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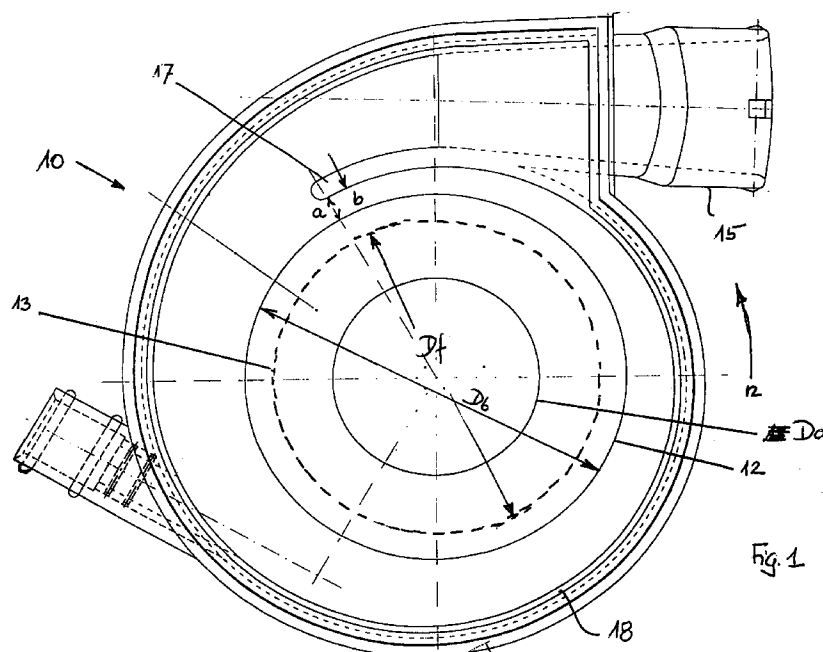
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(54) Circulating centrifugal pump for a dishwasher

(57) The invention relates to a circulating centrifugal pump for a dishwasher with a pump casing with an axial inlet opening and a radial outlet opening, and with a pump chamber expanding in a spiral shape with a spur (17), and in which there is rotarily mounted a round pump rotor (20) with a predetermined distance from the spur (17), and whose vanes (16) are disposed on a support disc (12). A noticeable reduction in noise during

operation can be achieved in a simple way in that the diameter of the ends of the vanes (16) is reduced relative to the diameter of the support disc (12), and the radial spacing (b) of the ends of the vanes from the spur is correspondingly enlarged compared to the radial spacing (a) of the support disc from the spur.



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Description

The invention relates to a circulating centrifugal pump for a dishwasher with a pump casing with an axial inlet opening and a radial outlet opening, and with a pump chamber expanding in a spiral shape with a spur, and in which there is rotarily mounted a round pump rotor with a predetermined distance from the spur, and whose vanes are disposed on a support disc.

Circulating centrifugal pumps of this type, having a relatively small consumption of electrical power of the electrical motor, have generated sufficient pump performance to achieve good cleaning of the crockery and generates the necessary pressure and sufficient quantity of water. The known circulating centrifugal pumps of this type have a pump runner wheel whose vanes extend as far as the circumference of the carrier disc and have the same spacing from the spur as the carrier disc. The consequence is that during operation of the circulating centrifugal pump a high degree of noise is generated. It is therefore necessary to provide expensive sound deafening measures in order to achieve noise values of less than 50 dB.

It is the object of the invention to improve a circulating centrifugal pump of the type already mentioned in such a way that the noise during operation is considerably reduced without substantially reducing the pump performance.

This object is achieved according to the invention in that the diameter of the ends of the vanes is reduced relative to the diameter of the support disc, and the radial spacing of the ends of the vanes from the spur is correspondingly enlarged compared to the radial spacing of the support disc from the spur.

By simply shortening the vanes on the support disc, i.e. with a slightly altered pump runner wheel, a reduction in noise of 3 to 4 dB can be achieved, the pump performance only being insignificantly reduced. In addition, the circulating centrifugal pump thus improved can be used in high quality dishwashers to reduce the outlay on sound deafening.

In one design, the diameter of the support disc is selected as 72 mm, and with a radial spacing of 3.8 mm of the support disc, the radial spacing of the vane ends is enlarged to 7.3 to 10.5 mm. The circulating centrifugal pump preferably operates in a rotational speed range of 2500 to 3000 rpm.

The invention will be described in more detail with reference to an embodiment given by way of example and shown in the drawings. Shown are:

Figure 1: a side view of the pump casing with a schematic view of the dimensions of pump chamber and pump runner wheel,

Figure 2: on a reduced scale, an elevation of the vane side of the pump runner wheel, and

Figure 3: a cross-section through the pump runner wheel along the line III-III of Figure 2.

The view in Figure 1 shows the pump casing 10 with an axial inlet opening projected thereon with diameter D_a . Disposed in a support disc 12 of a pump runner wheel 20 is a central opening 11 for the motor shaft. The pump chamber 18 narrowing in a spiral form in the direction of rotation of the pump runner wheel forms, in the transition to an outlet opening 15, a spur 17 which acts as a flow break-off point. Disposed on the support disc 12 are curved vanes 16, whose convex sides, during operation of the circulating centrifugal pump are in a leading configuration, as shown by the arrow identified by n in Figure 1.

The diameter D_b of the support disc 12 is, as Figures 2 and 3 show larger the diameter D_f of the ends of the vanes 16. As Figure 1 shows, the support disc 12 has a spacing a from the spur 17, which comes to for example 3.8 mm, when the support disc 12 with a diameter D_b of 72 mm is adapted to the pump chamber 18.

The spacing b between the ends of the vanes 16 and the spur 17 is greater than the spacing a between the support disc 12 and the spur 17 and is selected at between 7.3 to 10.5 mm, i.e. the vane ends are set back with respect to the circumference of the support disc 12 by 3.5 to 6.7 mm. By means of this alteration in the pump runner wheel 20, while maintaining the unaltered pump casing 10, a reduction in noise of 3 to 4 dB can be achieved. Therefore in the case of a known circulating centrifugal pump with $D_f = D_b$, only the pump runner wheel need be changed over, in order to obtain the desired effect. If the rotary speed in a range of 2500 to 3000 rpm is also maintained, then the pump performance is only reduced insignificantly and sufficient washing performance of the dishwasher is retained.

If the main emphasis is not placed on noise reduction, then, with a cost-effective dishwasher, the outlay on sound deafening means and measures can be considerably reduced.

Claims

1. A circulating centrifugal pump for a dishwasher with a pump casing with an axial inlet opening and with a radial outlet opening, and with a pump chamber expanding in a spiral shape with a spur, in which there is rotarily mounted a round pump motor with a predetermined distance from the spur, and whose vanes are disposed on a support disc, characterised in that the diameter (D_f) of the ends of the vanes (16) is reduced with respect to the diameter (D_b) of the support disc (12) and the radial spacing (b) between the ends of the vanes (16) and the spur (17) is correspondingly enlarged with respect to the radial spacing (a) between the support disc (12) and the spur (17).

2. Circulating centrifugal pump according to claim 1, characterised in that, with a radial spacing (a) of 3.8 mm of the support disc (12), the radial spacing (b) of the vane ends is enlarged to 7.3 to 10.5 mm. 5
3. Circulating centrifugal pump according to claim 1 or 2, characterised in that the diameter (Db) of the support disc (12) is selected at 72 mm. 10
4. Circulating centrifugal pump according to one of claims 1 to 3, characterised in that 15 the rotational speed of the pump runner wheel (20) is selected at 2500 to 3000 rpm.

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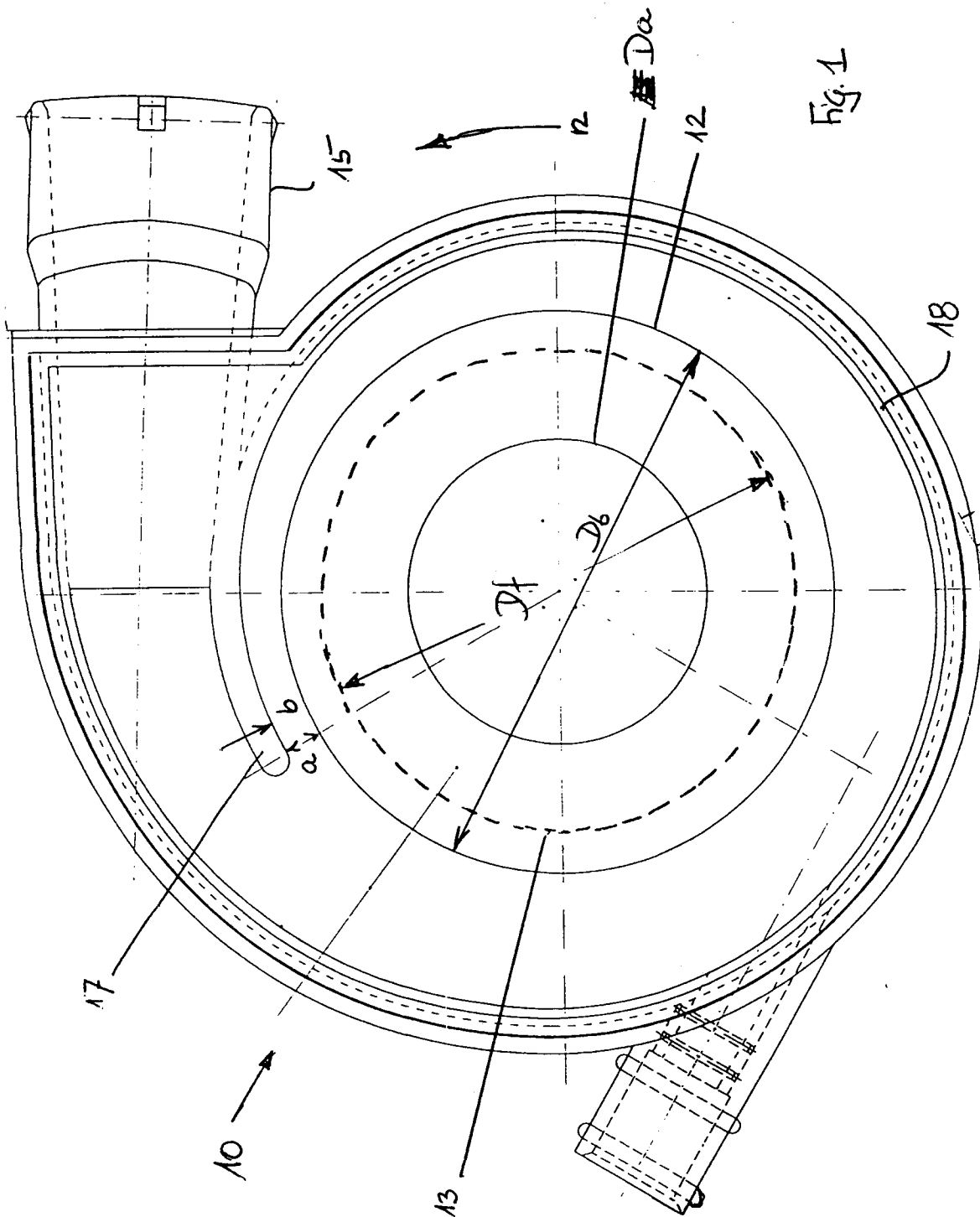
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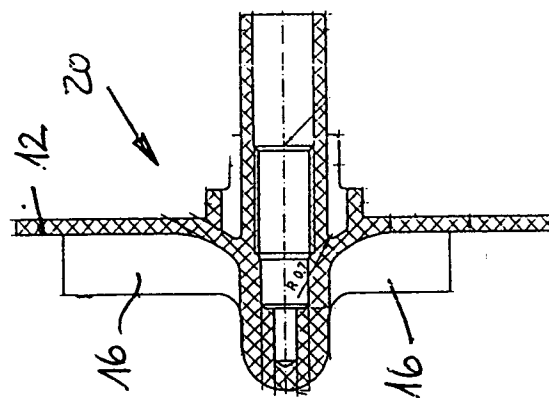
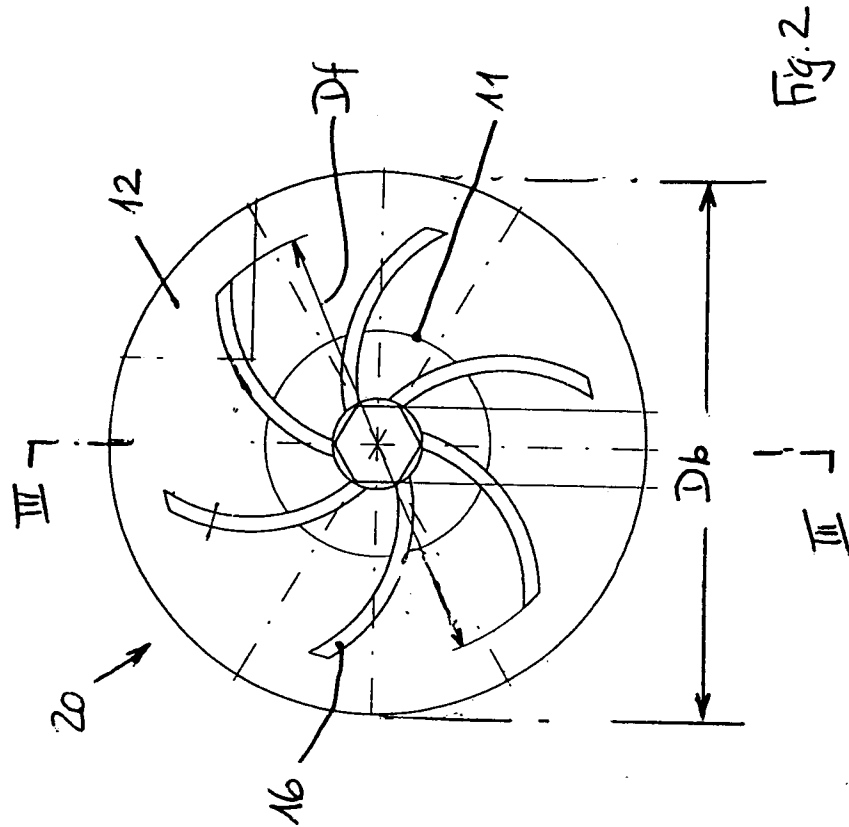
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EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
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A	OZTURK C: "TURNING DOWN DRAIN PUMP NOISE" MACHINE DESIGN, vol. 66, no. 22, 21 November 1994, page 60, 62, 64, 66, 68 XP000490691 * page 64 - page 68 *	1	
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A	PATENT ABSTRACTS OF JAPAN vol. 007, no. 183 (M-235), 12 August 1983 & JP 58 085397 A (HITACHI SEISAKUSHO KK), 21 May 1983, * abstract *	1	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27 July 1998	Examiner Zidi, K
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			

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Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27 July 1998	Examiner Zidi, K
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