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(54) **BLOWER AND HOUSEHOLD APPLIANCE**

(57) A blower and a household appliance are disclosed. The blower includes an impeller assembly and a motor, where the impeller assembly includes an impeller and a connecting disc connected to the impeller, and the motor includes a motor shaft. The connecting disc is provided with a through hole, an internal thread in a first rotation direction is disposed on the through hole, the motor shaft has a first part and a second part, and the first part is provided with an external thread that is in the first rotation direction and that matches the internal thread of the through hole, to allow the connecting disc to be in threaded connection to the first part of the motor shaft. The second part extends to an end portion of the motor shaft, a lock nut is fixedly connected to the second part and is in axial contact with at least a part of the connecting disc, to limit an axial movement of the connecting disc out of the motor shaft. This solution can limit the thread position, to reduce the original risk of larger noise caused by poor assembly of a clearance fit between a shaft and a hole to a larger extent; and can also achieve fool-proofing.

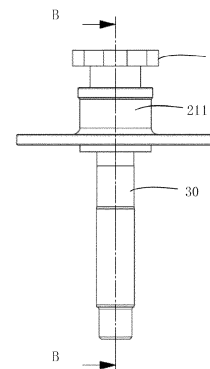


FIG. 3

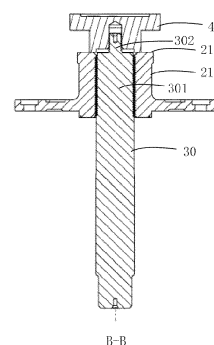


FIG. 4

Description

TECHNICAL FIELD

[0001] The present invention relates to the field of household appliance technologies, and in particular, to a blower and a household appliance.

BACKGROUND

[0002] A blower is a core component of household appliances, especially a range hood, and a structure of the blower directly affects performance and use experience of the range hood. Therefore, design of a relevant structure in the blower is particularly important. Usually, the blower mainly includes a housing and an impeller assembly and a motor disposed in the housing, and the motor drives the rotation of the impeller assembly through a motor shaft.

[0003] In the prior art, the impeller and the motor are usually connected by a clearance fit between the motor shaft and a hole on the impeller, then positioned by a pin through the motor shaft and the impeller, and finally locked with a reverse nut at an end portion of the motor shaft. However, there are some problems with this solution. On one hand, there is a risk that noise may be caused by poor assembly of a clearance fit between a shaft and a hole; on the other hand, a pin press-fit positioning manner is also relatively complex, and there is also a problem that an impeller assembly angle cannot be confirmed during reassembly after disassembly. In addition, for an impeller with forward and reverse rotation, especially for a range hood with a self-cleaning function, this connection manner cannot achieve two-way anti-loosening.

SUMMARY

[0004] In order to resolve the foregoing problems, the present invention provides at least a blower, including an impeller assembly and a motor, where the impeller assembly includes an impeller and a connecting disc connected to the impeller, and the motor includes a motor shaft. The connecting disc is provided with a through hole, an internal thread in a first rotation direction is disposed on the through hole, the motor shaft has a first part and a second part, and the first part is provided with an external thread that is in the first rotation direction and that matches the internal thread of the through hole, to allow the connecting disc to be in threaded connection to the first part of the motor shaft. The second part extends to an end portion of the motor shaft, a lock nut is fixedly connected to the second part and is in axial contact with at least a part of the connecting disc, to limit an axial movement of the connecting disc out of the motor shaft. Through a threaded connection manner between a motor output shaft and the connecting disc, a screw position can be limited, to reduce the original risk of larger

noise caused by poor assembly of a clearance fit between a shaft and a hole to a larger extent. Moreover, the assembly complexity of a production line is reduced, and the risk of disturbing an original balance due to reassembly can be avoided, to achieve fool-proofing.

[0005] In a possible embodiment, the through hole is columnar and protruded on at least one side surface of the connecting disc.

[0006] In a possible embodiment, an axial length of the through hole is equal to an axial length of the first part. In this way, the connecting disc is more firmly connected to the shaft and the risk of loosening is reduced.

[0007] In a possible embodiment, the lock nut is provided with an internal thread in a second rotation direction; and

the second part is provided with an external thread in the second rotation direction, and the second part is connected to the internal thread of the lock nut by the external thread. In this way, the two-way anti-loosening of the impeller assembly is achieved and the anti-loosening performance is improved.

[0008] In a possible embodiment, the first rotation direction is opposite to the second rotation direction.

[0009] In a possible embodiment, an outer diameter of the second part is less than an outer diameter of the first part to allow the output shaft to freely pass through the through hole, to achieve a threaded connection between the first part and the through hole and simpler assembly.

[0010] In a possible embodiment, the lock nut includes an end portion towards the through hole, the end portion is provided with a second groove, and a width of the second groove is not less than the outer diameter of the first part, so that the end portion of the lock nut is not in contact with the first part.

[0011] In a possible embodiment, the motor shaft has a third part, the third part is adjacent to the first part and is located on one side far away from the second part, the third part has a smooth surface, and an outer diameter of the third part is equal to an outer diameter of the first part. In this way, the limiting is achieved through the threaded connection while a proper distance between the motor and the impeller assembly is maintained, to avoid contact between the motor housing and the impeller assembly, avoid lowering the service life of components, and avoid affecting the working performance of the motor or the impeller.

[0012] In a possible embodiment, the internal thread of the through hole is connected to a tail end, close to the third part, of the external thread of the first part. In this way, the limiting is achieved by the threaded connection in a specific range to fix the impeller assembly to a position set by the motor output shaft.

[0013] A household appliance is provided, including a body, and further including the foregoing blower disposed on the body.

[0014] In a possible embodiment, the household appliance further includes a control device, where the control device is configured to cause an impeller assembly

to selectively rotate in a first rotation direction or a second rotation direction according to a program setting.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

FIG. 1 is a schematic exploded structural view of a blower in an embodiment of the present invention; FIG. 2 is a cross-sectional view of FIG. 1 in a direction A-A; FIG. 3 is a schematic structural view of a motor shaft and a connecting disc in an embodiment of the present invention; FIG. 4 is a cross-sectional view of FIG. 3 in a direction B-B; FIG. 5 is a schematic exploded structural view of a component in FIG. 3; and FIG. 6 is a schematic enlarged structural view of a nut in FIG. 4.

DETAILED DESCRIPTION

[0016] FIG. 1 and FIG. 2 show schematic exploded views of a main structure of a blower. FIG. 3 to FIG. 5 show schematic views of a connection structure of a motor output shaft and an impeller assembly in a blower.

[0017] With reference to FIG. 1 to FIG. 5, the blower 1 includes an impeller assembly 2 and a motor 3, where the impeller assembly 2 is connected by the motor output shaft 30, to drive the rotation of the impeller assembly 2 by the motor 3.

[0018] The impeller assembly 2 includes an impeller 20 and a connecting disc 21 connected to the impeller 20. The impeller 20 includes a wheel 201 and a plurality of blades 202 disposed on a periphery of the wheel 201. The connecting disc 21 may be connected to the wheel 201, or in other cases, the wheel 201 may also be integral with the connecting disc 21.

[0019] The connecting disc 21 is provided with a through hole 211 through which the motor output shaft 30 is connected, and the through hole 211 may be in threaded connection to the output shaft 30. The threaded connection avoids the risk of larger noise caused by due to poor assembly of a clearance fit between a shaft and a hole in the traditional manner. This risk can be reduced to a larger extent by screw assembly and screw limiting.

[0020] The through hole 211 may be provided in a middle part of the connecting disc 21 and may be protruded from the middle part of the connecting disc 21 to form a columnar through hole 211. The columnar through hole 211 may be protruded from at least one side of the connecting disc 21.

[0021] The meaning of the middle part herein is not limited to being a central position of the connecting disc 21.

[0022] Referring to FIG. 3 to FIG. 5, the motor output shaft 30 has a first part 301 and a second part 302, where

the second part 302 extends to an end portion of the motor output shaft 30.

[0023] In some embodiments, an outer diameter of the second part 302 of the motor output shaft 30 is less than an outer diameter of the first part 301. In the installation process of the motor shaft 30 and a connecting disc 21, the second part 302 of the motor output shaft 30 may pass through the through hole 211, so that the first part 301 of the output shaft 30 is in threaded connection to the through hole 211. The outer diameter herein may be understood as a nominal diameter of a thread set on the output shaft, that is, a large diameter of the thread, or a diameter of an outer surface of the thread for the part containing the external thread.

[0024] The through hole 211 is in threaded connection to the motor output shaft 30. The through hole 211 may be provided with an internal thread in a first rotation direction X, the first part 301 of the output shaft 30 is provided with an external thread that is in the first rotation direction X and that may match with the internal thread of the through hole 211, to allow the connecting disc 21 to be in threaded connection to the first part 301 of the motor output shaft 30.

[0025] The blower 1 further includes a lock nut 4 connected to the end portion of the motor output shaft 30. Specifically, the lock nut 4 may be fixedly connected to the second part 302 of the output shaft 30 and in axial partial contact with the connecting disc 21, to limit an axial movement of the connecting disc 21 out of the motor output shaft 30.

[0026] In an embodiment, the lock nut 4 includes an end portion 40 towards the through hole and a first groove 401 and a second groove 402 coaxially provided in the end portion 40, where a width of the first groove 401 is less than a width of the second groove 402, and the first groove 401 is in threaded connection to the second part 302 of the output shaft 30. The width of the second groove 402 is not less than the outer diameter of the first part 301. Preferably, the width of the second groove 402 is equal to the outer diameter of the first part 301.

[0027] In an embodiment, an outer diameter of the end portion 40 of the lock nut 4 is no greater than an outer diameter of the through hole 211, so that the end portion of the lock nut is at least in partial contact with an end surface of the through hole.

[0028] In some cases, the lock nut 4 may be pressed on the protruded end surface 212 disposed in the through hole 211, so that there is a sufficiently large frictional force between the connecting disc 21 and the lock nut 4 to cause the lock nut 4 to lock when the output shaft 30 rotates the connecting disc 21. Moreover, when the lock nut 4 is pressed on the end surface of the through hole, the lock nut 4 is provided with the second groove, so that the end surface of the first part is not in contact with the lock nut. In an embodiment, the lock nut 4 may be provided with an internal thread in a second rotation direction Y. The second part 302 of the output shaft 30 is provided with an external thread in the second rotation direction

Y, and the second part 302 is connected to the internal thread of the lock nut 4 by the external thread.

[0029] The first rotation direction X may be opposite to the second rotation direction Y. For example, if the first rotation direction is a counterclockwise rotation direction, that is, the through hole is provided with a left-handed internal thread, the first part of the motor output shaft is provided with a left-handed external thread. If the corresponding second rotation direction is a clockwise rotation direction, that is, the lock nut is provided with a right-handed internal thread, the second part of the motor output shaft is provided with a right-handed external thread.

[0030] Through the forward thread and reverse thread of the output shaft, the first part is tightened with the left-hand thread of the through hole when the impeller assembly is in forward rotation and the second part is tightened with the right-hand thread of the nut when the impeller assembly is in reverse rotation, and the anti-loosening effect is achieved by rotating in both forward and reverse directions. In addition, the threaded connection avoids the risk of disturbing an original balance of the blower after reassembly after disassembly, and achieves fool-proofing.

[0031] In some embodiments, an axial length of the through hole 211 is equal to an axial length of the first part 301 of the output shaft. More specifically, in some cases, an axial length of the internal thread of the through hole is equal to an axial length of the external thread of the first part of the output shaft, and the internal thread matches the external thread, to better limit the thread position.

[0032] In some embodiments, the motor output shaft 30 has a third part 303, the third part 303 is adjacent to the first part 301 and is located on one side far away from the second part 302, the third part 303 has a smooth surface, and an outer diameter of the third part is equal to an outer diameter of the first part 301.

[0033] In some embodiments, the internal thread of the through hole 211 is connected to a tail end, close to the third part 303, of the external thread of the first part 301.

[0034] An embodiment of the present invention further discloses a household appliance. The household appliance includes the foregoing blower. The household appliance further includes a control device, and the control device is configured to cause an impeller assembly to selectively rotate in a first rotation direction or a second rotation direction according to a program setting.

[0035] For example, the household appliance is a range hood, including a body, and the foregoing blower disposed in the body. The blower includes a housing, an impeller assembly and a motor are disposed in the housing, and the impeller assembly is connected through the motor output shaft. The range hood further includes a control device by which the motor may be controlled and selectively drive the impeller assembly in the forward rotation or reverse rotation. Usually, the impeller assembly is driven to rotate in a forward direction during the normal operation of the range hood and the exhaust of grease

and smoke. When a self-cleaning function of the range hood is activated, the impeller assembly may be selectively controlled and driven in the forward rotation or reverse rotation.

[0036] The range hood using the foregoing blower avoids the risk of disturbing a dynamic balance of an original system when the impeller is installed reversely during after-sales cleaning and maintenance, and achieves effective fool-proofing.

[0037] The foregoing descriptions are merely specific implementations of the present invention, but are not intended to limit the protection scope of the present invention. Any modification or replacement readily figured out by a person skilled in the art within the technical scope disclosed in the present invention shall fall within the protection scope of the present invention. Therefore, the protection scope of the present invention shall be subject to the protection scope of the claims.

Claims

1. A blower, comprising an impeller assembly and a motor, wherein the impeller assembly comprises an impeller and a connecting disc connected to the impeller, and the motor comprises a motor shaft, **characterized in that**, the connecting disc is provided with a through hole, an internal thread in a first rotation direction is disposed on the through hole, the motor shaft has a first part and a second part, and the first part is provided with an external thread that is in the first rotation direction and that matches the internal thread of the through hole, to allow the connecting disc to be in threaded connection to the first part of the motor shaft; and the second part extends to an end portion of the motor shaft, a lock nut is fixedly connected to the second part and is in axial contact with at least a part of the connecting disc, to limit to an axial movement of the connecting disc out of the motor shaft.
2. The blower according to claim 1, **characterized in that**, the through hole is columnar and protruded on at least one side surface of the connecting disc.
3. The blower according to claim 1, **characterized in that**, an axial length of the through hole is equal to an axial length of the first part.
4. The blower according to claim 1, **characterized in that**, the lock nut is provided with an internal thread in a second rotation direction; and the second part is provided with an external thread in the second rotation direction, and the second part is connected to the internal thread of the lock nut by the external thread.
5. The blower according to claim 4, **characterized in**

that, the first rotation direction is opposite to the second rotation direction.

6. The blower according to claim 4, **characterized in that**, an outer diameter of the second part is less than an outer diameter of the first part. 5
7. The blower according to claim 1, **characterized in that**, the lock nut comprises an end portion towards the through hole, the end portion is provided with a second groove, and a width of the second groove is not less than the outer diameter of the first part, so that the end portion of the lock nut is not in contact with the first part. 10 15
8. The blower according to claim 1, **characterized in that**, the motor shaft has a third part, the third part is adjacent to the first part and is located on one side far away from the second part, the third part has a smooth surface, and an outer diameter of the third part is equal to an outer diameter of the first part. 20
9. The blower according to claim 8, **characterized in that**, the internal thread of the through hole is connected to a tail end, close to the third part, of the external thread of the first part. 25
10. A household appliance, comprising a body, **characterized by** further comprising the blower according to any one of claims 1 to 9 disposed on the body. 30
11. The household appliance according to claim 10, **characterized by** comprising a control device, wherein the control device is configured to cause an impeller assembly to selectively rotate in a first rotation direction or a second rotation direction according to a program setting. 35 40 45 50 55

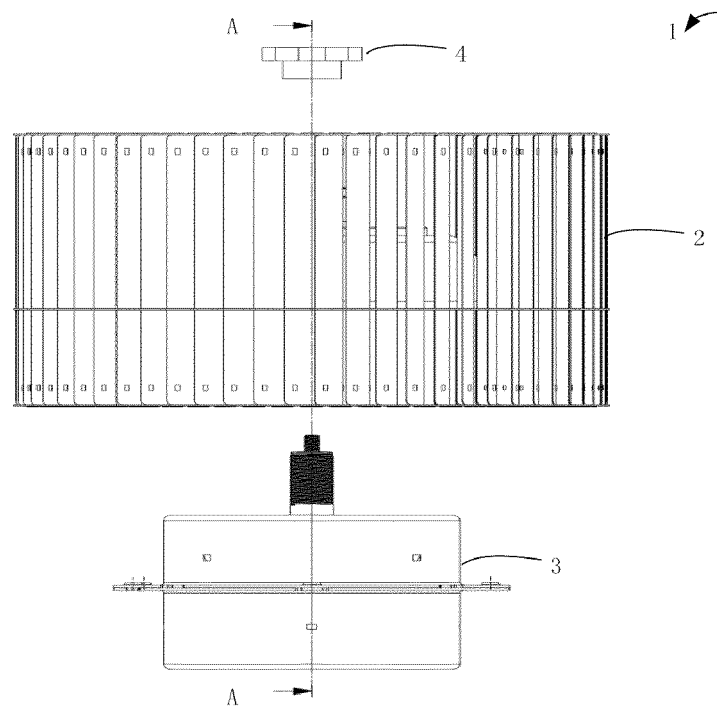


FIG. 1

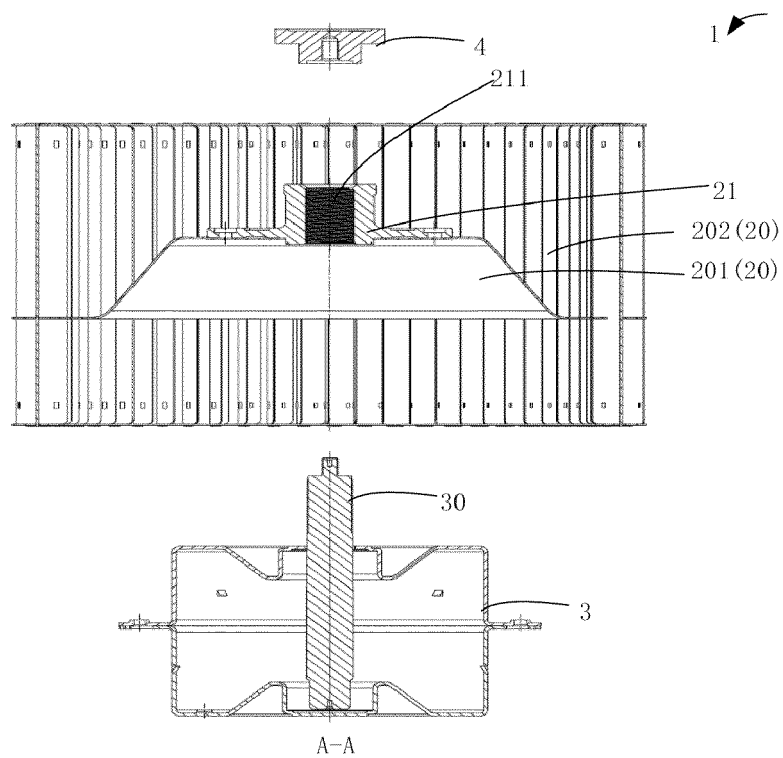


FIG. 2

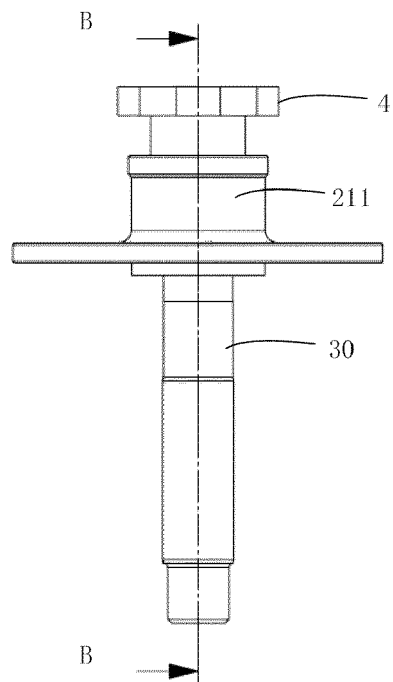


FIG. 3

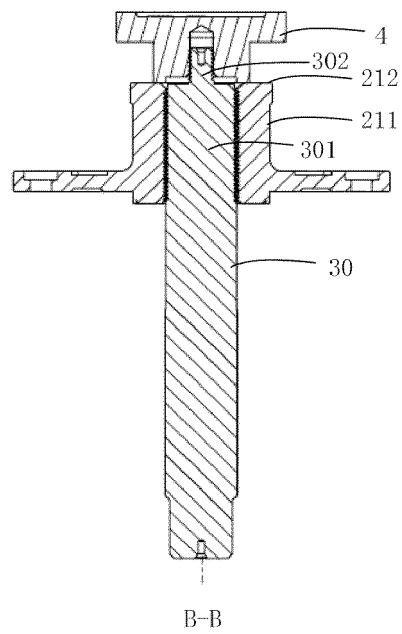


FIG. 4

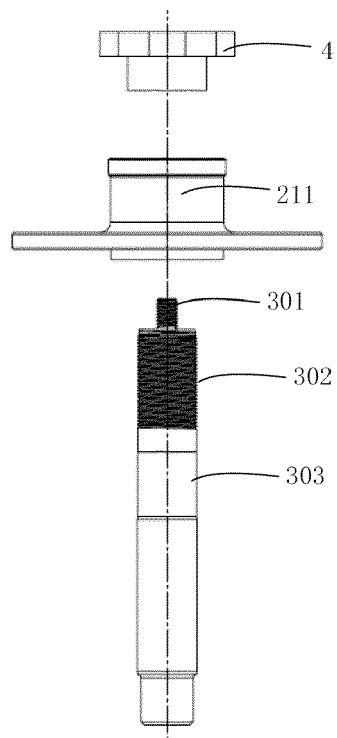


FIG. 5

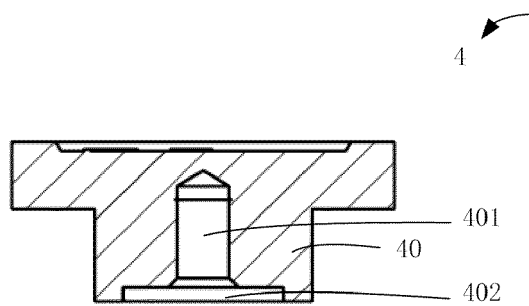


FIG. 6



EUROPEAN SEARCH REPORT

Application Number

EP 21 20 6211

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
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A	* abstract *	5	F04D29/60
	* figures 5a, 5b *		F04D29/28

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	* abstract *		
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A	DE 203 17 573 U1 (GRONBACH FORSCHUNGS UND ENTWIC [AT]) 31 March 2005 (2005-03-31)	1-11	
	* paragraph [0014] *		
	* figure 1 *		

			TECHNICAL FIELDS SEARCHED (IPC)
			F04D
			F24C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 16 March 2022	Examiner Lovergine, A
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
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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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16-03-2022

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