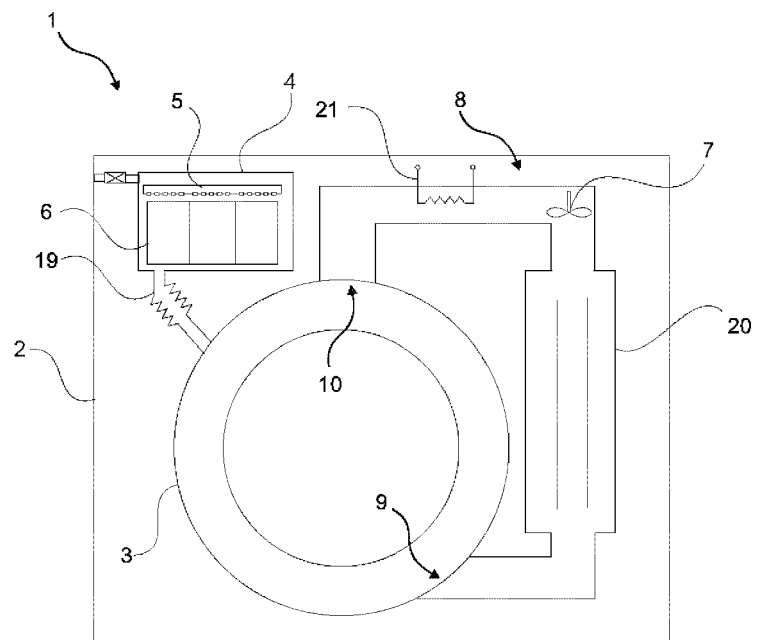


Figure 2

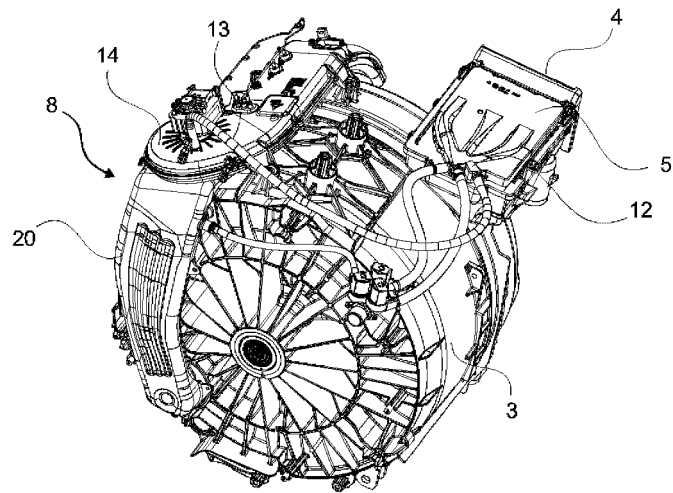


Figure 3

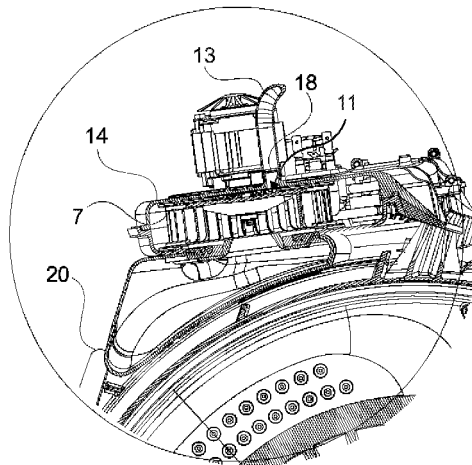


Figure 4

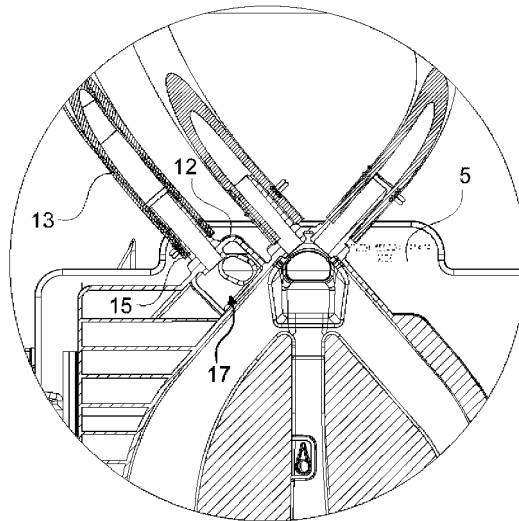
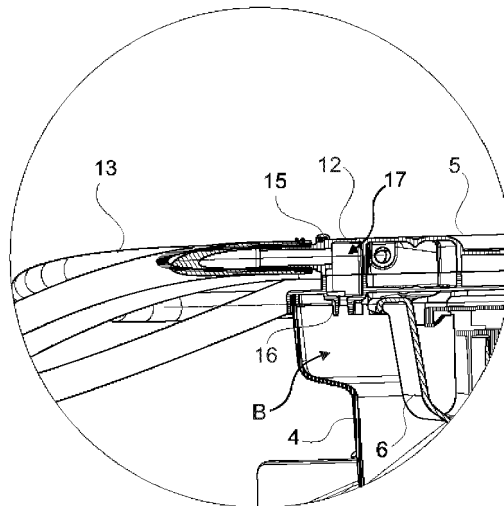


Figure 5



REFERENCES CITED IN THE DESCRIPTION

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