(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 959 816 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
30.12.2015 Bulletin 2015/53

(51) Int Cl.:
A47L 9/00 *(2006.01)* ***A47L 9/22*** *(2006.01)*

(21) Application number: **14192199.9**

(22) Date of filing: **07.11.2014**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **27.06.2014 CN 201410301150**

(71) Applicant: **KingClean Electric Co., Ltd.**
Suzhou, Jiangsu 215009 (CN)

(72) Inventor: **NI, Zugen**
215009 SUZHOU (CN)

(74) Representative: **EP&C**
P.O. Box 3241
2280 GE Rijswijk (NL)

(54) **A vacuum cleaner having motor damping structure**

(57) The present invention discloses a vacuum cleaner having motor damping structure, whose internal motor cover is hung and fixed inside an external motor cover through a cantilever. This vacuum cleaner of the present invention can effectively reduce the amount of vibration produced by high-speed rotation of the motor that is transferred to the outer surface of the vacuum cleaner, which reduces the vibration noise of the vacuum cleaner in operation, and weakens the numb feeling of hand when a hand is in contact with the outer surface of the vacuum cleaner, thereby enhancing the user experience.

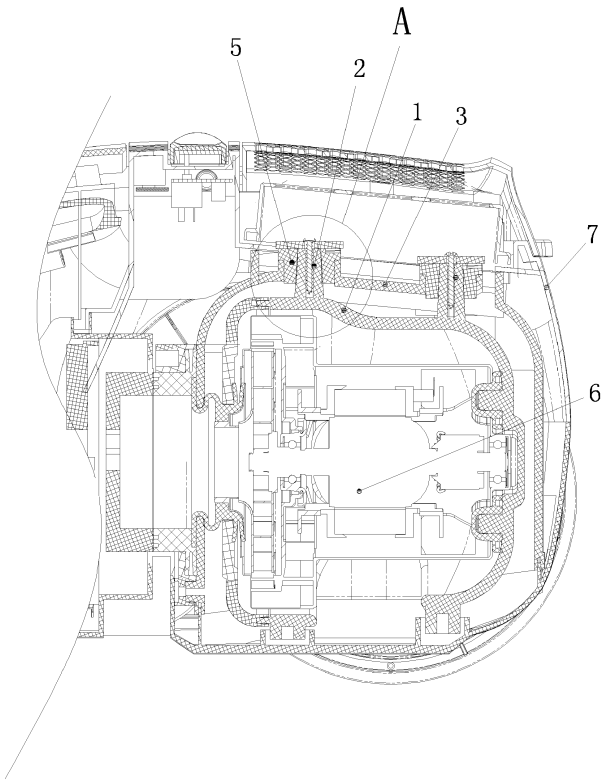

Fig. 1

EP 2 959 816 A1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to the field of vacuum cleaners, specifically to a vacuum cleaner having motor damping structure.

BACKGROUND OF THE INVENTION

[0002] A vacuum cleaner currently used on the market generally has an internal motor cover and an external motor cover, wherein the external motor cover is fixed together with the vacuum cleaner housing, the internal motor cover is fixedly provided inside with a suction motor for generating a negative pressure, and the internal motor cover is connected in direct contact with the external motor cover. The vacuum cleaner having such a traditional structure has the following problems:

[0003] When the vacuum cleaner is in operation, the motor in the internal motor cover rotates at a high speed, thus making the internal motor cover vibrate, and then the internal motor cover drives the external motor cover connected in contact therewith to vibrate; besides, in the process of vibration transmission, due to the resonance effect, the amount of vibration transferred to the external motor cover and the vacuum cleaner housing is great, which makes the entire vacuum cleaner noisy; when a user contacts the outer surface of the vacuum cleaner by hand, there is also a "numb" feeling of hand, weakening the user experience. However, there is no innovative solution for reducing vibration of the conventional vacuum cleaner, with the effect not greatly improved.

CONTENTS OF THE INVENTION

[0004] A purpose of the present invention is as follows: In order to solve the above problems, a vacuum cleaner having motor damping structure is provided, capable of weakening resonance of the entire machine caused by high speed rotation of the motor and reducing the vibration noise caused by resonance of the entire machine.

[0005] A technical solution of the present invention is as follows: A vacuum cleaner having motor damping structure, whose internal motor cover is hung and fixed inside an external motor cover through a cantilever.

[0006] Preferably, a hanging hole, formed on the external motor cover, is provided inside with a damping medium with a vertical through hole, the cantilever being hung at the vertical through hole of the damping medium.

[0007] Preferably, the cantilever comprises a connecting pin inserted into the vertical through hole of the damping medium, a support plate supported above the damping medium, and a screw for fixedly connecting the connecting pin to the support plate, wherein the connecting pin is integrally connected at its bottom with the internal motor cover. Preferably, the damping medium is made of a sponge, rubber or a spring. Preferably, there is one or more cantilevers.

[0008] Preferably, there are four cantilevers.

[0009] The present invention has the following advantages: In this vacuum cleaner of the present invention, the internal motor cover used for mounting the motor is hung and fixed inside the external motor cover, and completely isolated from the external motor cover; besides, a damping medium is disposed at a suspension point of the internal motor cover and external motor cover, thus blocking the path of transmission of the motor vibration from the internal motor cover to the vacuum cleaner housing and reducing the amount of vibration transferred from the internal motor cover to the external motor cover, making the resonance phenomenon between the external motor cover and the internal motor cover disappear; in operation, the internal motor cover vibrates independently in the external motor cover with little effect on the external motor cover, which makes the vibration amplitude of the vacuum cleaner housing reduced greatly, thereby reducing the vibration noise of the vacuum cleaner in operation; besides, when a user's hand contacts the outer surface of the vacuum cleaner, the numb feeling of hand is weakened greatly or even disappears, enhancing the user experience.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The present invention will be further described below with reference to drawings and examples.

Fig. 1 is a partial sectional view of the vacuum cleaner in the example of the present invention; and
Fig. 2 is an enlarged view of the portion A in Fig. 1.

[0011] Wherein: 1. internal motor cover; 2. cantilever; 21. connecting pin; 22. support plate; 23. screw; 3. external motor cover; 4. hanging hole; 5. damping medium; 6. motor; and 7. vacuum cleaner housing.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0012] Fig. 1 and Fig. 2 show one specific example of the vacuum cleaner having motor damping structure of the present invention, which comprises an internal motor cover 1 and an external motor cover 2 disposed outside the internal motor cover 1, wherein a motor 6 is mounted inside the internal motor cover 1, and the external motor cover 2 is fixed inside the vacuum cleaner housing 7.

[0013] The key improvement of this example is that the internal motor cover 1 is hung and fixed inside the external motor cover 3 through a cantilever 2. The specific structure is as follows:

A hanging hole 4, formed on the external motor cover 3, is provided inside with a damping medium 5 with a vertical through hole (not shown in the drawing); the cantilever 2, hung at the vertical through hole of the damping medium 5, is in no direct contact with

and completely isolated from the external motor cover 3; and the entire internal motor cover 1 is completely isolated from and in no direct contact with the external motor cover 3. The damping medium 5 can be made of a sponge, and certainly can also be made of other flexible materials such as rubber and a spring.

[0014] In this example, the detailed structure of the cantilever 2 may be as shown in Fig. 2: The cantilever 2 is composed of a connecting pin 21 inserted into the vertical through hole of the damping medium 5, a support plate 22 supported above the damping medium 5, and a screw 23 for fixedly connecting the connecting pin 21 to the support plate 22, wherein the connecting pin 21 is integrally connected at its bottom with the internal motor cover 1, i.e., the connecting pin 21 is formed integrally with the internal motor cover 1. The support plate 22 is provided with a vertical mounting through hole, and the connecting pin 21 is provided with a vertical threaded hole. While assembling, first making the connecting pin 21 go from bottom to top into the vertical through hole of the damping medium 5, then placing the support plate 22 horizontally above the damping medium 5, making the mounting through hole in the support plate 22 aligned with the threaded hole in the connecting pin 21, and then screwing the screw 23 from top to bottom into the threaded hole in the connecting pin 21, thus making the connecting pin 21 fixedly connected together with the support plate 22, the support plate 22 being supported above the damping medium 5 and pulling the hung internal motor cover 1 to prevent it from falling down.

[0015] In order to ensure the connecting strength between the internal motor cover 1 and the external motor cover 3 as well as prevent the internal motor cover 1 from shaking substantially in the external motor cover 3, two or more cantilevers 2 are generally provided, there being totally four cantilevers 2 in this example. Certainly, we can also set one cantilever 2.

[0016] When the vacuum cleaner is in operation, the motor 6 runs to drive the internal motor cover 1 to vibrate; the vibration of the internal motor cover 1 can be released in the presence of the damping medium 5 of a soft material, and the internal motor cover 1 is completely isolated from the external motor cover 3, which effectively reduce the effect of transmission of the vibration produced by the internal motor cover 1 to the external motor cover 3, and make the vibration amplitude of the external motor cover 3 extremely small or even be zero, further reducing the amount of vibration of the vacuum cleaner housing 7, weakening the vibration noise caused by resonance of the entire machine resulted from high speed rotation of the motor, thus there being no "numb" feeling of hand any more when a hand is in contact with the outer surface of the vacuum cleaner housing 7.

[0017] Certainly, the above example is used only for explaining the technical concept and characteristics of the present invention. It is provided to make people understand the present invention and implement it, rather than limit the scope of protection thereof. Any equivalent alteration or modification made according to the spiritual essence of the main technical solution of the present invention should fall within the scope of protection of the present invention.

Claims

1. A vacuum cleaner having motor damping structure, **characterized in that**: an internal motor cover (1) is hung and fixed inside an external motor cover (3) through a cantilever (2).

2. The vacuum cleaner having motor damping structure according to claim 1, wherein a hanging hole (4), formed on the external motor cover (3), is provided inside with a damping medium (5) with a vertical through hole, the cantilever (2) being hung at the vertical through hole of the damping medium (5).

3. The vacuum cleaner having motor damping structure according to claim 2, wherein the cantilever (2) is composed of a connecting pin (21) inserted into the vertical through hole of the damping medium (5), a support plate (22) supported above the damping medium (5), and a screw (23) for fixedly connecting the connecting pin (21) to the support plate (22), wherein the connecting pin (21) is integrally connected at its bottom with the internal motor cover (1).

4. The vacuum cleaner having motor damping structure according to claim 2, wherein the damping medium (5) is made of a sponge, rubber or a spring.

5. The vacuum cleaner having motor damping structure according to claim 1, wherein there is one or more cantilevers (2).

6. The vacuum cleaner having motor damping structure according to claim 5, wherein there are four cantilevers (2).

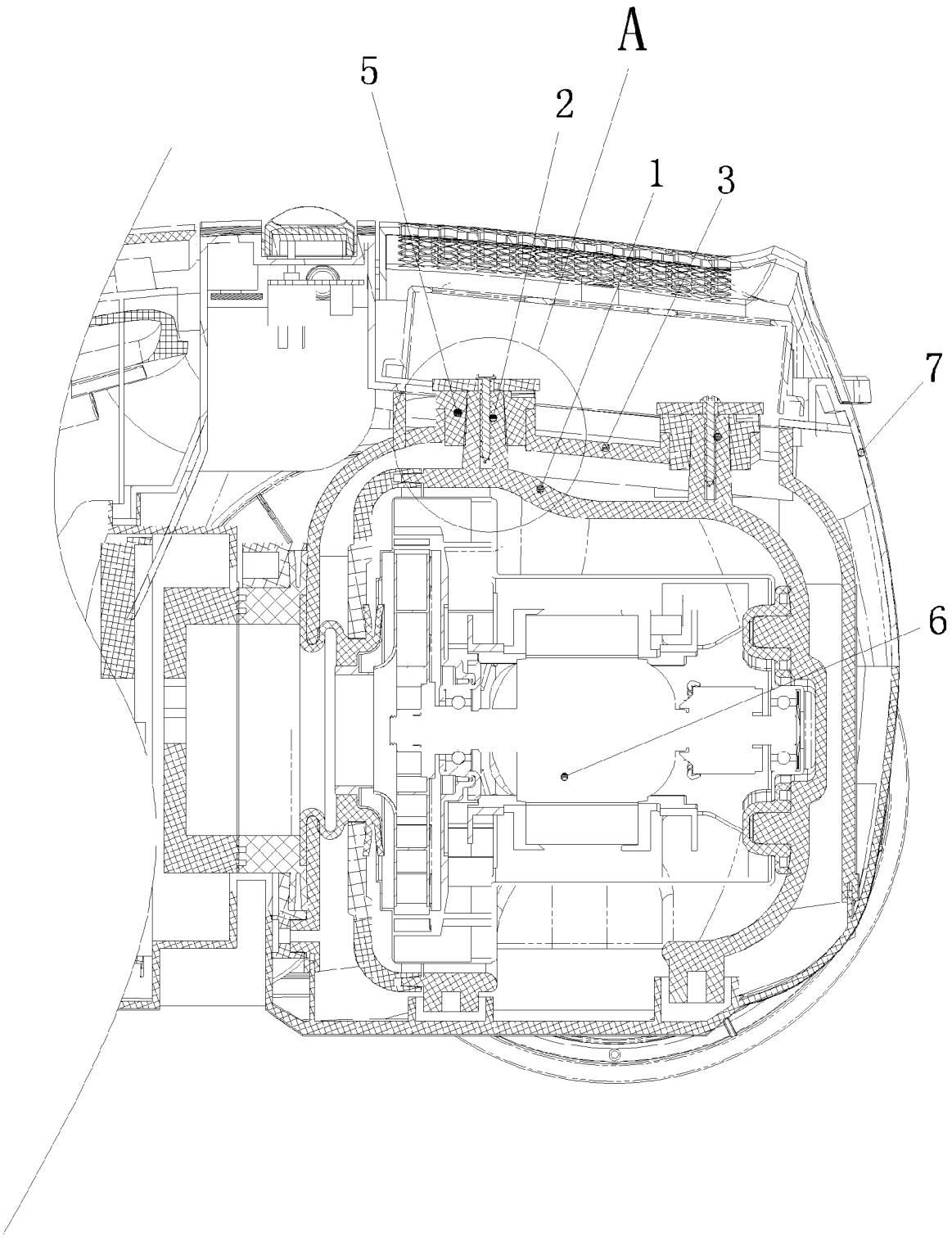

Fig. 1

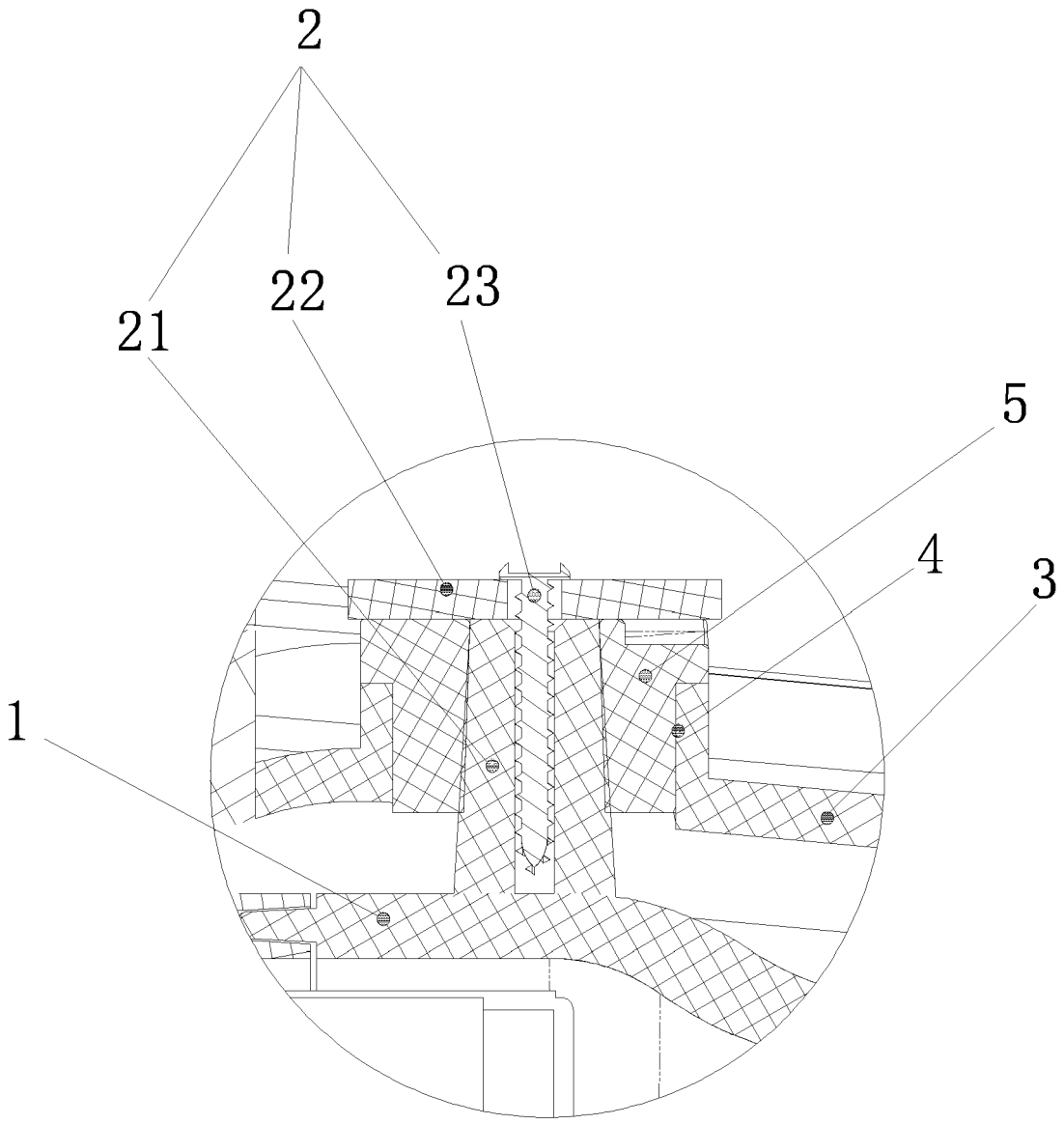

Fig. 2

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 14 19 2199

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 2 142 526 A (SHARP KK) 23 January 1985 (1985-01-23) * figure 2 *	1-6	INV. A47L9/00 A47L9/22
X	DE 41 00 858 A1 (SIEMENS AG [DE]) 16 July 1992 (1992-07-16) * figure 1 *	1-6	
X	WO 2009/101775 A1 (TOSHIBA KK [JP]; TOSHIBA CONSUMER ELECT HOLDING [JP]; TOSHIBA HOME APP) 20 August 2009 (2009-08-20) * figures 1,6,10 *	1-6	
A	US 4 597 131 A (LYMAN JOHN B [US]) 1 July 1986 (1986-07-01) * figure 2 *	1-6	
			TECHNICAL FIELDS SEARCHED (IPC) A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	12 March 2015	Trimarchi, Roberto

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 14 19 2199

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

12-03-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2142526 A	23-01-1985	AU 575055 B2	21-07-1988
		AU 2918384 A	03-01-1985
		DE 3417163 A1	10-01-1985
		GB 2142526 A	23-01-1985
		US 4592764 A	03-06-1986
DE 4100858 A1	16-07-1992	NONE	
WO 2009101775 A1	20-08-2009	CN 101945606 A	12-01-2011
		EP 2252189 A1	24-11-2010
		KR 20100114067 A	22-10-2010
		WO 2009101775 A1	20-08-2009
US 4597131 A	01-07-1986	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82