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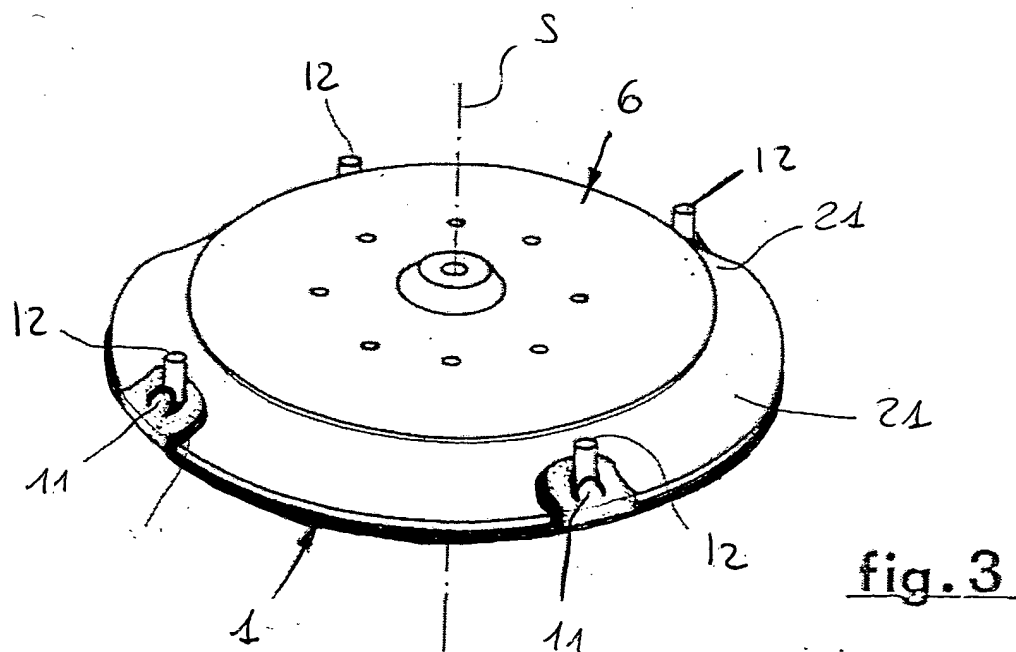
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(54) **Abrasive body**

(57) It is disclosed an abrasive body having a work surface (2) that under operating conditions is designed to face a surface of an article of manufacture to be worked; this surface is provided with abrasive means to enable an abrading or finishing working; also present is a predetermined number of tongues (5) emerging from the central portion (4) of the abrasive body (1) to enable

engagement of the latter with a support (6). The abrasive body is made of an elastically deformable material and is not fastened to the lower surface (8) of the support (6). The presence of cuts (9) on the tongues (5) increases gripping of the abrasive body on the support and use of the elastic material gives the abrasive body a longer duration and greater yield and allows better finishing off while reducing clogging problems.



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 abra-

[0002] It is known that there are on the market machines adapted to carry out working operations by abra-
sion 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 sur-
faces of articles of manufacture to be prepared for fur-
ther finishing treatments such as painting, or a well-fin-
ished 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 corre-
sponding supporting wheel and to set the latter in rota-
tion around an axis thereof.

[0004] The supporting wheel is in turn such envisaged as to be able to receive a suitable sanding disk in en-
gagement, 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 abra-
sive 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 generat-
ed by the action of the abrasive body on the surface be-
ing worked and conveying of said powders to appropri-
ate 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 sand-
ing disks consisting of a support of paper material car-
rying 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 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 sec-
tion of respective pins emerging on top of the supporting

wheel.

[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 respec-
tive 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 engage-
ment 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 en-
ables 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 sup-
porting 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 con-
sequently 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 as-
sociated disk is pressed against the surface to be abra-
ded or scraped off and the peripheral portion of the sup-
porting wheel itself, giving rise to deformation and in-
volving 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 sand-
ing disk from the support, this fact obviously being a fur-
ther drawback.

[0018] Under this situation the technical task underly-
ing 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 avail-
able a sanding disk that is of easy mounting to the re-
spective supporting wheel and is able to be maintained
in engagement also following deformation of the periph-
erally region of the supporting wheel during use of same
thereby avoiding separation of the sanding disk.

[0020] Therefore the present invention aims at mak-
ing available a sanding disk ensuring an optimal grip on
the supporting wheel also during the operations for ma-
terial removal.

[0021] It is another aim of the invention to make avail-
able 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 man-
ufacture.

[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] As an alternative to the above solution, it is possible to provide use of an elastic material capable of allowing passage of the abraded material at least in a situation of elastic deformation of the abrasive body.

[0044] For example, the sanding disk can be made of a material of a spongy nature with open cells or of an elastic net (i.e. susceptible of deformation in its extension plane following pulling actions) allowing passage of the abraded powder due to the presence of the cavities of the material the sizes of which can be increased following deformations of the disk, which will improve the efficiency in sucking the abraded powder.

[0045] 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.

[0046] 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.

[0047] 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.

[0048] 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).

[0049] During the mounting step the elastic character of the abrasive body can be utilised to promote engagement of same with the supporting wheel.

[0050] 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.

[0051] 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.

[0052] 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.

[0053] 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.

[0054] 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.

[0055] 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.

[0056] 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.

[0057] The invention achieves important advantages.

[0058] 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.

[0059] 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.

[0060] 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.

[0061] 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), **characterised in that** said abrasive body (1) is at least partly made of an elastically deformable material.

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 pre-

ceding 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 portion (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.

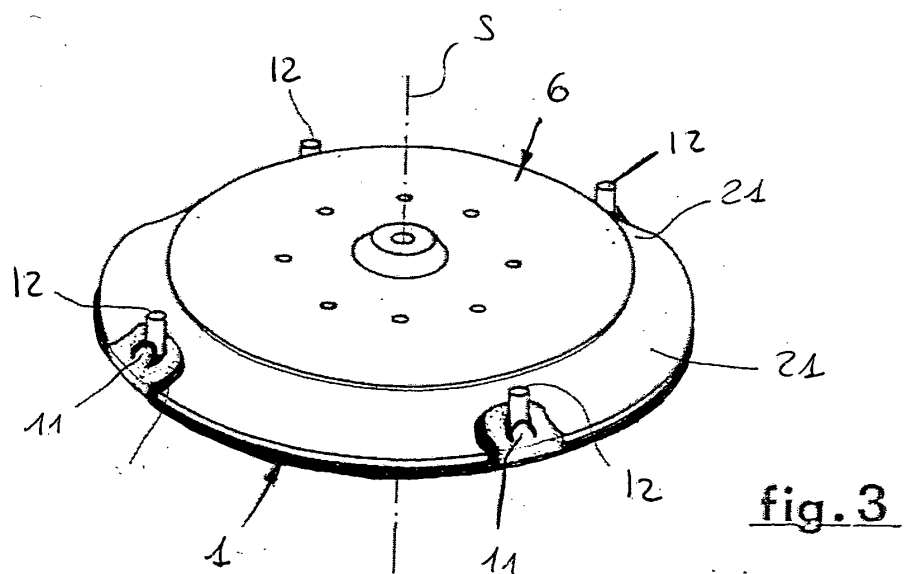
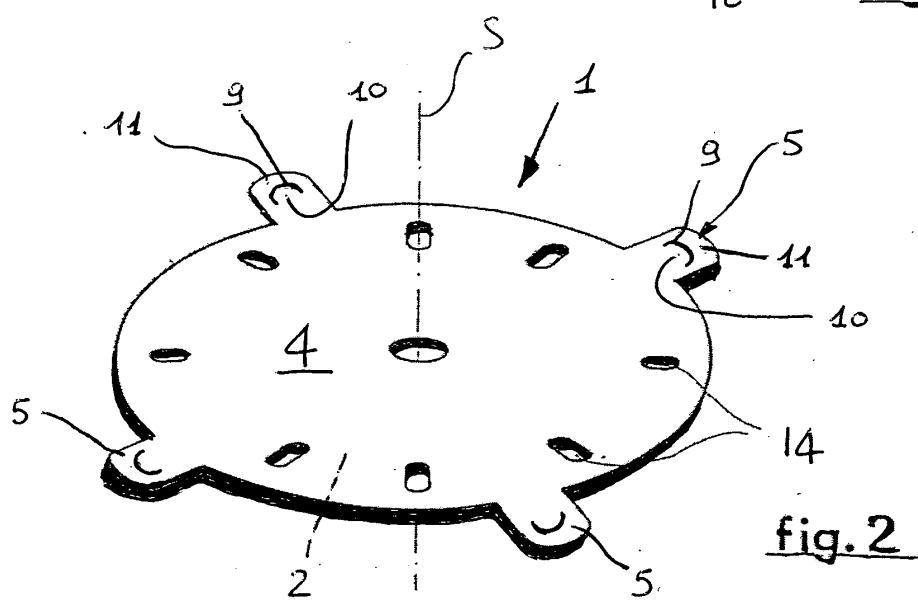
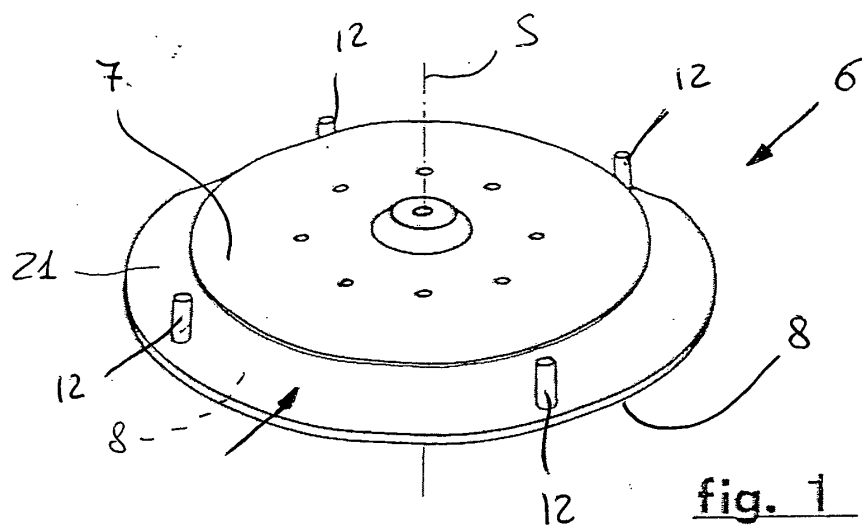
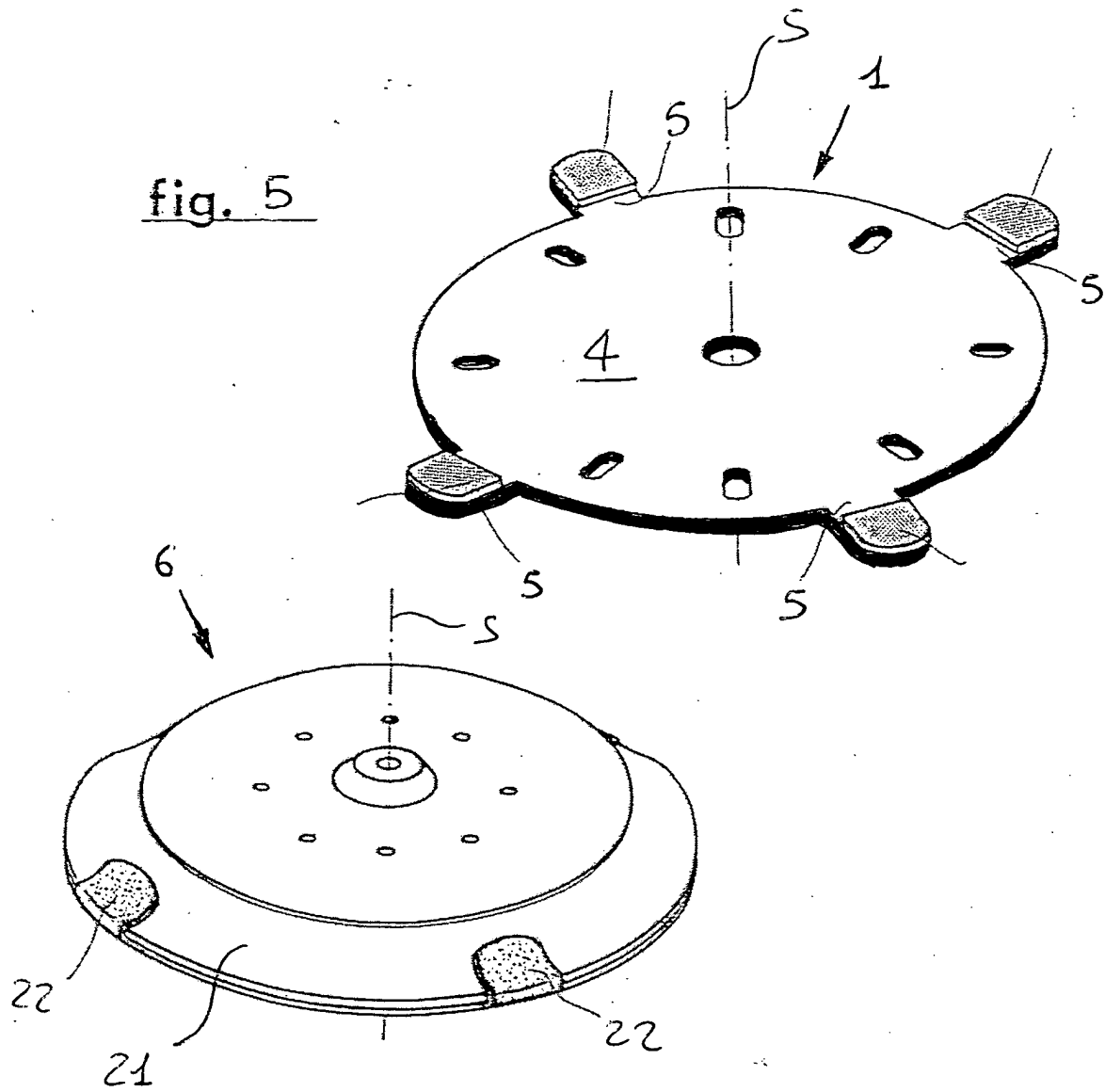


fig. 5



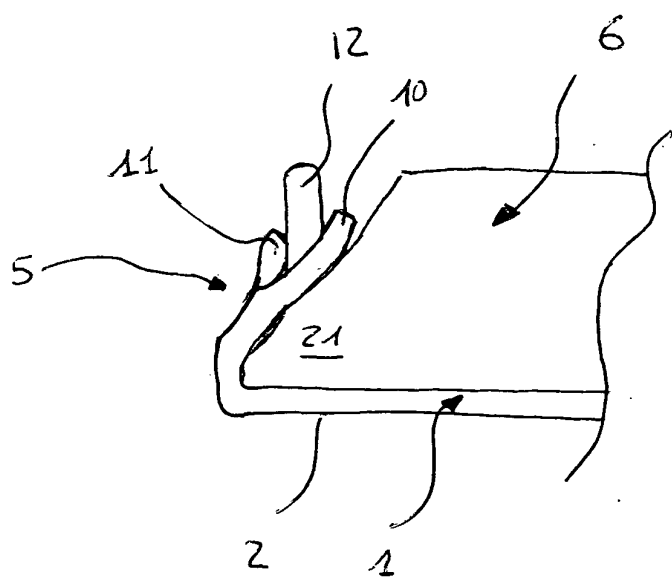
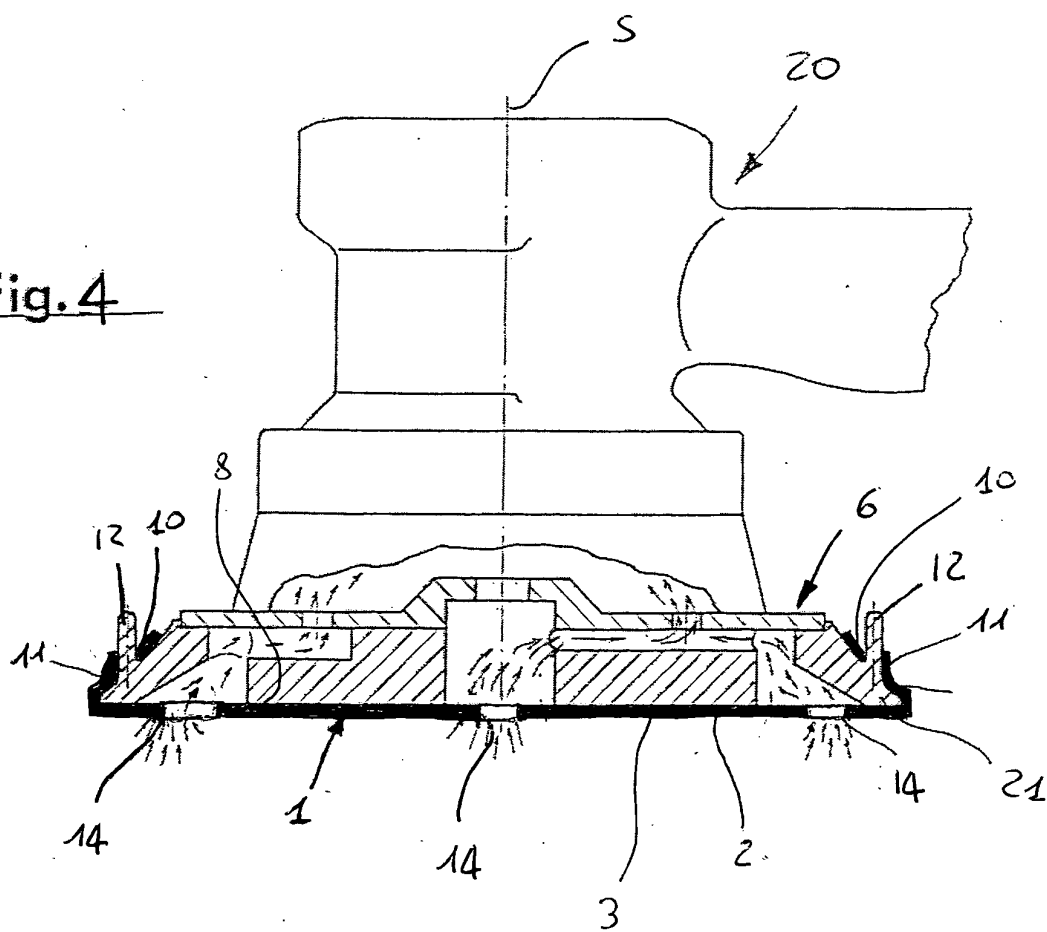


FIG. 6

fig. 4





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EUROPEAN SEARCH REPORT

Application Number
EP 04 42 5440

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Place of search The Hague		Date of completion of the search 10 November 2004	Examiner Eschbach, D
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			

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**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.
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