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(54) **WATER-COOLED CONDENSER AND INTEGRATED WASHER DRYER**

(57) Provided is a water-cooled condenser and an integrated washer dryer, including a condenser body and a boss, where the condenser body has a hollow interior to form a cavity, an upper end of the condenser body is provided with a water inlet that is in communication with the cavity; and a boss disposed on an inner wall of the cavity and provided with a boss hole. When flushing water is introduced into the water inlet, the boss is configured to splash the flushing water around after the flushing water collides with the boss, so as to flush the inner wall of the condenser body; and when condensate water is introduced into the water inlet, the boss is configured to flow the condensate water out from the boss hole.

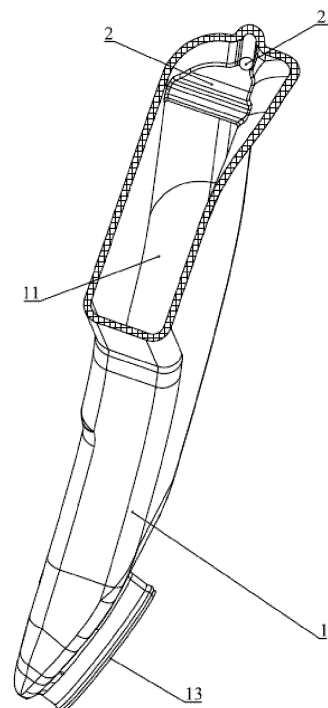


FIG. 2

Description

[0001] This disclosure claims priority to Chinese patent application No. 201710847510.6 filed on September 19, 2017, application of which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The present disclosure relates to a technical field of integrated washer dryer, for example, a water-cooled condenser and an integrated washer dryer.

BACKGROUND

[0003] With the improvement of economic level and changes of the environment, more and more users are paying attention to the drum-type integrated washer dryer.

[0004] A drying principle of the integrated washer dryer is generally as follows: the air is heated by a set of heating elements, the heated air is taken into a drum of the washing machine by a fan, after clothes in the drum are heated, moisture on the clothes evaporates into hot and humid air, and then the hot and humid air is drawn into the condenser by the fan. The hot and humid air is condensed in the condenser via direct or indirect contact with a cooling medium to turn into condensate water and flow out along an inner wall of the condenser, the dried air enters the drum after being heated by the heating elements, and such circulation may achieve a purpose of drying clothes.

[0005] In a drying process, debris of the clothes might enter the condenser from an inner cylinder following circulating air and accumulate in the condenser. As drying cycles increase, threads of clothes will gradually accumulate in multiple portions of the condenser. The accumulation of the debris of clothes will block exchange of the circulating air, making an air resistance greater, a circulating air volume smaller, drying performance attenuated, and even causing machine failure.

SUMMARY

[0006] The present disclosure provides a water-cooled condenser, which may clean debris such as threads and hair inside the condenser, avoiding affecting a circulating air volume inside the condenser, reducing air resistance, and avoiding affecting a condensation process of the condensate water.

[0007] A water-cooled condenser includes a condenser body, where the condenser body has a hollow interior to form a cavity, an upper end of the condenser body is provided with a water inlet that is in communication with the cavity; and a boss disposed on an inner wall of the cavity and provided with a boss hole; where when flushing water is introduced into the water inlet, the boss is configured to splash the flushing water around after the flushing water collides with the boss, so as to flush the

inner wall of the condenser body; and when condensate water is introduced into the water inlet, the boss is configured to flow the condensate water out from the boss hole.

[0008] In one embodiment, the boss is disposed on the inner wall of the cavity and adjacent to the water inlet.

[0009] In one embodiment, the boss is integrally formed with a side wall of the condenser body.

[0010] In one embodiment, the boss is formed by recessing the side wall of the condenser body inward the cavity.

[0011] In one embodiment, the boss is long-strip shaped and is perpendicular to a flow direction of water-flow.

[0012] In one embodiment, an end portion of the boss is bent upward and forms a groove with the inner wall of the cavity, and the end portion of the boss is inclined from top to bottom away from a center of the cavity.

[0013] In one embodiment, an inner wall of the groove includes a first guide surface and a second guide surface, the first guide surface is connected to the inner wall of the cavity and is a flat surface or a concave arc surface, and the second guide surface is connected to the first guide surface and is an inclined surface.

[0014] In one embodiment, the boss hole is adjacent to a connection between the boss and the cavity, and is in communication with a flow path of the condensate water.

[0015] The present disclosure further provides an integrated washer dryer, which may flush debris such as threads in the condenser to avoid affecting the drying performance and reduce failure rate of the integrated washer dryer.

[0016] Provided is an integrated washer dryer, including a drum; a drying device, air outlet of which is in communication with the drum; and a water-cooled condenser described above, where a hot and humid air inlet of the water-cooled condenser is in communication with the drum, and a dry air outlet of the water-cooled condenser is in communication with the drying device.

BRIEF DESCRIPTION OF DRAWINGS

[0017]

FIG. 1 is a structural schematic diagram of a water-cooled condenser according to an embodiment;

FIG. 2 is a sectional view I of the water-cooled condenser according to an embodiment;

FIG. 3 is a sectional view II of the water-cooled condenser according to an embodiment;

FIG. 4 is a partial enlarged view of a part A of FIG. 3;

FIG. 5 is a schematic diagram of a flow path of flushing water in the water-cooled condenser according

to an embodiment;

FIG. 6 is a schematic diagram of a flow path of condensate water in the water-cooled condenser according to an embodiment; and

FIG. 7 is a partial structural schematic diagram of an integrated washer dryer according to an embodiment.

[0018] In the drawings:

1. condenser body; 11. cavity; 12. water inlet; 13. hot and humid air inlet; 14. dry air outlet; 2. boss; 21. boss hole; 22. first guide surface; 23. second guide surface; 3. drying fan; 4. heating device; 5. drum.

DETAILED DESCRIPTION

[0019] The present disclosure is described hereinafter through specific embodiments in conjunction with the accompanying drawings.

[0020] As shown in FIGS. 1 to 6, the present embodiment provides a water-cooled condenser, which may be applied to an integrated washer dryer for condensing hot and humid air to achieve drying effect.

[0021] The water-cooled condenser includes a condenser body 1, the condenser body 1 has a hollow interior to form a cavity 11, the condenser body 1 is provided with a hot and humid air inlet 13, a dry air outlet 14, and a condensate water inlet that are respectively in communication with the cavity 11. After the hot and humid air enters the cavity 11 from the hot and humid air inlet 13 and exchanges heat with the condensate water that enters the cavity 11 through the condensate water inlet, the hot and humid air is condensed into liquid after giving out heat, and is discharged out of the cavity 11 together with the condensate water; at the same time, the hot and humid air turns into dry air and is discharged from the dry air outlet 14 to complete a heat exchange process.

[0022] In a condensation process of the hot and humid air, debris such as threads or hair might enter the cavity 11 together with the hot and humid air and attach to an inner wall of the cavity 11. In order to avoid accumulation of the debris, such as threads, and increase air resistance of warm air to affect the drying effect, the water-cooled condenser in the present embodiment further includes a boss 2 and a water inlet 12, where the water inlet 12 is the condensate water inlet. In an embodiment, flushing water may be introduced through the water inlet 12, and the water inlet 12 is located at an upper end of the condenser body 1, so that the flushing water may flush the inner wall of the cavity 11 from top to bottom. The boss 2 is disposed on the inner wall of cavity 11, and the water inlet 12 is in communication with the cavity 11 and is used to introduce the flushing water to flush the inner wall of the cavity 11, so that the water-cooled condenser has a function of cleaning debris such as threads.

[0023] As shown in FIG. 5, when the flushing water

enters the cavity 11 from the water inlet 12, and due to a large flow of the flushing water, the flushing water collides with the boss 2, so that the flushing water is scattered by the boss 2 and splashed around and upward to flush the inner wall of the condenser body 1, and then the threads or hairs attached to the inner wall are flushed away and discharged out of the condenser body 1 together with the flushing water. In order to improve the flushing effect of the flushing water, the flushing water may have a certain pressure, which is conducive to the upward splashing of the flushing water, thereby increasing a flushing area and a flushing force.

[0024] As shown in FIG. 3, in order to increase the flushing area and improve the flushing effect on the inner wall of water scattered by the boss 2, the boss 2 may be disposed on the inner wall of the cavity and adjacent to the water inlet 12, so that the water scattered by the boss 2 flush the inner wall of the cavity 11 from the top of the cavity 11, where the flushing area is large and the flushing effect is good.

[0025] In an embodiment, in order to collide all the flushing water with the boss 2 after the flushing water enters the cavity 11 so as to splash the water around and upward, the boss 2 may be long-strip shaped and perpendicular to a flow direction of the flushing water, such that a blocking effect is applied to the flushing water and the flushing water collides with the boss and is scattered.

[0026] As shown in FIG. 4, in order to splash the flushing water upward when colliding with the boss 2 so as to increase the flushing area of the flushing water, an end portion of the boss 2 is bent upward and forms a groove with the inner wall of the cavity 11, and the end portion of the boss 2 is inclined, from top to bottom, away from a center of the cavity, that is, the end portion of the boss 2 expands outward, so as to provide a certain guiding effect for the flushing water, so that the flushing water is splashed upward along the end portion of the boss 2, to flush the inner wall of the cavity 11. The inner wall of the groove includes a first guide surface 22 and a second guide surface 23, the first guide surface 22 is connected to the inner wall of the cavity, the second guide surface 23 is connected to the first guide surface 22, and the first guide surface 22 is a flat surface and the second guide surface 23 is an inclined surface, so that the end portion of the boss 2 is expanded outward. The first guide surface 22 may also be a curved surface that is recessed inward, as long as a certain guiding effect for the flushing water is provided to splash the flushing water upward.

[0027] In addition, the boss 2 may be transited to the inner wall of the cavity 11 on a side adjacent to the water inlet 12 via an inclined surface or a curved surface, each of which plays a guiding effect on the flushing water, thereby splashing the flushing water upward and increasing the splash area.

[0028] The condensate water needs to be introduced in a working process of the water-cooled condenser. To simplify a structure of the condenser body 1, the condensate water inlet and the water inlet 12 may be a same

inlet. When condensation is needed, the condensate water is introduced via the inlet; and when the inner wall of the cavity 11 needs to be flushed, flushing water is introduced via the inlet.

[0029] In an embodiment, when the condensate water is introduced, in order to prevent the condensate water from being splashed upward by the guiding effect of the boss 2 to affect the condensation effect, as shown in FIG. 2, the boss 2 is further provided with a boss hole 21. Due to a small flow of the condensate water, after introduced via the water inlet 12, the condensate water will directly flow out through the boss hole 21 to avoid being guided by the boss 2. As shown in FIG. 6, the boss hole 21 may be adjacent to a connection between the boss 2 and the cavity 11, so that after introduced from the water inlet 12, the condensate water naturally enters the boss hole 21 along the inner wall of the cavity 11. At the same time, in order to avoid changes of a flow path of the condensate water to affect the condensation effect, the boss hole 21 may also be in communication with the flow path of the condensate water, so that the condensate water continues to flow according to the flow path of the condensate water to achieve a better condensation purpose.

[0030] When the flushing water is introduced, due to the large flow of the flushing water, the flushing water cannot pass through the boss hole 21, so that the flushing water may only flow along the boss 2 and splash upward while colliding with the boss 2, thereby increasing the flushing area of the scattered water.

[0031] In the present embodiment, the boss 2 may be integrally formed with a side wall of the condenser body 1, for example, the boss 2 may be a convex structure formed by recessing the side wall of the condenser body 1 inward the cavity 11, or a convex structure convexly arranged on the inner wall of the cavity 11. The boss 2 being integrally formed with the condenser body 1 may improve the impact resistance of the boss 2. The boss 2 may be a separate structure, which may be fixed to the inner wall of the cavity 11 by a fastening device, as long as the effect of scattering and splashing the flushing water may be achieved.

[0032] As shown in FIG. 7, the present embodiment further provides an integrated washer dryer, including a drum 5, a drying device, and the above-mentioned water-cooled condenser, where an air outlet of the drying device is in communication with the drum 5, a hot and humid air inlet 13 of the water-cooled condenser is in communication with the drum 5, and a dry air outlet 14 of the water-cooled condenser is in communication with the drying device. The drying device includes a drying fan 3 and a heating device 4, where the air is heated by the heating device 4 and then enters the drum 5 through the air outlet to heat the clothes; the hot and humid air with moisture enters the water-cooled condenser through the hot and humid air inlet 13 of the water-cooled condenser, that is, to enter the cavity 11, the hot and humid air is condensed into liquid by the water-cooled condenser and flows out with the condensate water; and the dried dry air is intro-

duced into the heating device 4 by the drying air and enters a next cycle.

[0033] The water-cooled condenser in the integrated washer dryer provided in the present embodiment has the function of cleaning debris such as threads. By providing the boss 2, the flushing water entering the interior of the condenser body 1 is scattered, and the scattered water is splashed toward multiple directions under the guiding effect of the boss 2, thereby flushing the inner wall of the condenser body 1 with a large flushing area, and flushing away debris such as threads attached to the inner wall of the condenser body 1, so that the circulating air volume inside the condenser body 1 is ensured and the air resistance is reduced, thereby improving the drying effect of the integrated washer dryer and reducing the failure rate of the integrated washer dryer. When the condensate water is introduced, due to a small flow of the condensate water, the condensate water will flow out through the boss hole, so as to avoid changing the flow path of the condensate water to affect the condensation effect after the condensate water is splashed along the boss.

Claims

1. A water-cooled condenser, comprising:

a condenser body (1), wherein the condenser body (1) has a hollow interior to form a cavity (11), an upper end of the condenser body (1) is provided with a water inlet (12) that is in communication with the cavity (11); and
a boss (2) disposed on an inner wall of the cavity (11) and provided with a boss hole (21);
wherein the boss is configured to, in response to flushing water being introduced into the water inlet (12), splash the flushing water around after the flushing water collides with the boss, so as to flush the inner wall of the condenser body (1); and
the boss is further configured to, in response to condensate water being introduced into the water inlet (12), flow the condensate water out from the boss hole (21).

2. The water-cooled condenser according to claim 1, wherein the boss (2) is disposed on the inner wall of the cavity (11) and adjacent to the water inlet (12).

3. The water-cooled condenser according to claim 2, wherein the boss (2) is integrally formed with a side wall of the condenser body (1).

4. The water-cooled condenser according to claim 3, wherein the boss (2) is formed by recessing the side wall of the condenser body (1) inward the cavity (11).

5. The water-cooled condenser according to any one of claims 1-4, wherein the boss (2) is long-strip shaped and is perpendicular to a flow direction of waterflow. 5
6. The water-cooled condenser according to any one of claims 1-4, wherein an end portion of the boss (2) is bent upward and forms a groove with the inner wall of the cavity (11), and the end portion of the boss (2) is inclined from top to bottom away from a center of the cavity (11). 10
7. The water-cooled condenser according to claim 6, wherein an inner wall of the groove comprises a first guide surface (22) and a second guide surface (23), the first guide surface (22) is connected to the inner wall of the cavity (11) and is a flat surface or a concave arc surface, and the second guide surface (23) is connected to the first guide surface (22) and is an inclined surface. 15 20
8. The water-cooled condenser according to any one of claims 1-4, wherein the boss hole (21) is adjacent to a connection between the boss (2) and the cavity (11), and is in communication with a flow path of the condensate water. 25
9. An integrated washer dryer, comprising:
 - a drum (5); 30
 - a drying device, an air outlet of which is in communication with the drum (5); and
 - a water-cooled condenser according to any one of claims 1-8, wherein a hot and humid air inlet of the water-cooled condenser is in communication with the drum (5), and a dry air outlet of the water-cooled condenser is in communication with an air inlet of the drying device. 35

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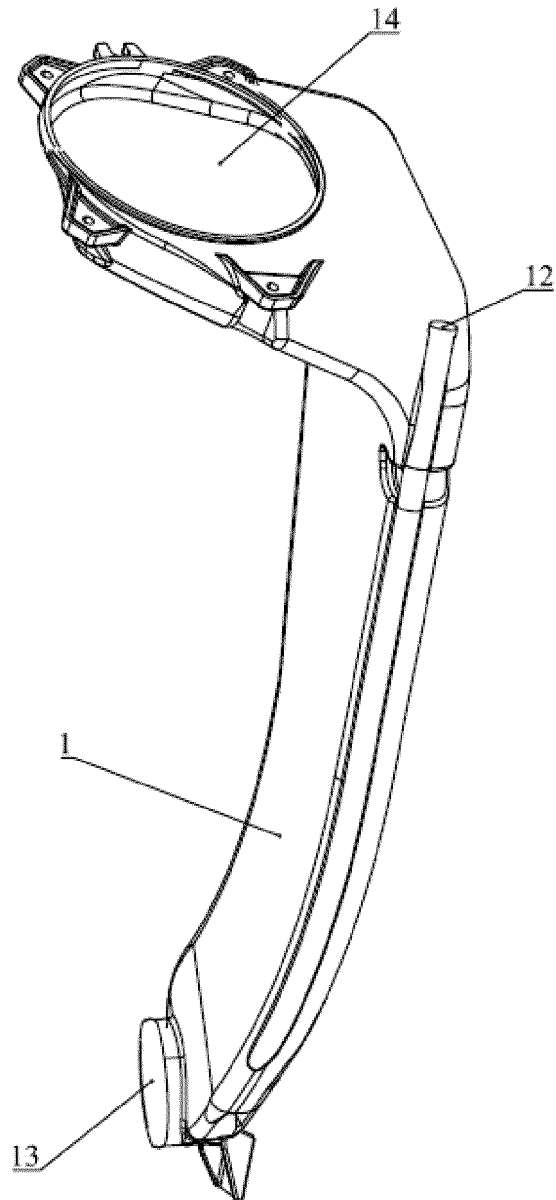


FIG. 1

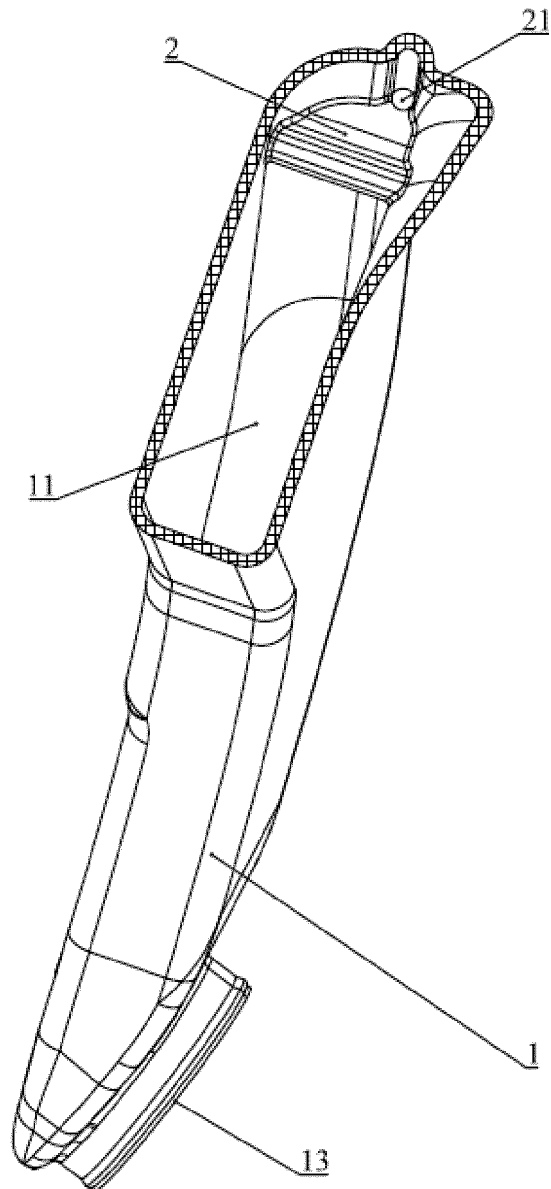


FIG. 2

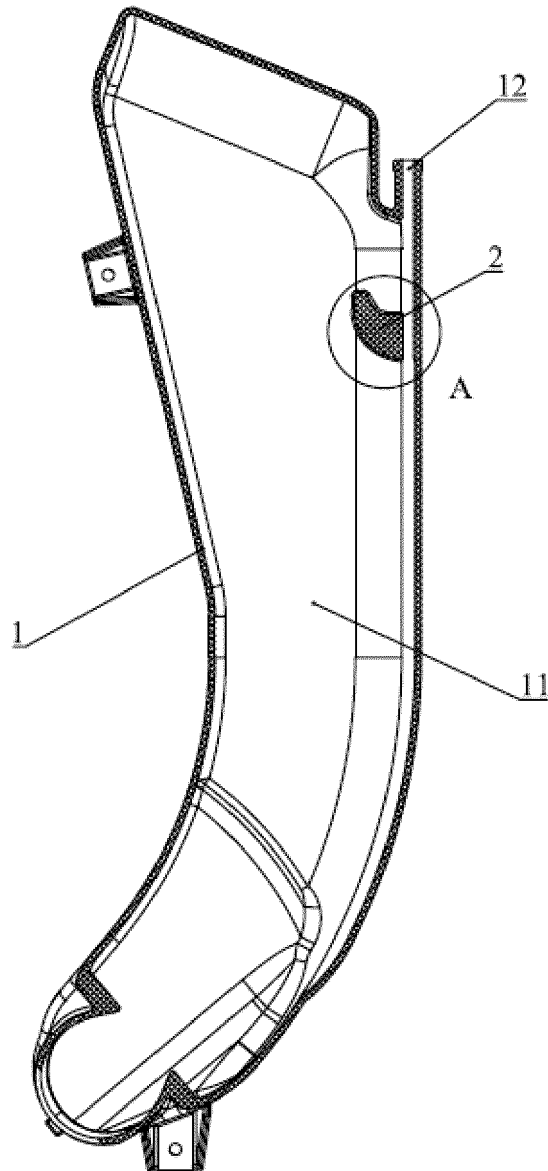


FIG. 3

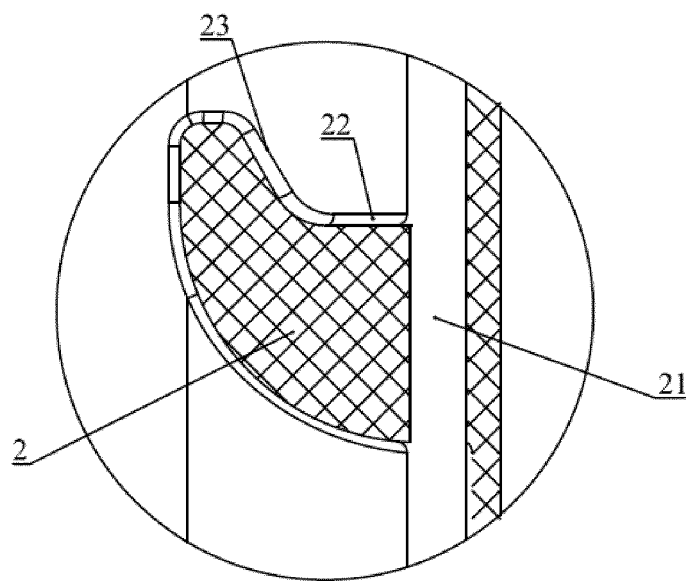


FIG. 4

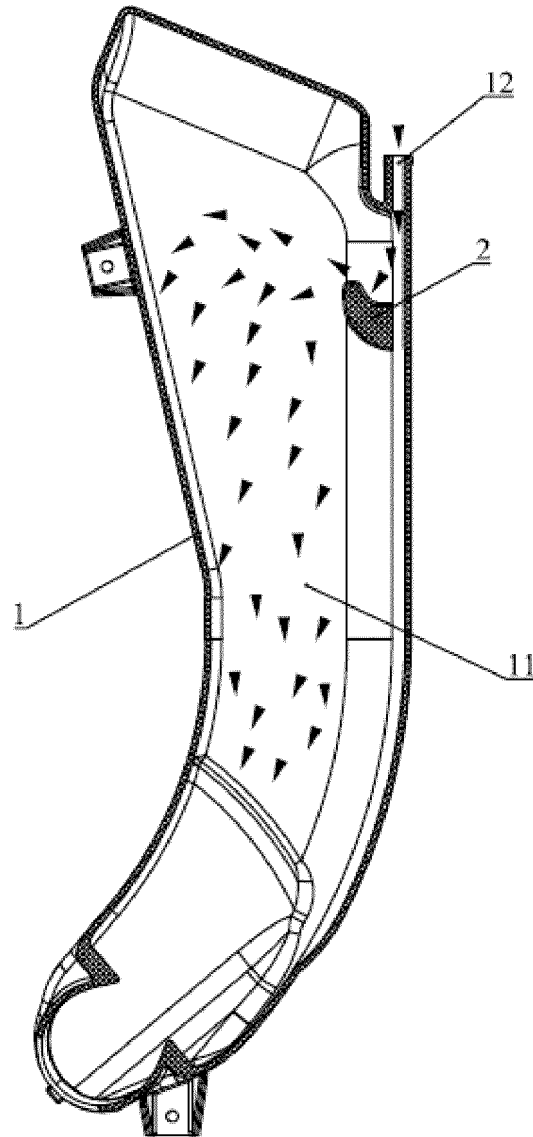


FIG. 5

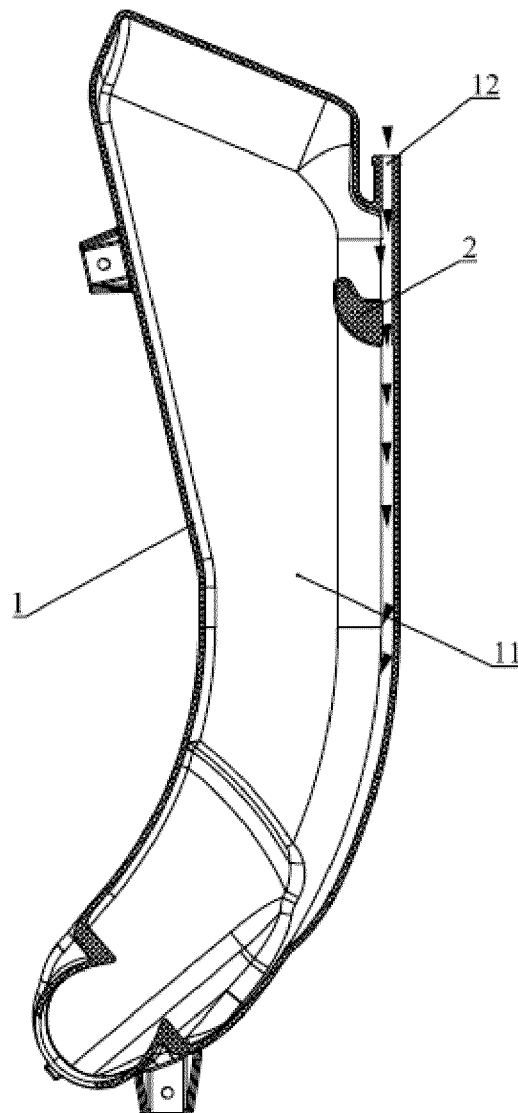


FIG. 6

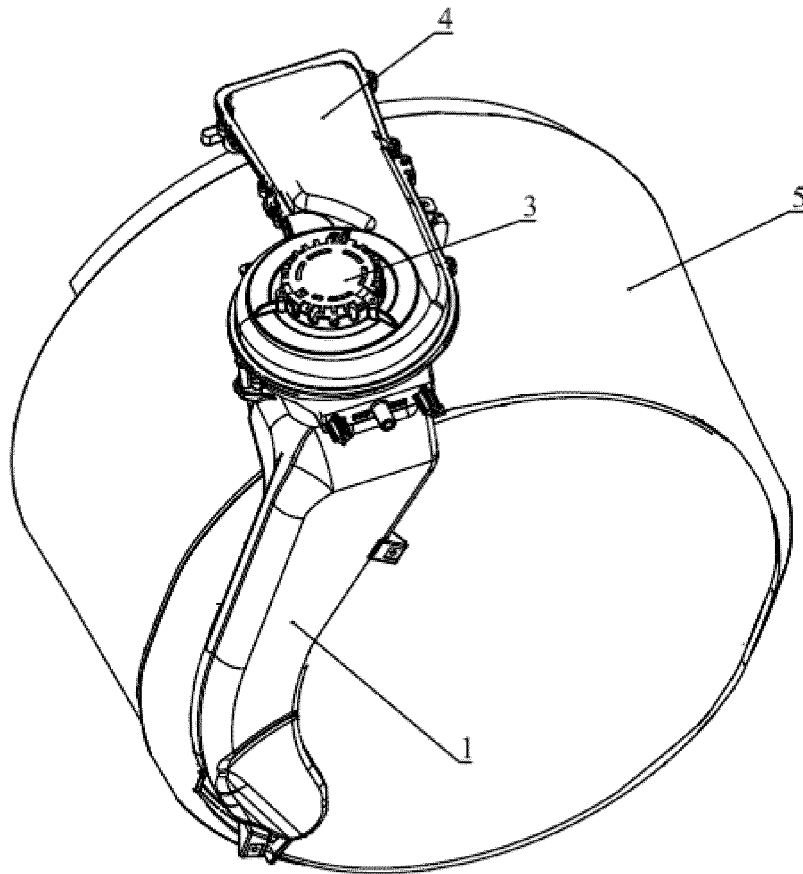


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2018/105994

A. CLASSIFICATION OF SUBJECT MATTER D06F 58/24(2006.01)i According to International Patent Classification (IPC) or to both national classification and IPC	B. FIELDS SEARCHED															
Minimum documentation searched (classification system followed by classification symbols) D06F	Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched															
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) CNPAT, CNKI, EPDOC, WPI: 冷凝器, 水冷, 凸台, 冲洗, 冷凝水, 孔, 线屑, condenser, water cooling, boss, washing, condensed water, hole, thread scraps	C. DOCUMENTS CONSIDERED TO BE RELEVANT															
<table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>CN 101387059 A (BSH ELECTRICAL APPLIANCES (JIANGSU) CO., LTD.) 18 March 2009 (2009-03-18) description, page 5, line 9 to page 8, antepenultimate line, and figures 2-3</td> <td>1-9</td> </tr> <tr> <td>A</td> <td>CN 204690433 U (WUXI LITTLE SWAN COMPANY LIMITED) 07 October 2015 (2015-10-07) entire document</td> <td>1-9</td> </tr> <tr> <td>A</td> <td>CN 102517860 A (HAIER ELECTRONICS GROUP CO., LTD. ET AL.) 27 June 2012 (2012-06-27) entire document</td> <td>1-9</td> </tr> <tr> <td>A</td> <td>US 2005223503 A1 (LG ELECTRONICS INC.) 13 October 2005 (2005-10-13) entire document</td> <td>1-9</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	A	CN 101387059 A (BSH ELECTRICAL APPLIANCES (JIANGSU) CO., LTD.) 18 March 2009 (2009-03-18) description, page 5, line 9 to page 8, antepenultimate line, and figures 2-3	1-9	A	CN 204690433 U (WUXI LITTLE SWAN COMPANY LIMITED) 07 October 2015 (2015-10-07) entire document	1-9	A	CN 102517860 A (HAIER ELECTRONICS GROUP CO., LTD. ET AL.) 27 June 2012 (2012-06-27) entire document	1-9	A	US 2005223503 A1 (LG ELECTRONICS INC.) 13 October 2005 (2005-10-13) entire document	1-9	
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Date of the actual completion of the international search 09 November 2018	Date of mailing of the international search report 06 December 2018															
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2018/105994

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