

IN THE UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF ILLINOIS EASTERN DIVISION

Robert Bosch Tool Corporation,
a Delaware Corporation, and

Plaintiff,

v.

Black & Decker Inc.
a Delaware Corporation, and
Black & Decker (U.S.) Inc.,
a Maryland Corporation

Defendants.

06CV4746

JUDGE ZAGEL

MAGISTRATE JUDGE ASHMAN

CAUTION NO.

COMPLAINT

(Jury Trial Demanded)

FILED

AUG 31 2006

MICHAEL W. DOBBINS
CLERK, U.S. DISTRICT COURT

Comes now the Plaintiff, and for its Complaint against Defendants, states and alleges as follows:

THE PARTIES

1. Plaintiff, Robert Bosch Tool Corporation, is incorporated in the state of Delaware, having a principal place of business at 1800 West Central Road, Mt. Prospect, IL 60056.

2. Upon information and belief, Defendant, Black & Decker, Inc., is incorporated under the laws of the state of Maryland, having a principal place of business at 701 East Joppa Road, Towson, MD 21286.

3. Upon information and belief, Defendant, Black & Decker (U.S.), Inc., is incorporated under the laws of the state of Maryland, having a principal place of business at 701 East Joppa Road, Towson, MD 21286.

JURISDICTION AND VENUE

4. This is a claim of patent infringement arising under the Acts of Congress relating to patents, 35 U.S.C. § 1, *et seq.*

5. This Court has subject matter jurisdiction over Plaintiff's patent infringement lawsuit under 28 U.S.C. §§ 1331 and 1338(a).

6. This Court has personal jurisdiction over the Defendants by virtue of, *inter alia*, their continuous and systematic contacts with Illinois.

7. Venue is proper in this Court pursuant to 28 U.S.C. §§ 1391(b) and (c) and 28 U.S.C. § 1400(b).

INFRINGEMENT OF UNITED STATES PATENT NO. 4,729,195

8. Plaintiff restates the allegations set forth in paragraphs 1-7 and incorporates them herein by reference.

9. On March 8, 1988, United States Patent No. 4,729,195 (hereinafter "the '195 patent") entitled HAND GRIPPING MACHINE WITH A SUCTION DEVICE was duly and legally issued to Robert Bosch GmbH as assignee of the inventor, Günter Berger. Robert Bosch GmbH since that date has been, and still is, the owner of all right, title and interest in the '195 patent. A copy of the '195 patent is attached hereto as Exhibit A.

10. The '195 patent was duly and legally licensed to Plaintiff as the exclusive licensee by the owner and assignee, Robert Bosch GmbH.

11. By virtue of its exclusive license of the '195 patent, Plaintiff has acquired and continues to maintain the right to sue on and the right to recover for infringement of the '195 patent.

12. On information and belief, Defendant, Black & Decker, Inc. and Defendant, Black & Decker (U.S.) Inc., (hereinafter jointly "the B&D Defendants") have directly infringed, contributed to the infringement of, and/or induced infringement of the '195 patent through the manufacture, use, sale, and offer for sale of certain sander products, including Black & Decker 5" Random Orbital Sander, Model #RO400G; Black & Decker 5" Random Orbital Sander, Model #RO410K; Black & Decker 5" Firestorm Random Orbital Sander, Model #FS4000ROS; DeWalt Heavy Duty 5" Random Orbit Palm Sander, Catalog #DW420; DeWalt Heavy Duty 5" Random Orbit Palm Sander, Catalog #DW421; DeWalt 5" Random Orbit Palm Sander, Catalog #DW423; DeWalt Heavy-Duty 5" Random Orbit Palm Sander, Model #D26450; DeWalt Heavy-Duty 5" Random Orbit Palm Sander Kit, Model #D26453K; and DeWalt Heavy-Duty 5" Random Orbit Palm Sander Kit, Model #D26451K.

13. Plaintiff has been damaged by the B&D Defendants infringement of the '195 patent and will continue to be damaged in the future unless the B&D Defendants are permanently enjoined from infringing that patent, contributing to the infringement of that patent, and/or inducing the infringement of that patent by others.

14. Upon information and belief, the B&D Defendants have had actual knowledge of the '195 patent and, on information and belief, have had actual knowledge that the use, manufacture, sale, and offer for sale of the above-identified products infringes that patent, contributes to the infringement of that patent and induces the infringement of that patent by others.

15. Upon information and belief, the B&D Defendants' infringement of the '195 patent is now and has been willful and will continue unless enjoined by the Court.

PRAYER FOR RELIEF

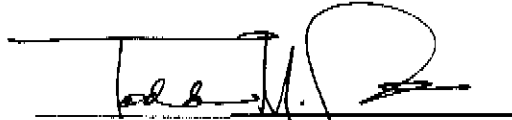
WHEREFORE, Plaintiff prays for judgment that:

- A. United States Patent No. 4,729,195 was duly and legally issued, is valid and enforceable;
- B. The B&D Defendants have directly infringed, contributorily infringed, and/or induced infringement of one or more claims of United States Patent No. 4,729,195;
- C. The B&D Defendants' infringement of one or more claims of United States Patent No. 4,729,195 was willful;
- D. The B&D Defendants, their officers, agents, servants and employees, and those persons in active concert or participation with any of them be enjoined from further infringing, contributing to the infringement, or inducing the infringement of the United States Patent No. 4,729,195;
- E. An accounting be had and that Plaintiff be awarded damages arising out of the B&D Defendants' infringement of United States Patent No. 4,729,195, including treble damages for willful infringement as provided by 35 U.S.C. § 284, with interest;
- F. The B&D Defendants be permanently enjoined from continued use, importation, offer for sale, or sale of the B&D Defendants' products used to infringe the patent-in-suit;
- G. This case be adjudged and decreed exceptional pursuant to 35 U.S.C. § 285 and that Plaintiff be awarded its costs and attorney's fees in pursuing this action; and
- H. Plaintiff be awarded such other and further relief as this Court may deem necessary and proper.

DEMAND FOR JURY TRIAL

Plaintiff hereby demands a trial by jury of all issues so triable.

Date: August 31, 2006

A handwritten signature in black ink, appearing to read "Todd M. Rowe", is written over a horizontal line.

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Attorneys for Robert Bosch Tool Corporation

United States Patent [19][11] **Patent Number:** **4,729,195****Berger**[45] **Date of Patent:** **Mar. 8, 1988**[54] **HAND GRIPPING MACHINE WITH A SUCTION DEVICE**[56] **References Cited****U.S. PATENT DOCUMENTS**

2,639,564 5/1953 Atkin 51/170 MT
 2,683,336 7/1954 Scace 51/170 MT
 4,624,078 11/1986 Rijen et al. 51/170 MT

FOREIGN PATENT DOCUMENTS

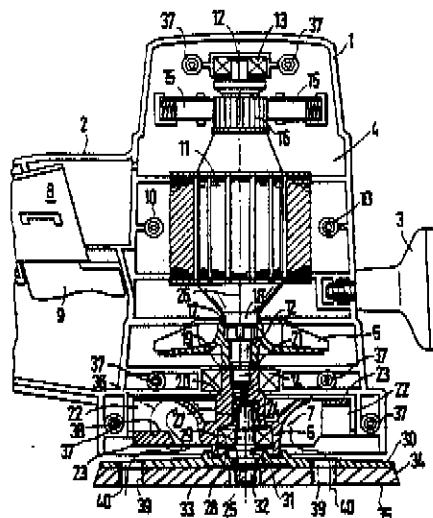
1189405 3/1965 Fed. Rep. of Germany 51/170 T
 2743129 4/1979 Fed. Rep. of Germany 51/170 MT

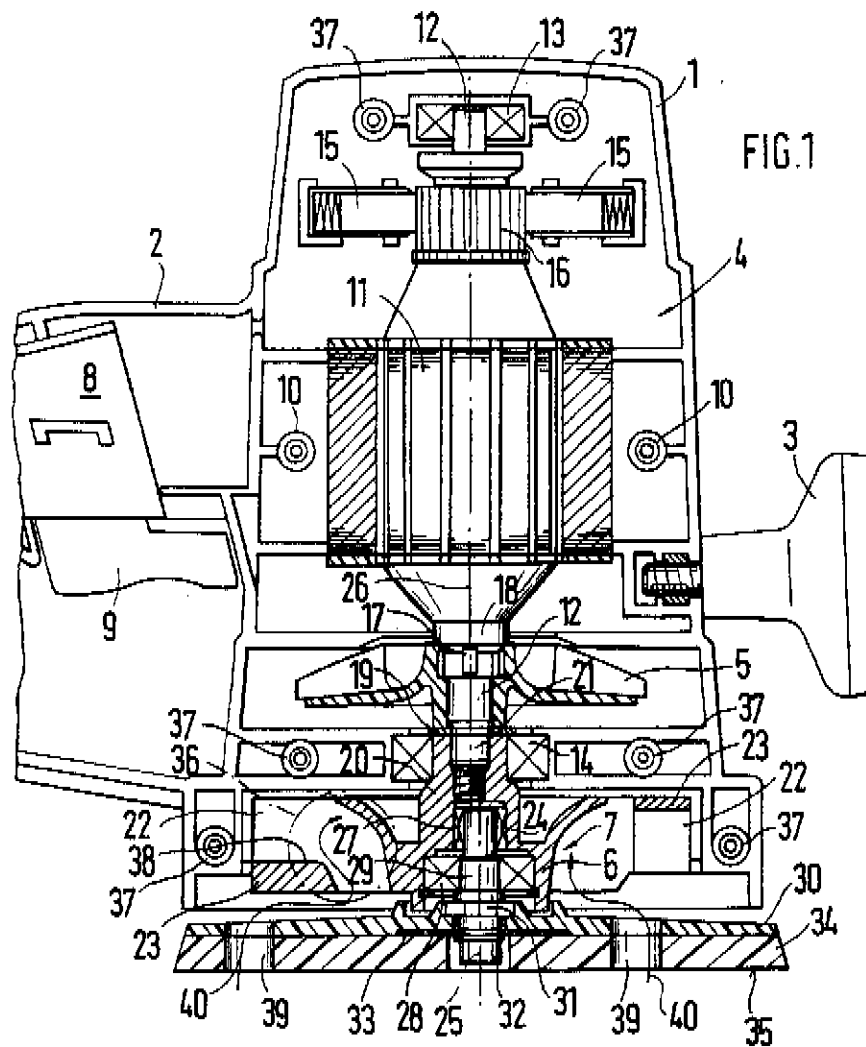
[75] **Inventor:** **Günther Berger, Notzingen, Fed. Rep. of Germany**[73] **Assignee:** **Robert Bosch GmbH, Stuttgart, Fed. Rep. of Germany**[21] **Appl. No.:** **35,905**[22] **Filed:** **Apr. 2, 1987**[30] **Foreign Application Priority Data**

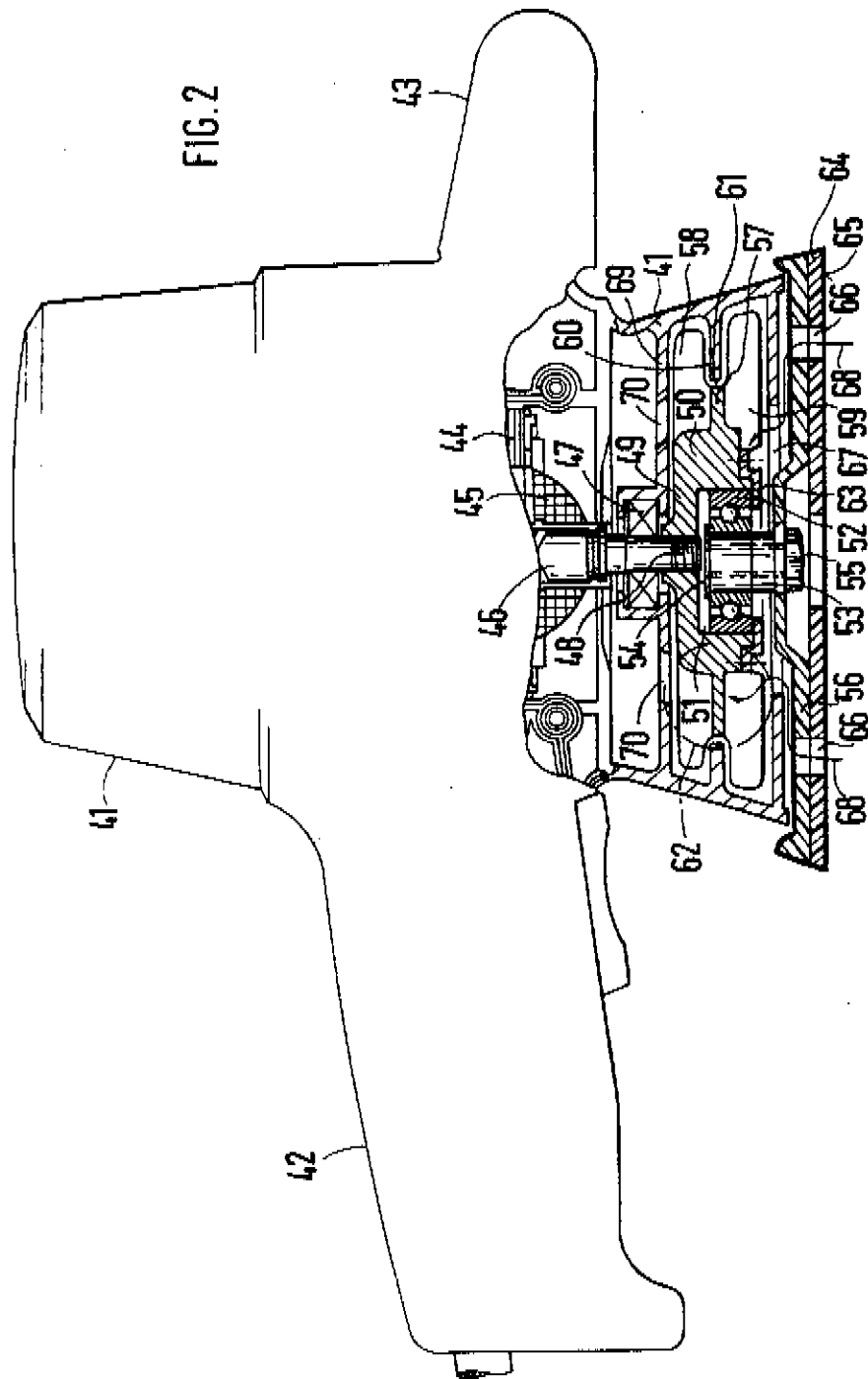
Jun. 14, 1986 [DE] Fed. Rep. of Germany 3620136

[51] **Int. CL⁴** **B24B 23/00**[52] **U.S. CL.** **51/170 MT; 51/273**[58] **Field of Search** **51/169, 170 MT, 170 R, 51/170 T, 273****Primary Examiner—Roscoe V. Parker****Attorney, Agent, or Firm—Michael J. Striker**[57] **ABSTRACT**

A hand-held grinding machine with a device for the suction of grinding dust comprises a motor with a motor shaft, an eccentric drive for driving a support of a grinding sheet. The machine further includes a fan wheel which carries an element for compensating for imbalance mass of the eccentric drive.

14 Claims, 2 Drawing Figures





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HAND GRIPPING MACHINE WITH A SUCTION DEVICE

BACKGROUND OF THE INVENTION

The present invention relates to a hand-held grinding machine.

Hand grinding machines of the type under discussion include a suction device for sucking dust produced during the grinding process, an eccentric drive for driving a grinding sheet support and a fan wheel.

One of conventional grinding machines of the foregoing type has been disclosed in European patent application No. 0,138,278. The disadvantage of this known grinding machine is that a great number of structural components arranged one after another are required in order to transmit the drive movement of the motor shaft to the support of the grinding sheet and also to provide a suction air flow. This requires a relatively large structure height.

Furthermore, the mass compensation due to the provision of the fan wheel is not ideal in the known grinding machine because the balancing mass act far from the imbalance mass. Therefore a tilting torque is produced from the action of the imbalance mass and the compensating mass, which unfavorably affects the grinding process.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an improved hand-held grinding machine.

It is another object of the invention to provide a grinding machine which is simple and compact.

These and other objects of the invention are attained by a hand-held grinding machine, which comprises a motor having a motor shaft; a grinding sheet support; an eccentric drive for said support, connected to said motor shaft; and a fan wheel which has an imbalance mass compensated by a mass of said eccentric drive. Said wheel has a bore concentric with the motor shaft and receiving an end of the motor shaft, and a recess eccentric to said bore. A pin is received in said recess via at least one bearing, said pin holding said grinding sheet support.

Said fan wheel has vanes and an air guiding ring which forms a portion of an end face of the grinding sheet support and has a varying thickness for compensating for imbalance mass.

The fan wheel may have vanes of various thickness for compensating for mass imbalance.

At least one vane may be omitted to compensate for mass imbalance.

The motor shaft may be supported in a machine housing via the fan wheel.

One ball bearing or two bearings, of which one is a ball bearing and another one is a needle bearing, may be positioned in the fan wheel to support said pin therein.

The fan wheel may be formed of good heat-conductive material.

Two rows of air-guiding vanes may be provided in the fan wheel, of which one row serves for dust suction and cooling the bearings and another row serves for cooling the motor.

Air-admitting openings may be provided in the fan wheel and the housing.

Due to the provision of the small fan wheel with the compensating mass for the drive of the grinding sheet

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support, the imbalance masses and mass-compensating masses can be interchanged.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an axial sectional view of the first embodiment of the hand-held grinding machine according to the invention; and

FIG. 2 is a partial axial sectional view of the second embodiment of this invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings in detail, and firstly to FIG. 1 thereof which shows the first embodiment of the invention, it will be seen that the grinding machine has a housing 1 having a hand grip 2 and an additional handgrip 3. A drive motor 4 with a fan wheel 5 which serves to cool the motor, a further fan wheel 6 and an eccentric drive 7 are accommodated in the housing 1.

A switch 8 with an actuation knob 9 is mounted in the handgrip 2. Motor 4 is screwed by bolts 10 in the motor housing. The rotor 11 of motor 4 is supported on a motor shaft 12 which in turn is supported in ball bearings 13 and 14. Carbon brushes 15 correspond to a collector 16 of the rotor 11. The fan wheel 5 is rotation-fixedly supported on the motor shaft 12 by means of a key 17. A collar 18 of the motor shaft 12 and a safety washer 19 inserted in a recess of the motor shaft 12 secure the fan wheel 5 against the axial displacement. The same safety washer 19 also serves as a stop for a hub 20 of the fan wheel 6. Hub 20 is secured at the end of the motor shaft 12 by means of a threaded pin 21. The extension of the hub 20 receives the ball bearing 14 which forms the second bearing for the motor shaft. Accordingly this ball bearing 14 is held on the other side in the housing 1.

The hub 20 carries fan vanes 22, and a ring 23 which can be of various thickness. Hub 20 also includes a stepped cylindrical recess 24, the central axis of which is parallel to the central axis 26 of the motor shaft 12. Recess 24 is positioned eccentrically in respect to the motor shaft 12. This recess receives, via two bearings 27 and 28, a pin 29, to which a grinding sheet support 30 is connected. A hexagonal portion 31 of the pin 29 acts as a rotation transmitter. Hexagonal portion 31 is fit in a respective recess of the grinding paper support 30 whereas a bolt 32 screwed into the threaded bore, provided in the pin 29, holds the grinding sheet support 30 on the pin 29 by a washer 33.

The grinding sheet support 30 includes a soft pad 34 to which a suitable grinding sheet 35 is glued or otherwise secured, for example by Velcro means.

A circle 36 indicated by dash-dotted line shows schematically an air outlet connection in housing 1, though which connection an exhaust air can flow outside.

Housing 1 is formed of two cover-shaped halves which are held together by means of screw connections 37. Bolts 10 also serve to connect these two housing halves to each other. An asymmetrical material concentration or thickening 38 of the ring 23 serves here as a compensating or balancing mass for the eccentrically

positioned pin 29 with the grinding sheet support 30 carried thereby. The compensating mass can be additionally obtained such that in the region of the thickening 38 of the ring 23 at least one of the vanes 22 would be thicker than others, and at least one vane diametrically opposing the thicker vane would be omitted. A compensation for a dynamic imbalance can be further obtained by that the portion of the ring 23, which is diametrically opposed to the thickening 38, would be axially offset relative to the thickening 38. Openings 39 which extend through the grinding sheet 35, pad 34 and grinding sheet support 30 form a part of trajectory or path of the suction, which is indicated by arrow 40.

As clear from FIG. 1, imbalance producing masses and imbalance-compensating masses can be reversed. It is also clear that fan wheel 6 which has three functions has also a space-saving effect.

In the embodiment shown in FIG. 2, housing 41 is provided with a main handgrip 42 and an additional handgrip 43 with a motor 44. A motor shaft 46 of this motor which carries a rotor 45 is supported in housing 41 by means of a ball bearing 47. The end of the motor shaft 46 provided with a threaded pin 48 is screwed in a hub 49 of a fan wheel 50. A ball bearing 52 is inserted in an eccentric recess 51 of the hub 49. The ball bearing 52 receives a pin 53 which is secured against an axial displacement, by means of a safety washer 54. Bolt 55 can be screwed in the pin 53. Bolt 55 in turn rigidly connects a grinding sheet support 56 with the pin 53. Hub 49 forms a disk-shaped rib or web 57 which is concentric to the motor shaft 46. This rib 57 separates two rows of vanes 58 and 59 from each other. Both rows of vanes 58, 59 are supported by the hub 49. An annular rib 60 formed on the inner wall of the housing 41 engages in a similar manner in a respective recess 61 provided between vanes 58 and 59. An exhaust air connection indicated by circle 62 overlaps both rows of vanes 58 and 59.

A cover 63 which is screwed to the end face of the hub 49 rigidly holds the ball bearing 52 in the recess 51.

Similarly to the embodiment of FIG. 1, the grinding sheet support 56 has a soft pad 64 with a grinding sheet 65 connected thereto. Openings 66 are provided to guide therethrough the exhaust air. A central opening 67 formed in the end wall of the housing 41, which faces the grinding sheet support 56, defines a further path of exhaust air, which is indicated by arrow 68.

A housing wall 69 has openings 70 through which a cooling air flowing through the motor 44 towards the fan wheel 50 can pass to the row of vanes 58. This embodiment shows that by means of the single fan wheel 50 a suction air flow through the row of vanes 59 and a cooling air flow for the motor 44 through the row of vanes 58 can be generated. Both air flows pass towards the air exhaust connection encircled by reference 2. Therefore, the embodiment of FIG. 2 is even more compact than that of FIG. 1 and presents a further improvement of the invention. The imbalance-compensating mass can be carried out in the device of FIG. 2 in the same manner by various thicknesses of the vanes or by the enlargement of the mass of the hub.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of hand-held grinding machines differing from the types described above.

While the invention has been illustrated and described as embodied in a hand-held grinding machine, it is not intended to be limited to the details shown, since

various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

We claim:

1. A hand-held grinding machine, comprising a motor with a motor shaft; a grinding sheet support; an eccentric drive for said grinding sheet support and connected to said motor shaft; and a fan wheel having an imbalance mass compensated by an imbalance of said eccentric drive, said fan wheel having a bore concentric to said motor shaft and receiving an end of said motor shaft, and a recess eccentric with said bore; and a pin received in said recess via bearings, said pin holding said grinding sheet support.

2. The machine as defined in claim 1, said fan wheel having vanes, and an air guiding ring carried by said vanes, said ring forming a portion of an end face of said fan wheel which faces said grinding sheet support and has various thickness for compensating for a mass imbalance.

3. The machine as defined in claim 1, wherein said fan wheel has vanes of various thickness for compensating for a mass imbalance.

4. The machine as defined in claim 1, wherein said fan wheel is formed with at least one vane omitted for compensating for a mass imbalance.

5. The machine as defined in claim 2, wherein said fan wheel has vanes of various thickness for compensating for mass imbalance.

6. The machine as defined in claim 2, wherein said fan wheel is formed with at least one vane omitted for compensating for mass imbalance.

7. The machine as defined in claim 1, wherein said fan wheel has vanes of various thickness and at least one of the vanes is omitted for compensating for mass imbalance.

8. The machine as defined in claim 1, said fan wheel having vanes of various thickness and at least one of the vanes being omitted for compensating for mass imbalance, said fan wheel further including an air guiding ring carried by said vanes, said ring forming a portion of an end face of said fan wheel, which faces said grinding sheet support and has various thickness for compensating for mass imbalance.

9. The machine as defined in claim 1, including a housing in which said motor shaft is supported via said fan wheel.

10. The machine as defined in claim 1, including a housing, said motor shaft and said fan wheel enclosing said shaft being supported in said housing by a ball bearing.

11. The machine as defined in claim 1, wherein said bearings include a ball bearing and a needle bearing positioned in said fan wheel and supporting said pin therein.

12. The machine as defined in claim 1, wherein said fan wheel is formed of a good heat-conductive material.

13. The machine as defined in claim 1, wherein said fan wheel includes two rows of air-guiding vanes, of

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which one row serves for dust suction and cooling said bearings and another row serves for cooling the motor.

14. The machine as defined in claim 13, further including air guide means (66, 67, 69), and wherein a common exhaust air opening (62) is formed between 5

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said housing and said fan wheel, said two rows of vanes generating air flows which are guided by said air guide means and said common opening.

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