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(54) **PULSATOR OF WASHING MACHINE AND WASHING MACHINE**

(57) A pulsator of washing machine and a washing machine, a base body (1) of the pulsator is disk-shaped. A central portion (4) is arranged at and protrudes from a center of the base body (1) of the pulsator, on an upper surface of the base body is provided with and a stirring blade (2) protruding the base body and a groove (3), the stirring blade extends from the central portion (4) of the base body (1) to a outer periphery of the base body (1). Moreover, a bottom surface of the base body (1) is provided with a smoothly undulating surface corresponding to the upper surface. The undulating surface does not stiffly protrude from the bottom surface of the base body (1), so there is no hard angle formed between the undulating surface, or between the undulating surface and the other surface of the base body (1). In addition, the pulsator does not divide the bottom surface of the pulsator into a plurality of small areas like the existing pulsator, but has a large overall surface with the undulating surface, which reduces the amount of dirt that accumulated at the dead corner, resulting in that dirt is less likely to adhere to the lower surface of the pulsator.

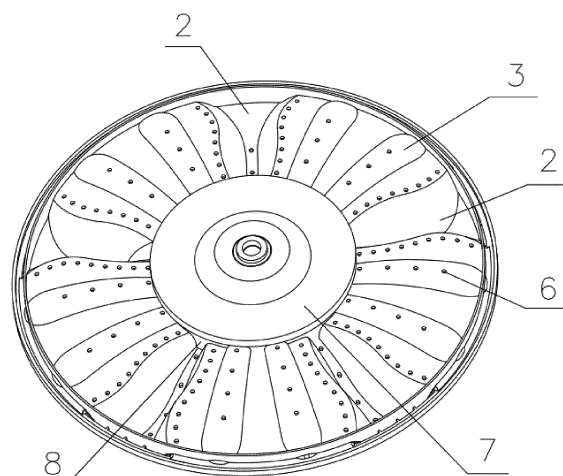


Fig.3

## Description

### Technical field

**[0001]** The present disclosure relates to a pulsator of washing machine and a washing machine, belonging to the field of washing machine devices.

### Background

**[0002]** As shown in Fig. 6, an existing pulsator is provided with a plurality of circular ring ribs 10 on a bottom surface and a plurality of transverse ribs 11 extending in the radial direction of its base body. Since a plurality of the circular ring ribs 10 and the transverse ribs 11 protrude from the bottom surface of the base body, and the number of intersecting points formed by the circular ring ribs 10 and the transverse ribs 11 is relatively large, a large number of small regions are formed by the division. Since the circular ring ribs 10 and the transverse ribs 11 intersect on the bottom surface of the base body at right angles, the intersections are easy to hide dirt. Because of a large number of the small areas formed by the division, the force of the water flow against the bottom of the pulsator is reduced, resulting in that it is easier for the dirt to attach to the bottom surface of the wheel disc.

**[0003]** The present disclosure is proposed due to all the above.

### Summary

**[0004]** The technical problem to be solved by the present disclosure is to overcome the deficiencies of the prior art and to provide a pulsator of washing machine and a washing machine, which can make the dirt not easily adhere to the bottom surface of the pulsator.

**[0005]** In order to solve the above technical problems, the main concept of the technical solution adopted by the present disclosure is:

A pulsator of a washing machine is provided, and a base body of the pulsator is disk-shaped. A central portion is arranged at and protrudes from the center of the base body of the pulsator, on an upper surface of the base body is provided with a stirring blade protruding the base body and a groove, the stirring blade extends from a central portion of the base body toward the outer periphery of the base body. Moreover, a bottom surface of the base body is provided with a smoothly undulating surface corresponding to the upper surface.

**[0006]** Further, a ring-shaped rib is arranged at a center of the bottom surface of the base body, and a radial rib is arranged in the radial direction in a region enclosed by the ring-shaped rib. A region enclosed by the ring-shaped rib is covered by a lower seal cover to form a smooth surface.

**[0007]** Further, both sides of the stirring blade are arc surface, and the arc surface connects a top of the stirring blade and the upper surface of the base body. An inter-

section line of the arc surface and the upper surface of the base body is a curve, and the curve includes a plurality of continuous arcs. The arcs comprise an inwardly concave arc, an outwardly convex arc, and an inwardly concave arc in turn from the center of the base body to the periphery of the base body. Moreover, the stirring blade has a wider bottom and gradually narrows upward.

**[0008]** Further, the stirring blade is a hollow structure, and a bottom of the stirring blade is open.

**[0009]** Further, the top of the stirring blade extends from the central portion of the base body to the outer periphery of the base body in a curve shape from low to high, and a highest point of the stirring blade is higher than the central portion of the base body.

**[0010]** Further, the top of the stirring blade extends downwards in a smoothly curved surface from the highest point and is connected with the outer periphery of the base body.

**[0011]** Further, the groove extending in the radial direction of the base body is arranged between two adjacent stirring blades on the base body. The width of the groove gradually increases from the central portion of the base body to the periphery of the base body.

**[0012]** Further, a plurality of through holes are respectively arranged at the top of the stirring blade, the base body, and the groove on the base body.

**[0013]** Further, a through hole is arranged in the base body between the stirring blade and its groove adjacent to the stirring blade, and a plurality of through holes are arranged on the base body near the intersection line of the side surface of the stirring blade and the upper surface of the base body.

**[0014]** A washing machine equipped with a pulsator that described in any of the above.

**[0015]** Adopting the above technical solution, the present disclosure has the following advantages compared with the prior art.

**[0016]** A pulsator of the washing machine and the washing machine is provided by the present disclosure. the base body of the pulsator is disk-shaped. And a central portion is arranged at and protrudes from the center of the base body of the pulsator. On an upper surface of the base body is provided with a stirring blade protruding the base body and a groove, the stirring blade extends from the central portion of the base body to the outer periphery of the base body. The concave surface formed by the stirring blade on the bottom surface of the base body and the convex surface formed by the groove on the bottom surface of the base body form a smoothly undulating surface of the bottom surface of the base body. The undulating surface does not stiffly protrude from the bottom surface of the base body, so there is no hard angle formed between the undulating surface, or between the undulating surface and the other surface of the base body. In addition, the pulsator does not divide the bottom surface of the pulsator into a plurality of small areas, but has a large overall surface with the undulating surface, which reduces the dirt that accumulated at the

dead corner, resulting in that dirt is less likely to adhere to the bottom surface of the pulsator.

[0017] The embodiments of the present disclosure are described in further detail below with reference to the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWING

### [0018]

Fig. 1 is a structure diagram of the upper surface of a pulsator of a washing machine according to the present disclosure;

Fig.2 is a structure diagram of the upper surface of a pulsator of a washing machine without pulsator cover according to the present disclosure;

Fig. 3 is a structure diagram of the bottom surface of a pulsator of a washing machine according to the present disclosure;

Fig. 4 is a structure diagram of the bottom surface of a pulsator of a washing machine without the lower seal cover according to the present disclosure;

Fig.5 is a half sectional diagram of a pulsator of a washing machine according to the present disclosure;

Fig. 6 is a structure diagram of the bottom surface of a conventional pulsator.

[0019] 1.base body; 2.stirring blade; 3.groove; 4.central portion; 5.pulsator cover; 6.through hole; 7.lower seal cover; 8. ring-shaped rib; 9. radial rib.

## Detailed description

### Embodiment 1

[0020] As shown in Fig. 1, a pulsator of a washing machine according to the present disclosure is displayed. As shown in Fig. 2 to 4, the base body 1 of the pulsator is disk-shaped, and a central portion 4 is arranged at and protrudes from the center of the base body 1 of the pulsator, moreover on an upper surface of the base body is provided with a stirring blade 2 protruding the base body. The stirring blade extends from the central portion of the base body toward the outer periphery of the base body. The stirring blade 2 is a hollow structure, and a bottom of the stirring blade 2 is open, that is to say, when viewed from the bottom of the pulsator, the stirring blade 2 forms a hollow structure concave upwardly on the bottom surface of the base body 1.

[0021] As shown in Fig. 1 to 2, the central portion 4 arranged at the center of the base body 1 has a through hole along the upper and bottom direction of the pulsator.

A drive shaft of the driving device is inserted into the through hole of the central portion 4 from the bottom of the pulsator toward upwards, and is connected to the pulsator via a connecting device. After the pulsator and the drive shaft are fixedly assembled, a pulsator cover 5 is mounted on a top of the central portion 4 to close the through hole.

[0022] As shown in Fig. 1 to Fig. 1 2, both sides of the stirring blade 2 are arc surfaces, and the arc surface connects the top of the stirring blade 2 and the upper surface of the base body 1, meanwhile the stirring blade 2 has a wider bottom and gradually narrows upward. The intersection line of the arc surface on both sides of the stirring blade 2 and the upper surface of the base body 1 is a curve, and the curve includes a plurality of continuous arcs. The arcs comprise an inwardly concave arc, an outwardly convex arc, and an inwardly concave arc in turn from the center of the base body 1 to the periphery of the base body 1.

[0023] The top of the stirring blade 2 extends from the central portion of the base body to the outer periphery of the base body 1 in a curve shape from low to high. Moreover, the highest point of the stirring blade 2 is higher than the central portion of the base body 1. The top of the stirring blade 2 extends downwards in a smoothly curved surface from the highest point to connect with the outer periphery of the base body 1.

[0024] A groove 3 is arranged between any two adjacent stirring blades 2 on the upper surface of the base body 1 extending from the central portion of the base body to the outer periphery of the base body in the radial direction of the base body. The width of the groove 3 gradually increases from the central portion of the base body 1 to the periphery of the base body 1.

[0025] The bottom surface of the base body 1 is provided with a smooth undulating surface corresponding to the upper surface. That is to say, the stirring blade 2 protruding the base body on the upper surface of the base body 1 corresponds to the concave surface on the bottom surface of the base body 1, and the groove 3 on the upper surface of the base body 1 corresponds to the convex surface on the bottom surface of the base body. The combination of undulating surface on the bottom surface of the base body forms the smooth undulating bottom surface of the base body.

[0026] A plurality of through holes 6 are respectively arranged at the top of the stirring blade 2 and in the groove 3.

[0027] A plurality of through holes 6 are arranged between the stirring blade 2 and the groove 3 on the upper surface of the adjacent base body 1. Moreover, a plurality of holes are arranged on the base body 1 near the intersection line between the side surface of the stirring blade 2 and the upper surface of the base body 1.

[0028] As shown in Fig. 3, Fig. 4, Fig.5, the pulsator according to the present disclosure is provided with ring-shaped rib 8 at a position near the center of the base body on the bottom surface of the base body 1. There

are a plurality of ring-shaped ribs, and the ring-shaped ribs 8 are arranged concentrically. The radial ribs 9 are arranged in the radial direction in the region enclosed by the ring-shaped rib. This structure enhances the strength of the central portion of the pulsator. The lower seal cover 7 seals the annular region enclosed by the ring-shaped rib 8, so that the portion enclosed by the ring-shaped rib is covered by the lower seal cover and becomes a smooth plane. The lower seal cover 7 and the ring-shaped ribs 8 are welded to prevent dirt from entering the annular region enclosed by the ring-shaped ribs 8. The center of the lower seal cover has a through hole for the drive shaft of the drive device to pass through, and the drive shaft is connected with the pulsator.

**[0029]** The pulsator is provided with a concave groove 3 recessed from the top to the bottom on the base body 1 to form a pressure rib to replace a part of the ring-shaped ribs and the radial ribs of the existing pulsator, and the pressure ribs formed by the groove 3 enhance the strength of the base body of the pulsator. Moreover, the groove extends from the center of the base body to the outer periphery of the base body, that is, the region enclosed by the ring-shaped rib are also provided with groove. The groove 3, the ring-shaped ribs 8 and the radial ribs 9 reinforce together the strength of the pulsator that close to the centre portion of the base body 1. Compared to the conventional pulsator, the pulsator of the present disclosure has higher strength.

**[0030]** The pulsator of the washing machine of the present disclosure has a base body, and the base body of the pulsator of the washing machine is disk-shaped, moreover at the centre of the base body of the pulsator is provided with a convex central portion. On the upper surface of the base body is provided with stirring blade protruding the base body and a groove, the stirring blade extends from the central portion of the base body to the outer periphery of the base body. The concave surface formed by the stirring blade on the bottom surface of the base body and the convex surface formed by the groove on the bottom surface of the base body build a smooth undulating surface of the bottom surface of the base body. The undulating surface does not stiffly protrude from the bottom surface of the base body, there is no hard angle formed between the undulating surface, or between the undulating surface and the other surface of the base body. In addition, the pulsator does not divide the bottom surface of the pulsator into a plurality of small areas but has a large overall surface with the undulating surfaces, which reduces the dirt that accumulated at the dead corner, resulting in that dirt is less likely to adhere to the bottom surface of the pulsator.

## Embodiment 2

**[0031]** A washing machine, is provided with the pulsator discussed in the embodiment 1.

**[0032]** The washing machine of the present disclosure has a pulsator, a base body of the pulsator is disk-

shaped. Moreover at the centre of the base body of the pulsator is provided with a convex central portion. On the upper surface of the base body is provided with a stirring blade protruding the base body and a groove, the stirring blade extends from the central portion of the base body to the outer periphery of the base body. A concave surface formed by the stirring blade on the bottom surface of the base body and a convex surface formed by the groove on the bottom surface of the base body build a smooth undulating surface of the bottom surface of the base body. The undulating surface does not stiffly protrude from the bottom surface of the base body, there is no hard angle formed between the undulating surface, or between the undulating surface and the other surface of the base body. In addition, the pulsator does not divide the bottom surface of the pulsator into a plurality of small areas, but has a large overall surface with the undulating surfaces, which reduces the dirt that accumulated at the dead corner, resulting in that dirt is less likely to adhere to the bottom surface of the pulsator.

**[0033]** The embodiments in the above embodiments may be further combined or replaced, and merely the preferred embodiments of the present disclosure are described in the embodiments, moreover the embodiments are not intend to limit the concept and scope of the present disclosure. Without departing from the design concept of the present disclosure, the various changes and improvements made by the professional technicians in the technical field of the present disclosure are all belong to the protection scope of the present disclosure.

## Claims

1. A pulsator of a washing machine, comprising a base body of the pulsator being disk-shaped; wherein, a central portion is arranged at and protrudes from a center of the base body of the pulsator; on an upper surface of the base body is provided with a stirring blade protruding the base body and a groove, the stirring blade extends from the central portion of the base body to a outer periphery of the base body; a bottom surface of the base body is provided with a smoothly undulating surface corresponding to the upper surface.
2. The pulsator of the washing machine according to claim 1, **characterized in that** a ring-shaped rib is arranged at a center of the bottom surface of the base body, and a rib is arranged in a radial direction in a region enclosed by the ring-shaped rib; a region enclosed by the ring-shaped rib is covered by a lower seal cover to form a smooth surface
3. The pulsator of the washing machine according to claim 1 or 2, **characterized in that** both sides of the stirring blade are arc surface, and the arc surface connects a top of the stirring blade and the upper

surface of the base body;  
 an intersection line of the arc surface and the upper  
 surface of the base body is a curve, and the curve  
 includes a plurality of continuous arcs;  
 the arcs comprises an inwardly concave arc, an out- 5  
 wardly convex arc, and an inwardly concave arc in  
 turn from the center of the base body to the periphery  
 of the base body, and  
 the stirring blade has a wider bottom and gradually 10  
 narrows upward.

4. The pulsator of the washing machine according to  
 claim 3, **characterized in that** the stirring blade is a  
 hollow structure, and a bottom of the stirring blade  
 is open. 15
  
5. The pulsator of the washing machine according to  
 claim 3, **characterized in that** the top of the stirring  
 blade extends from the central portion of the base  
 body to the outer periphery of the base body in a 20  
 curve shape from low to high, and a highest point of  
 the stirring blade is higher than the central portion of  
 the base body.
  
6. The pulsator of the washing machine, according to 25  
 claim 3, **characterized in that** the top of the stirring  
 blade extends downwards in a smoothly curved sur-  
 face from the highest point and is connected with the  
 outer periphery of the base body. 30
  
7. The pulsator of the washing machine according to  
 claim 1 or 2, **characterized in that** the groove ex-  
 tending in the radial direction of the base body is  
 arranged between two adjacent stirring blades on  
 the base body, and 35  
 a width of the groove gradually increases from the  
 central portion of the base body to the periphery of  
 the base body.
  
8. The pulsator of the washing machine according to 40  
 claim 6, **characterized in that** a plurality of through  
 holes are respectively arranged at the top of the stir-  
 ring blade, the base body, and the groove of the base  
 body. 45
  
9. The pulsator of the washing machine according to  
 claim 3, **characterized in that** a through hole is ar-  
 ranged in the base body between the stirring blade  
 and the groove adjacent to the stirring blade, and  
 a plurality of through holes are arranged on the base 50  
 body near the intersection line of the side surface of  
 the stirring blade and the upper surface of the base  
 body.
  
10. A washing machine, **characterized in that** the 55  
 washing machine is equipped with the pulsator that  
 described in any one of claims 1-9.

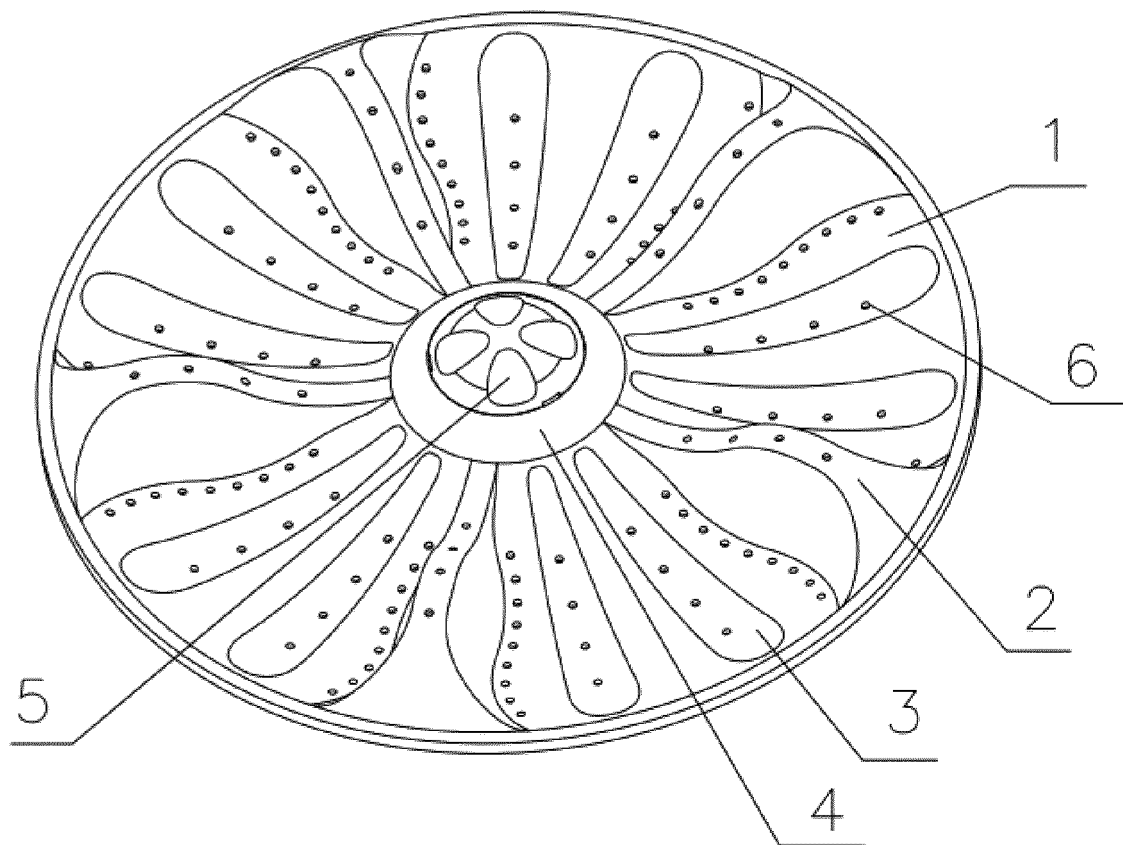


Fig.1

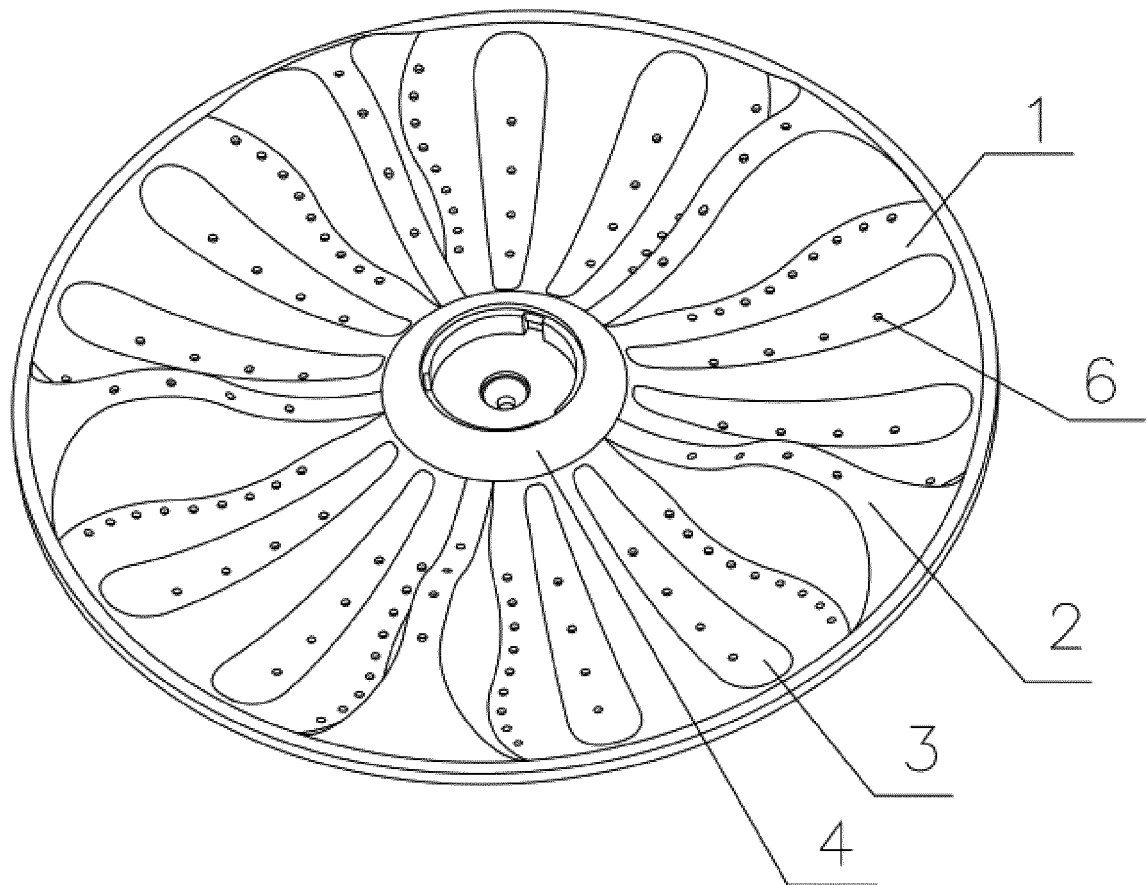


Fig.2

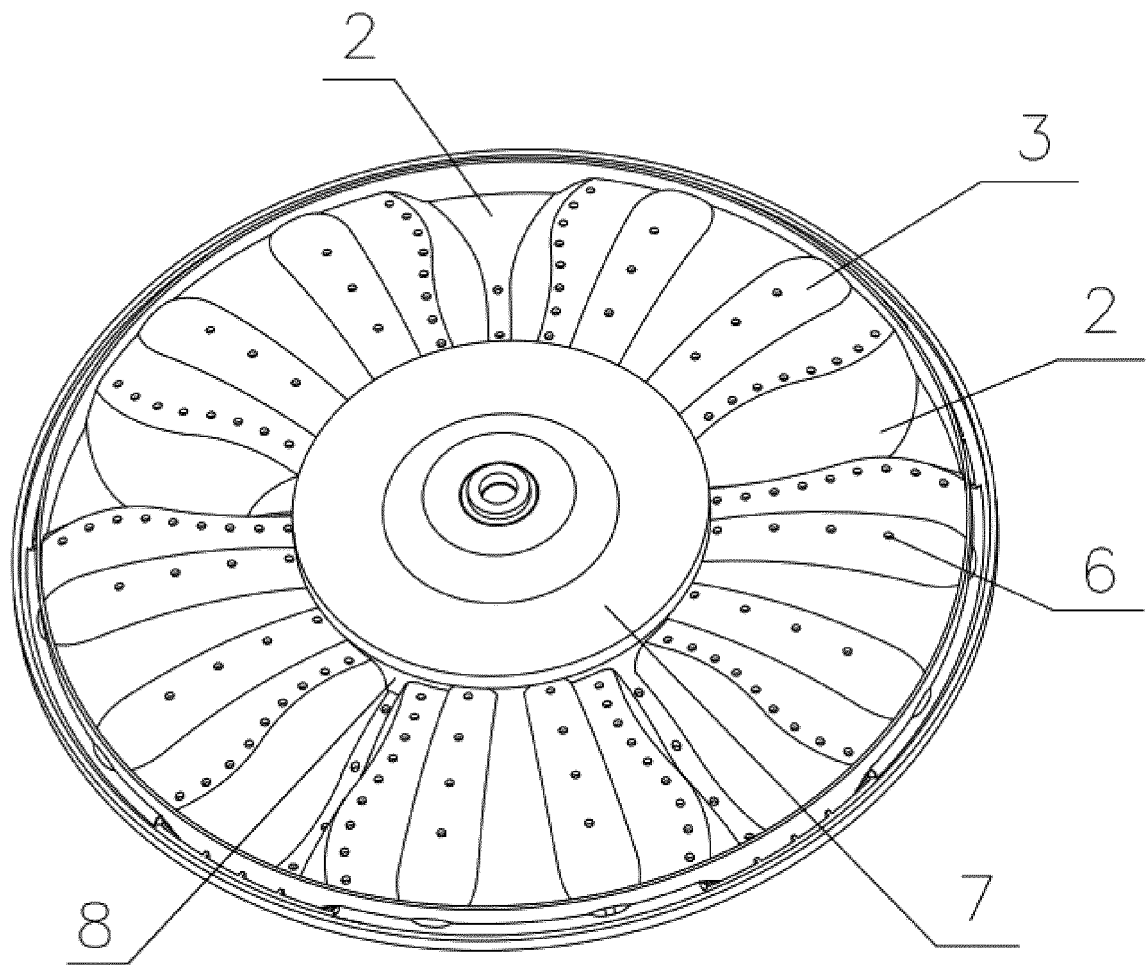


Fig.3

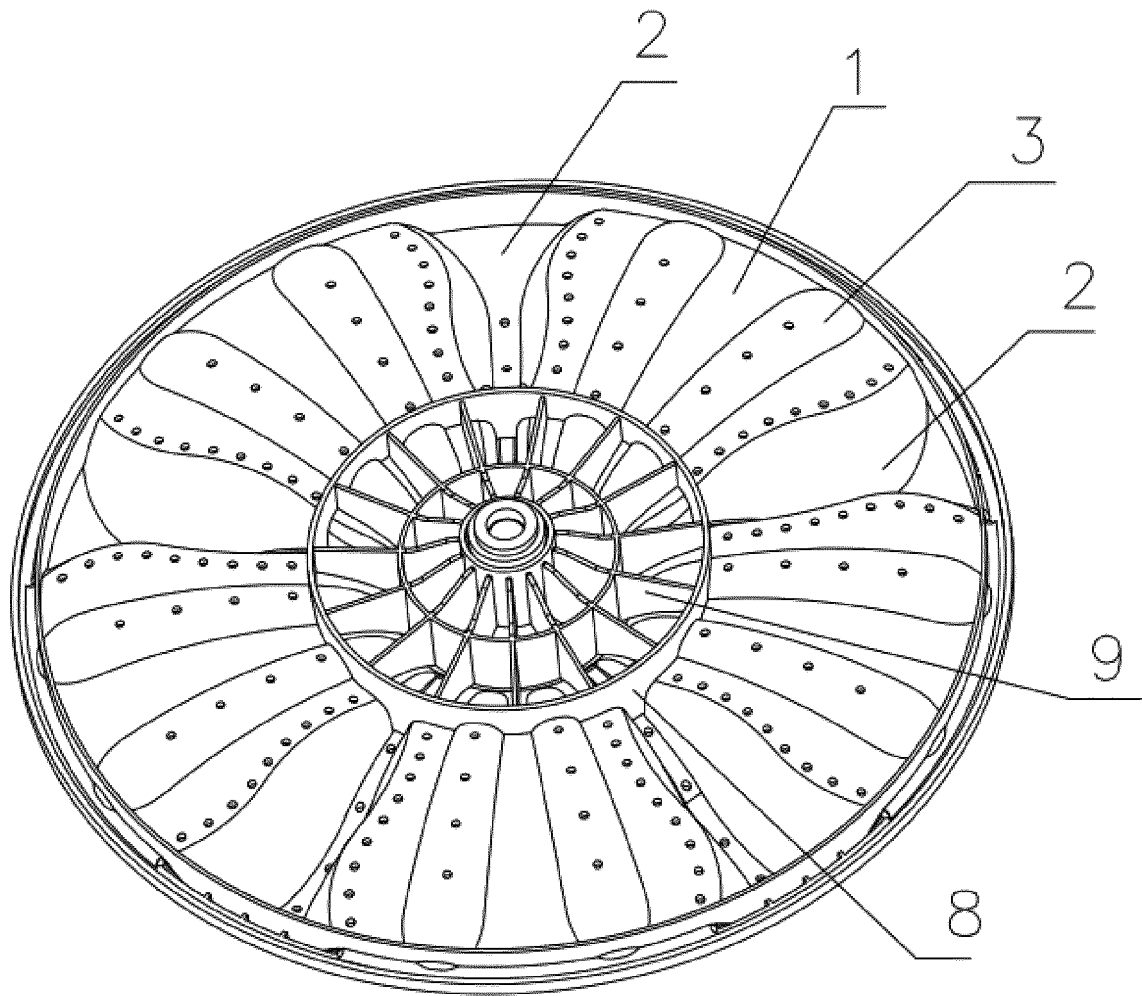


Fig.4

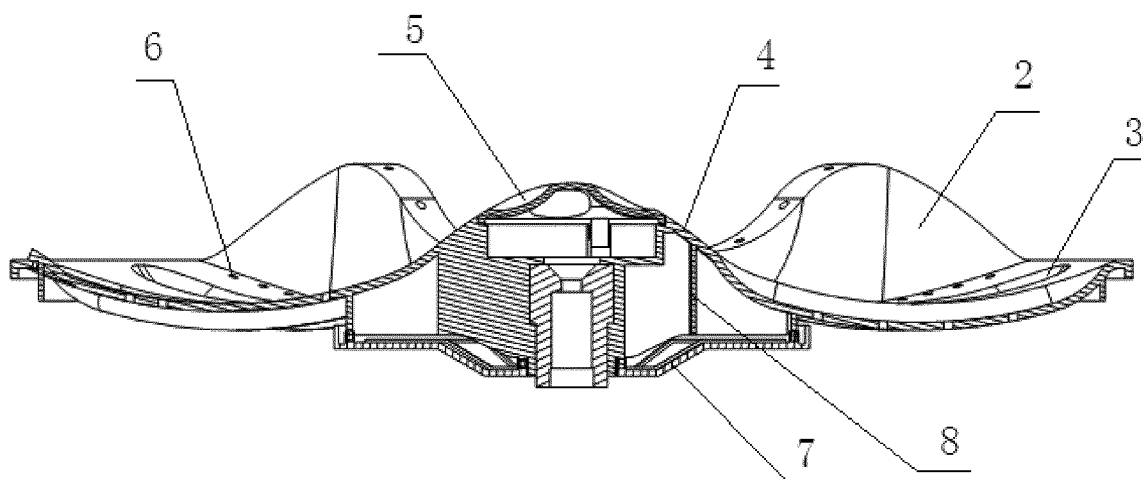


Fig.5

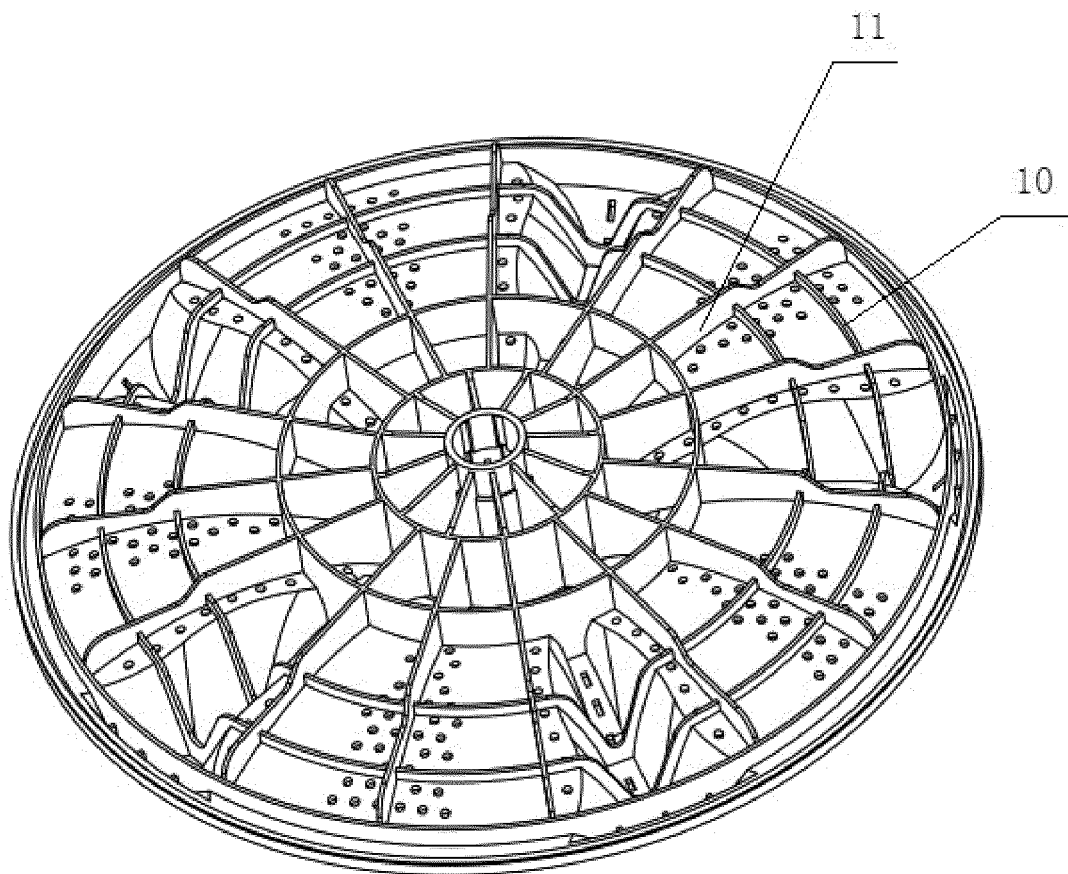


Fig.6

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2016/104974

## A. CLASSIFICATION OF SUBJECT MATTER

D06F 17/10 (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)

CNKI, CNPAT, WPI, EPODOC: HAIER; RONGSHEN; LITTLE SWAN; LG; impeller, curved line, curved surface washer, washing, pulsator, arc, curve, concave, groove, protrude, blade, agitate

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                                  | Relevant to claim No. |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
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| Y         | CN 203639711 U (HISENSE RONGSHEN (GUANGDONG) REFRIGERATOR CO., LTD.), 11 June 2014 (11.06.2014), description, paragraphs 0025-0034, and figures 1-4 | 3-6, 8, 9             |
| Y         | CN 104911861 A (HAIER ELECTRONICS GROUP CO., LTD. et al.), 16 September 2015 (16.09.2015), description, paragraphs 0033-0047, and figures 1-6       | 3-6, 8, 9             |
| A         | CN 203947325 U (CHINA HUACAI ELECTRIC APPLIANCE CO., LTD.), 19 November 2014 (19.11.2014), the whole document                                       | 1-10                  |
| A         | CN 101994223 A (LG ELECTRONICS INC.), 30 March 2011 (30.03.2011), the whole document                                                                | 1-10                  |
| A         | CN 103306089 A (HAIER ELECTRONICS GROUP CO., LTD. et al.), 18 September 2013 (18.09.2013), the whole document                                       | 1-10                  |
| A         | JP 2015146898 A (HAIER ASIA CO., LTD.), 20 August 2015 (20.08.2015), the whole document                                                             | 1-10                  |

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

\* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

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Date of the actual completion of the international search  
11 January 2017 (11.01.2017)Date of mailing of the international search report  
24 January 2017 (24.01.2017)Name and mailing address of the ISA/CN:  
State Intellectual Property Office of the P. R. China  
No. 6, Xitucheng Road, Jimenqiao  
Haidian District, Beijing 100088, China  
Facsimile No.: (86-10) 62019451

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INTERNATIONAL SEARCH REPORT

International application No.  
PCT/CN2016/104974

| C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT |                                                                                                                        |                       |
|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Category*                                             | Citation of document, with indication, where appropriate, of the relevant passages                                     | Relevant to claim No. |
| A                                                     | US 2014/0033444 A1 (QINGDAO HAIER WASHING MACHINE CO., LTD. ET AL.), 06 February 2014 (06.02.2014), the whole document | 1-10                  |

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

**INTERNATIONAL SEARCH REPORT**  
 Information on patent family members

International application No.

**PCT/CN2016/104974**

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