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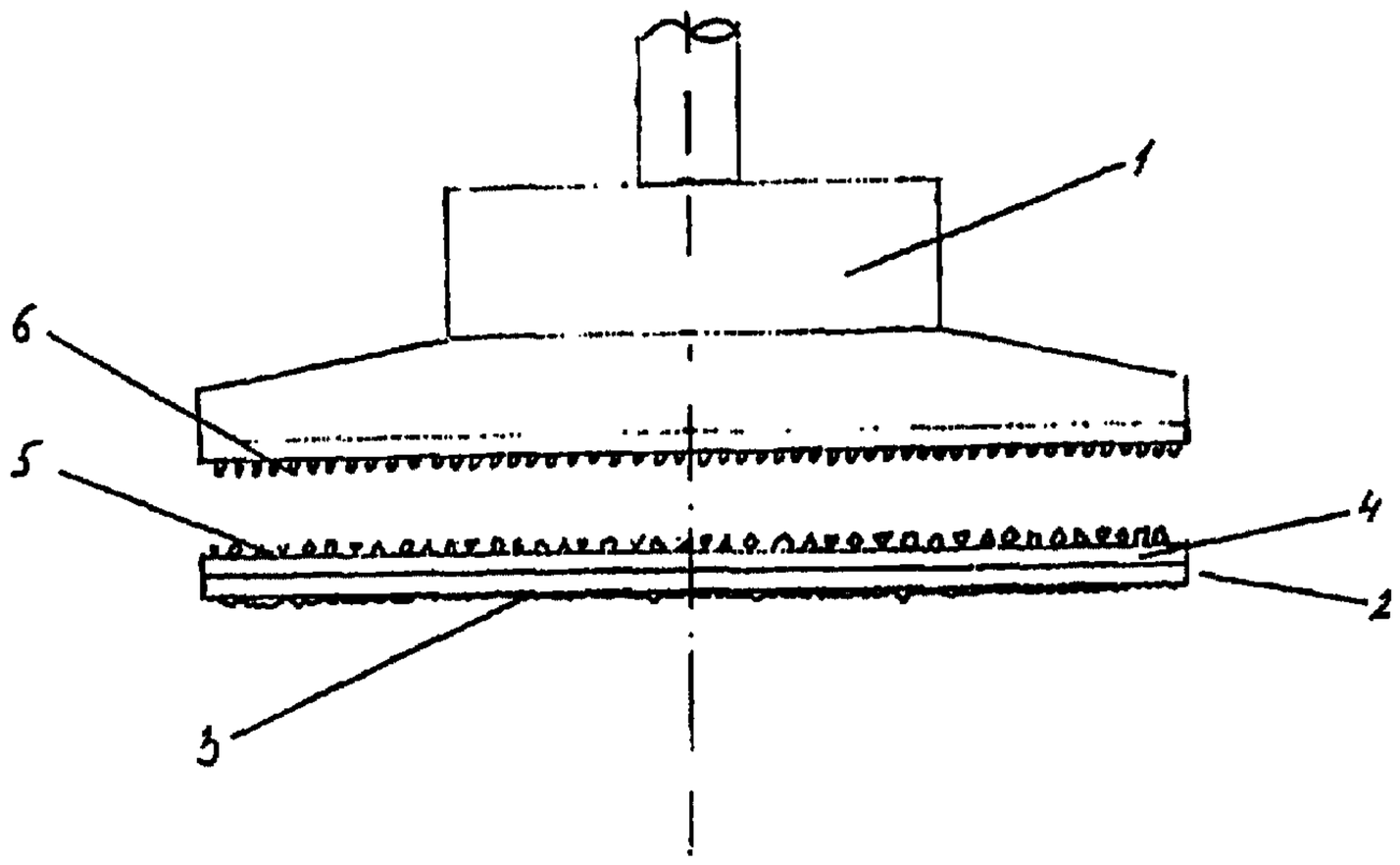
(54) **OUTIL PLAQUE COMPRENANT UN ELEMENT DE FIXATION RAPIDE DOTE D'UNE SURFACE DE TRAVAIL**

(54) **PLATE TOOL HAVING QUICK-ENGAGING ELEMENT, PROVIDED WITH WORK SURFACE**



(57) L'invention concerne un outil plaque sous forme de dispositif multicouche présentant un élément de fixation rapide, pourvu d'une surface de travail, comprenant un substrat. L'outil plaque est aussi adapté pour se fixer à une tête d'adaptation d'outil. L'invention est caractérisée en ce que l'on fixe directement ou indirectement par stratification sur le côté opposé à la surface de travail de l'outil plaque une couche plastique servant de partie de l'élément de fixation, de préférence un film thermoplastique, et en ce que l'on place sur la surface extérieure de l'autre côté de cette couche plastique des protubérances, à savoir des granulés formant un ensemble avec la couche plastique, de préférence soudés dans cette dernière.

(57) The invention relates to plate tool formed as a multi-layer device having a quick-engaging element, provided with a work surface, comprising a substrate. The plate tool according to the present invention is also suitable for fastening to a tool adapter head. The essence of the invention is that on the opposite side to the work surface of the plate tool, directly or indirectly a plastic layer formed as a part of the engaging element, preferably a thermo-plastic film, is fixed, suitably by lamination, and on the external surface of the other side of that plastic layer protrusions, granules forming one unit with the plastic layer, preferably welded into that, are placed.

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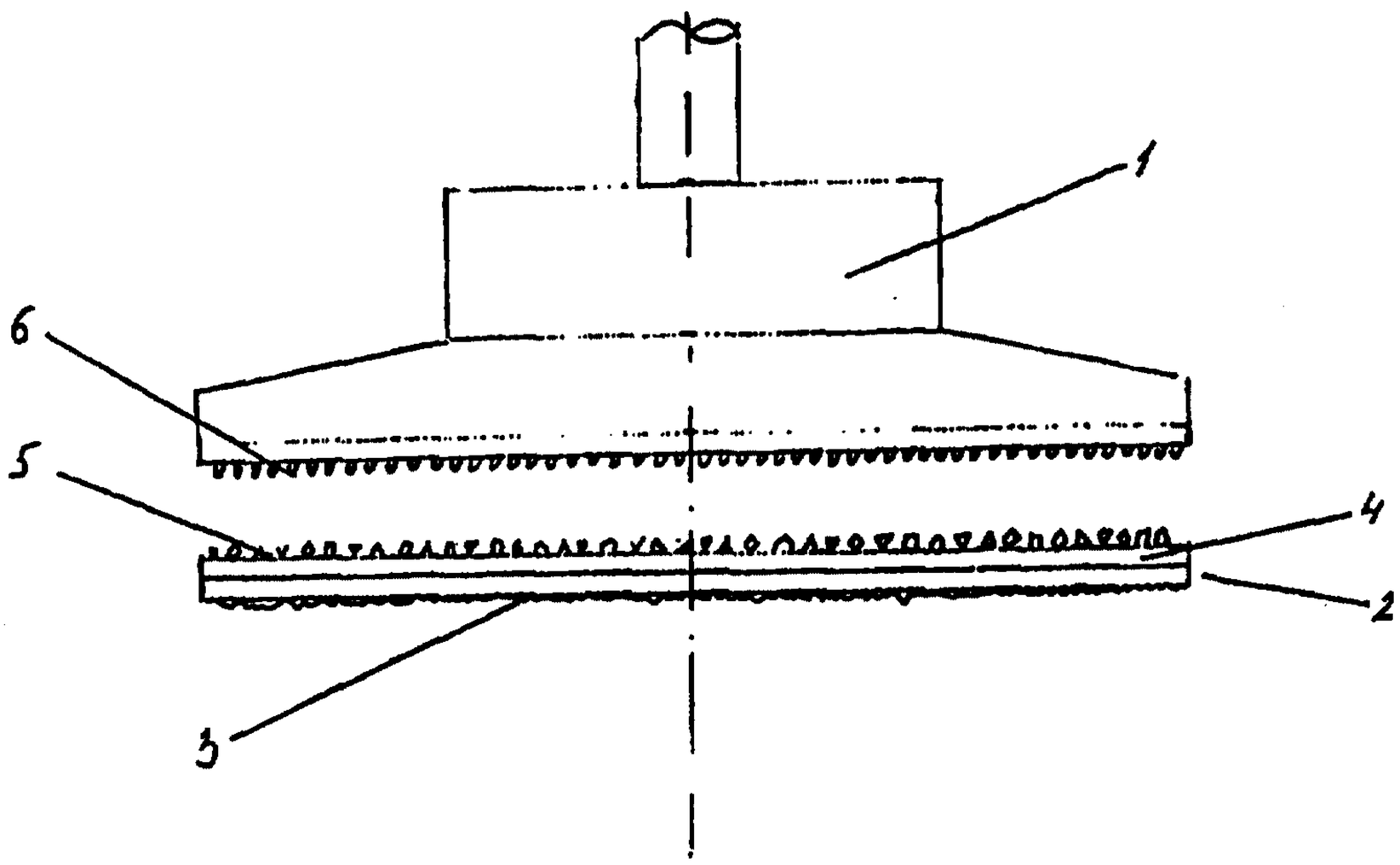
(54) Title: PLATE TOOL HAVING QUICK–ENGAGING ELEMENT, PROVIDED WITH WORK SURFACE



(57) Abstract

The invention relates to plate tool formed as a multi–layer device having a quick–engaging element, provided with a work surface, comprising a substrate. The plate tool according to the present invention is also suitable for fastening to a tool adapter head. The essence of the invention is that on the opposite side to the work surface of the plate tool, directly or indirectly a plastic layer formed as a part of the engaging element, preferably a thermo–plastic film, is fixed, suitably by lamination, and on the external surface of the other side of that plastic layer protrusions, granules forming one unit with the plastic layer, preferably welded into that, are placed.

65.157/DE

Abrasive article having quick-engaging element, provided with work surface

Field of the Invention

The invention relates to abrasive article formed as a multi-layer device having a quick-engaging element, provided with an abrasive work surface, comprising a substrate. The abrasive article according to the present invention is also suitable for fastening to a tool adapter head. The term „abrading" as used herein includes all methods of material removal due to frictional contact between contacting surfaces in relative motion, such as grinding, sanding, polishing, burnishing, and refining.

Technical Field

As it is known, for detachable joint of two surfaces of different substances a number of different solutions are wide-spread in practice.

The best known one of the earlier solutions was the snapable "snap-fastener" solution, wherein to several points of the two surfaces to be joined snaps were placed and by being interlocked successively, the two surfaces were fastened detachably. When a surface made of softer material had to be fixed to a harder material, on the softer material resilient, round shaped, concave recesses were usually created which were pressed in the harder surface, thereby after the stop of the pressure, because of the air displaced

from the concave recesses of the surface, the round shaped openings of the surface adhered to the hard surface and, simultaneously with the original concave shape regained, vacuum was produced in the concave recesses of the surface. Thus its tearing off was only possible by applying a suitable force. Antislip rubber mats, which for example can be placed into baths, are provided with such suction-grip discs.

In the aforementioned solutions on one hand during the opening-closing processes and, on the other hand, in consequence of the forces imparted on the two surfaces in fastened position, the forces were concentrated on the given points or on their surroundings and so the lifetime of the elements taking part in these joints was rather short.

In order to eliminate these deficiencies an engaging element consisting of two surfaces was created, wherein on one of the surfaces, as on a base, a hook carpet having hooks placed closely next to each other and on the other surface a loop carpet having loops being able to get caught in the hooks, placed also very close to each other, were formed. After the two surfaces were pressed into each other, their disjunction can only happen by removing them from each other gradually. That fastening element, usually named "hook and loop fastener", is used mainly in the clothing industry.

It was soon recognized, that to let the two surfaces of the hook and loop fastener fixed to each other slip on each other an extremely large shear force is needed, therefore at places where it is essential, this way of fixing can be economically applied.

One of those fields is, for example, the abrasive technology wherein the fast change of the abrasive surfaces and their reliable clamping to the driving tool is extremely important, and at the same time typically a stress of

shearing direction arises during the work. Solutions of this kind are described in the patent specifications Nos. DE-OS 1 577 588 and DE 32 19 344 A1. In this latter specification the surface of the hook and loop fastener provided with a hook carpet is placed on a driving disc while the receptive surface of the hook and loop fastener comprising a loop carpet is formed on the side of the polishing plate opposite to its abrasive surface.

In the practice of today's abrasive technology the attachments for abrasive hand tools are also constructed in that way.

Although solutions of this kind satisfy the emerged requirements from the technological point of view, their removal, detachment, change, i.e. all sorts of disjunction of the joint, is made by tearing, which, on one hand, needs extra energy expenditure and, on the other hand, because of the bending of the abrasive plate during the "tearing" process, the lifetime of the abrasive surface of the plate, which is not too long anyway, is reduced in contradiction to the relatively long lifetime of the other component of the hook and loop fastener fixed on the other side of the abrasive plate. Accordingly, the application of the expensive hook and loop fasteners having a relatively long lifetime in the abrasive technology is not really economical.

The fact, that at solutions of this kind considerable mechanical stress arises is also confirmed by US patent specification No 5 170 595, wherein, in order to avoid damage, a special ear ('tab member') is constructed.

From the prior art on the other hand, a plastic film is also known, which, in accordance with another solution of our own, is prepared in a way that particles consisting of the substance of the film and/or other plastic material being able to weld together with that, and having suitable granule size and/or abrasion resistance are brought to the surface to be roughed of semi-

finished product having sufficient reserved heat content to maintain condition appropriate for welding of the thermoplastic film surface to be roughed or to one or both film-surfaces re-heated to such temperature and are dispersed in suitable closeness and configuration and that condition of the roughed surface is maintained until desired welding process is completed. When two surfaces roughed with that kind of method are placed on each other the friction resistance will be substantially increased in comparison with plastic films having smooth surfaces and in most cases the two surfaces can practically be prevented from splipping on each other.

The gripping-frictional force acting between the two roughed surfaces is not enough to overcome the shear force acting between the engaging elements of the finishing machines, thus the roughed films are not suitable for such purposes.

Disclosure of the Invention

Therefore the object of the present invention is to provide an abrasive article supplied with a quick-engaging element, wherein such a way of fastening may be attained which, to a similar extent as with the hook and loop fastener, is able to withstand the shear force necessarily acting in the course of abrading process, but is substantially simpler, its removal and change is cheaper and can be carried out more easily.

The invention is based on the recognition that while the penetration of hooks - arranged along the penetrating surface of the hook and loop fastener - into the loops of the receptive surface makes it difficult to disjunct the two surfaces from each other, to provide the proper grip it is enough to set such a penetrating surface against the receptive surface supplied with loops, which is roughed to such an extent that its protrusions are able to enter be-

tween the loops of the receptive surface and the elements creating the surface's roughness - i.e. protrusions which are constituted by granules - by getting caught in the loops are able to prevent the slipping on each other, thereby such an attachment is gained, wherein the two surfaces "adhere" to each other to the required extent and so are invariably able to counteract the shear force while, at the change, the elements creating the roughness can easily be lifted off the loops; in this way the two surfaces can easily be detached. It may be explained with that for the separation of the surfaces no resilient deformation of the protrusions is needed. The invention is based on the recognition that the receptive surface provided with loops of the hook and loop fastener, known *per se*, being attached with the plastic film roughed with protrusions, which are constituted by granules creates such a joint, which is suitable for constructing a quick-engaging element. In addition, we have found that alternatively, the receptive portion does not necessarily contain loops, but optionally it can also be made of a non-woven fabric consisting of fibres which are able to sustain the said protrusions. The lifting off resistance can be increased by bringing a layer of self-adhesive glue binding by pressure to the surface provided with protrusions, which are constituted by granules or to a portion of that or to several smaller portions of that.

Thus the essence of the invention is that on the opposite side to the work surface of the abrasive article, directly or indirectly a plastic layer formed as a part of the engaging element, preferably a thermoplastic film, is fixed, suitably by lamination, and on the external surface of the other side of that plastic layer protrusions, which are constituted by granules forming one unit with the plastic layer, preferably welded into that, are placed.

Best Mode for Carrying Out the Invention

For better understanding the invention further will be described in detail with reference to the accompanying drawing wherein

FIG. 1 is a front elevational view of one alternate embodiment of the abrasive article in accordance with the present invention together with the tool adapter head in detached form.

FIG. 2 is an axonometric view of a part of a sanding belt with spliced ends in the application environment of a cylinder.

The tool adapter head (**1**) as shown in FIG. 1 in case of rotary finishing machines, for example sanding or polishing machines is a disk while in case of hand tools it has a with quadrangular joining surface. Accordingly the abrasive article (**2**) which may be attached to that, may also be a multi-layer processing device having a disc shaped or quadrangular work surface (**3**). For example the work surface (**3**) of the abrasive article (**2**) is formed as an abrasive or polishing surface. On the opposite side to the work surface (**3**) of the abrasive article (**2**) directly or indirectly a plastic layer (**4**) formed as one component of the engaging element, preferably a thermoplastic film, is fixed, preferably by lamination, and on the surface opposite to the mounted side of that plastic layer (**4**) a granule carpet (**5**) consisting of granules having random distribution and random shape and forming one unit with the plastic layer (**4**) is formed. As thermoplastic film suitably a polyethylene film is used. Work surface (**3**) on the opposite side to the mounted side to the abrasive article (**2**) is constructed in the form of an abrasive surface. The other component of the engaging element is a fabric, practically corresponding to the

loop member of the hook and loop fasteners, placed on the tool adapter head (**1**), being covered by loop carpet (**6**) consisting of resilient loops projecting from the surface or non-woven.

When the surface of the plastic film (**4**) of the abrasive article (**2**) covered by granule carpet (**5**) is placed on the surface of the tool adapter head (**1**) provided with the loop carpet (**6**) suitable for clamping the abrasive article (**2**), then the random shaped engaging granules penetrate the loops of the loop carpet (**6**). When the shear force encountered at the start of the sanding process wants to slip the two engaging surfaces is relation to each other, the engaging granules are getting caught in the loops and their shape prevent them from slipping out of the loops. It is preferable, if the closeness of the granules in the granule carpet (**5**) and the closeness of the loops in the loop carpet (**6**) are the same or at least are approximately the same, because in that way can be assured, that the greatest part of the granules are able to find a loop to catch.

In the course of placing the two surfaces on top of each other, before putting to work, when the engaging granules are positioned next to the loops, then the joint between the two surfaces may only be formed if the two surfaces are moved in relation to each other in the interfacial plane of the surfaces. That can be replaced by the application of a thin self adhesive glue layer binding by pressure. The thickness of the adhesive layer is less than the average projection of the engaging granules.

As it is shown by its axonometric view in FIG. 2, a portion of a sanding belt (**7**) in the environment of a cylinder (**8**) applied as a work surface (**3**) of spliced ends presents a solution which, by using the joint of the hook and

loop fasteners, could not be realized until now. The abrasive surface is formed on the external side of the sanding belt (**7**) not being in contact with the cylinder (**8**), the plastic film (**4**) is positioned on its internal side being in contact with the cylinder (**8**), turning towards the cylinder (**8**) with its granule carpet (**5**), while the loop carpet (**6**) is constructed on the surface of the cylinder-jacket (**8**). Under one revolution of the sanding belt (**7**) the two surfaces (complementary engaging elements) are engaged and detached twice. The cheapest hook and loop fasteners known today deteriorate after fastening about 3 to 5 hundred times, however even the hook and loop fasteners having the longest lifetime are not able to engage and disengage more than 10 to 12 thousand times. It means that even the latter deteriorate after 5 to 6 thousand revolutions. The engaging element of the present invention is able to resist at least as long as it is required from the point of view of the lifetime of the abrasive surface, is significantly cheaper and so considerably more economical.

What we claim is:

1. Abrasive article formed as a multi-layer device having a quick-engaging element, provided with an abrasive work surface, comprising a substrate characterized in that on the opposite side to the work surface (**3**) of the abrasive article (**2**) directly or indirectly a plastic layer (**4**) formed as one component of the engaging element, preferably a thermoplastic film, is fixed, suitably by lamination, and on the external surface of the other side of that plastic layer (**4**) protrusions which are constituted by granules, forming one unit with the plastic layer (**4**), preferably welded into that, are placed.

2. Abrasive article as claimed in claim 1 wherein on the surface of the plastic layer (**4**), on the side opposite to its fixed side, a granule carpet (**5**) comprising engaging granules having random distribution and/or random shape and forming one unit with the plastic layer (**4**) is formed.

3. Abrasive article as claimed in claim 1 wherein the work surface (**3**) on the opposite side to the laminated side of the abrasive article (**2**) is constructed in the form of an abrasive surface.

4. Abrasive article as claimed in any of claims 1 to 3 wherein the component formed as one part of the engaging element is suitable for joining either with a loop carpet (**6**) consisting of resilient loops projecting from the surface or with a non-woven fabric.

5. Abrasive article as claimed in claim 4 wherein the component formed as one part of the engaging element is suitable for joining with thermo-fleece.

6. Abrasive article as claimed in any of claims 1 to 5 wherein on the granule carpet (**5**) or on a part (or parts) of that a self-adhesive glue carpet binding by pressure is formed.

7. Abrasive article as claimed in any of claims 4 to 6 wherein the closeness of the engaging granules of the granule carpet (**5**) and the closeness of the loops of the loop carpet (**6**) to be joined are approximately the same.

8. Abrasive article as claimed in any of claims 1 to 7 wherein the thermo-plastic layer is a polyolefin film.

9. Abrasive article as claimed in any of claims 1 to 8 wherein the band shaped abrasive article (**2**) with spliced ends is a sanding belt (**7**) and on the external side of that sanding belt (**7**) the work surface (**3**), while on its internal side a granule carpet (**5**) forming one unit with the plastic film (**4**) constructing one part of the engaging element is arranged, and a loop carpet (**6**) to be joined forming the other component of the engaging element is created on the cylinder-jackets of the two cylinders (**8**) used for moving the sanding belt (**7**) of spliced ends.

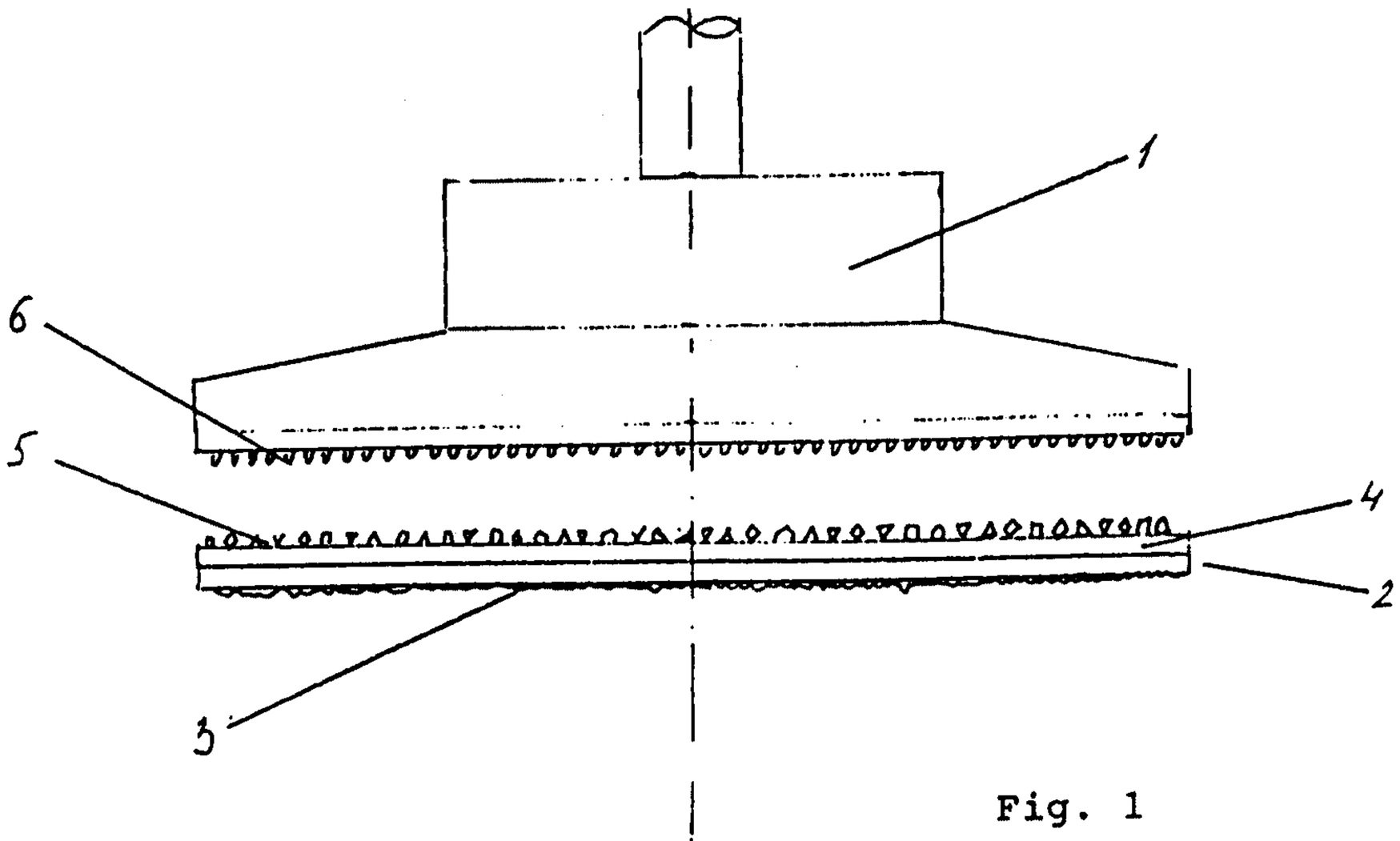


Fig. 1

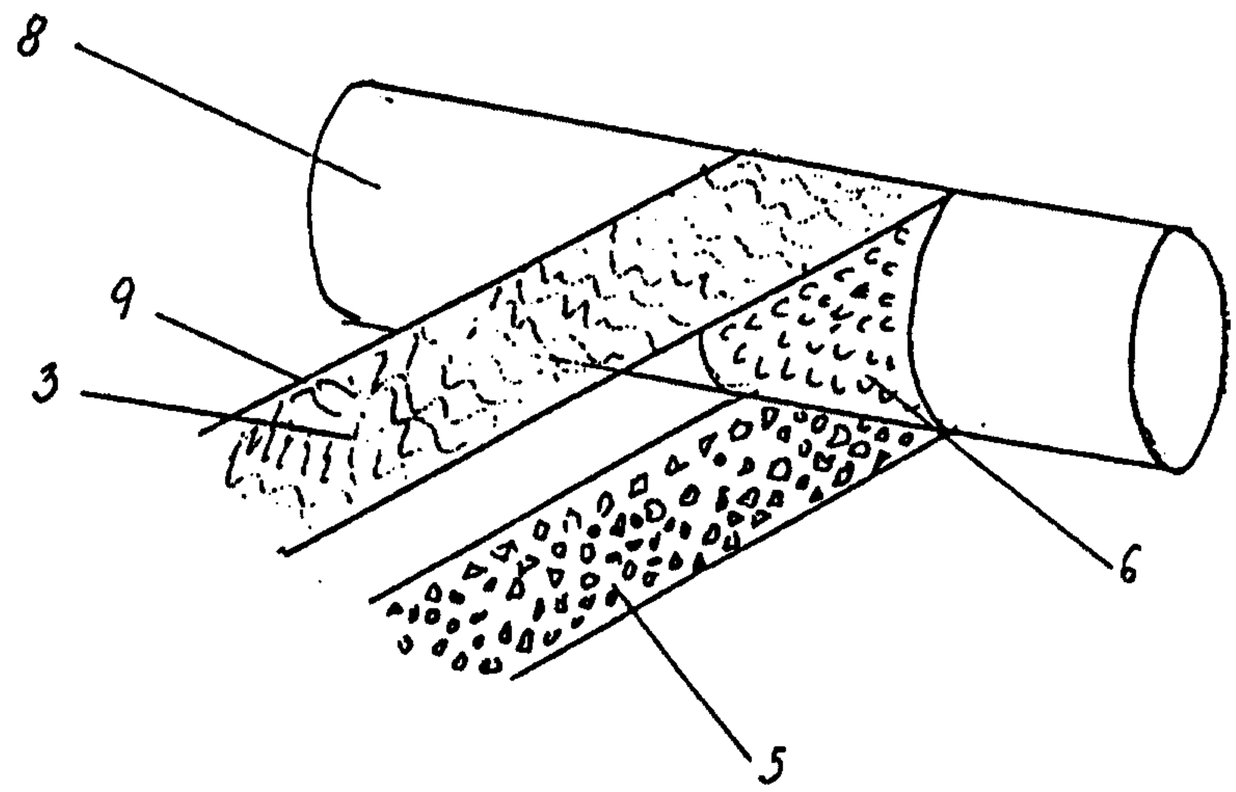


Fig. 2