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(54) **Use of a system for for everyday maintenance of a hard floor surface of stone or stone-like material**

Verwendung eines Systems zur täglichen Pflege einer harten Oberfläche eines Bodens aus Stein oder steinartigem Material

Utilisation d'un système pour le nettoyage quotidien d'une surface dure des sols en pierre ou en matériaux pierreux

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Description

Technical field

[0001] The invention relates to use of a system for maintenance of hard surfaces, primarily concrete (cement), terrazzo and granite floor surfaces, but also marble or limestone surfaces. The invention particularly relates to use of a tool for maintenance which is suitable for use on a daily basis to maintain a polished hard floor surface.

Background

[0002] Use of a system as defined in the preamble of claim 1 is know from Scotch-Brite (TM), Blue Floor Pad, TD103, May 1997, or Scotch-Brite (TM) Green Floor Pad, TD 106, March 1999.

[0003] It is known in connection with cleaning or light polishing of floor surfaces to use a pad in the form of a three-dimensional non-woven web. The pad is usually provided as a circular, disc-shaped body, which is to be disconnectably mounted on a circular carrier plate, which in use is caused to rotate in a plane parallel with the floor surface, such that the pad, when brought into contact with the floor surface, is slightly compressed by the pressure arising between the floor surface and the carrier plate. The carrier plate is usually driven by a motor and may be mounted on a carrier frame, which may be arranged to be pushed or pulled by a walking operator or which may be arranged as a ridable vehicle.

[0004] Such pads are formed from fibers of an organic material, e.g. polyamide and/or polyester, particularly polyethylene terephtalate. In some cases the fibers also include natural fibers, such as walnut fibers or coconut fibers.

[0005] The fibers of the pad is interconnected at their mutual points of contact by so-called melt bonding, whereby the fibers are subjected to heat that cause the outer part of the fibers to slightly melt and thereby to bond to each other.

[0006] Alternatively, or additionally, the fibers may be interconnected at their mutual points of contact by the pad being impregnated with a polymer resin, hereinafter referred to as a "primary binder".

[0007] Production of this type of non-woven pads is well known from e.g. US-A-3,537,121, US-A-4,893,439, EP-A-0 397 374, GB-A-1 348 526 and EP-B-0 562 919, and thus does not need to be further elaborated on herein.

[0008] US-A-3,537,121 discloses pads for polishing surfaces of aluminum, plastic, wax and similar surfaces. US-A-3,537,121 also discloses production of such pads. In US-A-3,537,121 a binder mixed with abrasive particles is applied to the pad by passing the pad between a pair of squeeze rolls, one of which is partially immersed in a container for a mixture of binder resin and abrasive particles, after which the pad is allowed to cure or dry. Thus, in US-A-3,537,121 a pad is provided, which is entirely impregnated by the binder and abrasive particles.

[0009] US-A-4,893,439 discloses a pad for polishing floor surfaces or aluminum. The pad consists of fibers of organic material and constitutes a lofty open non-woven structure, and contains a binder binding abrasive particles to the fibers. The pad shown in US-A-4,893,493 has larger voids than that shown in US-A-3,537,121, and thereby has an improved ability to absorb dirt, so that it can be used for a longer period. Also the pad disclosed in US-A-4,893,493 is entirely impregnated by binder and abrasive particles.

[0010] EP-A-0 397 374 discloses a pad for floor polishing machines, which also is entirely impregnated by binder and abrasive particles.

[0011] Pads of the above type are frequently used for so-called "burnishing", i.e. dry polishing (often on a daily basis) of very lightly worn surfaces at high speed (1500-3000 rpm) and relatively low pressure, with a view to restoring a polished surface. This type of treatment is commonly used for both vinyl and marble floorings. Pads suitable for this purpose are available from 3M® under the designation "3M™ Floor Pads", and provide no or little effect on very hard floor surfaces, such as terrazzo or concrete, which have been subject to wear for a longer period of time.

[0012] EP-B-0 562 919 discloses a non-woven pad of polymer fiber, which is entirely impregnated by a binder comprising a mixture of curable plastic resin and abrasive particles having a particle size of 0,1-30 μm. As examples of curable resins are mentioned phenol resin, acrylic resins, melamine resin and urea resin. Diamond is mentioned as one among several other examples of plausible abrasive particles. However, according to EP-B-0 562 919, the pad disclosed therein is suitable for treatment of marble floor surfaces, and only in combination with crystallization chemicals, which means that treatment must be made in the presence of liquid containing a salt-forming acid.

[0013] The pad in EP-B-0 562 919 is also provided by passing a non-woven pad through a nip between two squeeze rolls, one of which being partially immersed in a binder/abrasive particles mixture, such that the binder and abrasive particles, via the surface of the cylinder is distributed in the pad.

[0014] Since the pad disclosed in EP-B-0 562 919 is to be used in the presence of crystallization chemicals, the method described in EP-B-0 562 919 actually constitutes a vitrification method, used with a view to improving the stain resistance and durability of a marble floor. This method is not suitable for daily maintenance purposes, since it involves use of special crystallization chemicals, including acids, which are to react with calcium present in the floor surface to form insoluble calcium salts. Such a method is typically used once in connection with the initial preparation of the polished marble floor, and thereafter at intervals of 6-12 months. The method described in EP-B-0 562 919 is thus too complicated

for being used on a daily basis.

[0015] Pads of the type referred to in EP-B-0 562 919 are sold by 3M® under the designations "3M™ 5200 Brown Stone Renew Pad" and "3M™ 4000 Grey Stone Polish Pad", and are used for treating marble in the presence of crystallization chemicals and at relatively low speeds (below 250 rpm) .

[0016] The need for crystallization chemicals makes the polishing work more complicated, since the chemicals are to be applied to the surface, possibly followed by removal of excess chemicals, which also contribute to making the polishing work more time consuming. Handling and application of the chemicals also constitute a potential hazard to the environment in general and to the work environment in particular.

[0017] It is also known to provide a polished stone or concrete surface by using tools comprising grinding or polishing elements made from a plastic resin mixed with abrasive particles, i.a. diamond particles. Since such elements are fixedly mounted on a usually rotating plate, they do not have the ability to compensate for unevenness in the floor, which may lead to uneven treatment of the floor surface, or to scratching or staining of the floor surface in case such an element is to contact the surface at an excess pressure. Yet another problem is that debris, such as grains of sand, small stones or metal may get stuck in or near the elements and cause scratching of the floor surface. Finally, this type of tools require special machinery capable of applying a higher pressure to the contact surface between the tool and the floor surface.

[0018] WO03/075734 discloses a disc-shaped device for cleaning purposes, comprising a nylon scouring material, which is arranged on a rigid disc, whereby grinding elements containing industrial diamonds are placed in recesses in the active scouring surface. A disadvantage with the device disclosed in WO03/07534 is that it does not eliminate the risk of debris getting stuck in or near the grinding elements. Yet another disadvantage is that this tool is complex and therefore more prone to breaking and more difficult and expensive to manufacture.

[0019] Hence, there is a need for an improved and simplified method and tool for daily maintenance of hard surfaces. Preferably, the method should be simple to use, e.g. by persons who do not have specialist training in floor surface preparation, and the method should be usable with conventional floor surfacing equipment, e.g. burnishing machines, etc. Also, the tools should be easy to manufacture, not too expensive and durable.

Summary of the invention

[0020] It is an object of the invention to provide improved technique, which wholly or partially eliminate the problems with the prior art methods and pads. In particular, it is an object to provide use of a system for treating a hard surface which is more easy to use and which provides a comparable or better result than the prior art.

[0021] The invention is based on the idea that abrasive particles in the form of diamond particles provide a polishing effect which is vastly superior to that achievable with those abrasive particles used in the examples shown in e.g. EP-B-0 562 919, and that this polishing effect is so superior as to eliminate the need for crystallization chemicals.

[0022] The invention is defined by the appended independent claim. Embodiments are set forth in the dependent claims and in the following description and drawings.

[0023] The term "diamond" is understood to include natural diamond as well as synthetic diamond, and diamond particles being coated with any suitable coating, e.g. silver.

[0024] In the present disclosure, the term "effective amount" is understood as an amount that is sufficient to achieve a measurable gloss improvement as compared to the same treatment using a liquid containing no crystallization agent at all. Amounts known to be effective are about 1-2 liters of crystallization agent (comprising 2-30 % by weight of e.g. magnesium hexafluorosilicate) per 50 m^2 of floor surface for a single treatment operation. Hence, amounts known to be effective on an ad-hoc basis range from about 0,4 g of magnesium hexafluorosilicate per m^2 floor surface. However, diluted crystallization agent, e.g. at a ratio of 1:100 is also known to be effective when used repeatedly, e.g. in connection with daily or weekly maintenance. Hence, amounts known to be effective for maintenance on a regular basis range from about 0,004 g of magnesium hexafluorosilicate per m^2 floor surface. It is understood that there are other types of crystallization agents, e.g. zinc hexafluorosilicate, hydrofluoric acid and oxalic acid. The values given above may thus need to be adjusted to apply to the respective type of crystallization agent chosen.

[0025] The combination of a flexible pad and diamond particles provides compensation for unevenness in the surface, and distributes the pressure applied to the pad evenly. Also, this combination, through the flexibility of the pad, considerably reduces the risk of the diamonds scratching the surface.

[0026] Using diamond particles as abrasive particles when polishing hard stone surfaces provides an effect equal to or better than use of conventional abrasive particles, both in wet and dry conditions. In particular, the use of diamonds enables the crystallization agent to be abolished, thereby eliminating its handling.

[0027] The abrasive particles have an average diameter of 0.1 to 30 μm, preferably between 0.1 and 15 μm and most preferably between 10 and 15 μm.

[0028] In one embodiment, the second portion is substantially free from diamond particles.

[0029] Since the abrasive particles present in the parts of the pad that are not in contact with the hard surface do not fulfill any function, pads according to the invention can be manufactured at a lower cost.

[0030] The flexibility of the pad eliminates or reduces the harmful effects that diamond abrasive particles could otherwise have on the hard surface. Hence, the tool may be used for and is particularly effective for hard stone or stone-like surfaces, such as granite, concrete, terrazzo, etc.

[0031] In one embodiment, the pad consists of a disc-shaped body having a thickness and a first surface, wherein said abrasive particles are present on said first surface and down to a depth from said first surface, which depth is less than said thickness, such that said first portion is at said first surface and said second portion is at a second surface, opposite said first surface. By leaving the second surface free from abrasive material and binder, the attachment of the pad to a Velcro hook connector on a carrier plate is facilitated.

[0032] In a second embodiment, the pad consists of a disc-shaped body having a thickness and a first surface, wherein said abrasive particles are present over less than the entire first surface, such that said first and second portions are situated adjacent each other at said first surface. This second embodiment facilitates migration of dust and debris into the pad.

[0033] The pad comprises an open, lofty, three dimensional non-woven web, including a plurality of fibers, which are adhered to each other at their points of mutual contact.

[0034] The abrasive particles may be bonded to the fibers of the pad by a secondary binder. Hence, the bonding of the fibers of the pad does not in any way need to be negatively affected by the fact that the abrasive particles are only present at the contact surface.

[0035] As non-limiting examples, the secondary binder may be selected from a group consisting of phenol resin, melamine resin, urea resin and epoxy resin.

[0036] In one embodiment, the secondary binder forms a plurality of distinct droplets having a maximum diameter which is smaller than an average length between two points of mutual contact of a fiber. Thus, the fibers are not entirely coated by the binder resin, facilitating further the migration of dust and debris into the pad.

[0037] The pad may further comprise second abrasive particles selected from a group consisting of graphite, tin oxide, silicon carbide and aluminum oxide.

[0038] The pad is preferably provided in the shape of a circular disc having a diameter between 30 and 100 cm and an uncompressed thickness between 1 and 5 cm.

Brief description of the drawings

[0039]

Figs 1a-1b show a pad according to a first embodiment.
Figs 2a-2b show a pad according to a second embodiment.
Figs 3a-3b show enlarged photographs of a pad according to the present invention, before and after the binder and abrasive particles have been applied.
Fig. 4a-4b show a diagram of a pad according to the first embodiment, and an enlargement of a portion of the pad.
Fig. 5 is a sectional view of a floor surfacing machine on which a pad according to the invention is mounted.

Description of embodiments

[0040] The description will first focus on a tool suitable for use in maintenance of hard surfaces, subsequently on the method for manufacturing the tool, and finally on the use of the tool for maintenance of a hard surface.

[0041] Referring to Fig. 1a, there is shown a pad 1 made up from an open, lofty three dimensional non-woven web of fibers 2. A first surface of the pad 1 has a portion P1 presenting abrasive particles bonded to the web by means of a secondary binder, i.e. a binder having as a main purpose to bond fibers to the web. The pad 1 is circular in shape.

[0042] Referring to Fig. 1b, a cross section along the line S1-S2 in Fig. 1a is shown. As is indicated in Fig. 1b, the portion P1 presenting the abrasive particles is present at the first surface A and to a depth D, which is less than the thickness T of the pad 1. Hence, at the second surface B there is a portion P2, which is substantially free from the abrasive particles and the secondary binder.

[0043] When referring to "portions", it is to be understood as a portions of the macrostructure of the pad 1 and not portions of the individual fibers.

[0044] Referring to Figs 2a and 2b, there is shown a similar pad 1, the difference being that there is a portion P2' also at the first surface A, which portion P2' is substantially free from the abrasive particles and the secondary binder.

[0045] In both embodiments, the abrasive particles are present throughout the secondary binder, and the fibers are bonded to each other by a primary binder and/or by being melt-bonded.

[0046] A description of the preparation of a pad 1 according to the embodiment discussed with reference to Figs 1a and 1b will now be given.

[0047] As a starting material, circular, disc shaped Glit/Microtron® Tan Floor Polishing Pad having a diameter of 20

inches (51 cm), a thickness of 28 mm and a weight of 157 grams was used. Such pads are available from Glit/Microtron, Wrens, GA, USA. The starting density of the pad was thereby 27 kg/m^3. Fig. 3a is a microscope photograph showing the pad prior to application of the polymer resin/abrasive particles. From Fig. 3a, it can be seen that the fibers constituting the pad are held together at their points 10 of mutual contact by a primary polymer resin. The pad is flexible and resilient and comprises polyester and nylon fibers.

[0048] A homogenous polymer resin mixture was prepared, consisting of 200 g PA resin 52-68 phenol resin (available from Perstorp AB, Perstorp, Sweden), 100 g of T-RÖD® ethanol (available from Alfort & Cronholm AB, Bromma, Sweden) and 20 g of LANDS LS600F 4-8 μm diamond particles (available from Lands Superabrasives, Co., New York, NY, USA). Just before application of the mixture, 60 g of 65% p-toluene sulfonic acid (PTS) was added as a hardener.

[0049] The resin mixture was sprayed onto a first one A of the surfaces of the polishing pad, using a standard-type compressed air spray gun (normally used for spraying paint). The pad with the uncured resin thereafter weighed 173 grams. Subsequently, the pad was placed in a hot air oven at approximately 120°C for approximately 20 minutes.

[0050] The pad has now assumed the appearance that can be seen from Fig. 3b, which is a microscope photograph. Globules or droplets 11 of the resin/particle mixture are formed along each fiber, also between the fibers' points of mutual contact. The droplets are so distributed that the fibers to which they are adhered are not entirely covered. A more clear illustration of this is found in Figs 4a-4b, which show a pad as described above with reference to Figs 1a-1b, and an enlargement of a portion of that pad (Fig. 4b), wherein droplets 11 of binder/particle mixture are attached to the fibers.

[0051] In order to evaluate the performance of the pad produced as described above, comparative tests were carried out in order to evaluate two different 20 inch (51 cm) pads, prepared as described above: a first one, referred to as "yellow", having 7-12 μm silver coated diamond particles, and a second one, referred to as "green", having 3-6 μm normal diamond particles. As a reference, two different commercially available pads were used: a 20 inch (51 cm) 3M™ 5200 Brown Stone Renew Pad and a 20 inch (51 cm) 3M™ 4000 Grey Stone Polish Pad were used, both available from 3M, St. Paul, MN, USA.

[0052] The tests were made on two different surface types: Kolmården marble (marble from the Kolmården area outside Norrköping, Sweden) and K40 concrete. Each test was carried out on a surface of about 1 m^2, using a Coor & Kleever Crystallizer 1250KG floor surfacing machine (available from Coor & Kleever, S.A., Barcelona, Spain) having a single carrier plate adapted for receiving a 20 inch floor pad and rotating at about 175 rpm. The test included polishing the surface for about 1 minute/m^2. The surface gloss was measured at several spots on the area before and after each treatment using a Sanwal/Cenma IG-310 Glosschecker. The gloss value in the tables below constitute the average value for each area. High gloss is rated 80-90°. Semi gloss is rated 50-75°. Satin is rated 30-45°. Rubbed effect is rated 20-25°. Flat sheen is rated 5-15°.

[0053] Each surface was tested both dry and using water as a lubricant. Additionally, the concrete surface was tested using Coor Rosa/K-2 crystallizer (available from Coor & Kleever S.A., Barcelona, Spain) as lubricant, i.e. the crystallization chemical mentioned in EP-B-0 562 919 as comprising magnesium hexafluourosilicate as crystallization agent.

[0054] When testing the 3M™ pads, each surface portion was first treated with the brown pad and subsequently with the gray pad.

Table 1: Tests performed with water as lubricant on Kolmården marble

Pad	Brown	Gray	Green
Initial gloss	17	17	10
Liquid	Water	Water	Water
Final gloss	17	35	30

Table 2: Tests performed without lubricant on Kolmården marble

Pad	Brown	Gray	Green
Initial gloss	20	25	28
Liquid	No	No	No
Final gloss	25	30	50

[0055] From tables 1 and 2, it can be concluded that on marble, which is a relatively soft stone having a hardness of about 3-5 Mohs and using water as a lubricant, the 3M™ pad combination (brown and gray) provide a slightly better effect, although both the gray and the green pads achieved values falling within the "satin" range. However, during dry

conditions, the green pad achieved a remarkable improvement, reaching the semi-gloss range.

Table 3: Tests performed with water as lubricant on K40 concrete

Pad	Brown	Gray	Yellow	Green
Initial gloss	30	29	24	35
Liquid	Water	Water	Water	Water
Final gloss	29	29	35	46

Table 4: Tests performed without lubricant on K40 concrete

Pad	Brown	Gray	Yellow	Green
Initial gloss	29	34	30	48
Liquid	No	No	No	No
Final gloss	34	35	48	58

[0056] From Tables 3 and 4, it is noted that in wet conditions and on K40 concrete, having a hardness of about 6-7 Mohs, the combination of brown and gray pads did not provide any measurable improvement at all, whereas the combination of yellow and green pads provided a distinct improvement. In dry conditions, a small improvement was noted for the surface treated with the combination of brown and gray pads, whereas a major improvement was noted for the surface treated by the combination of yellow and green pads.

Table 5: Tests performed with Coor Rosa/K-2 crystallizer as lubricant on K40 concrete

Pad	Gray	Green
Initial gloss	41	35
Liquid	VMC-Pink	VMC-Pink
Final gloss	45	51

[0057] From table 5, it is noted that some effect is achievable with a gray pad using Coor Rosa/K-2 crystallizer as lubricant on K40 concrete, and that a somewhat better effect is achievable with the green pad using Coor Rosa/K-2 crystallizer as lubricant.

[0058] All in all, it is concluded that the pad according to the invention provides a noticeable improvement as compared with the prior art. The improvement is particularly noticeable during dry conditions and on concrete.

[0059] Fig. 5 is a sectional view of a floor surfacing machine 20 on which a pad 1 according to the invention is mounted so as to define a contact surface 9 with the hard surface 8, which in this example is a floor surface. The pad 1 is mounted on a driven, rotatable carrier plate 4, which is typically journalled in bearings and thus rotatable relative to a machine body 5, on which a motor unit 6 is arranged. In this embodiment, the machine has a handle 7, and is thus adapted for being held/pushed/pulled by a walking operator. It is recognized that in other embodiments the floor surfacing machine 20 may be e.g. a ridable vehicle fitted with a carrier plate 4 that is adapted for receiving the pad 1.

[0060] The pad 1 and method described above can be used for everyday cleaning/maintenance of polished hard surfaces, such as stone, concrete or terrazzo floor surfaces using a floor surfacing machine such as a scrubber/dryer combination machine, e.g. the Nilfisk CR1300; a single disc floor maintenance machines (low speed or high speed), e.g. the Nilfisk 510B or 545; a burnisher, e.g. the Nilfisk SDH5120, BHS5120 or BHS7014, all of which are available from Nilfisk-Advance, Stockholm, Sweden.

[0061] The treatment of the floor surface is typically performed by causing the pad, when in contact with the floor surface, to rotate in a plane parallel with the floor surface. Typical rotational speeds are from 50 rpm to 3000 rpm. However, lower or higher rotational speeds are not excluded.

[0062] As is clear from the above, a first embodiment of the pad according to the invention comprises an open, lofty, three dimensional non-woven web, including a plurality of fibers, which are adhered to each other at their points of mutual contact by means of a primary binder, and in which abrasive particles are mixed with a secondary binder and applied only to a first surface of the pad, such that the pad is only partially impregnated by the binder/particle mixture. Alternatively, or additionally, the fibers may be melt-bonded to each other.

[0063] In a second embodiment of the pad, binder/particle mixture is only applied to parts of said first surface. This can be achieved by masking those parts of the surface to which the binder/particle mixture should not be applied.

[0064] In a third embodiment, the pad is entirely impregnated with the binder/particle mixture, e.g. by using such squeeze rollers as are described in EP-B-0 562 919.

[0065] In a fourth embodiment, the abrasive particles are present in the material of the pad.

[0066] The invention is not limited to the use of phenol resin. Other examples of suitable resins are melamine, urea, epoxy and polyester resins.

[0067] Furthermore, the hardener may be selected from any hardener suitable for the type of resin selected. Also it is possible not to include the hardener, e.g. by allowing the pad to cure at a higher temperature and/or for a longer period of time.

[0068] Also, the solvent (ethanol was used in the example) is provided merely to reduce the viscosity of the mixture and thereby to facilitate spraying thereof. Any suitable solvent may be used, and the solvent may also be excluded, provided that the method of application so allows.

[0069] It is understood that the pad 1 having secondary binder and abrasive particles as described above may be attached to a disc or plate having an arbitrary connector for being connected to a carrier plate of the surfacing machine, or that the pad may be directly connectable to the surfacing machine by means of a Velcro-type hook arrangement provided on the carrier plate, the hooks of which engage the fibers of the pad 1. Hence, the maintenance tool may be composed of the pad with the primary binder, the secondary binder and the abrasive particles, possibly with the addition of dyes or printed areas providing information on the type of pad, manufacturer, trademark etc.

[0070] Alternatively, or additionally, the pad may be provided with a backing layer.

Claims

1. Use of a system comprising:

a floor surfacing machine (20) in the form of a scrubber/dryer combination machine, and
a tool for treating a hard surface, the tool comprising a flexible pad (1) comprising an open, lofty, three dimensional non-woven web, including a plurality of fibers (2), which are adhered to each other at their points (10) of mutual contact,
the tool having an active treatment surface presenting abrasive particles bonded to the pad,
said use being for everyday cleaning/maintenance of a polished hard floor surface of stone or stone-like material in the absence of crystallization agent on a contact surface between the tool and the floor surface,
characterized in that the pad presents a first portion (P1) wherein said abrasive particles are present in a first concentration, and a second portion (P2, P2') having a second, lower concentration of said abrasive particles, and said abrasive particles consist essentially of diamond particles of an average diameter of 0.1 to 30 μm.

2. The use as claimed in claim 1, wherein said second portion (P2) is substantially free from diamond particles.

3. The use as claimed in claim 1 or 2, wherein the pad comprises a disc-shaped body having a thickness (T) and a first surface (A), wherein said abrasive particles are present on said first surface (A) and down to a depth (D) from said first surface, which depth is less than said thickness (T), such that said first portion (P1) is at said first surface and said second portion (P2) is at a second surface (B), opposite said first surface.

4. The use as claimed in any one of the preceding claims, wherein the pad comprises a disc-shaped body having a thickness (T) and a first surface (A), wherein said abrasive particles are present over less than the entire first surface (A), such that said first and second portions (P1, P2') are situated adjacent each other at said first surface (A).

5. The use as claimed in any one of the preceding claims, wherein the abrasive particles are bonded to the material of the pad by a secondary binder.

6. The use as claimed in claim 5, wherein the secondary binder comprises at least one of phenol resin, melamine resin, urea resin and epoxy resin.

7. The use as claimed in claim 5 or 6, wherein said secondary binder forms a plurality of distinct droplets (11) having a maximum diameter which is smaller than an average length between two points of mutual contact of a fiber.

8. The use as claimed in claim 5-7, wherein the abrasive particles are present throughout the secondary binder.

9. The use as claimed in any one of the preceding claims, wherein the fibers are bonded to each other by a primary binder and/or by being melt-bonded.

10. The use as claimed in any one of the preceding claims, wherein the tool further comprises second abrasive particles selected from a group consisting of graphite, tin oxide, silicon carbide and aluminum oxide.

11. The use as claimed in any one of the preceding claims, wherein the pad has the shape of a circular disc having a diameter between 30 and 100 cm and an uncompressed thickness between 1 and 5 cm.

Patentansprüche

1. Verwendung eines Systems umfassend:

eine Bodenoberflächenbehandlungsmaschine (20), in Form einer Scheuersaugkombinationsmaschine, und ein Werkzeug umfassend ein flexibles Pad (1) das ein offenes, aufgebauschtes, dreidimensionales nicht-gewebtes Geflecht umfasst, das eine Mehrzahl von Fasen beinhaltet (2), die an ihren gemeinsamen Kontaktpunkten (10) aneinander haften,
wobei das Werkzeug eine aktive Behandlungsoberfläche hat, die an das Pad gebundene Schleifpartikel aufweist, wobei die genannte Verwendung zur täglichen Reinigung/Pflege einer polierten harten Bodenoberfläche aus Stein oder einem steinartigen Material ist, in Abwesenheit eines Kristallisationsmittels auf einer Kontaktfläche zwischen dem Werkzeug und der Bodenoberfläche, **dadurch gekennzeichnet, dass** das Pad einen ersten Bereich (P1) aufweist, in dem die genannten Schleifpartikel in einer ersten Konzentration vorhanden sind, und einen zweiten Bereich (P2, P2') aufweist, der eine zweite, geringere Konzentration der genannten Schleifpartikel hat, und genannte Schleifpartikel im Wesentlichen aus Diamantpartikeln mit einem durchschnittlichen Durchmesser von 0,1 bis 30 μm bestehen.

2. Die Verwendung gemäß Anspruch 1, wobei der genannte zweite Bereich (P2) im Wesentlichen frei von Diamantpartikeln ist.

3. Die Verwendung gemäß Anspruch 1 oder 2, wobei das Pad einen scheibenförmigen Körper umfasst, der eine Dicke (T) und eine erste Oberfläche (A) hat, wobei genannte Schleifpartikel auf der genannten ersten Oberfläche (A) und bis zu einer Tiefe (D) von genannter ersten Oberfläche vorhanden sind, wobei diese Tiefe weniger als die genannte Dicke (T) ist, so dass der genannte erste Bereich (P1) auf genannter erster Oberfläche ist und der genannte zweite Bereich (P2) auf einer zweiten Oberfläche (B) gegenüber der genannten ersten Oberfläche ist.

4. Die Verwendung gemäß irgendeinem der vorherigen Ansprüche, wobei das Pad einen scheibenförmigen Körper umfasst, der eine Dicke (T) und eine erste Oberfläche (A) hat, wobei genannte Schleifpartikel auf weniger als der gesamten ersten Oberfläche (A) vorhanden sind, so dass die genannten ersten und zweiten Bereiche (P1, P2') nebeneinander auf der genannten ersten Oberfläche (A) gelegen sind.

5. Die Verwendung gemäß irgendeinem der vorherigen Ansprüche, wobei die Schleifpartikel an das Material des Pads mit einem sekundären Klebemittel gebunden sind.

6. Die Verwendung gemäß Anspruch 5, wobei das sekundäre Klebemittel mindestens eines aus Phenolharz, Melaminharz, Harnstoffharz und Epoxidharz umfasst.

7. Die Verwendung gemäß Anspruch 5 oder 6, wobei das genannte sekundäre Klebemittel eine Mehrzahl von abgegrenzten Tropfen (11) bildet, die einen maximalen Durchmesser haben, der kleiner als der durchschnittliche Abstand zwischen zwei gemeinsamen Kontaktpunkten auf einer Faser ist.

8. Die Verwendung gemäß Anspruch 5 bis 7, wobei die Schleifpartikel im gesamten sekundären Klebemittel vorhanden sind.

9. Die Verwendung gemäß irgendeinem der vorherigen Ansprüche, wobei die Fasern mit einem primären Klebemittel und/oder mittels Schmelzverbindung aneinander gebunden sind.

10. Die Verwendung gemäß irgendeinem der vorherigen Ansprüche, wobei das Werkzeug zusätzlich zweite Schleifp-

artikel umfasst, die aus einer Gruppe ausgewählt werden, welche aus Graphit, Zinnoxid, Siliziumkarbid und Aluminiumoxid besteht.

11. Die Verwendung gemäß irgendeinem der vorherigen Ansprüche, wobei das Pad die Form einer zirkulären Scheibe mit einem Durchmesser zwischen 30 und 100 cm und eine nicht komprimierte Dicke zwischen 1 und 5 cm hat.

Revendications

1. Utilisation d'un système comprenant :

une machine à surfacer les sols (20), sous la forme d'une machine combinée brosseuse/sécheuse, et
un outil permettant de traiter une surface dure, l'outil comprenant un patin flexible (1) comprenant un voile non tissé en trois dimensions ouvert et résilient, incluant une pluralité de fibres (2), qui adhèrent les unes aux autres en leurs points (10) de contact mutuel,
l'outil ayant une surface de traitement active présentant des particules abrasives liées au patin, ladite utilisation étant destinée à un nettoyage/entretien quotidien d'une surface de sol dure polie d'un matériau de pierre ou de type pierre en l'absence d'agent de cristallisation sur une surface de contact entre l'outil et la surface du sol,
caractérisée en ce que
le patin présente une première portion (P1) dans laquelle lesdites particules abrasives sont présentes dans une première concentration, et une seconde portion (P2, P2') ayant une seconde concentration, inférieure, desdites particules abrasives,
et lesdites particules abrasives sont essentiellement constituées de particules de diamant d'un diamètre moyen de 0,1 à 30 μm.

2. Utilisation selon la revendication 1, dans laquelle ladite seconde portion (P2) est sensiblement dépourvue de particules de diamant.

3. Utilisation selon la revendication 1 ou 2, dans laquelle le patin comprend un corps en forme de disque ayant une épaisseur (T) et une première surface (A), où lesdites particules abrasives sont présentes sur ladite première surface (A) et jusqu'à une profondeur (D) depuis ladite première surface, laquelle profondeur est inférieure à ladite épaisseur (T), de telle sorte que ladite première portion (P1) est au niveau de ladite première surface et ladite seconde portion (P2) est au niveau d'une seconde surface (B), opposée à ladite première surface.

4. Utilisation selon l'une quelconque des revendications précédentes, dans laquelle le patin comprend un corps en forme de disque ayant une épaisseur (T) et une première surface (A), où lesdites particules abrasives sont présentes sur moins que l'intégralité de la première surface (A), de telle sorte que lesdites première et seconde portions (P1, P2') sont situées adjacentes l'une à l'autre au niveau de ladite première surface (A).

5. Utilisation selon l'une quelconque des revendications précédentes, dans laquelle les particules abrasives sont liées au matériau du patin par un liant secondaire.

6. Utilisation selon la revendication 5, dans laquelle le liant secondaire comprend au moins un élément parmi une résine de phénol, une résine de mélamine, une résine d'urée et une résine d'époxy.

7. Utilisation selon la revendication 5 ou 6, dans laquelle ledit liant secondaire forme une pluralité de gouttelettes distinctes (11) ayant un diamètre maximal qui est plus petit qu'une longueur moyenne entre deux points de contact mutuel d'une fibre.

8. Utilisation selon les revendications 5 à 7, dans laquelle les particules abrasives sont présentes sur la totalité du liant secondaire.

9. Utilisation selon l'une quelconque des revendications précédentes, dans laquelle les fibres sont liées les unes aux autres par un liant primaire et/ou en étant thermoliées.

10. Utilisation selon l'une quelconque des revendications précédentes, dans laquelle l'outil comprend en outre des secondes particules abrasives choisies dans un groupe consistant en le graphite, l'oxyde d'étain, le carbure de silicium et l'oxyde d'aluminium.

11. Utilisation selon l'une quelconque des revendications précédentes, dans laquelle le patin a la forme d'un disque circulaire ayant un diamètre compris entre 30 et 100 cm et une épaisseur non comprimée comprise entre 1 et 5 cm.

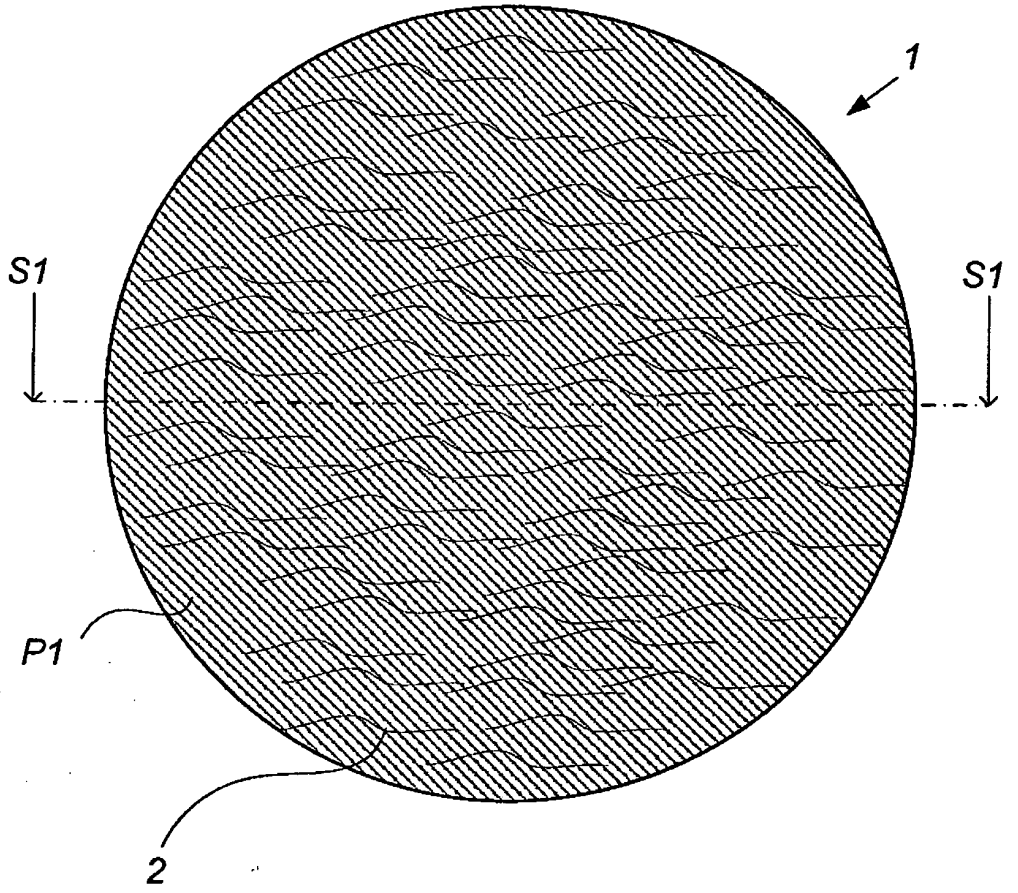

Fig 1a

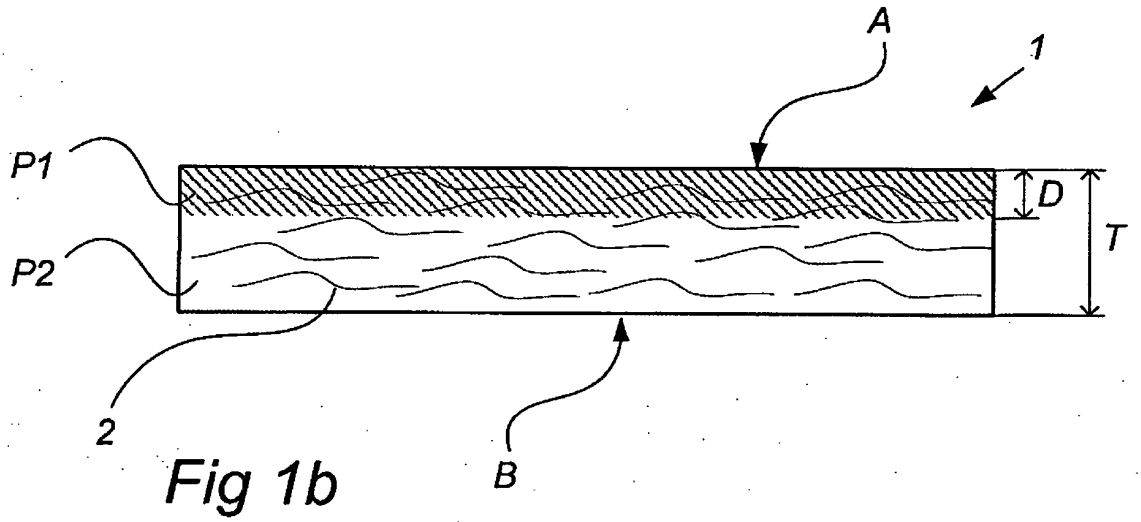

Fig 1b

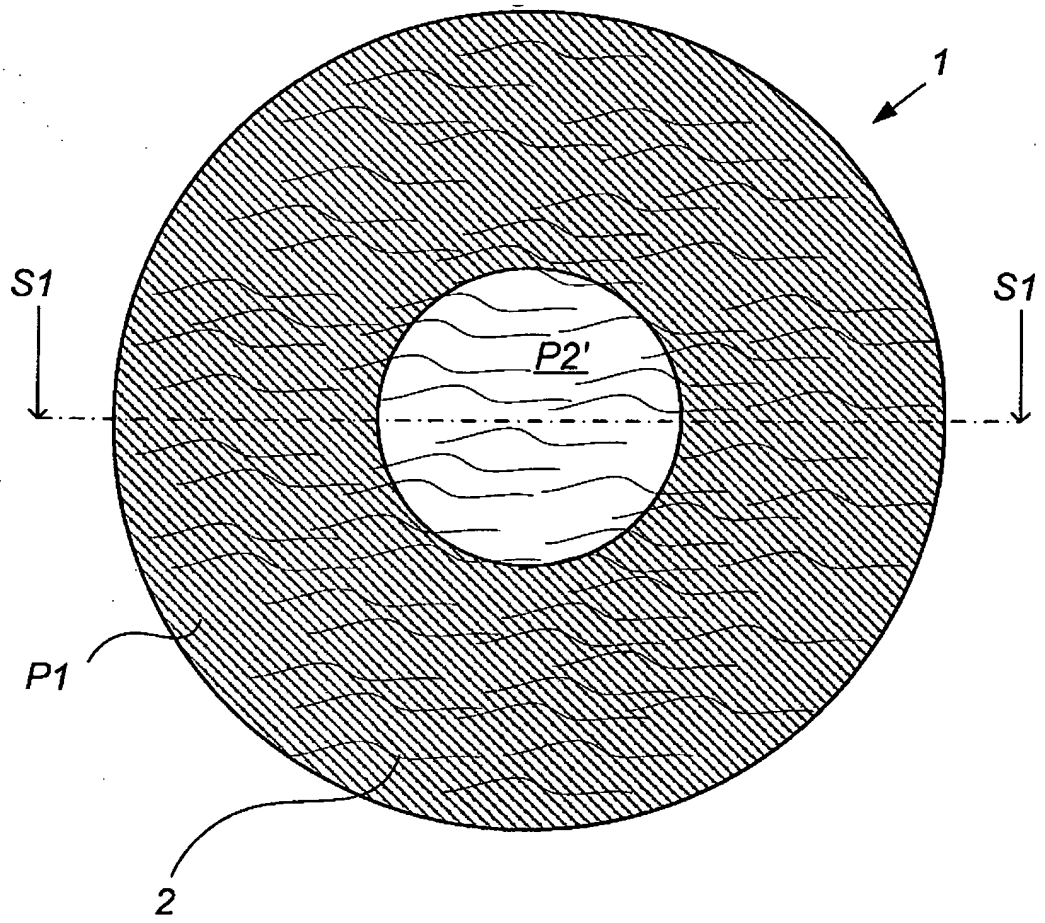

Fig 2a

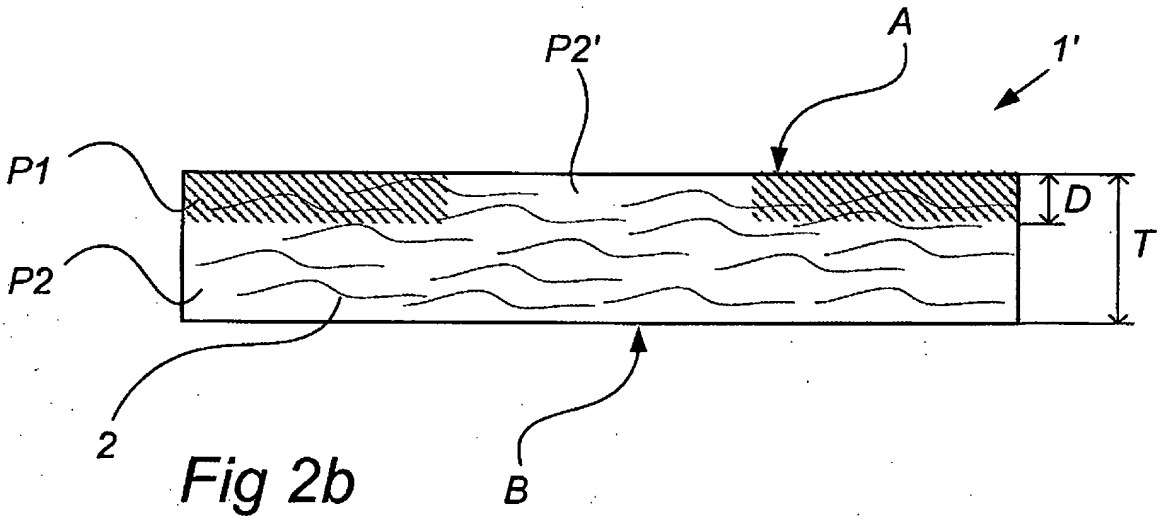

Fig 2b

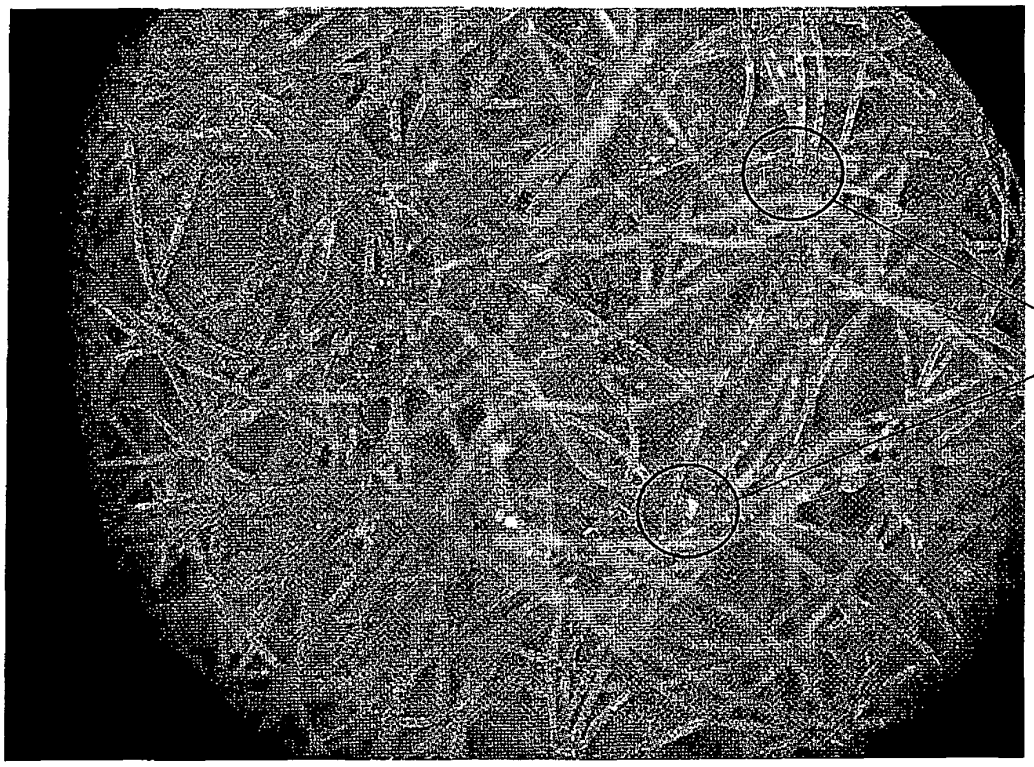

Fig 3a

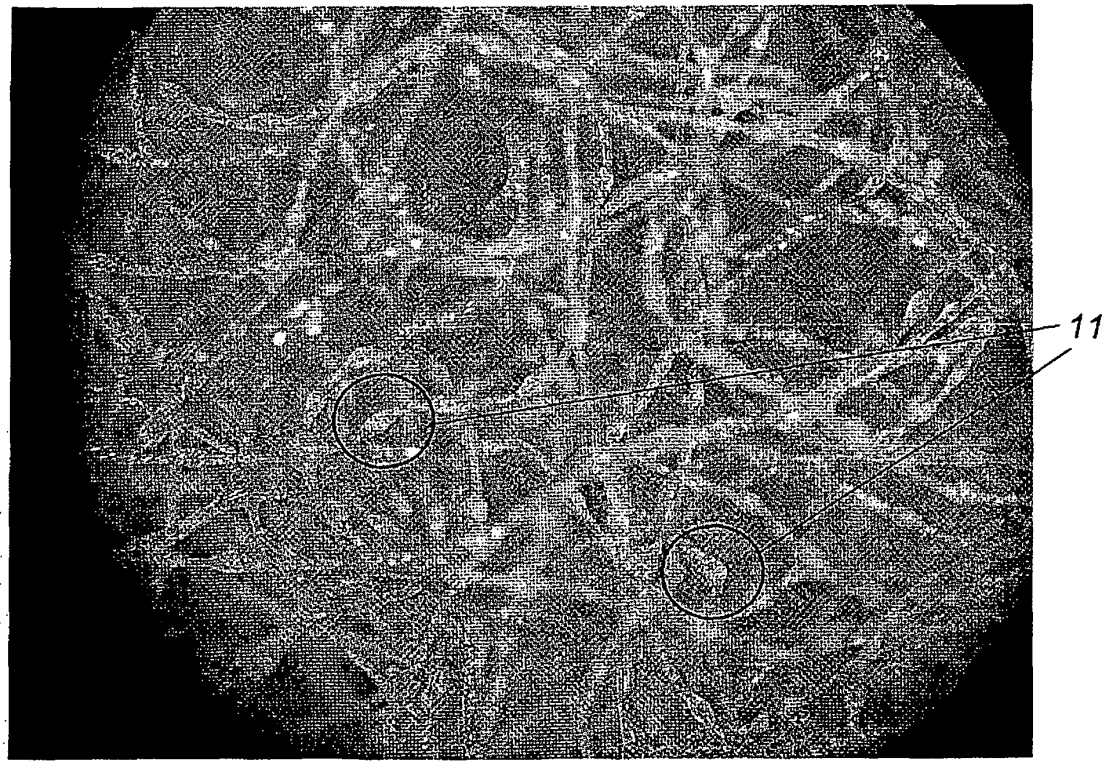

Fig 3b

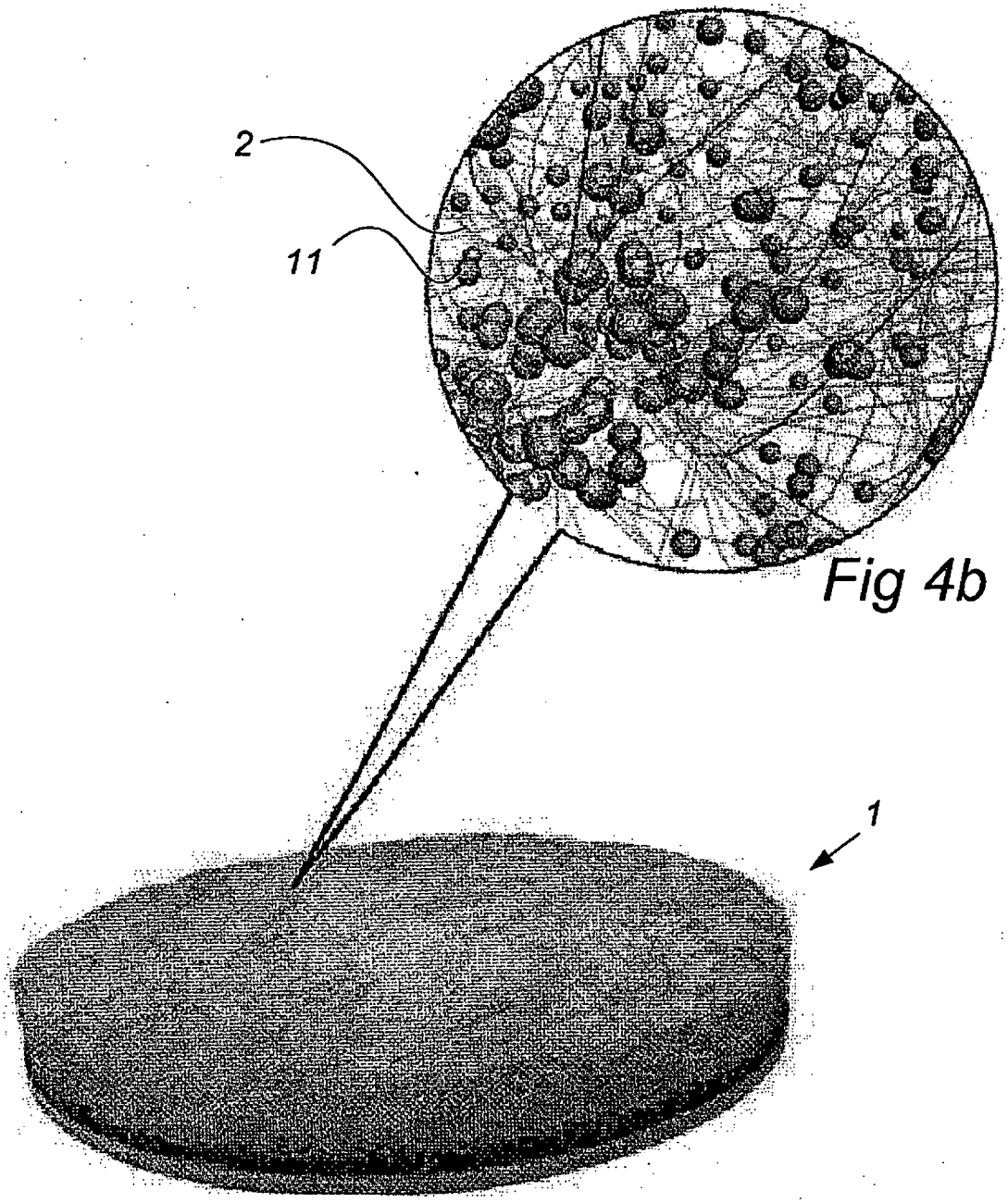

Fig 4b

Fig 4a

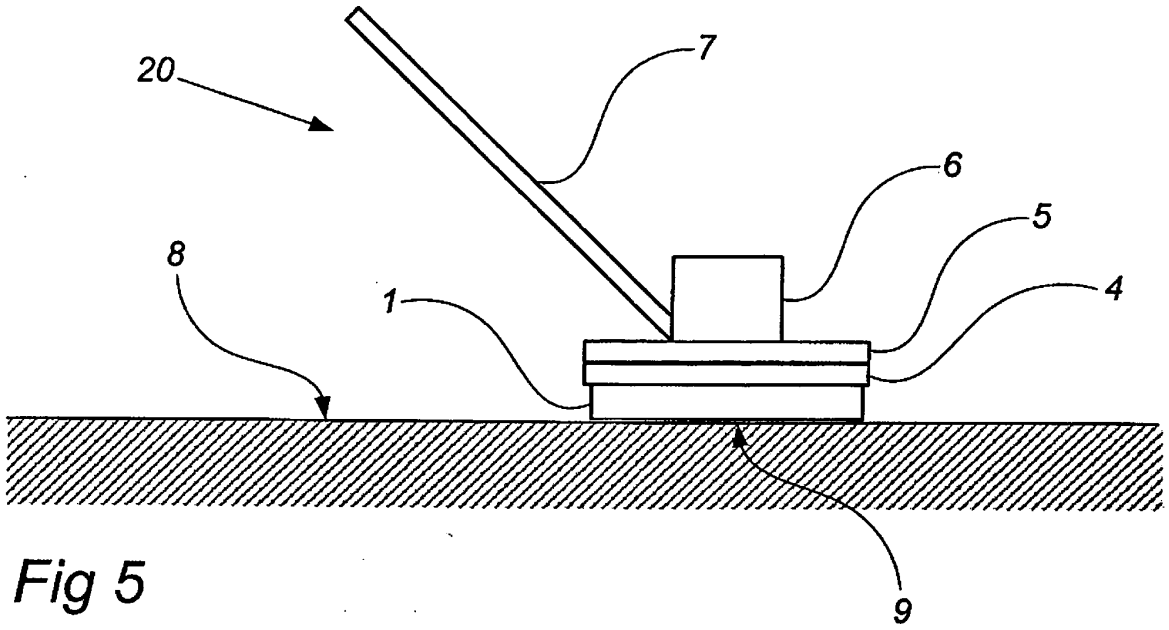

Fig 5

REFERENCES CITED IN THE DESCRIPTION

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