

(19)



(11)

EP 1 739 280 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

03.01.2007 Bulletin 2007/01

(51) Int Cl.:

F01C 1/344 (2006.01)

B25B 21/00 (2006.01)

B25F 5/00 (2006.01)

F01C 21/10 (2006.01)

(21) Application number: **05013843.7**

(22) Date of filing: **27.06.2005**

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR**

Designated Extension States:

AL BA HR LV MK YU

(72) Inventor: **Chang, Johnson**

Wu-Jih Shiang

Taichung Hsien (TW)

(74) Representative: **Viering, Jentschura & Partner**

Patent- und Rechtsanwälte,

Steinsdorfstrasse 6

80538 München (DE)

(71) Applicant: **Mighty Seven International Co., Ltd.**

Taichung Hsien (TW)

(54) **Motor of pneumatic tool**

(57) There is disclosed a motor of a pneumatic tool. The motor includes a cylinder (10), a rotor (20) put in the cylinder (10), a plurality of leaves (22) movable to the cylinder (10) from the rotor (20) in operation, a front cover (30) connected to a front end of the cylinder (10), a rear

cover (40) connected to a rear end of the cylinder (10), a front pad (50) put between the rotor (20) and the front cover (30) and between the leaves (22) and the front cover (30), and a rear pad (51) put between the rotor (20) and the rear cover (40) and between the leaves (22) and the rear cover (40).

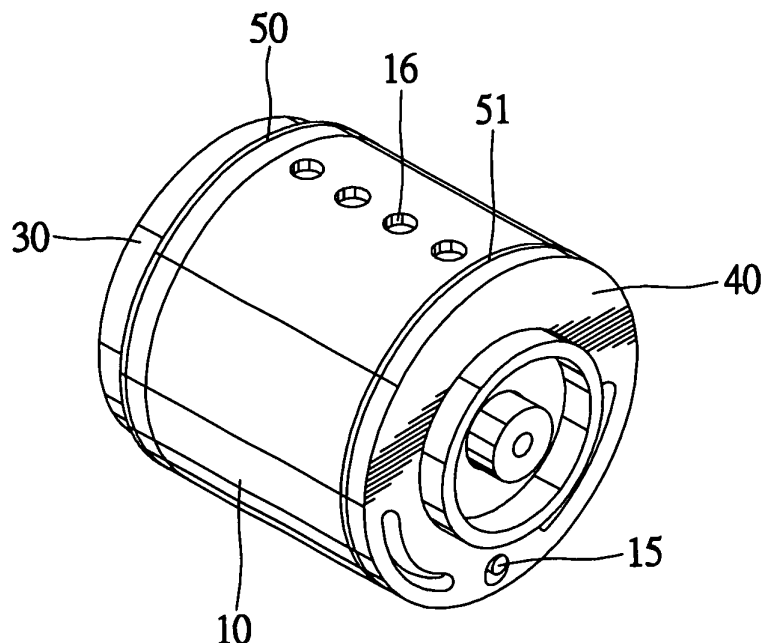


Fig. 1

EP 1 739 280 A1

Description

Background of Invention

1. Field of Invention

[0001] The present invention relates to a pneumatic tool and, more particularly, to a reliable and durable motor of a pneumatic tool.

2. Related Prior Art

[0002] A typical pneumatic tool includes a motor for driving a tool bit and a shell for containing the motor. The motor includes a rotor for driving the tool bit and a cylinder for containing the rotor. Pressurized drives the rotor while going through the cylinder

[0003] Referring to Fig. 4, a conventional motor includes a cylinder 1, a rotor 2, several leaves 5, a front cover 3 and a rear cover 4. The rotor 2 is put in the cylinder 1. The leaves 5 are movable relative to the rotor 2 in radial directions. The front cover 3 is connected to a front end of the cylinder 1. The rear cover 4 is connected to a rear end of the cylinder 1. While going through the cylinder 1 Pressurized air moves the leaves 5 to the cylinder 1 and rotates the rotor 2. Thus, the space in the cylinder 1 is divided into several sub-spaces. To ensure the operation of the motor, the sub-spaces must be separated from one another. To this end, the rotor 2 must contact the covers 3 and 4, and the leaves 5 must contact the cylinder 1 and the covers 3 and 4. To stand the long-term heavy-duty operation, the rotor 2 and the leaves 5 are made of hard materials. The cylinder 1 and the covers 3 and 4 are made of soft materials. The rotor 2 wears away the covers 3 and 4, and the leaves 5 wear away the cylinder 1 and the covers 3 and 4. Enlargement of the internal diameter of the cylinder 1. for the wear against the leaves 5 is compensated by the radial movement of the leaves 5; however, enlargement of the axial dimension of the space in the cylinder 1 for the wear against the rotor 2 and the leaves 5 is not compensated. In such a case, the sub-spaces are not separated from one another so that the motor cannot operate normally.

[0004] There is disclosed a motor of a pneumatic tool. The motor includes a cylinder, a rotor put in the cylinder, a plurality of leaves movable to the cylinder from the rotor in operation, a front cover connected to a front end of the cylinder, a rear cover connected to a rear end of the cylinder, a front pad put between the rotor and the front cover and between the leaves and the front cover, and a rear pad put between the rotor and the rear cover and between the leaves and the rear cover.

[0005] The primary advantage of the motor of the present invention is to prevent wear of the front and rear covers because of the use of the front and rear pads.

[0006] The present invention is therefore intended to obviate or at least alleviate the problems encountered in prior art.

Summary of Invention

[0007] According to the present invention,

[0008] The primary advantage of the motor according to the present invention is.

[0009] Other advantages and novel features of the invention will become more apparent from the following detailed description in conjunction with the drawings.

10 Brief Description of Drawings

[0010] The present invention will be described through detailed description of the preferred embodiment referring to the drawings.

15

Fig. 1 is a perspective view of a motor of a pneumatic tool according to the preferred embodiment of the present invention.

20

Fig. 2 is an exploded view of the motor shown in Fig. 1.

Fig. 3 is a cross-sectional view of the motor shown in Fig. 1.

25

Fig. 4 is a cross-sectional view of a conventional motor.

30

Detailed Description of Preferred Embodiment

[0011] Referring to Fig. 1, there is shown a motor of a pneumatic tool according to the preferred embodiment of the present invention.

35

[0012] Referring to Figs. 1 and 2, the motor includes a cylinder 10, a rotor 20, several leaves 22, a front pad 50, a rear pad 51, a front cover 30 and a rear cover 40. The rotor 20 is put in the cylinder 10. The leaves 22 are movable relative to the rotor 20. The front pad 50 is put between a front end of the rotor 20 and the front cover 30. Moreover, the front pad 50 is put between front ends of the leaves 22 and the front cover 30. The front cover 30 is connected to a front end of the cylinder 10. The rear pad 51 is put between a rear end of the rotor 20 and the rear cover 40. Moreover, the rear pad 51 is put between rear ends of the leaves 22 and the rear cover 40. The rear cover 40 is connected to a rear end of the cylinder 10.

40

[0013] The cylinder 10 eccentrically defines a space 11, two ports 12 and 13, a series of ports 16, and a tunnel 14. The ports 12, 13 and 16 will not be described in detail for not being the spirit of the present invention. The tunnel 14 is separated from the space 11.

45

[0014] The rotor 20 defines several grooves 21 in the periphery thereof. Each groove 21 receives a leaf 22. Thus, the leaves 22 are movable relative to the rotor 20. The leaves 22 move to the wall of the space 11 in operation. To stand the long-term heavy-duty operation, the leaves 22 are made of a hard material.

50

[0015] As mentioned above and shown in Fig. 3, the front pad 50 is put between a front end of the rotor 20 and the front cover 30 and between front ends of the leaves 22 and the front cover 30. That is, the front pad

50 keeps the rotor 20 and the leaves 22 from the front cover 30. Thus, the front pad 50 prevents the rotor 20 and the leaves 22 from wearing away the front cover 30.

[0016] The rear pad 51 is put between a rear end of the rotor 20 and the rear cover 40 and between rear ends of the leaves 22 and the rear cover 40. That is, the rear pad 51 keeps the rotor 20 and the leaves 22 from the rear cover 40. Thus, the rear pad 51 prevents the rotor 20 and the leaves 22 from wearing away the rear cover 40.

[0017] The pads 50 and 51 may be made of SCM21 or SCM415 steel so that the hardness thereof is above HRC60.

[0018] The covers 30 and 40 may be made of aluminum in order to minimize the weight.

[0019] The motor of the present invention is advantageous in several aspects. Firstly, wear of the covers 30 and 40 is prevented because of the use of the pads 50 and 51. Secondly, the normal operation of the motor is ensured because enlargement of the axial dimension of the space 11 is avoided due to the use of the pads 50 and 51 with the hardness higher than HRC60. Thirdly, the weight of the motor is minimized for the use of the aluminum covers 30 and 40.

[0020] The present invention has been described through the detailed description of the preferred embodiment. Those skilled in the art can derive variations from the preferred embodiment without departing from the scope of the present invention. The preferred embodiment shall not limit the scope of the present invention defined in the claims.

Claims

1. A motor comprising:

- a cylinder;
- a rotor put in the cylinder;
- a plurality of leaves movable to the cylinder from the rotor in operation;
- a front cover connected to a front end of the cylinder;
- a rear cover connected to a rear end of the cylinder;
- a front pad for preventing the rotor and the leaves from wearing away the front cover, wherein the front pad is harder than the front cover; and
- a rear pad for preventing the rotor and the leaves from wearing away the rear cover, wherein the rear pad is harder than the rear cover.

2. The motor according to claim 1 wherein the front and rear pads are made of steel.

3. The motor according to claim 2 wherein the hardness of the front and rear pads is at least equal to HRC 60.

4. The motor according to claim 3 wherein the front and rear pads are made of SCM steel.

5. The motor according to claim 1 wherein the front and rear covers are made of aluminum.

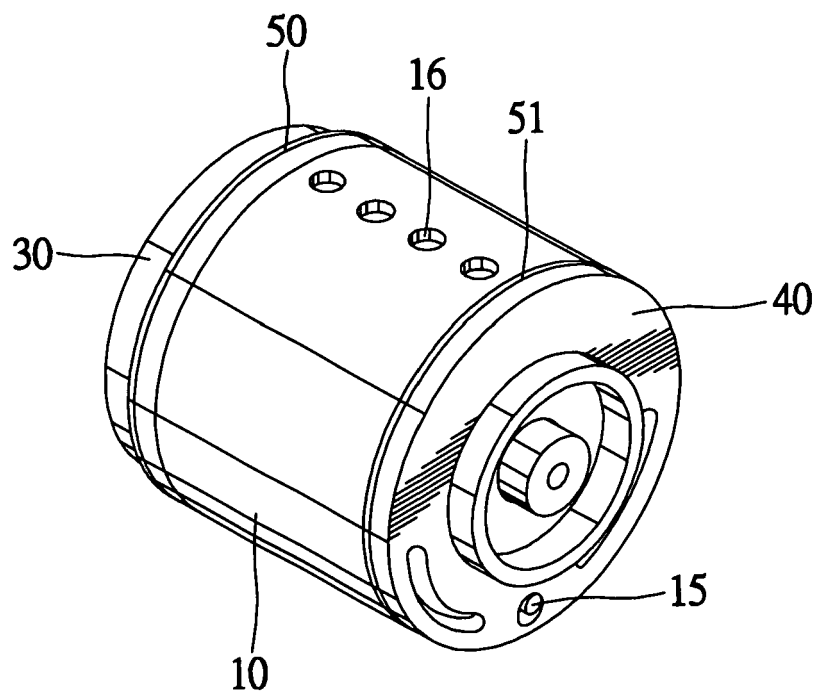


Fig. 1

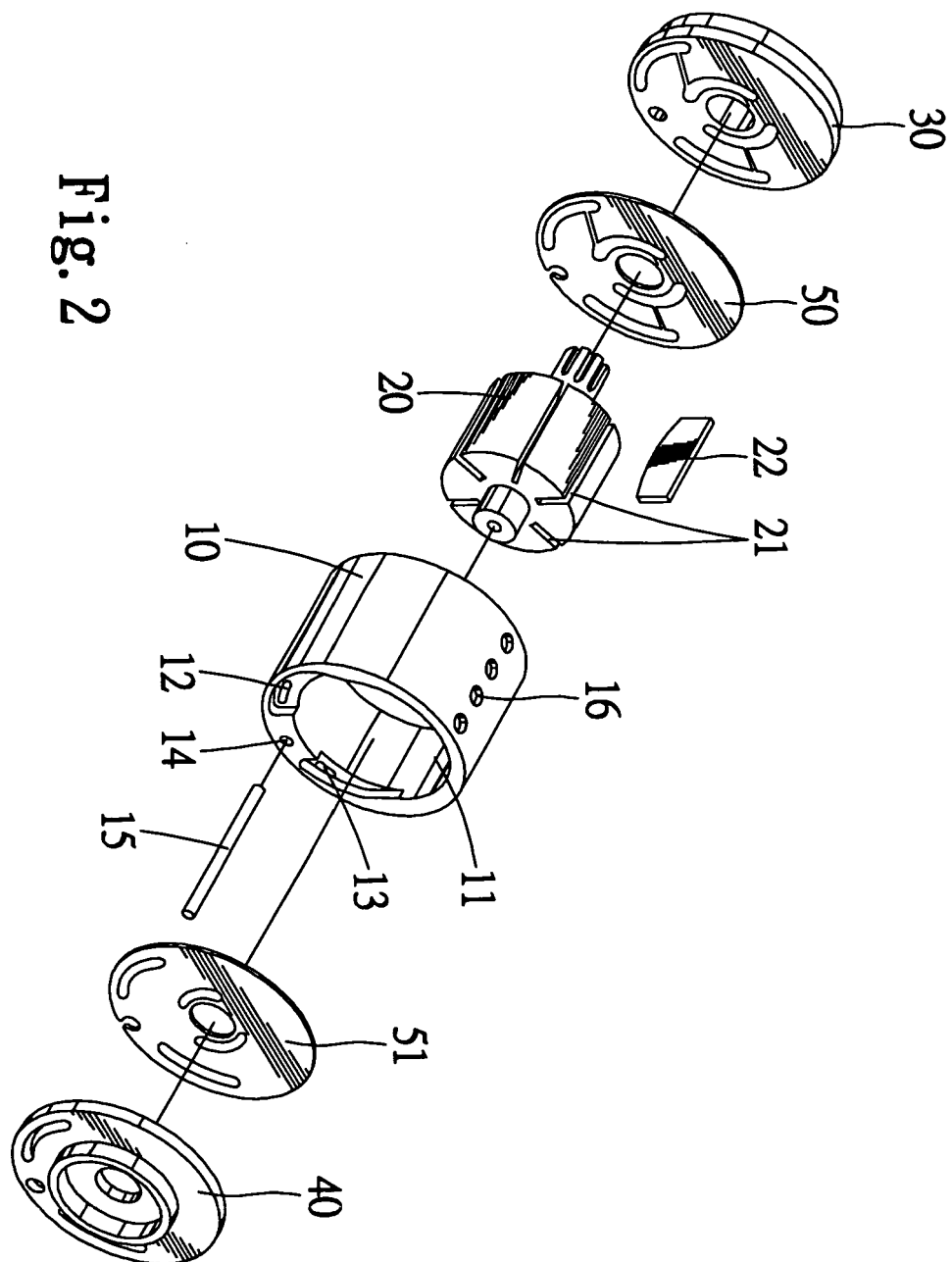


Fig. 2

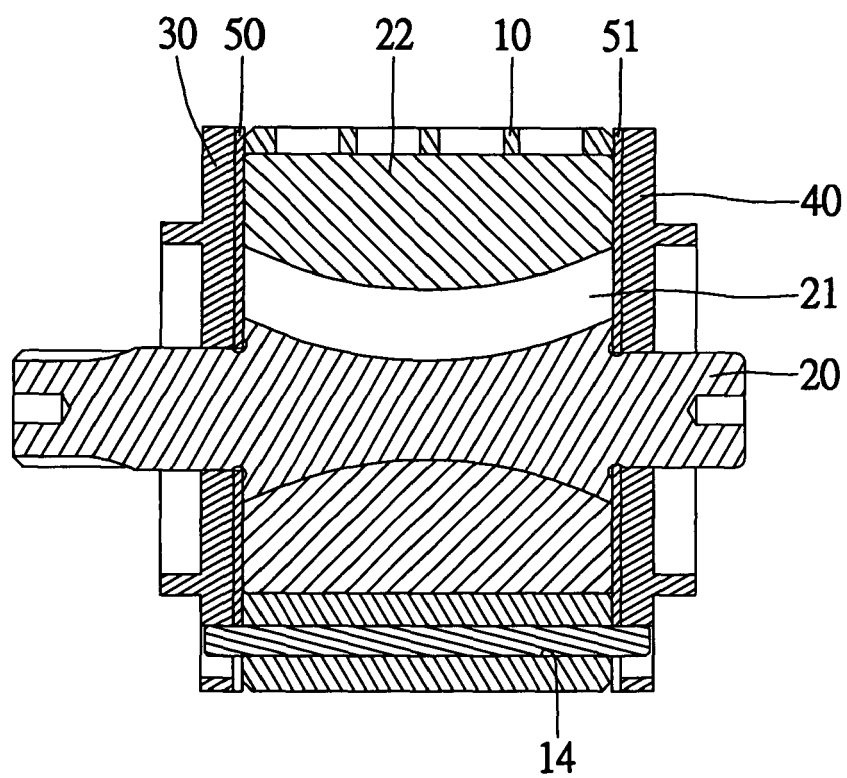


Fig. 3

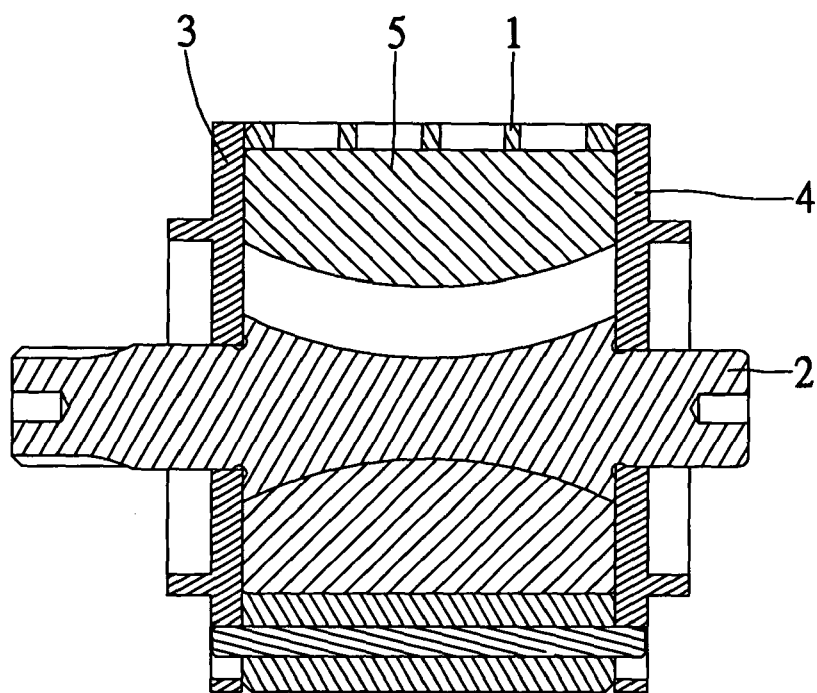


Fig. 4



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 01 3843

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	FR 2 347 527 A (MAIRE BERNARD) 4 November 1977 (1977-11-04) * page 27, line 7 - page 28, line 10 *	1,2	F01C1/344 B25B21/00 B25F5/00 F01C21/10
Y	* figure 1 *	3,4	
Y	----- US 4 986 036 A (HUTCHINS ET AL) 22 January 1991 (1991-01-22) * column 4, line 10 - line 34; figures 4,5 *	3	
Y	----- EP 0 838 593 A (ZEXEL CORPORATION; ZEXEL VALEO CLIMATE CONTROL CORPORATION) 29 April 1998 (1998-04-29) * column 4, line 49 - line 59 *	4	
X	----- PATENT ABSTRACTS OF JAPAN vol. 009, no. 294 (M-431), 20 November 1985 (1985-11-20) & JP 60 132091 A (MATSUSHITA DENKI SANGYO KK), 13 July 1985 (1985-07-13) * abstract *	1,5	
X	----- US 4 782 656 A (HANSEN ET AL) 8 November 1988 (1988-11-08) * column 5, line 19 - column 6, line 40 *	1	
A	----- DE 33 03 247 A1 (DIESEL KIKI CO.LTD; DIESEL KIKI CO. LTD., TOKIO/TOKYO, JP) 18 August 1983 (1983-08-18) * page 8, paragraph 4 *	2,5	
A	----- EP 0 116 136 A (KNORR-BREMSE GMBH; KNORR-BREMSE AG) 22 August 1984 (1984-08-22) * page 8, paragraph 1 *	4	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 November 2005	Examiner Schultz, T
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	

3
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 01 3843

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.

25-11-2005

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
FR 2347527	A	04-11-1977	NONE	
US 4986036	A	22-01-1991	NONE	
EP 0838593	A	29-04-1998	CN 1182174 A	20-05-1998
			DE 69706116 D1	20-09-2001
			DE 69706116 T2	06-06-2002
			JP 3069053 B2	24-07-2000
			JP 10122169 A	12-05-1998
			US 6056525 A	02-05-2000
JP 60132091	A	13-07-1985	NONE	
US 4782656	A	08-11-1988	NONE	
DE 3303247	A1	18-08-1983	JP 58133493 A	09-08-1983
EP 0116136	A	22-08-1984	DE 3301098 A1	19-07-1984