



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**29.10.2003 Bulletin 2003/44**

(51) Int Cl.7: **A46D 1/00, A46B 13/00**

(21) Application number: **03076184.5**

(22) Date of filing: **22.04.2003**

(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 PT RO SE SI SK TR**  
 Designated Extension States:  
**AL LT LV MK**

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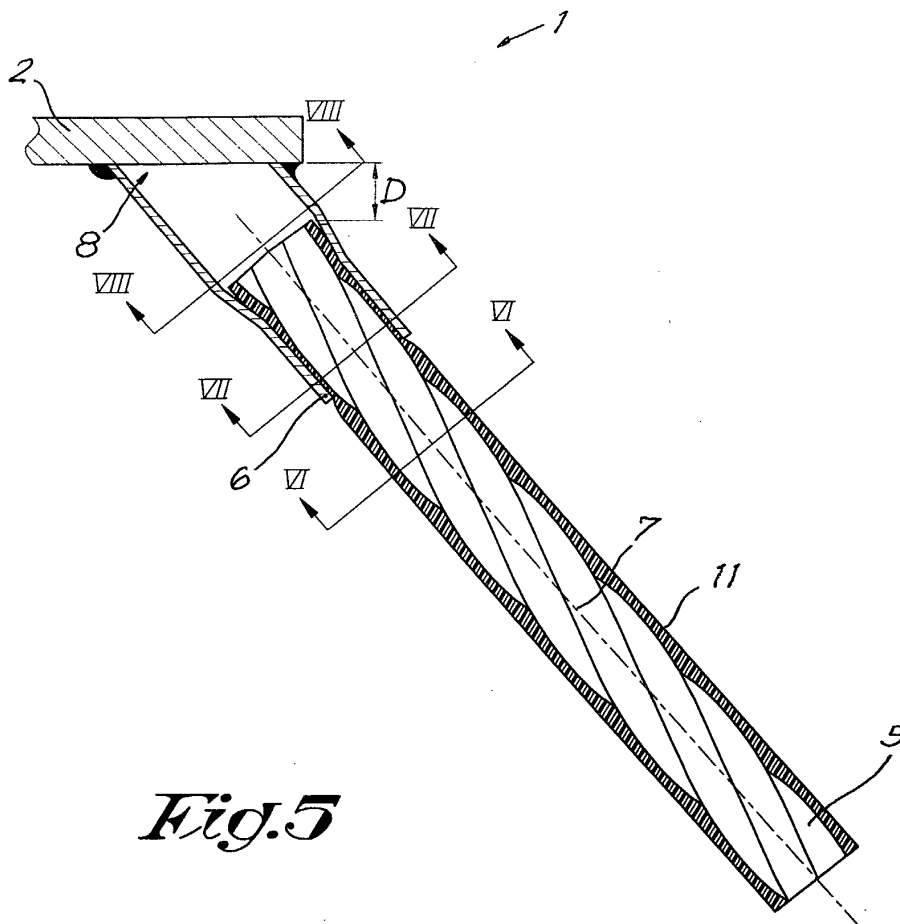
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(30) Priority: **25.04.2002 BE 200200284**

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(54) **Brush and method for manufacturing such a brush**

(57) Brush, in particular a rotating brush (1) for brushing a pavement surface, comprising bundles of fibres (5) which are provided with a casing, characterised in that the casing consists of a coating (11).



*Fig. 5*

## Description

**[0001]** The present invention concerns a brush and a method for manufacturing such a brush.

**[0002]** In particular, the invention concerns a rotating brush for brushing a pavement surface, which brush, as is known, is suspended under a vehicle, such that, as a result of the movement of the vehicle and the rotation of the brush, a large surface of the pavement can be treated in a short time by means of such a brush.

**[0003]** More in particular, it concerns rotating brushes designed to be implemented when carrying out heavy brushing operations, for example for brushing loose, brushing away respectively, weeds growing from out of the road surface, as well as for brushing away grass and weeds growing rank as of a roadside or the like over the edge of a road surface.

**[0004]** It is known to provide such brushes with bundles of fibres which are composed of metal, usually steel fibres. Every bundle of fibres hereby usually consists of a number of twisted fibre twines. In particular, use is made of lengths of twined steel cable for these bundles of fibres.

**[0005]** It is also known that, during the use of such brushes, the bundles of fibres tend to unravel, such that they can open up entirely at their free ends, which is disadvantageous in that the efficiency of the brush effect is considerably reduced. In order to remedy this, it is known to provide a casing around the bundle of fibres in the shape of a case made of plastic slid over every bundle of fibres, which counteracts the unravelling of the bundles of fibres at the free ends of the latter. The cases will wear away together with the fibres.

**[0006]** The use of such separate cases implies several disadvantages. A first disadvantage consists in that they may come loose and/or tear at the top end where they are fixed, as a result of which the desired effect is lost. A major disadvantage, however, is that such brushes are relatively expensive as they require a large number of assembly operations, among others because the above-mentioned cases have to be slid one after the other over the bundles of fibres and then have to be separately fixed.

**[0007]** The present invention aims a brush which is more efficient, both from a point of view of its construction and from a point of view of the manufacturing, than the embodiments known until now, and whereby, in particular, also the above-mentioned disadvantages are excluded.

**[0008]** To this end, the invention concerns a brush, in particular a rotating brush for brushing a pavement surface, comprising bundles of fibres which are provided with a casing, characterised in that the casing consists of a coating. By a coating is meant a casing according to the invention which, as will become clear from the preferred embodiments described hereafter, fits tightly around the bundle of fibres, as opposed to the conventional cases which fit loosely over the bundles of fibres

with a play of a few millimetres. Naturally, this casing is also made such that it offers sufficient resistance in order to prevent an undesired, considerable unravelling.

**[0009]** By making use of a casing consisting of a coating, it is as if it were already connected as such to the accompanying bundle of fibres over its entire length. Hence, it is excluded that such coating will come loose prematurely. Another major advantage consists in that separate cases do no longer have to be provided for, and that nor any fastenings have to be realised to this end, as a result of which the manual operations during the production can be considerably reduced, resulting in a lower cost price and a more economical product.

**[0010]** According to the most preferred embodiment, the bundles of fibres consist of pieces that are detached, in particular cut off from a fibre twine that has been provided with a coating beforehand, such as a coated cable or the like. Thus, when manufacturing brushes, in order to form the coated bundles of fibres, fibre twines or cables which are already coated and which are possibly available on the market can be taken as a basis, which only remain to be detached at the required lengths. This does not exclude that also fibre twines, for example twisted cables, can be taken as a basis which are especially provided with a coating in order to realise the aforesaid brush and which are then, as mentioned above, cut to pieces of the required length.

**[0011]** Although, as described above, use is preferably made of bundles of fibres which have been obtained by cutting off pre-coated fibre twines, in particular cables, at certain lengths, it is not excluded to realise the brushes of the invention with bundles of fibres which are provided with a coating, after they have been cut at length, either by immersion in plastic or in any other way whatsoever.

**[0012]** Preferably, the coating is made of plastic, in particular plastic which has cured around the bundles of fibres or the fibre twine out of which these bundles of fibres have been made, such that a good adhesion between the coating and the fibre twine is automatically obtained.

**[0013]** Although preference is given to plastic, this does not exclude other possibilities. Thus, for example, the coating may consist of a shoe-like structure, woven or wrapped around the bundles of fibres, made of any suitable material whatsoever, for example made of thin metal wire.

**[0014]** Although the invention is in the first place meant for rotating brushes with bundles of fibres which consist as such of metal, in particular plaited, twined or twisted cable parts, it is not excluded to apply it in combination with bundles of fibres which are made as such of another material than metal.

**[0015]** According to a practical embodiment, the bundles of fibres are contained in holders which are in turn fixed to a part of a brush body. This fastening preferably takes place by providing the holders through openings in the aforesaid part of a brush body and by welding

them in these openings. As opposed to the known embodiments whereby the holders are welded to the lower side of a part of a brush body, the aforesaid fastening offers several advantages, namely that it is rigid, that the holders, by sticking them in the holes, automatically take up the right position, such that the use of jigs for positioning the holders during the welding can be excluded, and that the holders can be welded quicker and more easily to the brush body, such that this results in an additional reduction of the production time.

**[0016]** The present invention also concerns a method for manufacturing such brushes, characterised in that, for the formation of the bundles of fibres of this brush, a coated fibre twine can be taken as a basis, preferably a plasticised fibre twine, and more in particular a plasticised twined or twisted steel cable, of which pieces at the length of the fibre bundles concerned are detached, in particular cut off.

**[0017]** This method is particularly efficient, for it excludes the conventional time-consuming operation of applying and fixing separate cases. Moreover, the bundles of fibres do not have to be provided with a coating one after the other.

**[0018]** The coated fibre twine, which is taken as a basis to form bundles of fibres, may consist of a product which is available on the market, or it can be especially made beforehand in view of the invention. To this end, a continuous fibre twine or cable is first provided with a coating and then divided in pieces of the required length. The coating can be applied in any way whatsoever, for example by extruding a plastic covering around the fibre twine or cable, by wrapping a plastic strip around the fibre twine and by fusing it around the fibre twine by means of heat, by applying one or several plastic shrinkage shoes around the fibre twine, etc.

**[0019]** In order to better explain the characteristics of the invention, the following preferred embodiments are described as an example only without being limitative in any way, with reference to the accompanying drawings, in which:

figure 1 shows a section of a known embodiment of a brush;

figure 2 shows a view according to arrow F2 in figure 1;

figure 3 shows the part indicated with F3 in figure 1 to a larger scale;

figure 4 shows a view analogous to that of figure 1, but for an embodiment according to the invention;

figure 5 shows the part indicated by F5 in figure 4 to a larger scale;

figures 6, 7 and 8 show sections according to lines VI-VI, VII-VII and VIII-VIII in figure 5 respectively to a larger scale;

figure 9 shows a view analogous to that of figure 4, but for a variant of the invention;

figure 10 represents the part indicated with F10 in figure 9 to a larger scale;

figure 11 shows a view according to arrow F11 in figure 10;

figure 12 schematically represents a number of steps of the method according to the invention.

**[0020]** The known brush 1 represented in figures 1 to 3 mainly consists of a part of a brush body 2 on the one hand, in this case a plate, which can be fixed to a rotating part 4 attached to a vehicle by means of fasteners 3, in this case bolts, and of bundles of fibres 5 on the other hand.

**[0021]** The bundles of fibres 5 consist of lengths of twined steel cable which are clamped in holders 6 at their top ends, which are in turn welded to the lower side of the part of the brush body 2. These holders are bush-shaped and have a top end 8 which is cut slantwise in relation to their longitudinal axis 7, such that, when they have been welded under the part of the brush body 2, they will extend at an angle, as represented.

**[0022]** The bundles of fibres 5 are each provided with a casing formed of a plastic case 9 slid over each bundle of fibres 5 concerned. In order to be able to apply these cases 9 over the sometimes more or less irregularly shaped bundles of fibres 5, the inner diameter of these cases is a few millimetres larger than the average diameter of the bundles of fibres 5. The cases 9 are fixed as they are slid with their top ends over the accompanying holder 6, and as they are fastened by means of a straining ring 10, usually in the shape of a ring pressed around it.

**[0023]** This known embodiment of a brush 1 has several disadvantages, as explained in the introduction.

**[0024]** By means of figures 4 to 8 is hereafter first described a first embodiment of a brush 1 according to the invention. Parts of this embodiment which correspond to those of the above-described known embodiment are indicated with identical reference figures.

**[0025]** This brush 1 is built in an analogous manner as those of figures 1 to 3 from a part of a brush body 2 and bundles of fibres 5 provided in holders 6 attached to it.

**[0026]** The invention is special in that the casing of the bundles of fibres 5 is no longer formed of a separate case 9, but of a coating 11 formed directly around every bundle of fibres 5, in this case made of plastic, preferably a somewhat flexible plastic.

**[0027]** The bundles of fibres 5 preferably consist of metal, in particular lengths of twined cable, composed of twined cable parts 12, in this case seven in number, which are each composed of bundles of thin steel wire 13. It is clear that the bundles of fibres 5 can have different diameters, but in practice they will usually have a diameter of 1 to 4 cm.

**[0028]** The coating 11 may consist of plastic cured around the bundles of fibres 5 and which thus fits closely to the outer side of these bundles of fibres 5. In combination with these bundles of fibres 5 which consist of a twined cable part, as represented in figures 4 to 8, this

offers the advantage that the plastic coating 11 is particularly well anchored around the actual bundle of fibres 5, as this plastic reaches into the deeper parts 14 situated on the outer perimeter.

**[0029]** At their top ends, the bundles of fibres 5, together with the part of the coating 11 which is situated there, are contained in the holders 6, in particular they are clamped therein as these holders 6 are pressed together around the coated bundles of fibres 5. According to a variant which is not represented, this coating 11 can possibly be removed at the top end of every bundle of fibres 5 concerned, although this is not necessary in practice.

**[0030]** It is clear that, regardless of whether the coating 11 either or not extends in the holder 6 concerned, no separate fasteners, such as the above-mentioned straining ring 10, are required to keep the casing in place.

**[0031]** Moreover, in the embodiment from figures 4 to 8, the holders are also provided with a far end 8 extending slantwise in relation to the longitudinal axis 7, with which these holders 6 are welded onto the lower side of the part of the brush body 2.

**[0032]** Figures 9 to 11 represent an embodiment whereby not only a casing in the shape of a coating is used, but also, thanks to the specific nature of the fastening of the holders 6 to the part of the brush body 2, a construction is obtained which makes it possible for the brushes 1 to be manufactured in a shorter time.

**[0033]** The holders 6 are hereby fixed to the part of the brush body 2 as these holders 6 are provided through openings 15 in this part of the brush body 2 and are welded in these openings 15, for example by means of each time two seals 16-17. As the holders are placed in openings 15, they are solidly anchored in the part of the brush body 2. Moreover, on condition that the openings 15 are accurately made, they are always positioned correctly, without any jig being required to this end during the welding, which is the case in the embodiments from figures 1 to 8. Moreover, the seals 16-17 can be provided on the back side 18 of the part of the brush body 2, where there is more freedom of movement to perform welding operations, as a result of which they can also be performed by a welding robot, which is very time-saving. In practice, however, this is practically impossible in the embodiments from figures 1 to 8.

**[0034]** As shown in figure 4, use can hereby be made of holders whose top ends 19 are not bevelled, but which are simply cut off straight, as there is no need for bevelled ends in such an embodiment. This offers the advantage that the holders 6 are easy to realise, which contributes to a lower cost of manufacture.

**[0035]** As indicated in the figures, the bundles of fibres 5 extend together with their coating 11, preferably only through a part of the holders 6, such that the coated bundles of fibres 5 only extend with their top ends up to a distance D under the seals, among others 16-17, with which the holders 6 are welded to the part of the brush

body 2. Thus is avoided that, at least when the coating 11 is made of plastic, this plastic ends up in the immediate vicinity of the seals concerned, so that any melting and evaporating of plastic, and any possible development of harmful vapours during the welding is minimised or excluded.

**[0036]** Figure 12 schematically represents a number of steps of the given method which is preferably applied to realise the aforesaid brushes 1 of the invention.

**[0037]** As is schematically represented in step A, a continuously coated fibre twine 20 is taken as a basis to form coated bundles of fibres 5, in particular a plasticised fibre twine 20, such as a plasticised twined steel cable, and pieces 21 thereof are detached at the length of the bundles of fibres 5 to be realised, in particular cut off.

**[0038]** Next, these pieces 21, which form the bundles of fibres 5 as such, as indicated in step B, are provided with one end in a bush-shaped holder 6, after which these holders 6, as indicated in step C, are pressed together around the coated bundles of fibres 5, as a result of which the latter are fixed in the holders 6.

**[0039]** Afterwards, the bundles of fibres 5 fixed in the holders 6 are fixed to a part of a brush body 2 by means of the holders 6, for example welded underneath it, as in the embodiment from figures 4 to 8, or they are for example welded in openings 15, as in the embodiment from figures 9 to 11.

**[0040]** It is clear that the bundles of fibres 5 according to the invention, whose casing consists of a coating 11, and not of a separate case, can also be used in other embodiments of brushes whereby the bundles of fibres 5 are for example connected to the part of the brush body 2 in another manner than by means of holders 6, or whereby the bundle of fibres 5, together with the accompanying holders 6, can be connected to the part of the brush body 2 in a detachable and replaceable manner.

**[0041]** From what precedes it is also clear that the coating 11 has the same purpose and working principle as the known cases 9. For, the coating 11 is also meant to keep the fibres of the bundles of fibres 5 together and to counteract their unravelling or an undesired deformation of the far ends of the bundles of fibres 5. While in use, the coating 11 will wear together with the bundles of fibres 5.

**[0042]** The present invention is by no means limited to the above-described embodiments given as an example and represented in the accompanying drawings; on the contrary, such a brush and the aforesaid method can be made in all sorts of variants while still remaining within the scope of the invention.

**[0043]** Thus, for example, the material of which the coating 11 is formed must not be exclusively situated on the outside of the bundles of fibres 11. For it is not excluded to wrap the bundles of fibres 5 of individually plasticised steel wire 13 or the like and to subsequently fuse the entire bundle of fibres together, in which man-

ner is also created a single unit provided with a coating.

## Claims

1. Brush, in particular a rotating brush (1) for brushing a pavement surface, comprising bundles of fibres (5) which are provided with a casing, **characterised in that** the casing consists of a coating (11).

2. Brush according to claim 1, **characterised in that** the bundles of fibres (5) consist of pieces (21) that are detached, in particular cut off from a fibre twine (20) provided with a coating (11), such as a coated cable or the like.

3. Brush according to claim 1 or 2, **characterised in that** the coating (11) is made of plastic.

4. Brush according to claim 3, **characterised in that** the bundles of fibres (5) comprise a coating (11) made of plastic which has cured around these bundles of fibres (5) or the fibre twine (20) out of which these bundles of fibres (5) have been made.

5. Brush according to any of the preceding claims, **characterised in that** the bundles of fibres (5) are made of metal, in particular twined cable.

6. Brush according to any of the preceding claims, **characterised in that** the bundles of fibres (5) are held in holders (6) at their top ends, via which they are provided directly or indirectly to a part of a brush body (2), and that they are contained in these holders (6), together with the coating (11) provided at the aforesaid far end, in particular are clamped in these holders (6).

7. Brush according to claim 6, **characterised in that** the aforesaid holders (6) are welded onto the part of the brush body (2) and **in that** the bundles of fibres (5), together with their coating (11), only extend through a part of the holders (6), such that the coated bundles of fibres (5) only extend with their top ends up to a distance (D) under the seals (16-17) with which the holders (6) are welded to the part of the brush body (2).

8. Brush according to any of the preceding claims, **characterised in that** the bundles of fibres (5) are held in holders (6) which are in turn fixed to a part of a brush body (2), whereby the fastening of the holders (6) to this part of the brush body (2) consists **in that** the holders (6) are provided through openings (15) in this part of the brush body (2) and are welded in these openings (15).

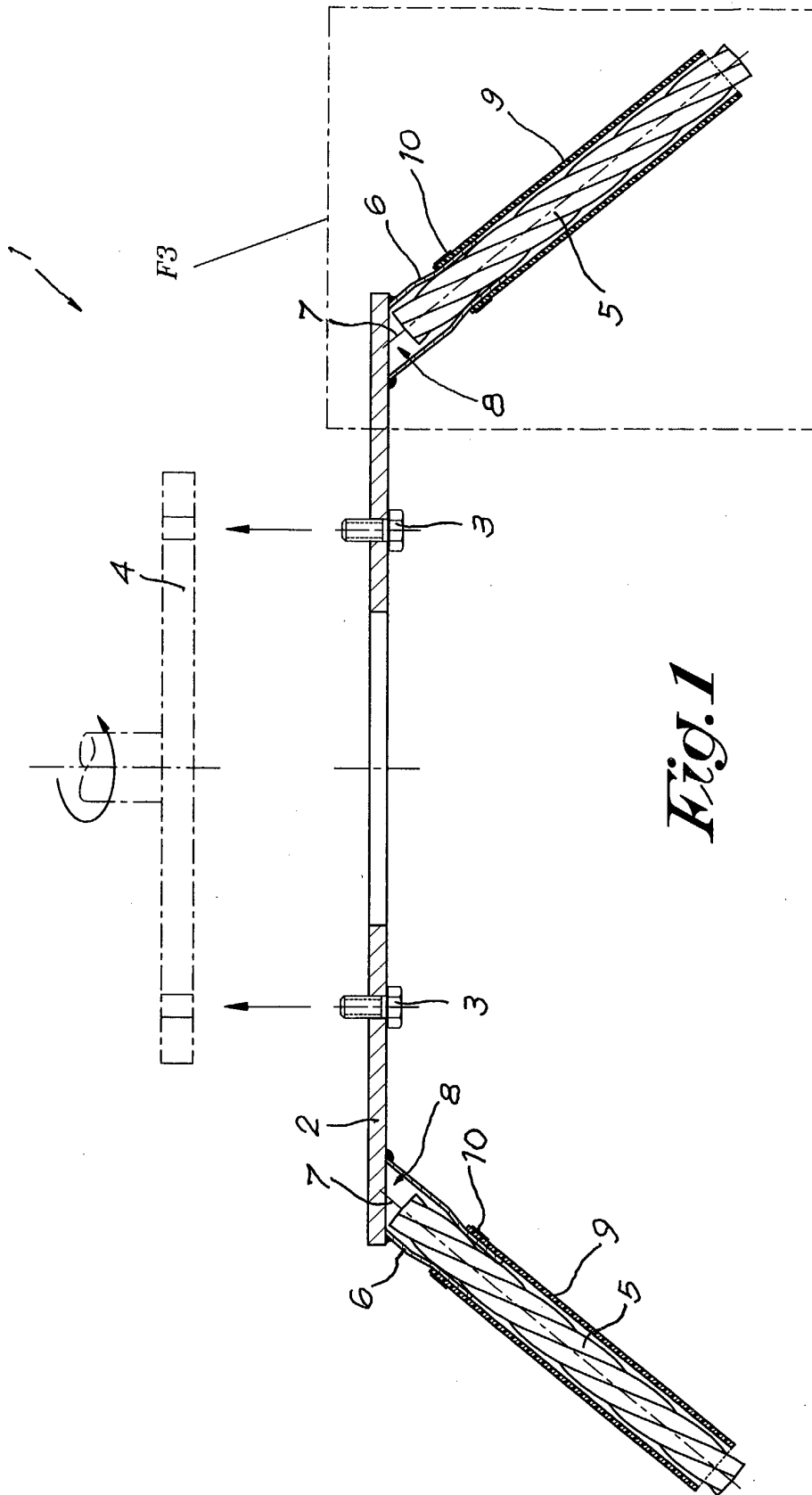
9. Method for manufacturing a brush, in particular a

rotating brush (1) according to any of claims 1 to 8, **characterised in that**, for the formation of the bundles of fibres (5) of this brush (1), a coated fibre twine (20) can be taken as a basis, of which pieces (21) at the length of the fibre bundles (5) concerned are detached, in particular cut off.

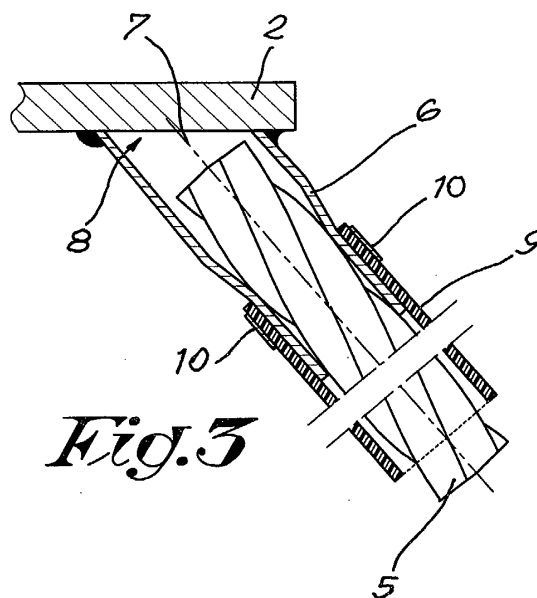
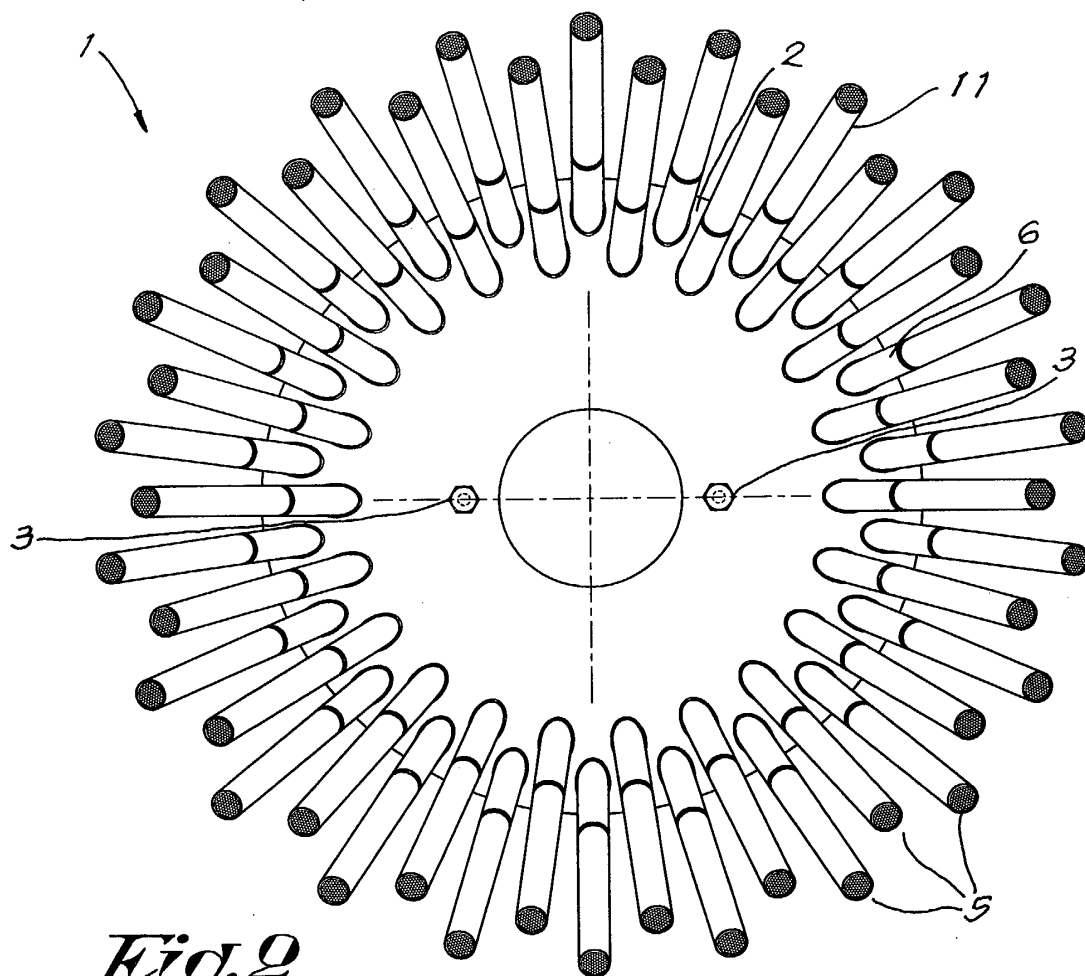
10. Method according to claim 9, **characterised in that** a plasticised fibre twine (20) is taken as a basis for the formation of the bundles of fibres (5).

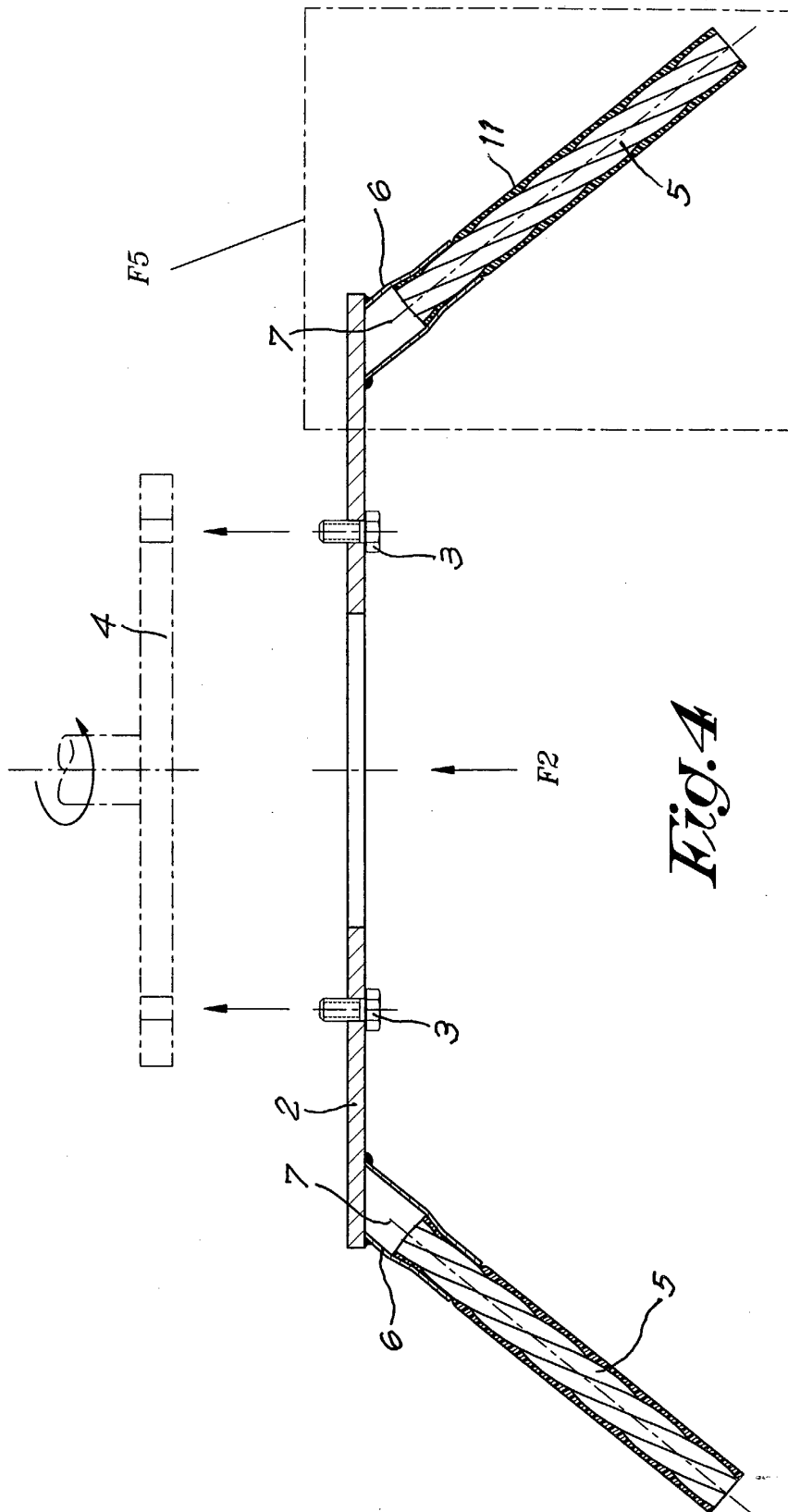
11. Method according to claim 10, **characterised in that** use is made of a twined steel cable for the fibre twine (20) which, as mentioned above, is provided with a coating (11).

12. Method according to any of claims 9 to 11, **characterised in that** the bundles of fibres (5) provided with a coating (11) are provided in bush-shaped holders (6) at one far end, with which they are in turn fixed to a part of a brush body (2), either or not in a detachable manner, whereby the fastening in the holders (6) takes place by clamping said holders (6) on the bundles of fibres (5) by pressing them together.

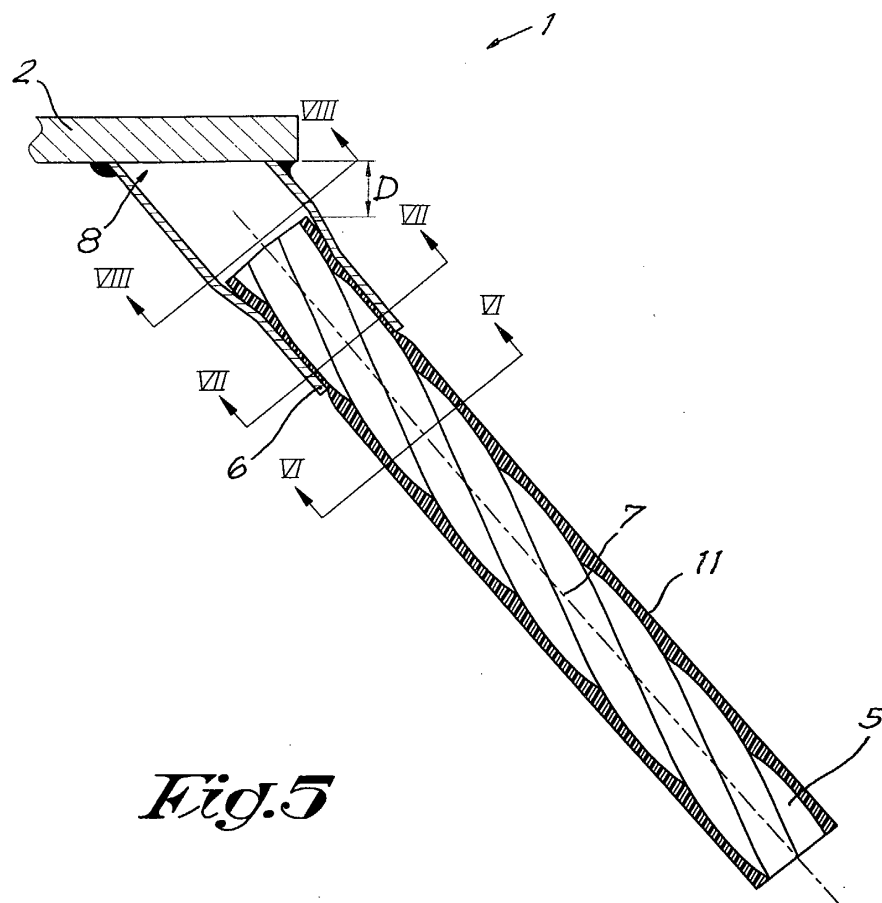


**Fig. 1**

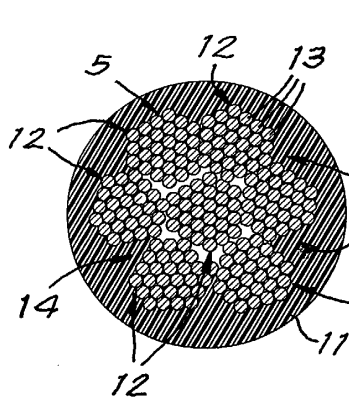




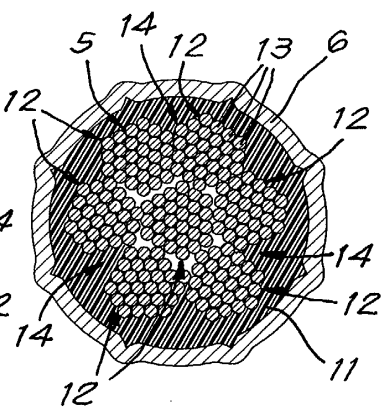




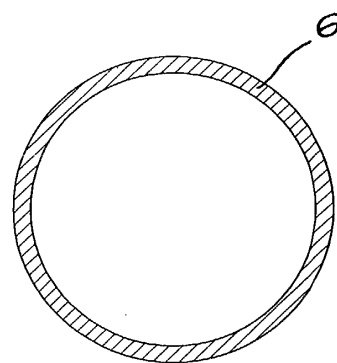
*Fig. 5*



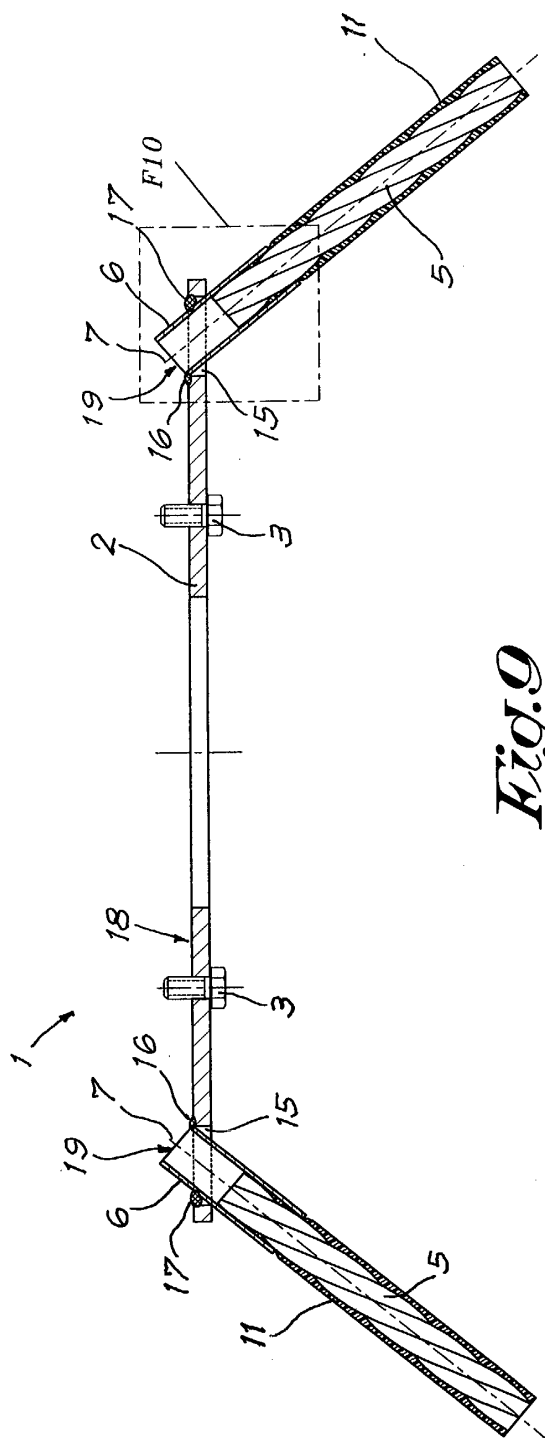
*Fig. 6*



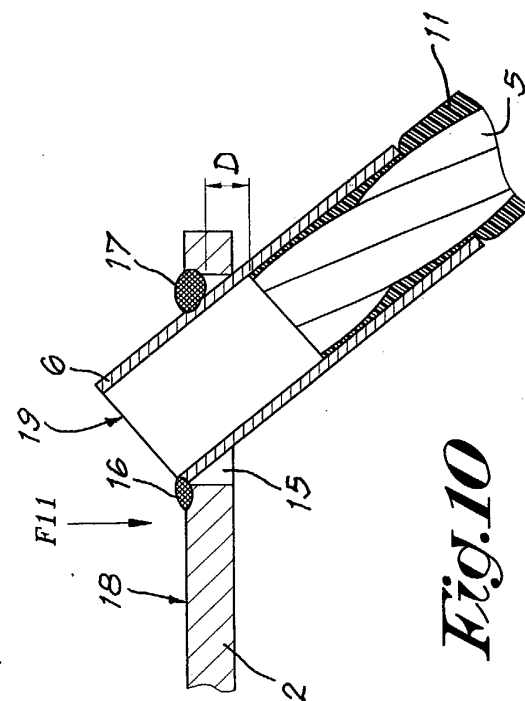
*Fig. 7*



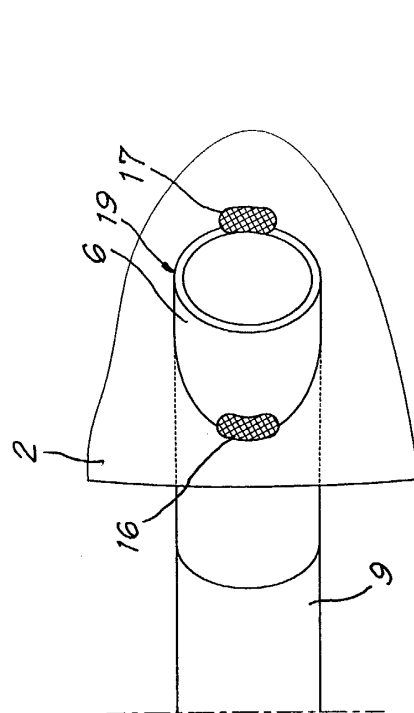
*Fig. 8*



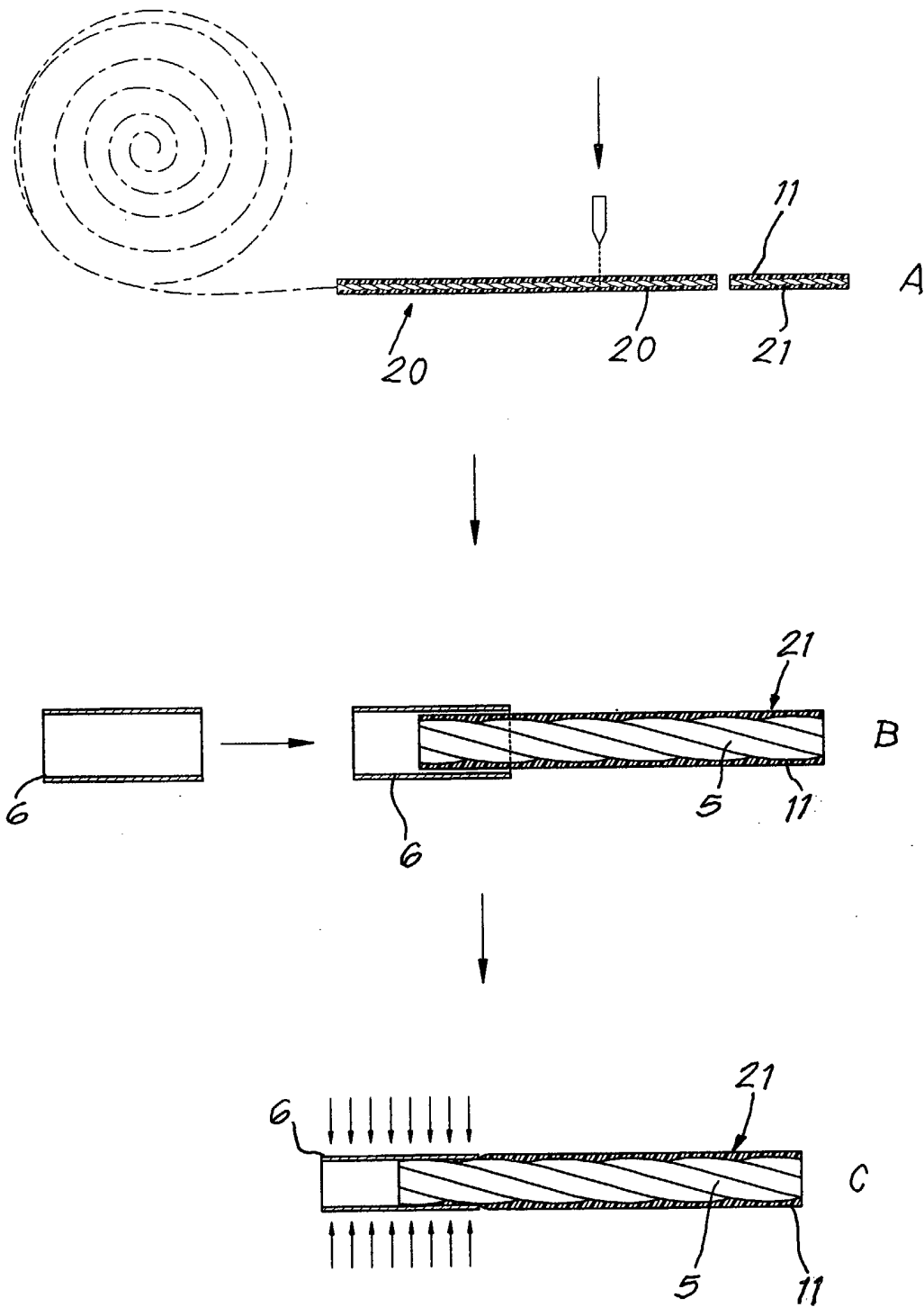
*Fig. 9*



*Fig. 10*



*Fig. 11*



*Fig. 12*



European Patent  
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# EUROPEAN SEARCH REPORT

Application Number  
EP 03 07 6184

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Place of search THE HAGUE		Date of completion of the search 2 July 2003	Examiner Triantaphillou, P
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