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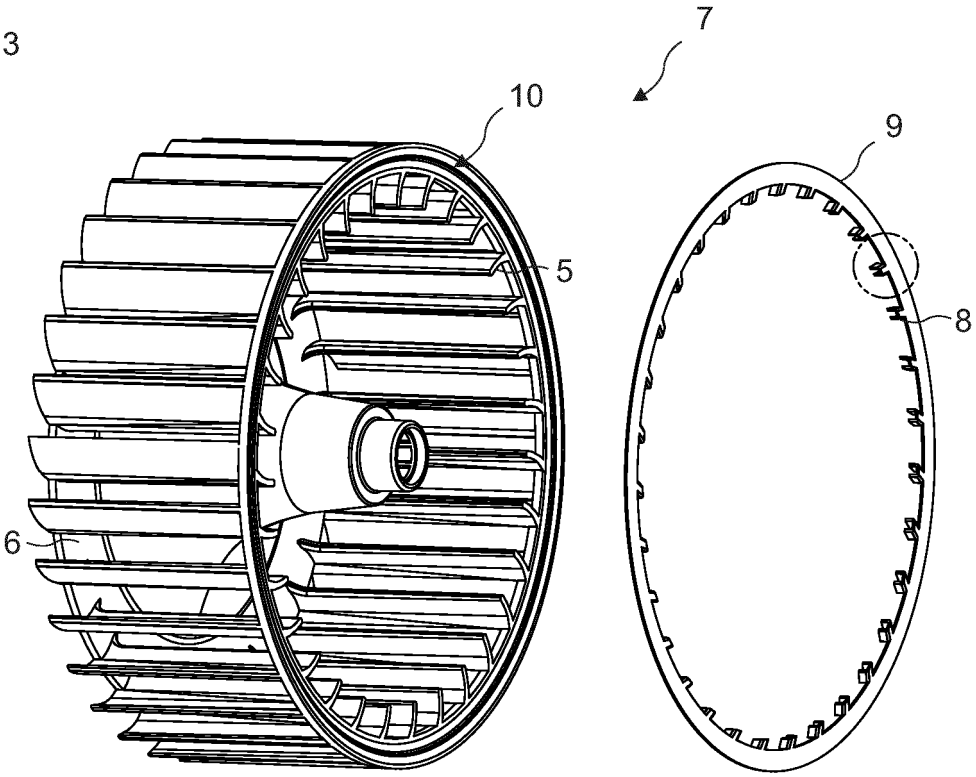
(71) Applicant: **Arçelik Anonim Sirketi**
34445 Istanbul (TR)

(72) Inventors:
- **SELCUK, Cem**
  34445 Istanbul (TR)
- **SAR, Can**
  34445 Istanbul (TR)
- **ERTAS, Guven**
  34445 Istanbul (TR)

(54) **A HOUSEHOLD APPLIANCE**

(57) The present invention relates to a household appliance (1) comprising a body (2); a drum (3) which is disposed in the body (2) and wherein the laundry is loaded; an air duct (12) through which the drying air to be delivered to the drum (3) is circulated; and a fan (7) positioned in the air duct (12) and having a hub (4) which is suitable to be placed on a shaft rotated by a motor and a frame (6) having a plurality of blades (5) which move the air.

Figure 3



EP 4 435 170 A1

Description

[0001] The present invention relates to a household appliance having a fan with increased strength. The household appliance is preferably a laundry dryer or a laundry washer/dryer.

[0002] The household appliances generally comprise one or more than one fan providing fluid circulation for various purposes. The fan has various blade structures which are angled or not. The blades are rotated by means of movement transmission members such as a motor and a shaft. The circulation of the fluid is ensured by means of the rotating blades. In case the household appliance is a laundry dryer, the fans generally provide the circulation of the drying air which enables the laundry to be dried or blow cold air on various components (compressor, etc.) in the laundry dryer so as to provide the cooling of the components. Operating the fan under high ambient temperature and high pressure or rotating the same at high speeds for a long time to accelerate the air flow causes cracks or breaks in the fan structure, which causes the same to completely lose its function. In order eliminate security risks, increase customer satisfaction and reduce financial losses resulting from fan damage, fans with increased strength are required.

[0003] In the state of the art European Patent Application No. EP2428682, a bidirectional fan system having self-adjusting vanes is disclosed.

[0004] The aim of the present invention is the realization of a household appliance having a fan with increased strength.

[0005] The household appliance 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 is loaded; an air duct through which the drying air to be delivered to the drum is circulated; a fan disposed in the air duct and having a hub which is suitable to be placed on a shaft rotated by a motor and a frame having a plurality of blades which provide kinetic energy to the drying air such that the drying air is circulated in the drying duct; and at least one support member which has a plurality of protrusions and which is fixed on the fan such that each protrusion is connected to a blade. By means of the support member, the blades are structurally supported more such that the strength of the blades is increased, thus preventing possible safety problems arising from deformations such as cracks, breaks, etc.. Moreover, mechanical vibrations caused by the passage of the drying air over the blades are damped by the support member. Thus, the sound level is prevented from reaching undesirable levels during the operation of the fan.

[0006] In an embodiment of the present invention, at least one slot is provided on the frame and the support member is placed in the slot. The slot is preferably in the form of a recess arranged on the frame, which extends along the frame. In case the support member is mechanically connected to the frame, the slot and the frame are connected to each by the snap-fit method such that the connection between the support member and the frame is enabled to be even more durable. In case the support member and the fan are manufactured by the plastic injection method, the slot enables the support member, which is a molten material, to adhere to the frame better.

[0007] In another embodiment of the present invention, the protrusion has a U profile so as to at least partially grip each blade. Thus, the blade is prevented from deflection.

[0008] In another embodiment of the present invention, the support member has a circular form so as to at least partially surround the frame. Thus, the support member also provides sound insulation.

[0009] In another embodiment of the present invention, a slot is provided on each of the two lateral faces of the frame, where the blades are fixed at the ends thereof, and two support members are placed in the slots. Thus, the forces acting on both sides of the blade are supported equally by the support members. Moreover, by eliminating significant changes in the center of mass of the fan, vibrations resulting from asymmetrical load distribution are prevented.

[0010] In an embodiment of the present invention, a plurality of curved sections are provided on the protrusion. The curved section can be in the form of a bevel. In this way, the economic life of the fan is extended by preventing possible deformation of the protrusions due to fatigue during the long-term use of the household appliance.

[0011] In another embodiment of the present invention, the fan and the support member are manufactured as a single piece by the plastic injection method. The plastic injection method is advantageous to ensure the secure connection of multiple components. Moreover, costs are decreased when production quantities are high.

[0012] The household appliance is a laundry dryer and/or a laundry washer/dryer.

[0013] By means of the present invention, a household appliance is realized, having a fan of which the strength is increased in a simple and cost-effective manner.

[0014] The household appliance realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

Figure 1 - is the schematic view of the household appliance related to an embodiment of the present invention.

Figure 2 - is the perspective view of the fan and the support member related to another embodiment of the present invention, where the support member is attached on the fan.

Figure 3 - is the view of the fan, the support member, the protrusion and the slot related to another embodiment of the present invention, before the support member is attached on the fan.

Figure 4 - is the detailed view of the support member related to another embodiment of the present invention, showing the protrusion before the support member is attached on the fan.

Figure 5 - is the detailed view of the support member related to another embodiment of the present invention, showing the protrusion engaging with the blade after the support member is attached on the fan.

[0015] The elements illustrated in the figures are numbered as follows:

1- Household appliance

2- Body

3- Drum

4- Hub

5- Blade

6- Frame

7- Fan

8- Protrusion

9- Support member

10- Slot

11- Curved section

12- Air duct

[0016] The household appliance (1) comprises a body (2); a drum (3) which is disposed in the body (2) and wherein the laundry is loaded; an air duct (12) through which the drying air to be delivered to the drum (3) is circulated; and a fan (7) positioned in the air duct (12) and having a hub (4) which is suitable to be placed on a shaft rotated by a motor and a frame (6) having a plurality of blades (5) which move the air. The hub (4) is connected to the shaft rotated by the motor such that the fan (7) is rotated around its own axis. The frame (6) disposed on the fan (7) enables the blades (5) to be rotated together with the hub (4). Thus, the hub (4), the frame (6) and the blades (5) are rotated as a whole. The rotational movement of the blades (5) enables the drying air to be moved. Thus, the circulation of the drying air in the air duct (12) is ensured.

[0017] The household appliance (1) of the present invention comprises at least one support member (9) which has a plurality of protrusions (8) thereon and which is placed on the fan (7) such that each protrusion (8) engages with one blade (5). The protrusions (8) provided on the support member (9) are placed on the blades (5) so as to ensure that the blades (5) are structurally supported by the support member (9). Thus, the area where the blades (5) join the frame (6) is strengthened and the blades (5) are prevented from breaking and deforming. Moreover, in the life tests carried out by the manufacturer, it is observed that the support member (9) effectively increases the economic life of the fan (7). In addition, in case of possible deformation of the blade (5), since the support member (9) is engaged with the blades (5), the blades (5) are prevented from breaking away from the frame (6) and suffering any damage casing the fan (7) to lose its function.

[0018] In an embodiment of the present invention, at least one slot (10) is provided on the frame (6) and the support member (9) is fitted in the slot (10). The centripetal force on the blades (5) and the weight of the support member (9) are transmitted to the frame (6) by means of the slot (10). Thus, a solid connection is achieved between the support member (9) and the frame (6), and by connecting the support member (9) directly to the blades (5) by means of the slot (10), additional force is prevented from acting on the blades (5), thus preventing the blades (5) from breaking easily.

[0019] In another embodiment of the present invention, the protrusion (8) has a U profile so as to at least partially surround the edge of each blade (5). The protrusion (8) has a U form which is suitable for receiving the blade (5) so as to grip the blade (5) from one edge. Since the blades (5) are generally in an angled or curved geometric form, the U shape of the protrusion (8) which surrounds at least a part of the blade (5) ensures that the blade (5) is structurally supported more effectively.

[0020] In another embodiment of the present invention, the support member (9) is in the form of a ring so as to surround the frame (6). Thus, the support member (9) is enabled to grip the frame (6) better. Moreover, the forces transmitted from the blades (5) to the support member (9) and the own weight of the support member (9) are distributed to the larger surface area of the frame (6).

[0021] In another embodiment of the present invention, two slots (10) are provided, each on one side of the frame (6) and two support members (9) are fitted in the slots (10). In this embodiment, a support member (9) is placed on each of the two sides of the frame (6) so as to be fitted into the slots (10). Thus, the strength and the noise dampening capability of the support member (9) are doubled.

[0022] In another embodiment of the present invention, a plurality of curved sections (11) are provided on the protrusion (8). Thus, the durability of the areas on the protrusion (8) with the highest stress concentration is increased such that the protrusions (8) are prevented from breaking away from the support member (9) over time.

[0023] In another embodiment of the present invention, the fan (7) and the support member (9) are manufactured in an integrated manner by the plastic injection method. The material to be used in plastic injection is manufactured from materials such as metal or high-strength plas-

tic and rubber. The material predetermined by the manufacturer is melted and injected into the mold. The order in which the fan (7) or the support member (9) is injected into the mold may vary. When the fan (7) and the support member (9) are manufactured to be fully integrated with each other, a connection resistant to deformations is achieved.

[0024] The household appliance (1) is a laundry dryer and/or a laundry washer/dryer.

[0025] By means of the present invention, a household appliance (1) is realized, having a fan (7) with increased security of which the strength, the noise level and the economic life are improved in a cost-effective manner by means of the support member (9).

Claims

1. A household appliance (1) **comprising** a body (2); a drum (3) which is disposed in the body (2) and wherein the laundry is loaded; an air duct (12) through which the drying air to be delivered to the drum (3) is circulated; and a fan (7) positioned in the air duct (12) and having a hub (4) which is suitable to be placed on a shaft rotated by a motor and a frame (6) having a plurality of blades (5) which move the air, **characterized by** at least one support member (9) which has a plurality of protrusions (8) thereon and which is placed on the fan (7) such that each protrusion (8) engages with one blade (5).

2. A household device (1) as in Claim 1, **characterized by** at least one slot (10) which is provided on the frame (6) and wherein the support member (9) is fitted.

3. A household appliance (1) as in Claim 1 or Claim 2, **characterized by** the protrusion (8) which has a U profile so as to at least partially surround the edge of each blade (5).

4. A household appliance (1) as in any one of the Claims 1 to 3, **characterized by** the support member (9) which is in the form of a ring so as to surround the frame (6).

5. A household appliance (1) as in any one of the above claims, **characterized by** two slots (10) which are provided, each on one side of the frame (6) and by two support members (9) which are fitted in the slots (10).

6. A household device (1) as in any one of the above claims, **characterized by** a plurality of curved sections (11) which are provided on the protrusion (8).

7. A household appliance (1) as in any one of the above claims, **characterized by** the fan (7) and the support member (9) which are manufactured in an integrated manner by the plastic injection method.

8. A household appliance (1) as in any one of the above claims, which is a laundry dryer and/or a laundry washer/dryer.

Figure 1

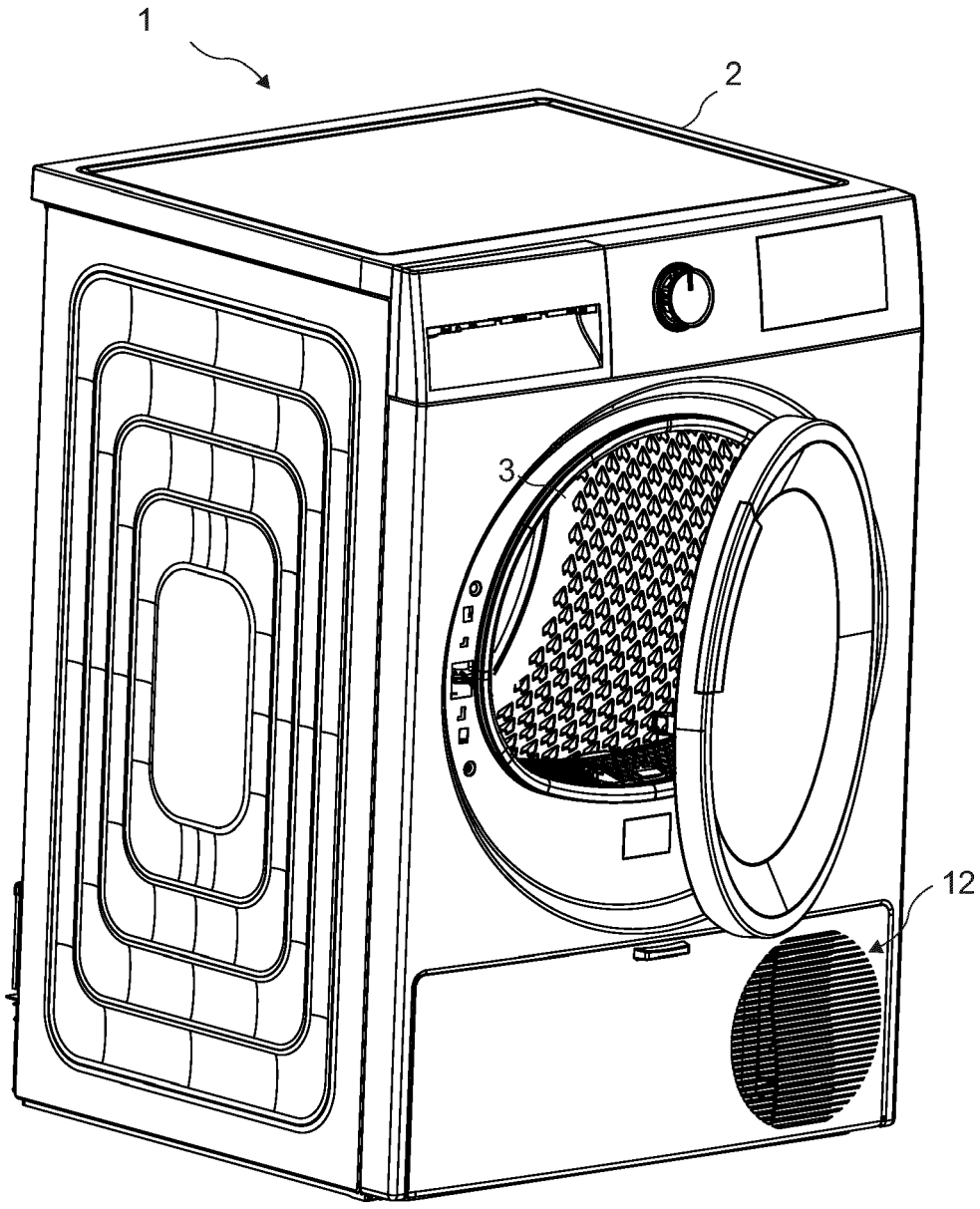


Figure 2

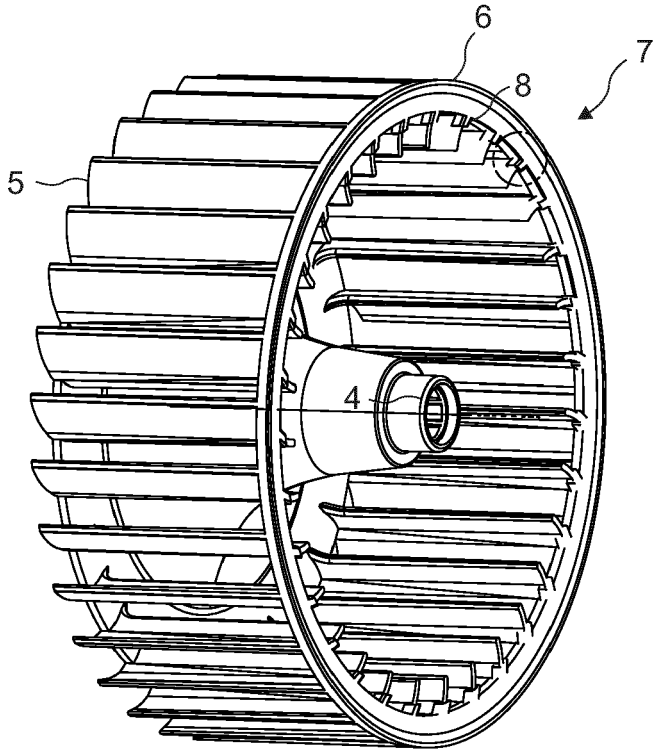


Figure 3

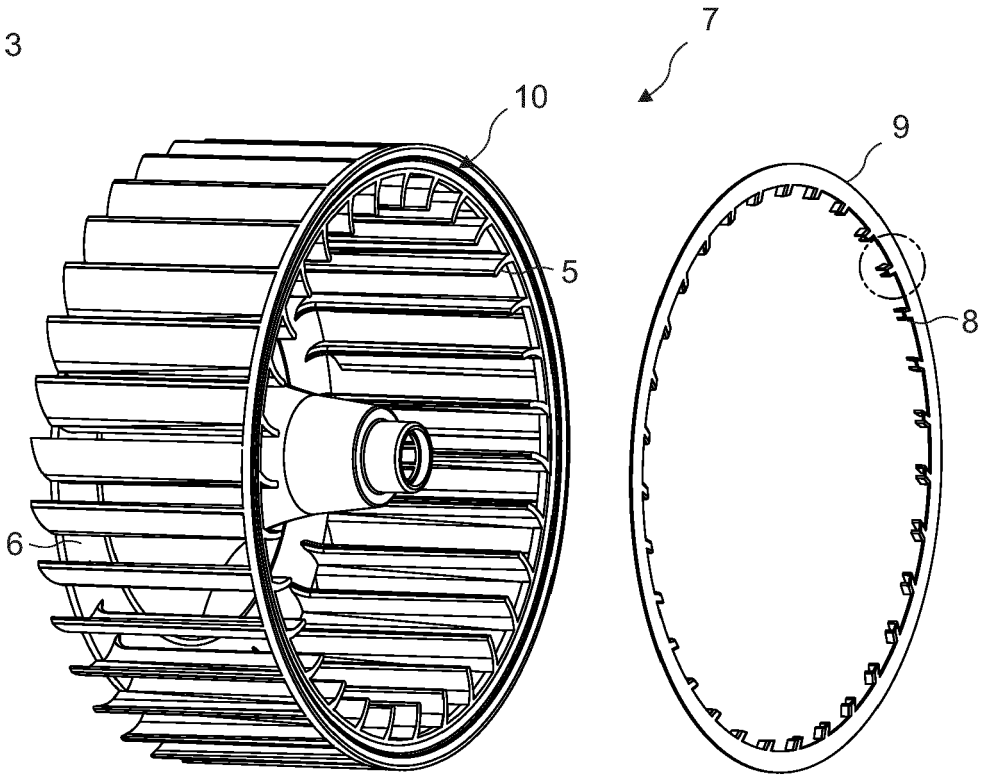


Figure 4

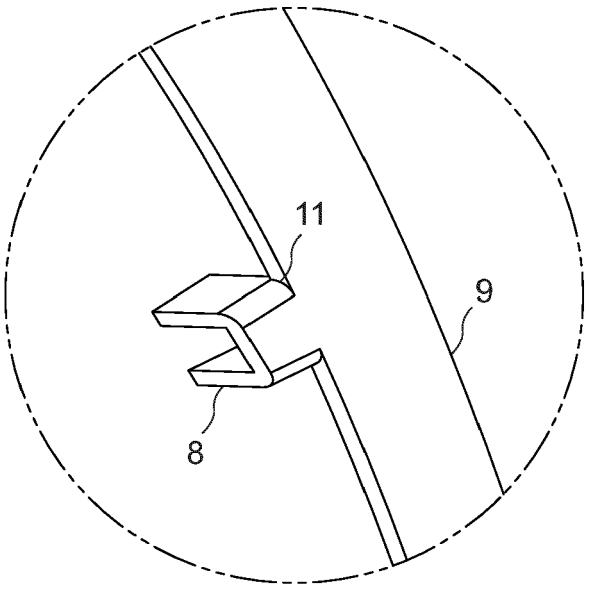
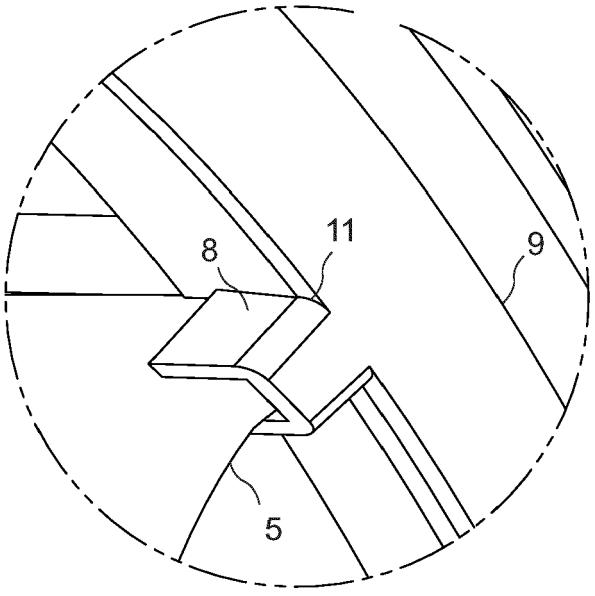


Figure 5



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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	22 July 2024	Stroppa, Giovanni

CATEGORY OF CITED DOCUMENTS

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