



(11) **EP 1 607 181 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:
21.04.2010 Bulletin 2010/16

(51) Int Cl.:
B24D 9/08 (2006.01) **B24D 11/02** (2006.01)
B24B 23/02 (2006.01)

(21) Application number: **04425440.7**

(22) Date of filing: **15.06.2004**

(54) **Abrasive body**

Schleifkörper

Corps abrasif

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PL PT RO SE SI SK TR**
Designated Extension States:
HR LT LV

(43) Date of publication of application:
21.12.2005 Bulletin 2005/51

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Description

[0001] The present invention relates to an abrasive body set to be used in machines designed to carry out working operations by abrasion; in particular the abrasive or sanding disks in accordance with the invention are intended for surface finishing of manufactured articles or for preparing predetermined treatments of same.

[0002] It is known that there are on the market machines adapted to carry out working operations by abrasion on surfaces to be finished off such as, by way of example, car bodies, wood furniture, floors or thresholds made of stone or wood; these machines enable the surfaces of articles of manufacture to be prepared for further finishing treatments such as painting, or a well-finished appearance to be given to said surfaces.

[0003] The apparatus of known type generally have a load bearing machine body to first of all bear a corresponding supporting wheel and to set the latter in rotation around an axis thereof.

[0004] The supporting wheel is in turn such envisaged as to be able to receive a suitable sanding disk in engagement, said disk having a work surface that, under operating conditions, is designed to face the article of manufacture to be worked.

[0005] This work surface carries the necessary abrasive material to enable working by material removal.

[0006] It is also to be pointed out that the above machines can also enable suction of the powders generated by the action of the abrasive body on the surface being worked and conveying of said powders to appropriate collection regions to allow a healthier and cleaner work environment.

[0007] After the above remarks it is to be pointed out that there are on the market many different typologies of sanding disks.

[0008] Particularly known and widespread are sanding disks consisting of a support of paper material carrying the abrasive material, said disks being connected with the respective supporting wheel by an adhesive or a coupling involving use of a tape fastener of the so-called "Velcro" type.

[0009] Obviously, in all applications where a suction action is required, the sanding disk too must have holes of the same features as those of the supporting wheel and in register with the latter to allow passage of the abrasive powders.

[0010] Taking into account the fact that these disks get worn in short periods of time due to the stresses to which they are submitted, it is apparent that change of same is a difficult and heavy operation since great care must be paid to make the holes correspond.

[0011] In order to solve the serious drawback connected with use of disks of the described type, another type of disk according to WO 95/21729 had a wide spreading on the market, said type being provided with suitable tongues each having a through hole of a diameter corresponding to the section of respective pins emerging on

top of the supporting wheel as per the preamble of claim 1.

[0012] In particular, the sanding disks in accordance with this type of solution are made of paper or cloth material and are brought into engagement with the respective supporting wheel by turning the tongues down and engaging them through the holes to the corresponding pins integral with the supporting wheel.

[0013] Use of a supporting wheel having a perimeter portion made of deformable material enables engagement between the sanding disk and the supporting wheel; the presence of tongues and the respective pins allows the suction holes of the sanding disk and those of the supporting wheel to be in register.

[0014] However while the last-mentioned solution enables a rather quick engagement of the sanding disks with the supporting wheel and also engagement of the two elements to the correct relative position, it suffers from some important drawbacks and operating limits as well.

[0015] First of all, if engagement of the sanding disk does not allow a perfect adhesion of same to the supporting wheel without any sliding and in a condition of partial tensioning, tearing of the sanding disk may occur during operation of the machine.

[0016] It is in fact to be pointed out that such a sanding disk is set in rotation at high angular speeds and consequently a loose engagement between the disk and supporting wheel necessarily involves breaking in use of the disk itself with clear and obvious drawbacks for the user.

[0017] Secondly, it is also to be noted that during working by abrasion the supporting wheel with the associated disk is pressed against the surface to be abraded or scraped off and the peripheral portion of the supporting wheel itself, giving rise to deformation and involving a slackening of the grip between the tongues of the abrasive disk and the pins of the supporting wheel thereby causing an undesirable separation of the sanding disk from the support, this fact obviously being a further drawback.

[0018] Under this situation the technical task underlying the present invention is to substantially solve all the drawbacks of the known art.

[0019] It is a first aim of the invention to make available a sanding disk that is of easy mounting to the respective supporting wheel and is able to be maintained in engagement also following deformation of the peripherally region of the supporting wheel during use of same thereby avoiding separation of the sanding disk.

[0020] Therefore the present invention aims at making available a sanding disk according to claim 1, ensuring an optimal grip on the supporting wheel also during the operations for material removal.

[0021] It is another aim of the invention to make available an abrasive body having a longer duration and a greater efficiency in working, also enabling an improved surface finishing to be obtained on the articles of manufacture.

[0022] It is a further aim of the invention to eliminate or at least limit the clogging problems present in the sanding disks of known type.

[0023] The foregoing and further aims that will become more apparent in the course of the present description are substantially achieved by an abrasive body in accordance with the features set out in the appended claims.

[0024] Further features and advantages will be best understood from the detailed description of a preferred but not exclusive embodiment of an abrasive body in accordance with the invention.

[0025] This description will be carried out hereinafter with reference to the accompanying drawings, given by way of non-limiting example, in which:

- Fig. 1 shows a supporting wheel adapted to be used in machines for surface working of manufactured articles in a perspective top view;
- Fig. 2 shows an abrasive body with tongues provided with a slit in accordance with the present invention;
- Fig. 3 shows the abrasive disk applied to the supporting wheel in a perspective view;
- Fig. 4 is a side view partly in section showing use of a sanding disk in accordance with the invention on a machine for surface working of articles of manufacture;
- Fig. 5 shows a possible alternative embodiment of the sanding disk in accordance with the present invention; and
- Fig. 6 shows the region of engagement of a tongue of the abrasive body with the respective pin of the supporting wheel, to an enlarged scale.

[0026] With reference to the drawings an abrasive body in accordance with the present invention has been generally identified by reference numeral 1.

[0027] As can be viewed from the accompanying figures, the abrasive body therein shown consists of a central portion 4 of a substantially disk-shaped conformation having a lower work surface 2 that under operating conditions is designed to enable material removal from the surface of an article of manufacture to be finished off.

[0028] Obviously, the work surface 2 will be provided with the suitable abrasive or sanding means 3 at least at the central portion 4 of body 1, which means will consist of appropriate granules of abrasive material applied to said work surface.

[0029] Also provided is the presence of a predetermined number of tongues 5 emerging from the central portion 4 and designed to enable engagement of the abrasive body itself with a support 6, as better clarified in the following.

[0030] There is in particular the presence of four of said tongues angularly spaced apart the same distance with respect to a central symmetry axis S of the abrasive body.

[0031] Obviously a different number of tongues may be provided, that possibly may not be spaced apart the

same distance from each other, provided they are able to ensure a substantially steady engagement of the sanding disk with the supporting wheel.

[0032] As can be viewed from the accompanied figures, the tongues 5 and central portion 4 of the abrasive body 1 are of one piece construction and in particular can be manufactured by injection moulding from an appropriate polyurethane material (obviously other materials and other manufacturing technologies can be also adopted).

[0033] Clearly, the abrasive body 1 can be made of several parts separated from each other, e.g. the tongues 5 separated from the central portion 4 to which they are then linked by means of bonding agents or by other systems.

[0034] In this connection it is to be pointed out that the abrasive body 1 will be made (at least partly or preferably fully) of an elastically deformable material.

[0035] In particular, deformations can take place in the extension plane of the central portion 4 of the abrasive body without involving breaks and tears on the disk.

[0036] In embodiments different from the one shown only some of the tongues 5 or part of the central portion 4 can be made of elastically deformable material, depending on the operating requirements.

[0037] In addition, the above mentioned abrasive means 3 can be alternatively dispersed at the inside of the abrasive disk, only in the central portion 4 thereof, for example (being injected in the abrasive body during the manufacturing step) or alternatively, said abrasive means can be engaged by suitable resins or bonding agents exclusively at the work surface 2 of the abrasive body itself.

[0038] When the abrasive means 3 is dispersed in the central portion 4 of disk 1, the elastic disk will have a longer duration than the sanding disks of known type; in fact, simultaneously with consumption of the abrasive means on the surface, also the elastic material in which the abrasive means is buried will be used up, which will cause the abrasive material buried in the region just below the work surface to go up to the surface. Therefore the disk will have to be replaced at a later time than the disks of standard type.

[0039] In addition it is also apparent that, depending on the materials used, sanding disks can be produced that are substantially impervious to passage of the abraded powder and in which the granules of abrasive material are directly engaged or not on the surface of the elastic material.

[0040] In this manner, on the one hand a greater amount of abrasive material on the operating surface of the disk is ensured with respect to solutions in which the disk is made in the form of an elastic net or fabric, exactly due to the greater operating surface provided and, on the other hand, a sanding disk is produced that is impervious to passage of the abraded powder.

[0041] Under this first situation a plurality of passage holes 14 can be provided on the sanding disk which holes

are adapted to enable suction of the scraped off material by a machine 20 of known type (see Fig. 4); said holes 14 must therefore necessarily be in register with the respective holes present in the supporting wheel.

[0042] It will be recognised in this connection that due to the presence of the engagement tongues 5 and the respective pins 12 to be fitted in the tongue holes and emerging from the supporting wheel, the correct relative positioning of the two parts and therefore the correspondence of the holes is ensured.

[0043] Obviously, a suitable thickness of the sanding disk 1 can be established a priori and said disk can reach a thickness of 80 mm for example, depending on requirements.

[0044] The type of engagement of the abrasive body 1 with the supporting wheel or support 6 will be now examined. In this connection it is to be noted that at least one of the tongues 5 and preferably all of them have a through cut 9 defined by adjacent edges 10, 11.

[0045] Correspondingly the support 6 will have respective pins 12 emerging from its upper surface 7 adapted, under engagement conditions, to pass through said cuts 9.

[0046] As can be viewed from the accompanying figures, one of the adjacent edges 11 is in the form of a convex tab and, under operating conditions, it exerts pressure against the respective pin 12 thereby improving the engaging steadiness between the two parts (see Fig. 6).

[0047] During the mounting step the elastic character of the abrasive body can be utilised to promote engagement of same with the supporting wheel.

[0048] In particular, the tongues 5 and/or central portion 4 of the abrasive body 1 can be elastically deformed to enable quick engagement of pins 12 in the respective cuts 9 while at the same time maintaining the sanding disk tensioned on the supporting wheel.

[0049] If a deformable supporting wheel is used, the particular configuration taken during the engagement step makes it impossible to disengage the sanding disk 1 from the supporting wheel 6 even as a result of possible deformations of the peripheral portion 21 of the supporting wheel 6 (which deformable portion enables the shape of the article of manufacture under working to be better followed and therefore improved finishing features and tensioning of the disk to be ensured), so that the operating reliability of the whole device is increased.

[0050] It will be appreciated in this connection that the abrasive body being the object of the invention is adapted to be mounted both on completely rigid supporting wheels and on supporting wheels having a deformable peripheral portion, due to exploitation of the intrinsic elasticity/deformability features of the sanding disk itself.

[0051] In addition, the abrasive body of the invention at the upper surface of the central disk-shaped portion 4 has no means for engagement with the supporting wheels such as adhesive means, bonding agents or tape fasteners of the "Velcro" type.

[0052] In other words, the abrasive body in accordance with the invention will be connected with the supporting wheel 6 exclusively by means of tongues 5, while the central portion 4 will be movable and will not be linked to the lower surface of the supporting wheel 6 itself.

[0053] In this manner and by use of an elastically deformable material, the inner deformations of the abrasive body with respect to the surface to be worked allow the workpiece to be better finished through creation of movements adapted to reduce and even eliminate clogging of the sanding disk.

[0054] In an alternative embodiment provision can be made for engagement of tongues 5 to the upper portion of the support 6 by use of a hooking system of the "Velcro" type, as shown in Fig. 5. In this case the supporting wheel 6 will be provided with corresponding hooking portions 22 to receive the tongues 5, as shown in said figure.

[0055] The invention achieves important advantages.

[0056] First of all use of an elastic material to make the abrasive body allows engagement between the disk and the supporting wheel to be greatly simplified. In addition, the solution herein adopted allows engagement of the abrasive body with completely rigid supporting wheels that are devoid of deformable portions.

[0057] The presence of through cuts instead of through holes in the tongues 5 enables a safe grip during the working operations also in the presence of important deformations of the peripheral portion 21 of the supporting wheel.

[0058] In addition, due to the absence of fasteners of the Velcro type or bonding agents between the upper surface 7 of the sanding disk 1 and the supporting wheel 6 the elastic character of the sanding disk is always maintained, which enables generation of inner deformations of the disk itself with respect to the surface under working. As a result of the above a better finishing off is achieved and clogging of the sanding disk is reduced or even eliminated.

[0059] In addition, the solution involving dispersion of the abrasive material within the spongy body increases duration of the disk as compared with the sanding disks present on the market.

Claims

1. An abrasive body comprising:

- a work surface (2) that is designed, under working conditions, to face a surface to be worked;
- abrasive means (3) associated at least with one central portion (4) of the abrasive body (1) to enable said working by abrasion; and
- a predetermined number of tongues (5) emerging from the central portion (4) of the abrasive body (1) to enable engagement of the abrasive body itself with a support (6), **characterized in that** said abrasive body (1) is at least partly

made of an elastically deformable material substantially impervious to passage of the abraded powder.

2. An abrasive body as claimed in claim 1, **characterised in that** under engagement conditions of the tongues (5) with the support (6) an upper surface (7) of the abrasive body (1) is not directly fastened to the lower surface (8) of the support (6), by adhesive means or fasteners of the "Velcro" type, for example.
3. An abrasive body as claimed in anyone of the preceding claims, **characterised in that** at least one of the tongues (5) and preferably all of them have a cut (9) defined by edges adjacent to each other (10, 11) said cut (9) being set to enable engagement of the tongue (5) with a respective pin (12) emerging from the upper surface (13) of the support (6).
4. An abrasive body as claimed in anyone of the preceding claims, **characterised in that** the central portion (4) of the abrasive body (1) and the tongues (5) are of one piece construction and are made of an elastically extendible material.
5. An abrasive body as claimed in anyone of the preceding claims, **characterised in that** the central portion (4) and tongues (5) are made separately and fastened to each other by suitable connecting means.
6. An abrasive body as claimed in anyone of the preceding claims, **characterised in that** the abrasive means (3) is directly in engagement at least with the central portion (4) of the abrasive body (1) at the work surface (2) in particular without interposition of any surface of non elastic material such as paper material, cloth material or still others.
7. An abrasive body as claimed in anyone of the preceding claims, **characterised in that** the abrasive means (3) is dispersed within at least the central portion (4) of the abrasive body (1).
8. An abrasive body as claimed in anyone of the preceding claims, **characterised in that** it is made of an elastically extendible material and is impervious to the passage of the abraded powder.
9. An abrasive body as claimed in anyone of the preceding claims, **characterised in that** it is made of an elastically extendible material, said abrasive body (1) enabling passage of the abraded powder through its central portion (4) at least when it is elastically deformed.
10. An abrasive body as claimed in anyone of the preceding claims, **characterised in that** the central por-

tion (4) is flat and is fully formed of an elastic material enabling at least deformation of same in the extension plane thereof.

11. An abrasive body as claimed in anyone of the preceding claims, **characterised in that** the central portion (4) has a plurality of through holes (14) to enable possible suction of the abraded particles.
12. An abrasive body as claimed in anyone of the preceding claims, **characterised in that** at least the tongues (5) are made of an elastically deformable material to enable engagement with the support (6).
13. An abrasive body as claimed in claim 3, **characterised in that** under engagement conditions of the tongues (5) with the pins (12) of the support, one of the adjacent edges (11) is in the form of a tab pressing against the pin itself.

Patentansprüche

1. Schleifkörper, umfassend:

- eine Arbeitsoberfläche (2), ausgelegt, um unter Arbeitsbedingungen zu einer Oberfläche, die bearbeitet werden soll, zu zeigen;
- Schleifmittel (3), das zumindest mit einem zentralen Teil (4) des Schleifkörpers (1) assoziiert ist, um die Bearbeitung durch Schleifen zu ermöglichen; und
- eine vorbestimmte Anzahl von Zungen (5), die aus dem zentralen Bereich (4) des Schleifkörpers (1) hervortreten, um die Verbindung des Schleifkörpers selbst mit einer Unterstützung (6) zu ermöglichen, **gekennzeichnet dadurch, dass** der Schleifkörper (1) zumindest teilweise aus elastisch deformierbarem Material besteht, das im Wesentlichen undurchlässig für den Durchgang des abgeschliffenen Puders ist.

2. Schleifkörper gemäß Anspruch 1, **gekennzeichnet dadurch, dass** unter Verbindungsbedingungen der Zungen (5) mit der Unterstützung (6) eine obere Oberfläche (7) des Schleifkörpers (1) nicht direkt an der unteren Oberfläche (8) der Unterstützung (6) befestigt ist, durch Haftmittel oder Befestigungen zum Beispiel des "Velcro"-Typs.

3. Schleifkörper gemäß einem der vorangehenden Ansprüche, **gekennzeichnet dadurch, dass** zumindest eine der Zungen (5) und vorzugsweise jede von diesen einen Einschnitt (9) definiert durch zueinander benachbarte Kanten (10, 11) aufweisen, wobei der Einschnitt (9) so gesetzt ist, dass die Verbindung der Zunge (5) mit dem entsprechenden Stift (12) ermöglicht wird, der aus der oberen Oberfläche (13)

der Unterstützung (6) hervortritt.

4. Schleifkörper gemäß einem der vorangehenden Ansprüche, **gekennzeichnet dadurch, dass** der zentrale Bereich (4) des Schleifkörpers (1) und die Zungen (5) eine einteilige Konstruktion haben und aus einem elastisch dehnbaren Material hergestellt sind. 5
5. Schleifkörper gemäß einem der vorangehenden Ansprüche, **gekennzeichnet dadurch, dass** der zentrale Bereich (4) und die Zungen (5) separat hergestellt sind und durch entsprechende Koppelmittel aneinander befestigt sind. 10
6. Schleifkörper gemäß einem der vorangehenden Ansprüche, **gekennzeichnet dadurch, dass** das Schleifmittel (3) in direkter Verbindung mit zumindest dem zentralen Bereich (4) des Schleifkörpers (1) auf der Arbeitsoberfläche (2) ist, im Besonderen ohne die Zwischeneinbringung jedweder Oberfläche aus nichtelastischem Material, wie Papiermaterial, Stoffmaterial oder andere. 20
7. Schleifkörper gemäß einem der vorangehenden Ansprüche, **gekennzeichnet dadurch, dass** das Schleifmittel (3) innerhalb zumindest dem zentralen Bereich (4) des Schleifkörpers (1) zerstreut ist. 25
8. Schleifkörper gemäß einem der vorangehenden Ansprüche, **gekennzeichnet dadurch, dass** er aus einem elastisch dehnbaren Material hergestellt ist und undurchdringlich ist für den Durchgang des Schleifpuders. 30
9. Schleifkörper gemäß einem der vorangehenden Ansprüche, **gekennzeichnet dadurch, dass** er aus einem elastisch dehnbaren Material hergestellt ist, wobei der Schleifkörper (1) den Durchgang des Schleifpuders durch seinen zentralen Bereich (4) ermöglicht, zumindest, wenn er elastisch deformiert wird. 35
10. Schleifkörper gemäß einem der vorangehenden Ansprüche, **gekennzeichnet dadurch, dass** der zentrale Bereich (4) flach ist und vollständig aus einem elastischen Material gebildet ist, das zumindest die Deformation desselben in der Dehnungsebene dessen ermöglicht. 40
11. Schleifkörper gemäß einem der vorangehenden Ansprüche, **gekennzeichnet dadurch, dass** der zentrale Bereich (4) eine Vielzahl von durchgehenden Löchern (14) aufweist, um mögliches Absaugen der abgeschliffenen Partikel zu ermöglichen. 45
12. Schleifkörper gemäß einem der vorangehenden Ansprüche, **gekennzeichnet dadurch, dass** zumindest die Zungen (5) aus einem elastisch deformier-

baren Material bestehen, um die Verbindung mit der Unterstützung (6) zu ermöglichen.

13. Schleifkörper gemäß Anspruch 3, **gekennzeichnet dadurch, dass** unter Verbindungsbedingungen der Zungen (5) mit den Stiften (12) der Unterstützung eine der benachbarten Kanten (11) die Form eines Streifens hat, der gegen den Stift selbst drückt.

Revendications

1. Corps abrasif comprenant :

- une surface de travail (2) qui est conçue, sous des conditions de travail, à faire face vers une surface à oeuvrer ;
- des moyens abrasifs (3) associés à au moins une portion centrale (4) du corps abrasif (1) pour permettre ledit travail par abrasion ; et
- un nombre prédéterminé de languettes (5) qui émergent depuis la portion centrale (4) du corps abrasif (1) pour permettre l'engagement du corps abrasif lui-même avec un support (6),

caractérisé en ce que ledit corps abrasif (1) est au moins partiellement réalisé en un matériau élastiquement déformable sensiblement imperméable au passage de la poudre enlevée par abrasion.

2. Corps abrasif selon la revendication 1, **caractérisé en ce que**, sous des conditions d'engagement des languettes (5) avec le support (6), une surface supérieure (7) du corps abrasif (1) n'est pas directement fixée à la surface inférieure (8) du support (6), par des moyens adhésifs ou des éléments de fixation du type connu sous la marque "Velcro", par exemple.
3. Corps abrasif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'une au moins des languettes (5), et de préférence toutes les languettes, comporte une entaille (9) définie par des bordures adjacentes l'une à l'autre (10, 11), ladite entaille (9) étant placée pour permettre un engagement de la languette (5) avec une tige respective (12) qui émerge de la surface supérieure (13) du support (6).
4. Corps abrasif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la portion centrale (4) du corps abrasif (1) et les languettes (5) ont une construction d'une seule pièce et sont réalisées en un matériau élastiquement extensible.
5. Corps abrasif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la portion centrale (4) et les languettes (5) sont réalisées séparément et fixées les unes aux autres par des

moyens de liaison appropriés.

6. Corps abrasif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les moyens abrasifs (3) sont directement en engagement au moins avec la portion centrale (4) du corps abrasif (1) au niveau de la surface de travail (2), en particulier sans interposition d'une quelconque surface de matériau non élastique, comme un matériau à base de papier, un matériau à base de tissu, ou autres. 5
10
7. Corps abrasif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les moyens abrasifs (3) sont dispersés au moins à l'intérieur de la portion centrale (4) du corps abrasif (1). 15
8. Corps abrasif selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'il** est réalisé en un matériau élastiquement extensible et imperméable au passage de la poudre enlevée par abrasion. 20
9. Corps abrasif selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'il** est réalisé en un matériau élastiquement extensible, ledit corps abrasif (1) permettant le passage de la poudre enlevée par abrasion à travers sa portion centrale (4), au moins quand il est élastiquement déformé. 25
30
10. Corps abrasif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la portion centrale (4) est plane et est totalement formée d'un matériau élastique permettant au moins une déformation de celui-ci dans son plan d'extension. 35
11. Corps abrasif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la portion centrale (4) comporte une pluralité de trous traversants (14) pour permettre une éventuelle succion des particules enlevées par abrasion. 40
12. Corps abrasif selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'au** moins les languettes (5) sont réalisées en un matériau élastiquement déformable pour permettre un engagement avec le support (6). 45
13. Corps abrasif selon la revendication 3, **caractérisé en ce que**, sous des conditions d'engagement des languettes (5) avec les tiges (12) du support, une des bordures adjacentes (11) a la forme d'une patte qui presse contre la tige elle-même. 50
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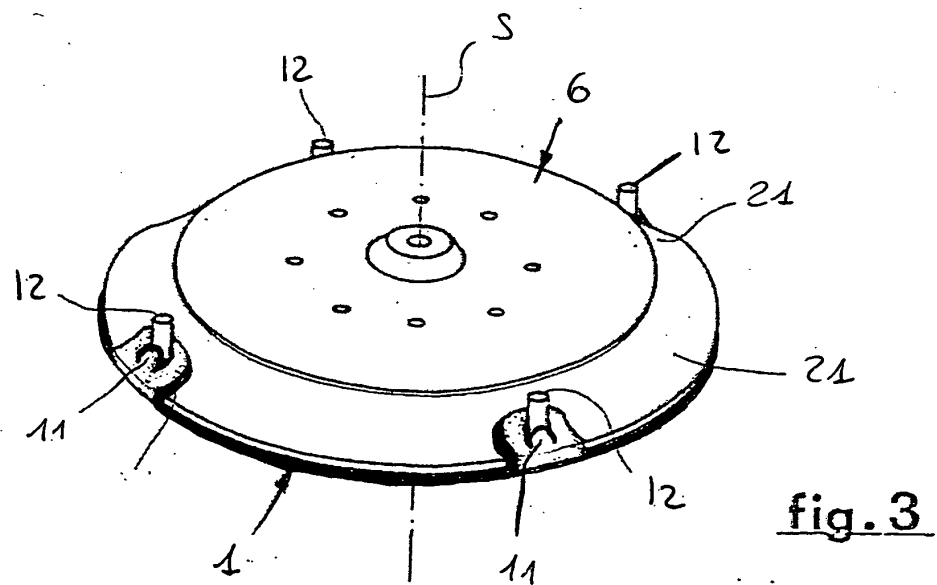
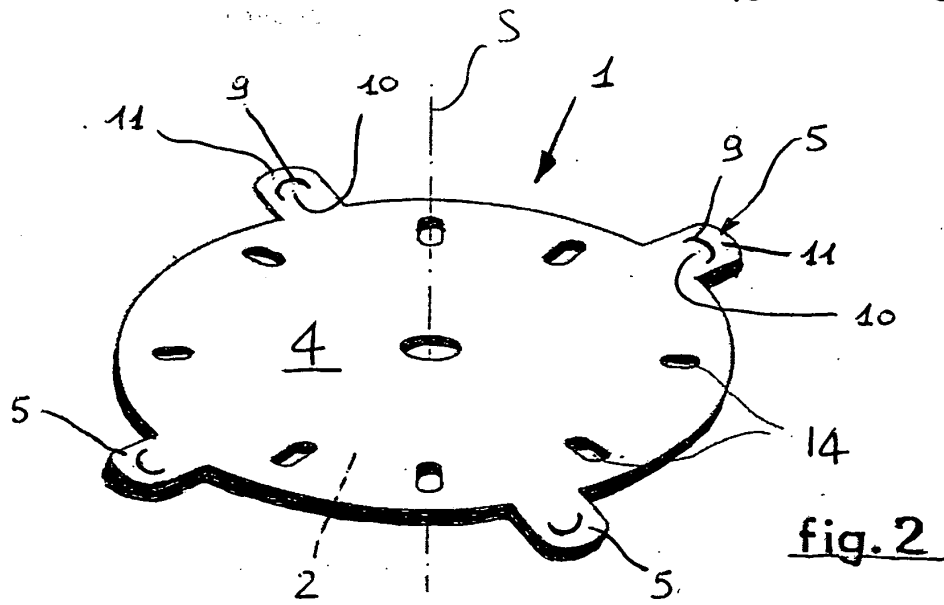
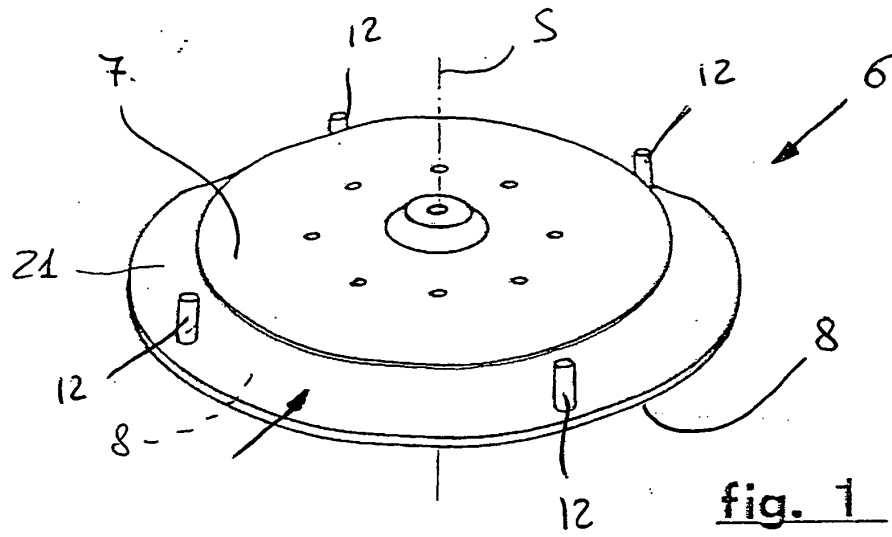
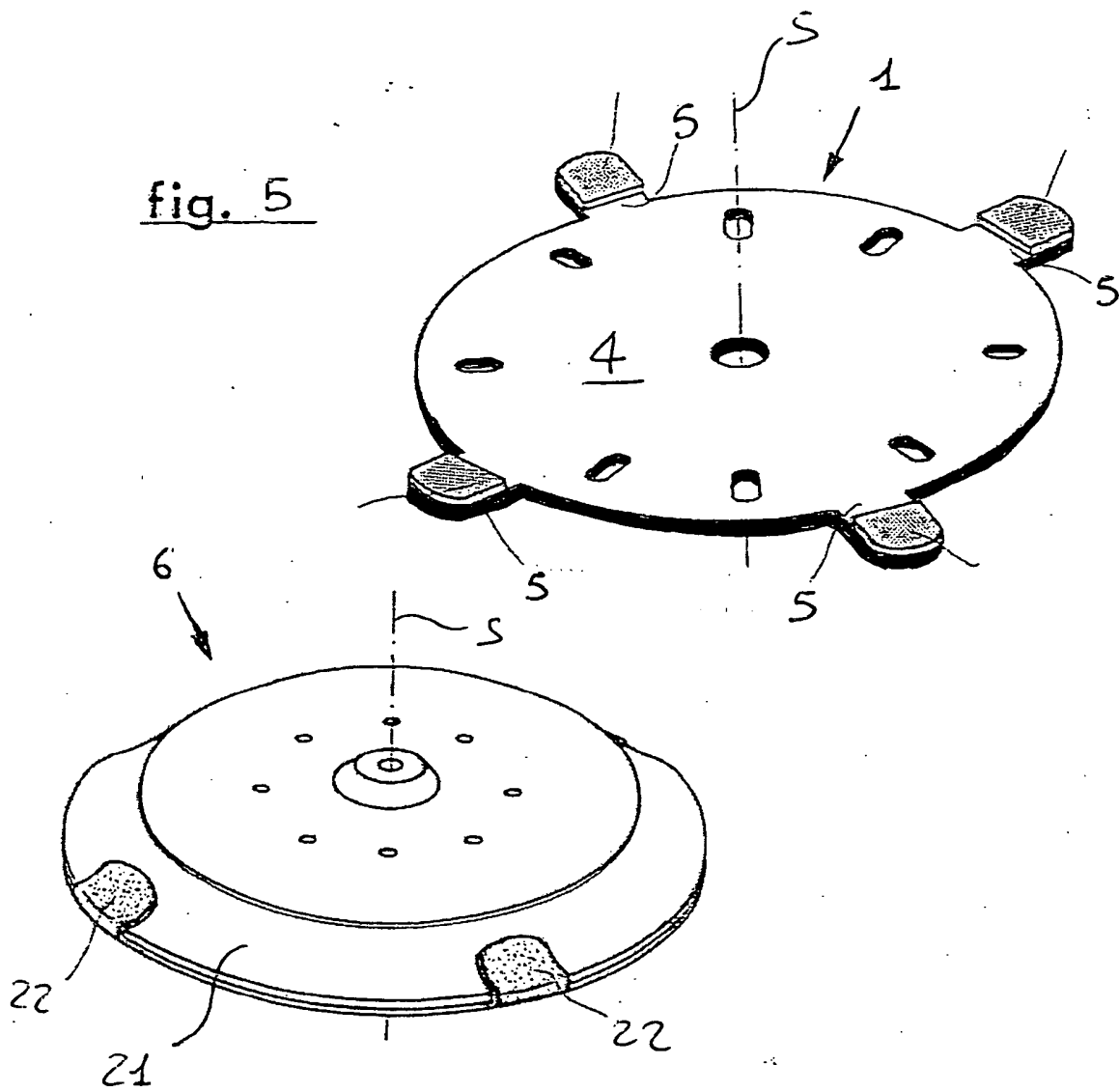


fig. 5



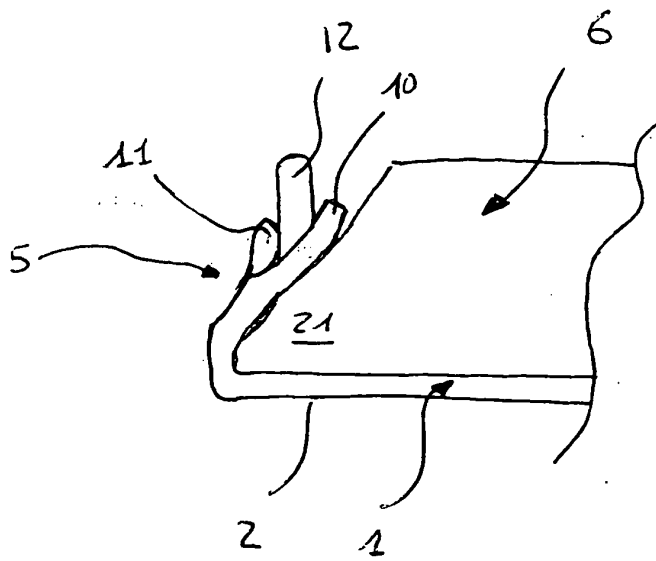
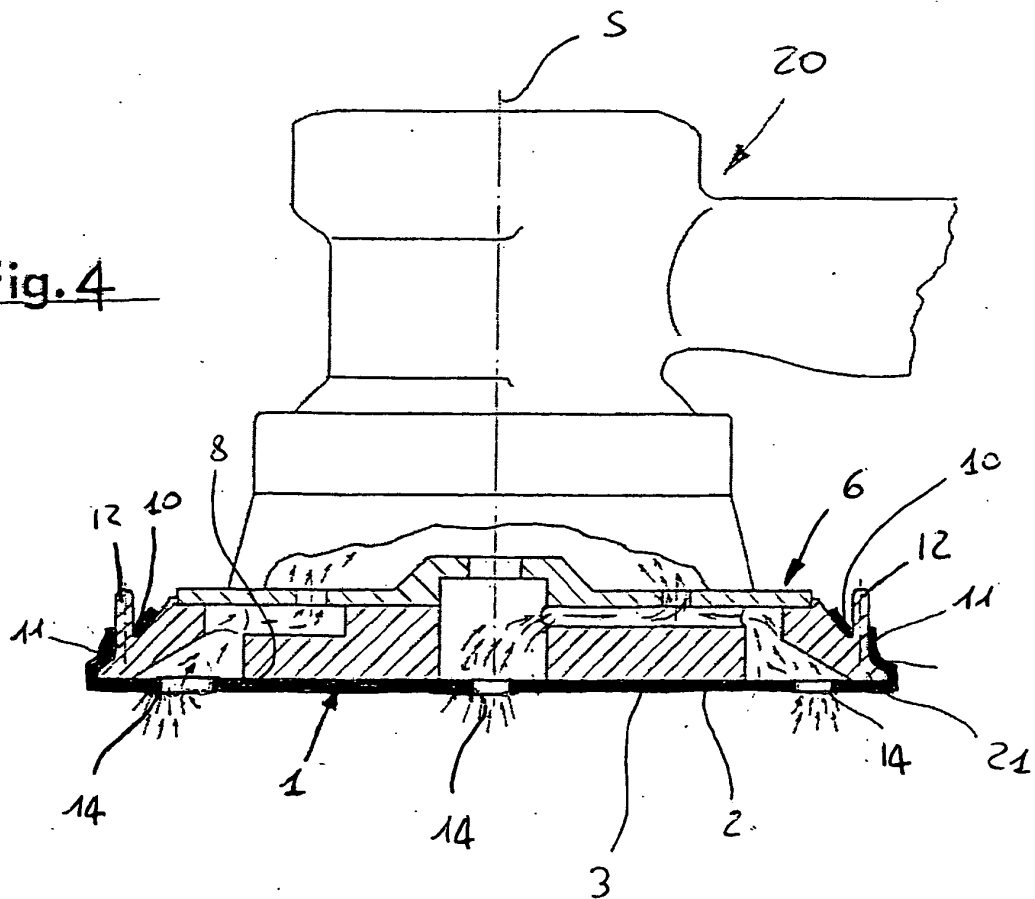


FIG. 6

fig. 4



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 9521729 A [0011]