



EUROPEAN PATENT APPLICATION

(43) Date of publication:
03.07.2024 Bulletin 2024/27

(51) International Patent Classification (IPC):
D06F 58/20 ^(2006.01) **D06F 58/06** ^(2006.01)
D06F 34/26 ^(2020.01)

(21) Application number: **23220167.3**

(52) Cooperative Patent Classification (CPC):
D06F 58/20; D06F 34/26; D06F 58/06

(22) Date of filing: **22.12.2023**

(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 ME MK MT NL
NO PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

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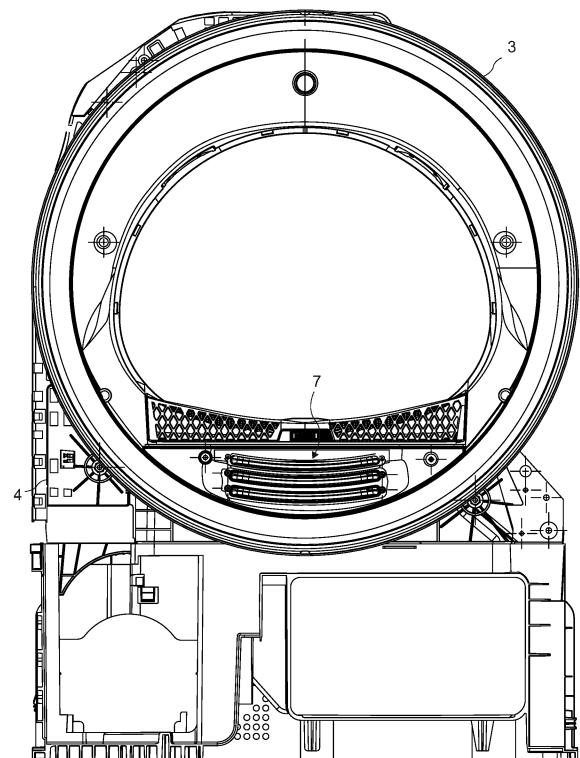
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(30) Priority: **30.12.2022 TR 202221750**

(54) **A LAUNDRY DRYER**

(57) The present invention relates to a laundry dryer (1) comprising a body (2); a drum (3) which is disposed in the body and wherein the laundry to be dried is placed; at least one bearing member (4) which provides the connection of the drum (3) to the body (2); at least one sensor member (7) having a sensor body (5) which is fixed onto the bearing member (4) and a plurality of electrodes (6) which are disposed on the sensor body (5) so as to face the interior of the drum (3) and which provide the detection of the humidity rate of the laundry; at least one grounding member (8) which is manufactured from an electrically conductive material and which is disposed on the sensor body (5) so as to face the interior of the drum (3); and at least one grounding line (9) which is connected to the grounding member (8) and which enables the electrical load on the grounding member (8) to be grounded.

Figure 2



Description

[0001] The present invention relates to a laundry dryer wherein the grounding process is performed.

[0002] In laundry dryers, various components on the laundry dryer are usually grounded to prevent electrical leaks and to prevent the user from encountering adverse situations. The laundry dryers comprises a drum wherein the laundry to be dried is loaded and that the user contacts through the laundry. During the drying process, the drum is rotated to tumble the laundry in the drum. Thus, the drying air, which is passed over the laundry to dry the wet laundry, is enabled to affect the laundry homogeneously. However, the rotating movement of the drum causes friction between the relatively dry laundry and the drum surface. These frictions cause static electric charge to accumulate on the laundry/fabrics. The electrical charge accumulated on the laundry is transferred to the drum which is manufactured from electrically conductive material. The grounding of the drum is critical for the user since the user is in direct contact with the drum. Flammable gases are used in the drying cycle to increase the energy efficiency of the laundry dryers. Therefore, possible electrical leaks which may occur on the drum may cause material and moral damage. Moreover, the static electricity charge accumulated on the laundry causes the laundry to stick to each other and prevents the drying air from penetrating the laundry effectively, thus resulting in undesirable increases in the drying times. Especially while drying synthetic fabrics whereon static electricity accumulates more, the energy consumption of the laundry dryer increases significantly. Therefore, a laundry dryer is needed wherein the static electric charge accumulated on the laundry during the drying process is grounded.

[0003] In the state of the art European Patent Application No. EP23 87642, a laundry dryer is disclosed, wherein the dryness detection sensitivity is increased.

[0004] In the state of the art European Patent Application No. EP2387643, a laundry dryer is disclosed, which is manufactured by the plastic injection method and which has a conductivity sensor for determining the moisture content of the laundry.

[0005] In the state of the art Chinese Patent Application No. CN101314914, a laundry dryer is disclosed, comprising a grounding device which has a plurality of electrically conductive components, which contacts the shaft providing the rotation of the drum about the horizontal axis, and which contacts the shaft so as to ensure that the electricity on the drum is grounded by removing the same from the drum.

[0006] In the state of the art Chinese Patent Application No. CN105220427, a laundry dryer is disclosed, comprising a grounding lid which is provided on the drum and which enables the drum to be grounded.

[0007] The aim of the present invention is the realization of a laundry dryer wherein the static electricity on the laundry is grounded.

[0008] The laundry 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 drum which is disposed in the body and wherein the laundry to be dried is placed; at least one bearing member whereon the drum is borne; at least one sensor member having a sensor body which is attached on the bearing member and a plurality of electrodes which are disposed on the front side of the sensor body facing the drum so as to contact the laundry in the drum and which provide the detection of the humidity rate of the laundry; at least one grounding member which is manufactured from electrically conductive material and which is provided on the front side of the sensor body facing the drum so as to contact the laundry in the drum; and at least one grounding line which is connected to the grounding member and which enables the electrical load to be grounded through the grounding member. Thus, the static electricity charge on the laundry is directly grounded as the laundry directly contacts the grounding member during the drying process. Consequently, by preventing the laundry from sticking to each other due to the static electricity accumulated on the laundry, the laundry is enabled to be exposed to the drying air more effectively and the drying times are significantly reduced.

[0009] In an embodiment of the present invention, at one end of the grounding member, there is at least one connection end which extends towards the back side of the sensor body facing the bearing member and whereon the grounding line is connected. Thus, the grounding line is prevented from being connected to the grounding member from the inside of the drum and the grounding line is prevented from getting caught in the laundry or the drum and breaking. Moreover, the grounding member is prevented from damaging the laundry.

[0010] In another embodiment of the present invention, at least one protrusion which is provided on the sensor body extends along the length between the grounding member and the electrodes so as to enable the grounding member and the electrodes to be separated from each other. In a preferred version of this embodiment, the protrusion is positioned on the rear side of the sensor body facing the bearing member. Thus, the protrusion physically separates the grounding line and the electrodes from each other and prevents the formation of short circuits which may occur due to the contact of the grounding line to the electrodes, the presence of a conductive object between the electrodes and the grounding member, etc. Consequently, the grounding of the electrodes is prevented such that the sensor member is prevented from detecting an incorrect humidity level.

[0011] In another embodiment of the present invention, a plurality of terminals which connect the electrodes to a detection circuit for determining the moisture content on the laundry is provided on the back side of the sensor body which does not face the drum, and the protrusion extends between the terminals and the connection end such that the terminals and the connection end remain

on opposite sides of the protrusion. Thus, the terminals and the connection end are prevented from contacting each other and the terminals are prevented from being grounded, in other words, a short circuit which may occur between the terminals and the connection end is avoided.

[0012] In another embodiment of the present invention, the grounding member is disposed on the sensor body so as to remain above the electrodes. Thus, when a small amount of laundry is dried, the moisture content of the laundry is detected and the static electric charge accumulated on the laundry is effectively grounded.

[0013] In another embodiment of the present invention, the grounding member and the electrodes are in the form of a rod. Thus, the contact level of the laundry with the electrodes and the grounding member is increased. Moreover, the grounding member and the electrodes may be in the form of rods extending perpendicular to the floor.

[0014] In another embodiment of the present invention, the grounding member and the electrodes are manufactured by the injection method so as to be integrated with the sensor body. Detailed and complex structures such as sensor members are manufactured cost-effectively by the injection method.

[0015] By means of the present invention, a laundry dryer is realized, having the sensor member wherein the grounding process is carried out and the moisture content of the laundry is determined during the drying process.

[0016] The laundry dryer realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

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

Figure 2 - is the view of the bearing member and the sensor member related to another embodiment of the present invention.

Figure 3 - is the front view of the sensor member and the grounding member disposed on the sensor member related to an embodiment of the present invention.

Figure 4 - is the view of the cross-section E-E shown in Figure 3.

Figure 5 - is the rear view of the sensor member related to another embodiment of the present invention.

[0017] The elements illustrated in the figures are numbered as follows:

- 1- Laundry dryer
- 2- Body

- 3- Drum
- 4- Bearing member
- 5- Sensor body
- 6- Electrode
- 7- Sensor member
- 8- Grounding member
- 9- Grounding line
- 10- Connection end
- 11- Protrusion
- 110- Terminal

[0018] The laundry dryer (1) comprises a body (2); a drum (3) which is disposed in the body and wherein the laundry to be dried is placed; at least one bearing member (4) which provides the connection of the drum (3) to the body (2); and at least one sensor member (7) having a sensor body (5) which is fixed onto the bearing member (4) and a plurality of electrodes (6) which are disposed on the sensor body (5) so as to face the interior of the drum (3) and which provide the detection of the humidity rate of the laundry. As the drum (3) is rotated, the laundry moves in the drum (3) and contacts the electrodes (6) disposed on the sensor body (5). If the laundry is wet, an electrical charge is transmitted between the electrodes (6) and the moisture content on the laundry is determined according to the electrical charge. The sensor member (7) is generally placed under the bearing member (4) positioned at the front of the body (2). Thus, the humidity level on the laundry is detected even when there is a small amount of laundry in the drum (3).

[0019] The laundry dryer (1) of the present invention comprises at least one grounding member (8) which is manufactured from an electrically conductive material and which is disposed on the sensor body (5) so as to face the interior of the drum (3), and at least one grounding line (9) which is connected to the grounding member (8) and which enables the electrical load on the grounding member (8) to be grounded. In addition to the electrodes (6), the grounding member (8) is located on the sensor body (5). As the drum (3) is rotated, the laundry in the drum (3) moves and contacts the grounding member (8). In order to ground the static electric charge on the laundry, the grounding member (8) is manufactured from an electrically conductive material, preferably from metal. The grounding member (8) is connected to the grounding line (9). The grounding process is performed by transmitting the electrical charge, transferred from the laundry to the grounding member (8), from the grounding member (8) to the grounding line (9). By means of the ground-

ing member (8) provided on the sensor member (7), the electrical charge accumulated on the laundry is enabled to be effectively grounded. Moreover, by placing the grounding member (8) and the grounding line (9) in an easily accessible position in the body (2), the maintenance and repair as well as the serviceability of the sensor member (7) are facilitated. Furthermore, the electric charge accumulated on the laundry is prevented from being transmitted to the drum (3), thus preventing the accumulation of an electric charge on the drum (3) in an amount which may pose a safety risk.

[0020] In an embodiment of the present invention, on the grounding member (8), there is at least one connection end (10) which is located on the back side of the sensor body (5) not facing the drum (3) and which provides the connection of the grounding line (9) to the grounding member (8). On the sensor body (6), there is at least one opening which enables the connection end (10) on the grounding member (8) to be passed there-through and to extend towards the back side of the sensor body (5) not facing the drum (3). The grounding line (9) is connected to the connection end (10) positioned on the back side of the sensor body (5) not facing the drum (3). The grounding line (9) remains at the back side of the sensor body (5) so as not to move with the rotating movement of the drum (3) or contact the laundry. Thus, the security of the connection between the connection end (10) and the grounding line (9) is provided.

[0021] In another embodiment of the present invention, on the sensor body (5), there is at least one protrusion (11) which extends longitudinally between the grounding member (8) and the electrodes (6) so as to separate the grounding member (8) from the electrodes (6). Thus, matters such as fluff and fiber are prevented from establishing electrical communication between the electrodes (6) and the grounding member (8). Thus, the electric current occurring between the electrodes (6) when the damp laundry contacts the electrodes (6) is prevented from being grounded by the grounding member (8), thus preventing the sensor member (7) from detecting incorrect humidity levels.

[0022] In another embodiment of the present invention, the protrusion (11) extends from the sensor body (5) towards the back side of the sensor body (5) not facing the drum (3). Thus, matters such as lint and fiber are prevented from leaking through the sensor body (5) to the back side of the sensor body (5) not facing the drum (3) and accumulating between the electrodes (6) and the grounding member (8). Thus, the electrical charge is prevented from being transmitted between the electrodes (6) and the grounding member (8).

[0023] In another embodiment of the present invention, on the back side of the electrodes (6) not facing the drum (3), there are a plurality of terminals (110) which connect the electrodes (6) to a detection circuit providing the detection of the moisture content on the laundry, and the protrusion (11) extends between the terminals (110) and the connection end (10) so as to separate the terminals

(110) and the connection end (10). Thus, the connection end (10) and the terminals (110) are prevented from contacting each other directly or indirectly through a conductive line which may form over time due to accumulation of lint, etc.

[0024] In another embodiment of the present invention, the grounding member (8) is positioned on the sensor body (5) so as to remain above the electrodes (6). The sensor body (5) is located at the lower side of the bearing member (4). According to the results of the tests performed with various amounts of laundry placed in the drum (3), in case the grounding member (8) is positioned above the electrodes (6), optimum grounding of the laundry tumbled by the movement of the drum (3) is achieved by increasing the contact of the grounding member (8) with the laundry.

[0025] In another embodiment of the present invention, the grounding member (8) and the electrodes (6) are in the form of a rod. Thus, the surface area where the laundry contacts the grounding member (8) and the electrodes (6) is increased such that more sensitive moisture detection is provided and a more effective grounding process is performed.

[0026] In another embodiment of the present invention, the grounding member (8) and the electrodes (6) are manufactured by the injection method so as to be integrated with the sensor body (5). First, the electrodes (6), the grounding member (8), the terminals (110) and the connection end (10) are pumped into molds prepared in advance by the manufacturer by the metal injection method. Then, a sensor body (5) mold is used in addition to this mold. By injecting plastic into the sensor body (5) mold, the integrated sensor member (7) is obtained. By means of the injection method, the sensor member (7) is ensured to have a durable structure and the production of the sensor member (7) is accelerated.

[0027] By means of the present invention, a laundry dryer (1) is realized, comprising the sensor member (7) having a grounding member (8) which removes the static electricity charge accumulated on the laundry during the drying process and a grounding line (9) which is connected to the grounding member (8) and which enables the electrical load received from the grounding member (8) to be grounded.

Claims

1. A laundry dryer (1) **comprising** a body (2); a drum (3) which is disposed in the body and wherein the laundry to be dried is placed; at least one bearing member (4) which provides the connection of the drum (3) to the body (2); and at least one sensor member (7) having a sensor body (5) which is fixed onto the bearing member (4) and a plurality of electrodes (6) which are disposed on the sensor body (5) so as to face the interior of the drum (3) and which provide the detection of the humidity rate of the laun-

dry, **characterized by** at least one grounding member (8) which is manufactured from an electrically conductive material and which is disposed on the sensor body (5) so as to face the interior of the drum (3), and at least one grounding line (9) which is connected to the grounding member (8) and which enables the electrical load on the grounding member (8) to be grounded. 5

2. A laundry dryer (1) as in Claim 1, **characterized by** at least one connection end (10) which is provided on the grounding member (8), which is located on the back side of the sensor body (5) not facing the drum (3) and which provides the connection of the grounding line (9) to the grounding member (8). 10 15
3. A laundry dryer (1) as in Claim 1 or 2, **characterized by** at least one protrusion (11) which is provided on the sensor body (5) and which extends longitudinally between the grounding member (8) and the electrodes (6) so as to separate the grounding member (8) from the electrodes (6). 20
4. A laundry dryer (1) as in Claim 3, **characterized by** the protrusion (11) which extends from the sensor body (5) towards the back side of the sensor body (5) not facing the drum (3). 25
5. A laundry dryer (1) as in Claim 4, **characterized by** a plurality of terminals (110) which are provided on the back side of the electrodes (6) not facing the drum (3) and which connect the electrodes (6) to a detection circuit providing the detection of the moisture content on the laundry, and by the protrusion (11) which extends between the terminals (110) and the connection end (10) so as to separate the terminals (110) and the connection end (10). 30 35
6. A laundry dryer (1) as in any one of the above claims, **characterized by** the grounding member (8) which is positioned on the sensor body (5) so as to remain above the electrodes (6). 40
7. A laundry dryer (1) as in any one of the above claims, **characterized by** the grounding member (8) and the electrodes (6) which are in the form of a rod. 45
8. A laundry dryer (1) as in any one of the above claims, **characterized by** the grounding member (8) and the electrodes (6) which are manufactured by the injection method so as to be integrated with the sensor body (5). 50

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Figure 1

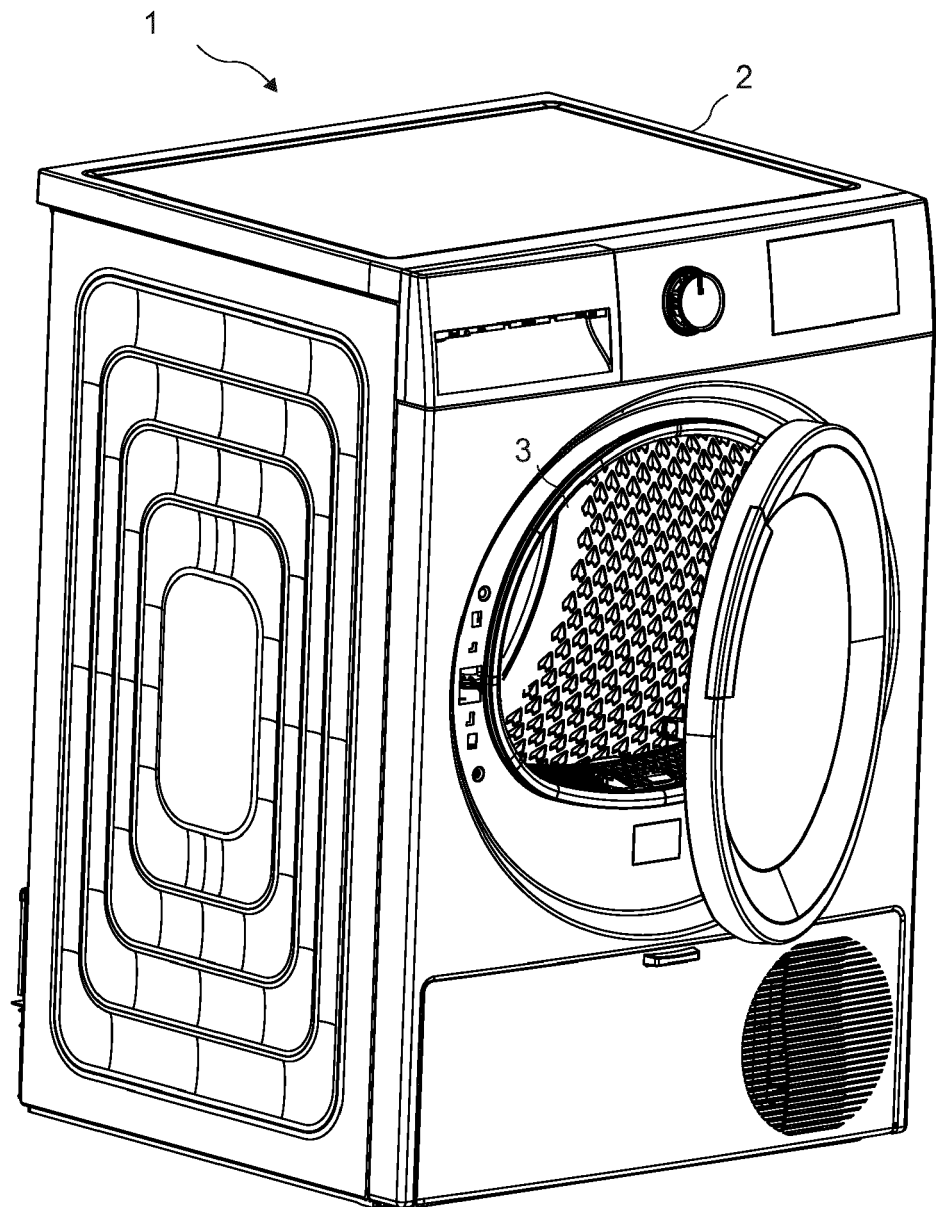


Figure 2

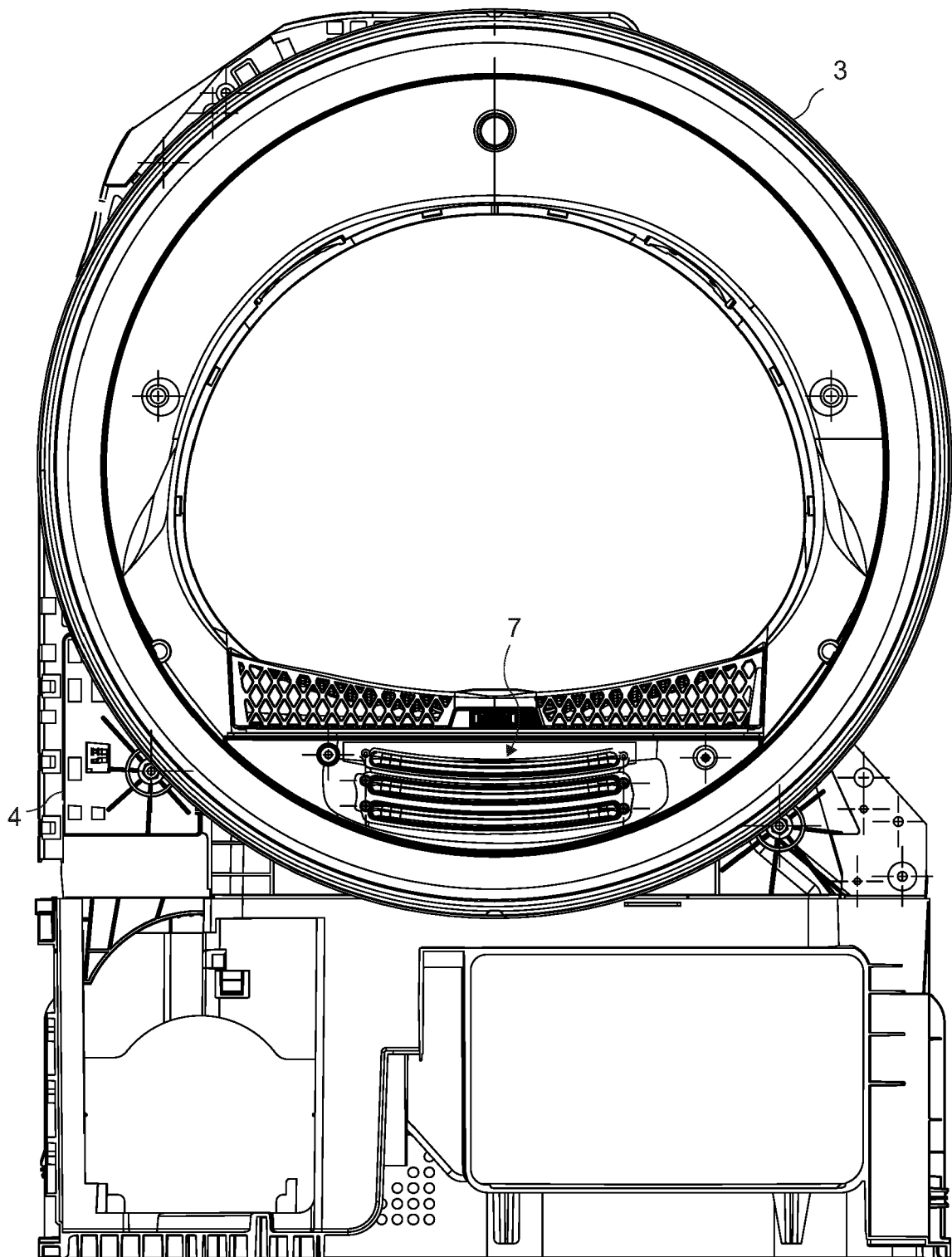


Figure 3

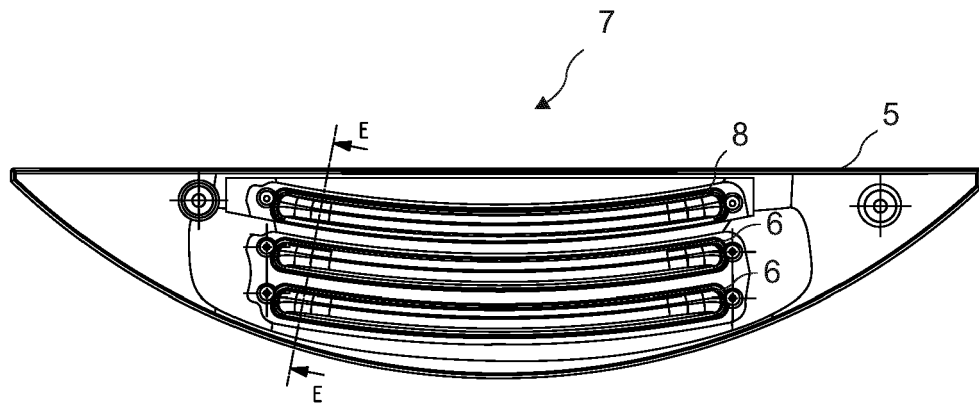


Figure 4

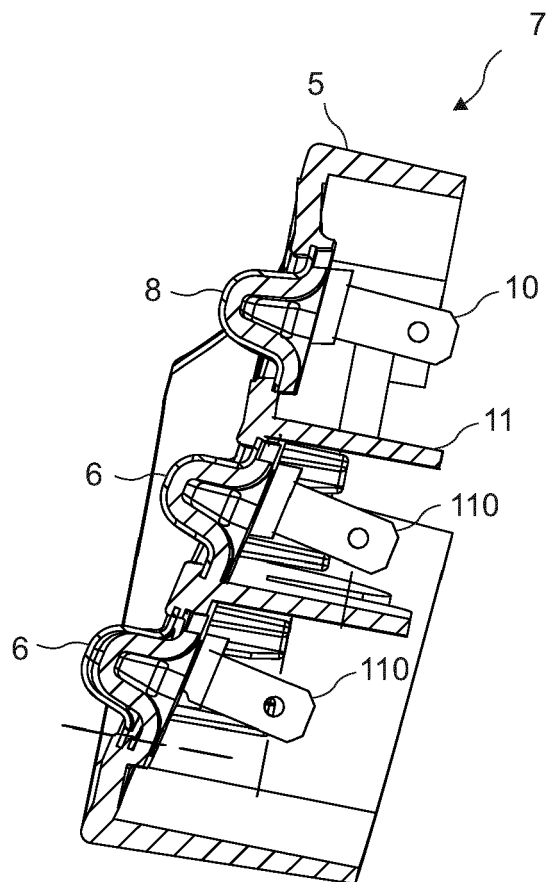
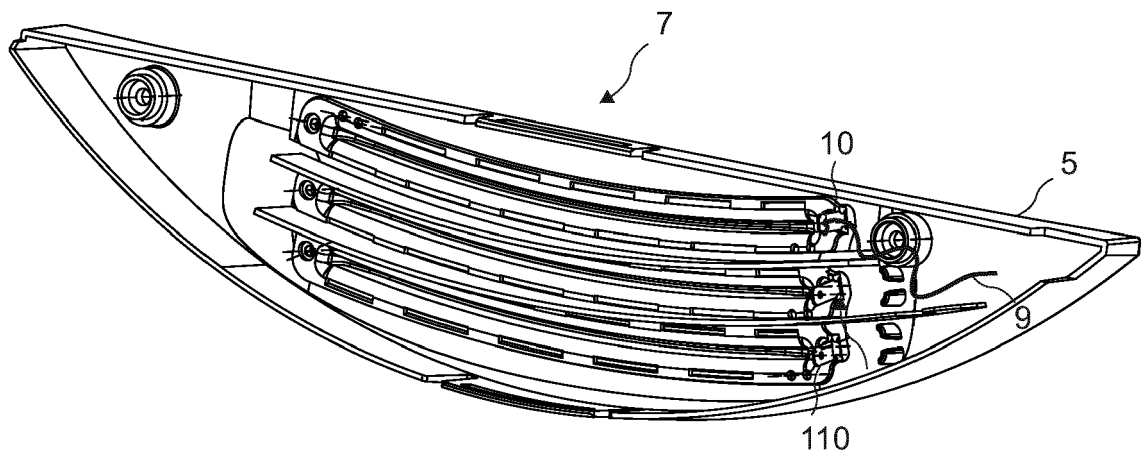


Figure 5





EUROPEAN SEARCH REPORT

Application Number

EP 23 22 0167

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EPO FORM 1503 03:82 (P04C01)

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			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 19 April 2024	Examiner Weidner, Maximilian
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			

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

EP 23 22 0167

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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