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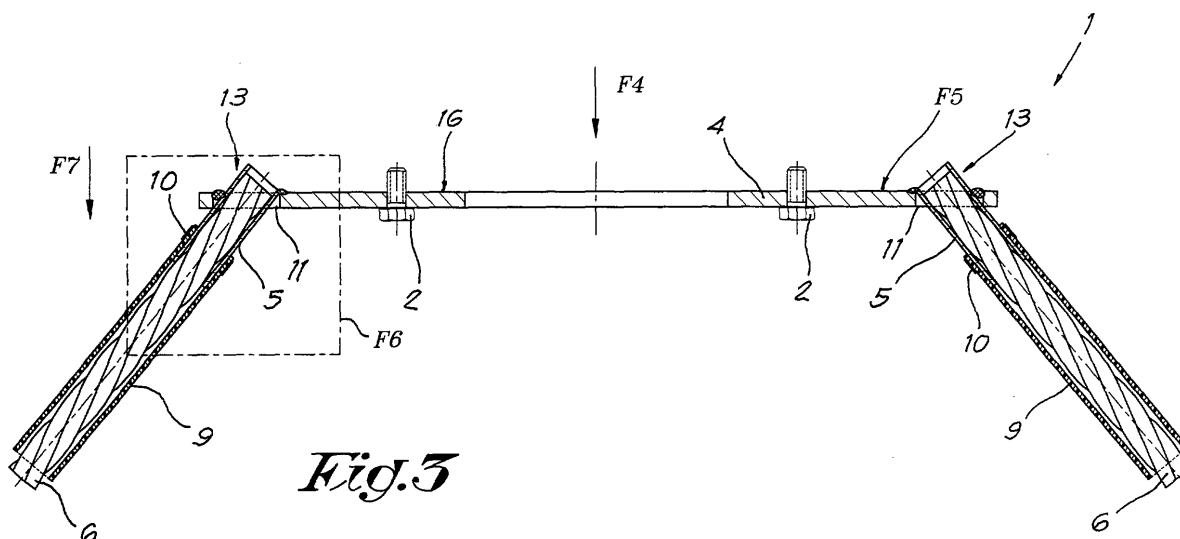
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(54) **Brush and method for manufacturing such a brush**

(57) Brush, in particular a rotating brush (1) for brushing a pavement surface, comprising bundles of fibres (6) which are provided in holders (5), and whereby

these holders (5) are fixed to a part of a brush body (4), characterised in that the holders (5) are not only provided in openings (11) in the part of the brush body (4), but are also welded onto the part of the brush body (4).



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, comprising bundles of fibres which are preferably formed of metal fibres provided in holders, and whereby these holders are fixed to a part of a brush body.

[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] With the known embodiments of such brushes, the far ends of the above-mentioned holders are sawn off slantwise, and these holders are welded with their slanting far ends to the lower side of the above-mentioned part of the brush body.

[0005] These known embodiments have a number of disadvantages. One of the major disadvantages consists in that the above-mentioned fixing of the holders results in a construction requiring a very time-consuming manufacturing process, which also results in that the cost price of such a brush is relatively high.

[0006] As the holders are welded to the lower side of the part of the brush body, the necessary welding work is rather difficult to accomplish, and the use of a welding robot is excluded. For, on the one hand, it is difficult to provide a welding seam entirely around every holder, as the spot where every holder forms the smallest angle with the part of the brush body is practically inaccessible for welding. On the other hand, as more holders are welded onto the part of the brush body, it becomes more difficult to move the welding torch between the bundles of fibres and the holders that have already been fixed by means of welding.

[0007] Moreover, there is relatively large risk that the part of the brush body will warp during the welding. For, in order to guarantee such a fastening, welding seams have to be provided over the entire perimeter of the holders, which may result in a large heat development.

[0008] Moreover, sawing the holders slantwise implies extra work.

[0009] Finally, in order to weld the different holders onto the part of the brush body, use has to be made of a jig to position these holders in the right places.

[0010] The present invention aims a brush whose construction is easy to realise, with a minimum of working time and with a solid fastening of the bundles of fibres in the part of the brush body, whereby moreover one or several of the above-mentioned disadvantages of the known embodiments are excluded.

[0011] To this end, the invention consists of a brush, in particular a rotating brush for brushing a pavement surface, comprising bundles of fibres that are provided

in holders, and whereby these holders are fixed to a part of a brush body, characterised in that the holders are not only provided in openings in the part of the brush body, but are also welded onto the part of the brush body.

[0012] As the holders are fixed in openings in the part of the brush body, the welding operations and/or the accompanying preparations can be considerably simplified. Thus, for example, the position of the holders is now automatically determined by the position of the above-mentioned openings, as a result of which the positioning of the holders, prior to the welding, is considerably simpler. Thanks to this automatic positioning, it is no longer necessary to make use of a jig.

[0013] As the holders are held in openings, a particularly solid fastening is obtained, so that, strictly speaking, it is no longer necessary to provide welding seams over the entire perimeter of the holders. According to a preferred embodiment, use will also be made of local welded joints.

[0014] Preferably, the above-mentioned openings extend through the part of the brush body, and the holders provided in the openings are fixed by means of welding on the backside of the part of the brush body. As the holders are welded on the backside of the part of the brush body, all the spots where welded joints have to be realised to this end will be easily accessible, which also makes it possible for such welded joints to be realised with a welding robot.

[0015] As the holders protrude through the above-mentioned openings, according to a preferred embodiment, they no longer have to be cut slantwise at their top end, not even when they have been inserted slantwise in relation to the part of the brush body. According to the invention, the holders can always have a straight cut form at their top end, at right angles to their longitudinal direction, which makes them easier to manufacture.

[0016] The invention also concerns a method for manufacturing a brush, in particular a rotating brush as described above, characterised in that it at least consists in the formation of a part of a brush body; in providing openings in this part of the brush body; in fixing bundles of fibres in these holders; in providing the bundles of fibres to the part of the brush body by placing them with their holders in the aforesaid openings; and in connecting the holders with the part of the brush body by means of one or several welded joints. This method allows for an efficient manufacturing of the brushes.

[0017] The welded joints are preferably realised by means of a welding robot.

[0018] 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 rotating brush

for brushing a pavement surface;
 figure 2 shows a view according to arrow F2 in figure 1 to a smaller scale;
 figure 3 shows a section of a brush according to the invention;
 figure 4 shows a view according to arrow F4 in figure 3 to a smaller scale;
 figure 5 shows the part of the brush body as such which is indicated by F5 in figure 3;
 figure 6 shows the part indicated with F6 in figure 3 to a larger scale;
 figure 7 shows a view according to arrow F7 in figure 3 to a larger scale;
 figures 8 and 9 represent in two steps how a bundle of fibres placed in a holder can be provided in the part of the brush body of figure 3;
 figures 10 and 11 represent two variants of the part of the brush body represented in figure 5.

[0019] Figures 1 and 2 represent a known rotating brush 1 for brushing a pavement surface.

[0020] This brush 1 can be fastened to a rotating part 3 provided under a vehicle by means of fasteners 2, which in the given example of the figures consist of bolts, such that the brush 1 can be moved in a rotating manner over a pavement surface or the like.

[0021] The brush 1 mainly consists of a part of a brush body 4 on the one hand, and of a number of bundles of fibres 6, fixed in bush-shaped holders 5 on the other hand, which, in the represented brush 1, stagger in relation to one another in two circular rows along the perimeter of the part of the brush body 4.

[0022] The bundles of fibres 6 consist of metal, in particular steel wire, and they are formed of pieces of twined or twisted steel cable, cut at the required length. Every bundle of fibres 6 is fixed in a holder 5 at its top end by clamping it.

[0023] The holders 5 are fixed under the part of the brush body 4 at a slanting angle. To this end, every holder 5 has a top end 7 that is cut slantwise, with which it is connected to the lower side of the part of the brush body 4 via a welded joint 8. This welded joint 8 extends over the entire perimeter of the holder 5.

[0024] Around every bundle of fibres 6 is provided a casing consisting of a case 9, which is fixed to the corresponding holder 5 by means of a straining ring 10. These cases 9 prevent the bundles of fibres 6 from unravelling or deforming to an unwanted degree at their far ends while the brush 1 is in use. While in use, they will wear away together with the bundles of fibres 6.

[0025] As use is made of holders 5 which are fixed in the aforesaid manner to the part of the brush body 4, the known embodiment, for the reasons explained in the introduction, has several disadvantages.

[0026] By means of figures 3 to 7, a brush 1 according to the invention will be described hereafter. Parts of the same name as the parts of the above-described known embodiment are indicated with the same reference

numbers.

[0027] As in the known embodiment, the brush 1 according to the invention mainly consists of a part of a brush body 4 and bundles of fibres 6 which are fixed to the part of the brush body 4 by means of holders 5. In a known manner, a case 9 is provided around every bundle of fibres 6, which is optional, however.

[0028] The invention is special in that the holders 5 are provided in openings 11 in the part of the brush body 4, in particular in continuous openings, and are also welded onto the part of the brush body 4.

[0029] In the given example, the part of the brush body 4 consists of a metal disc. In this disc, which is represented separately in figure 5, two rows of such openings 11 are provided along the perimeter, in such a manner that the successive openings stagger in relation to one another.

[0030] The openings 11, as represented, are preferably oval or elliptic, whereby they have a diameter D1 in the radial direction of the part of the brush body 4 which is larger than the diameter D2 of the holders 5. The difference in diameter is hereby selected such that, when the holders 5 are provided in the openings 11 and have been tilted until they make contact with the edge 12 of the openings 11 concerned, as represented in figure 6, the required tilting of the holders 5 and the bundles of fibres 6 is obtained. In the tangential direction, the openings 11 have a diameter D3 which is practically equal to the diameter D2 of the holders 5. However, it is not excluded for the above-mentioned openings 11 to have other shapes or dimensions.

[0031] As represented in figures 3 and 6, the holders 5 each time have a straight cut form at their far ends 13 situated on the part of the brush body 4, at right angles to the longitudinal direction of the holder 5 concerned. As opposed to the known embodiment from figures 1 and 2, the holders 5 are not cut slantwise on one far end here.

[0032] The holders 5 are fixed in the openings 11 in such a manner that the rear edge 14 of these holders 5, near its part 15 which is directed towards the centre of the brush 1, is situated at the height or almost at the height of the back side 16 of the part of the brush body 4, while the opposite part 17 then protrudes further from the back side 16.

[0033] Each holder 5 is connected to the part of the brush body 4 by means of welded joints 18-19. These welded joints 18-19 are, as represented, preferably realised on the back side 16 of the part of the brush body 4, and they consist of local welded joints situated at the aforesaid two parts 15 and 17 respectively. However, it is clear that, according to a variant, use can be made of welded joints situated elsewhere on the perimeter of the holders 5, or even of a single welded joint extending over the entire perimeter.

[0034] As the holders 5 are not only welded onto the part of the brush body 4, but are also provided in openings therein, a particularly rigid structure is obtained.

Moreover, the construction of the invention makes it possible for such brushes 1 to be realised according to a method which is considerably less time-consuming than the method applied for the aforesaid known embodiments.

[0035] Also, a preferred embodiment of the method according to the invention will be described hereafter.

[0036] First, a part of a brush body 4 is formed, whereby for example a round disc of steel is taken as a basis, in which openings 11, for example such as in figure 5, are then provided. These openings 11 can be realised in any way whatsoever, but preferably they are cut out by means of a laser, so that very precise openings 11 are obtained, which offers the advantage that the holders 5 provided in them later on always take up an accurate position.

[0037] The bundles of fibres 6, which may be formed of pieces that have been cut off from a twined steel cable, are fixed in the holders 5 by pressing the holders 5 together around them. If required, also cases 9 can then be provided over said holders 5 and they can be fixed by means of straining rings 10.

[0038] Next, in each of the openings 11 is provided a bundle of fibres 6, as represented in figure 8, by sticking it with its holder 5 in the opening 11 concerned and by tilting the holder 5 with the bundle of fibres 6 provided in it, as represented in figure 9, until the edge 12 of the opening 11 functions as a stop. Then, the above-mentioned welded joints 18-19 are realised, preferably by means of a welding robot.

[0039] It is clear that this method offers several advantages. As the holders 5 fit through the openings 11, they do not have to be cut off slantwise at their top ends, as a result of which they are easier to form. The openings 11 automatically provide for the right positioning of the holders 5 in relation to the part of the brush body 4, such that the time-consuming use of a jig for positioning the holders 5 can be excluded. As, moreover, the welded joints 18-19 can be realised on the backside 16 of the part of the brush body 4, the places where these welded joints 18-19 have to be provided for are easily accessible to a laser robot, as opposed to the known embodiment from figures 1 and 2, where the welded joints 8 have to be realised between the bundles of fibres 6. As the holders 5 are held in the openings 11, the welded joints 18-19 are loaded less heavily while the brush 1 is in use, and locally made welded joints 18-19 will suffice.

[0040] It is clear that different variants are possible. Instead of two rows of openings 11, the part of the brush body 4 can also be provided with several rows of openings 11, whereby the openings are either or not staggered in relation to one another. Figures 9 and 10 represent two variants of parts of brush bodies 4, which each contain only one row of openings 11.

[0041] Neither is it excluded to build the brush body of different parts of a brush body instead of one part of a brush body 4, which can then be assembled in any

way whatsoever.

[0042] Although the holders 5 are preferably cut off crosswise to their longitudinal direction at their top ends in the brush 1 according to the invention, it is not excluded either to cut them slantwise, such that they do not protrude from the back side 16 of the part of the brush body 4.

[0043] It should be noted that the invention is particularly advantageous when bundles of fibres 6 are applied which are directly provided in holders 5, whereby these holders 5 are welded in turn in the openings 11. However, this does not exclude that use can be made according to the invention of holders made of different parts, such that the bundles of fibres 6 can be dismounted. In the latter case, a bundle of fibres 6 can for example be fixed in a first bush-shaped part, whereby this first bush-shaped part can be provided in a second bush-shaped part, such that it can be dismounted, and whereby this second bush-shaped part is then welded in an opening 11, as described above.

[0044] The holders 5 must not necessarily be embodied as a bush and must not necessarily be cylindrical.

[0045] 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 method can be made in all sorts of variants while still remaining within the scope of the invention.

Claims

1. Brush, in particular a rotating brush (1) for brushing a pavement surface, comprising bundles of fibres (6) which are provided in holders (5), and whereby these holders (5) are fixed to a part of a brush body (4), **characterised in that** the holders (5) are not only provided in openings (11) in the part of the brush body (4), but are also welded onto the part of the brush body (4).
2. Brush according to claim 1, **characterised in that** the aforesaid openings (11) extend through the part of the brush body (4) and **in that** the holders (5) provided in the openings (11) are welded on the back side (16) of the part of the brush body (4).
3. Brush according to claim 1 or 2, **characterised in that** the holders (5) are bush-shaped; **in that** they are inserted slantwise in relation to the part of the brush body (4); and **in that** they have a straight cut form at their far ends (13) turned towards the part of the brush body (4), each time at right angles to the longitudinal direction of the holder (5) concerned.
4. Brush according to claim 3, **characterised in that** the holders (5) are fixed in the openings (11) in such

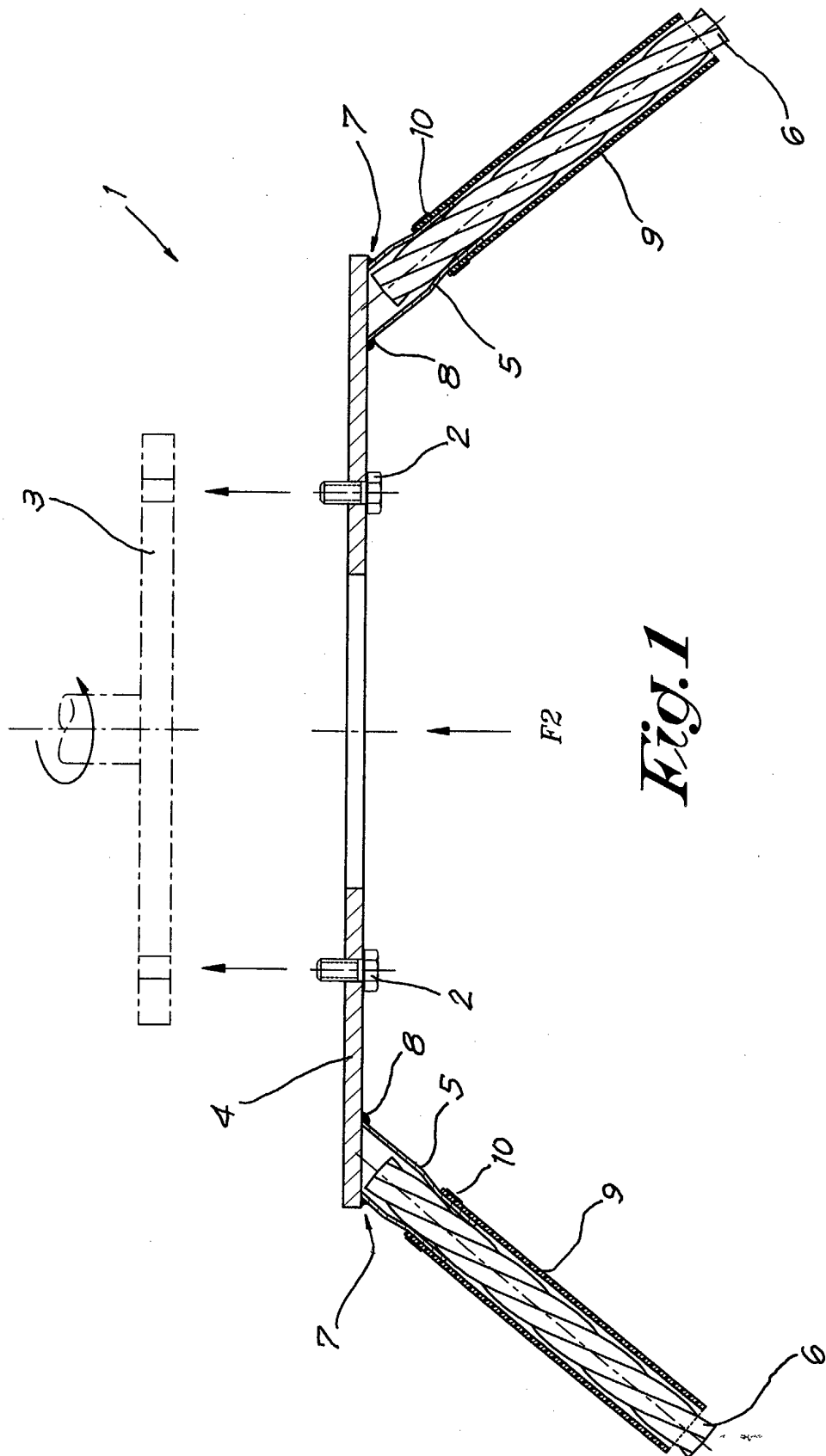
a manner that the rear edge (14) of these holders (5), near its part (15) which is directed towards the centre of the brush (1), is situated at the height or almost at the height of the back side (16) of the part of the brush body (4), while the opposite part (17) then protrudes further from the back side (16).

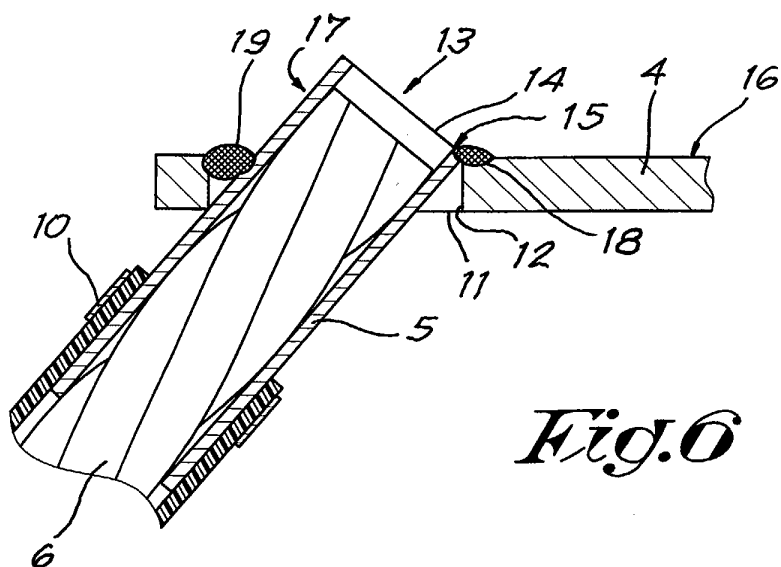
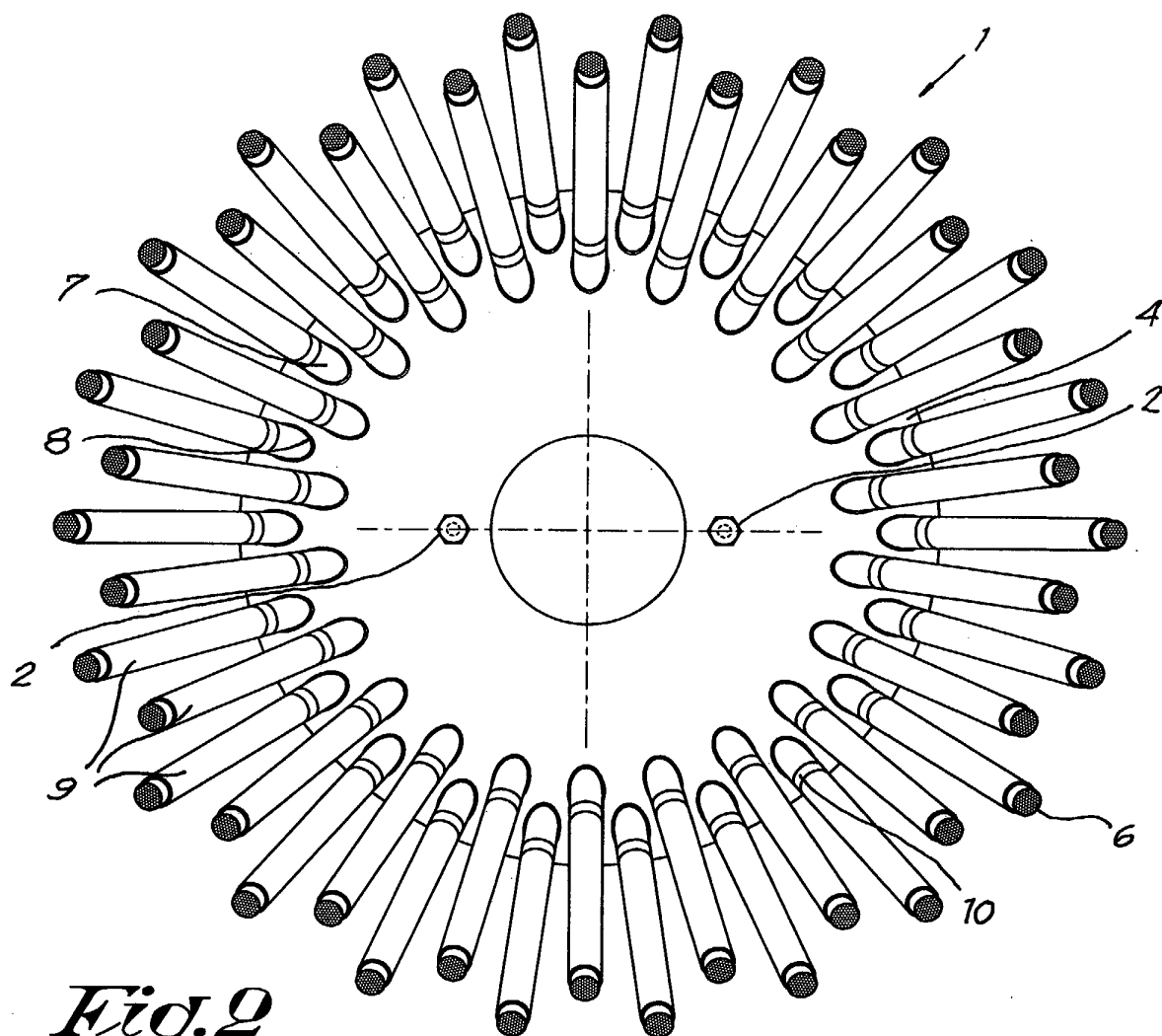
5. Brush according to claim 4, **characterised in that** the holders (5) are exclusively welded to the part of the brush body (4) on the spot of the aforesaid two parts (15-17) of the rear edge (14), the part (15) which is turned towards the centre of the brush (1) and the opposite part (17) respectively. 5
6. Brush according to any of the preceding claims, **characterised in that** the holders (5) are inserted slantwise in relation to the part of the brush body (4) and **in that** the above-mentioned openings (11) have a diameter (D1) in the radial direction of the part of the brush body (4) which is larger than the diameter (D2) of the holders (5), whereby the difference in diameter is selected such that when the holders (5) are provided in the openings (11) and have been tilted until they make contact with the edge (12) of the openings (11) concerned, the required tilting of the holders (5) and the bundles of fibres (6) is obtained. 10 15 20 25
7. Brush according to claim 6, **characterised in that** in the tangential direction, the aforesaid openings (11) have a diameter (D3) which is practically equal to the diameter (D2) of the holders (5). 30
8. Brush according to any of the preceding claims, **characterised in that** the openings (11) have a rounded shape, in particular are made oval or elliptic. 35
9. Brush according to any of the preceding claims, **characterised in that** it comprises at least two rows of bundles of fibres (6) provided in holders (5) along the perimeter, whereby the successive holders (5) are staggered in relation to one another. 40
10. Method for manufacturing a brush, in particular a rotating brush (1) according to any of claims 1 to 9, **characterised in that** it at least comprises the formation of a part of a brush body (4); the provision of openings (11) in this part of the brush body (4); the fixing of bundles of fibres (6) in holders (5); the application of bundles of fibres (6) to the part of the brush body (4) by placing them with their holders (5) in the aforesaid openings (11); and the connection of the holders (5) to the part of the brush body (4) by means of one or several welded joints (18-19). 45 50 55

11. Method according to claim 10, **characterised in**

that the holders (5) are welded onto the part of the brush body (4) on its back side (16).

12. Method according to claim 10 or 11, **characterised in that** the welded joints (18-19) are realised by means of a welding robot.
13. Method according to any of claims 10, 11 or 12, **characterised in that** the bundles of fibres (6), prior to the welding, are placed in the required slantwise position in relation to the part of the brush body (4) by tilting the holders (5) in such a manner in the openings (11) that the edge (12) of these openings (11) functions as a stop.
14. Method according to any of claims 10 to 13, **characterised in that** the aforesaid openings (11) are formed in the part of the brush body (4) by cutting them out by means of a laser.





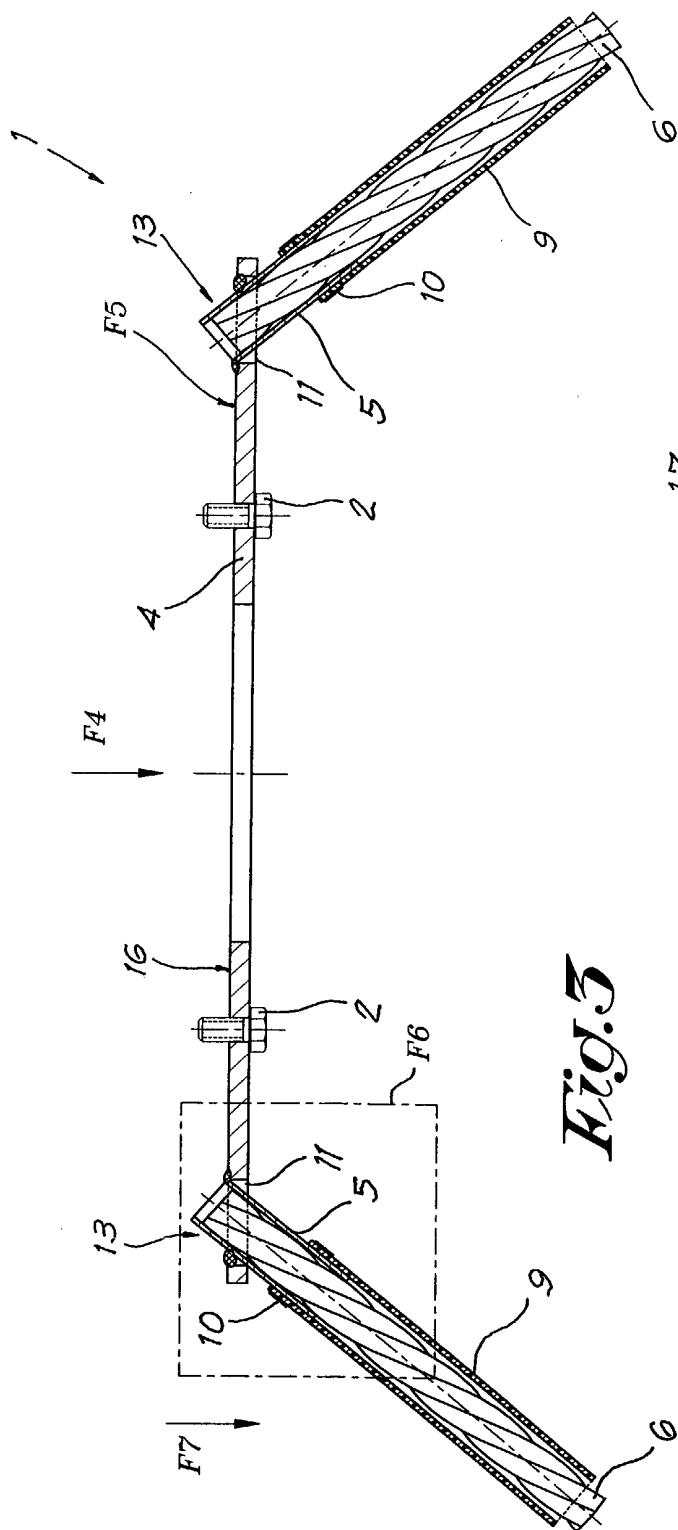


Fig. 3

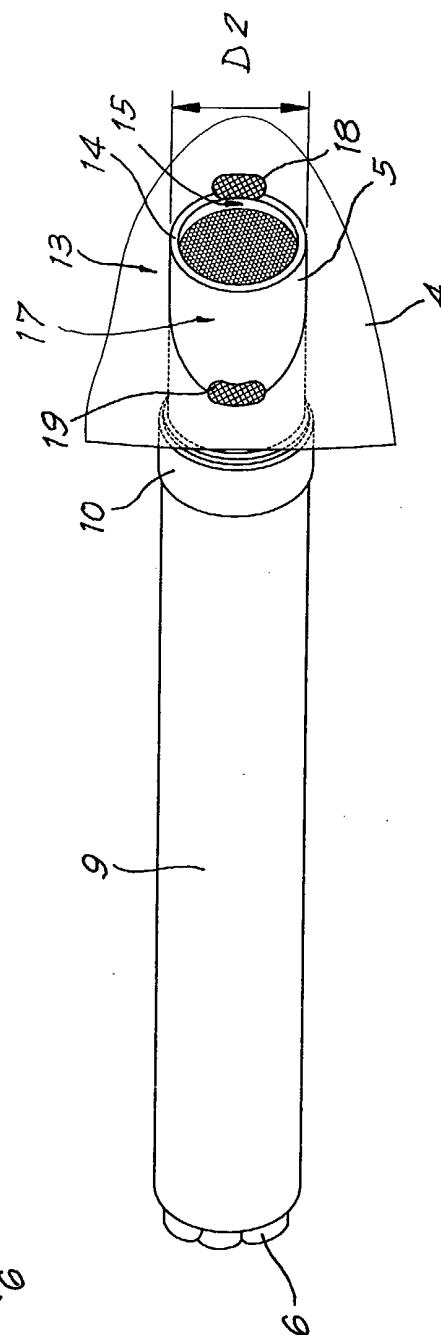


Fig. 7

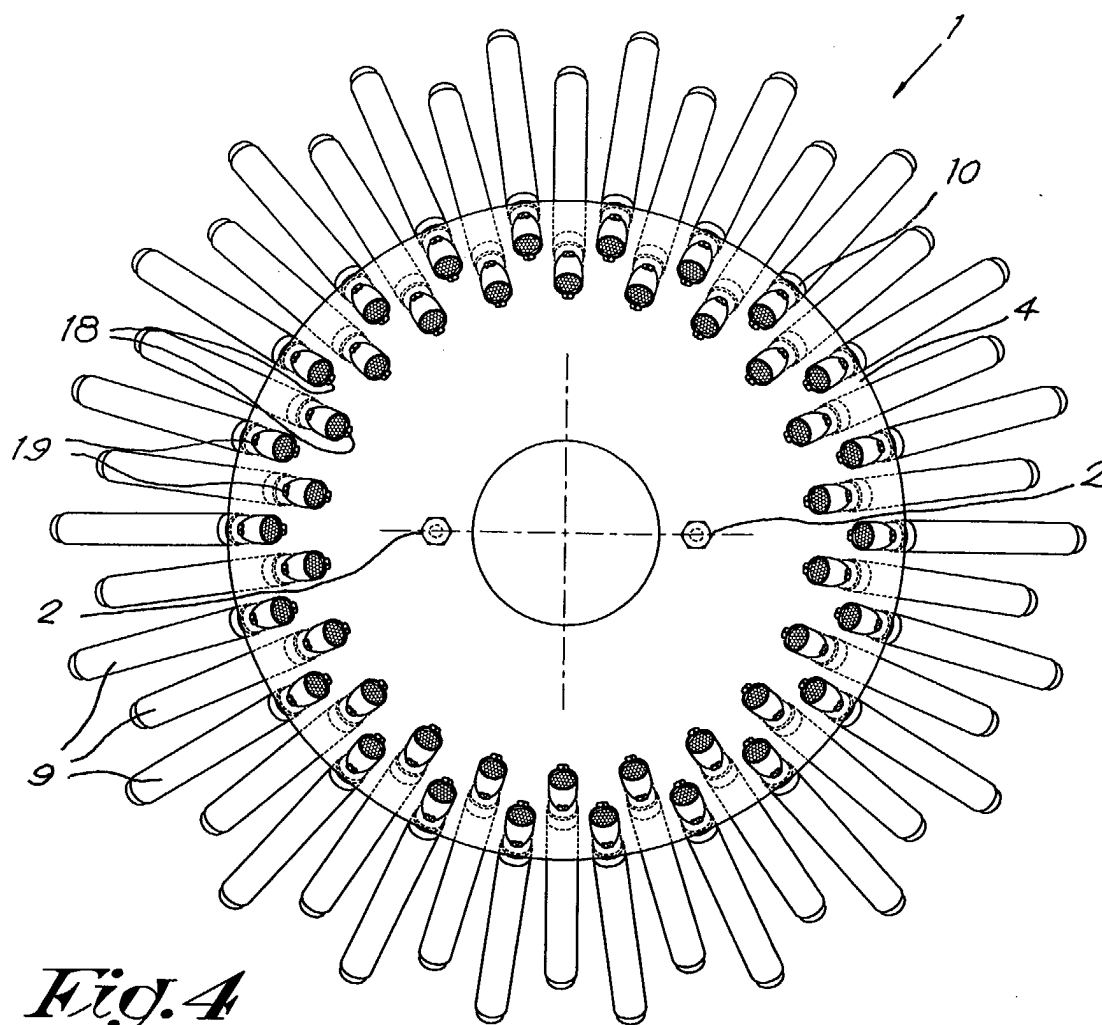


Fig. 4

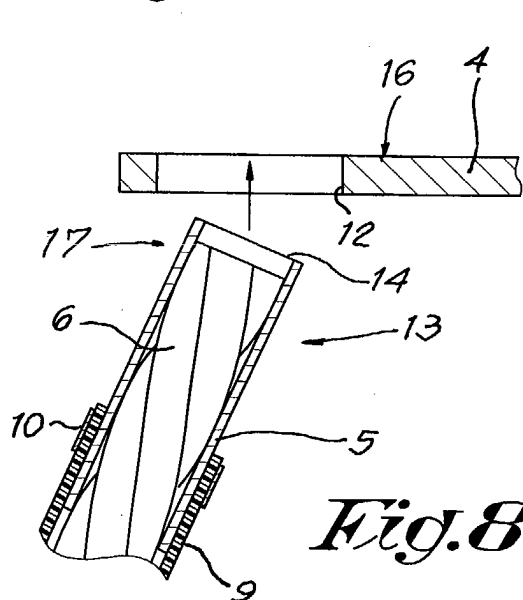


Fig. 8

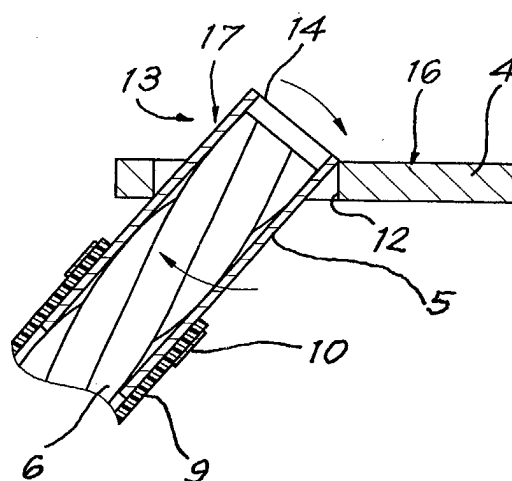


Fig. 9

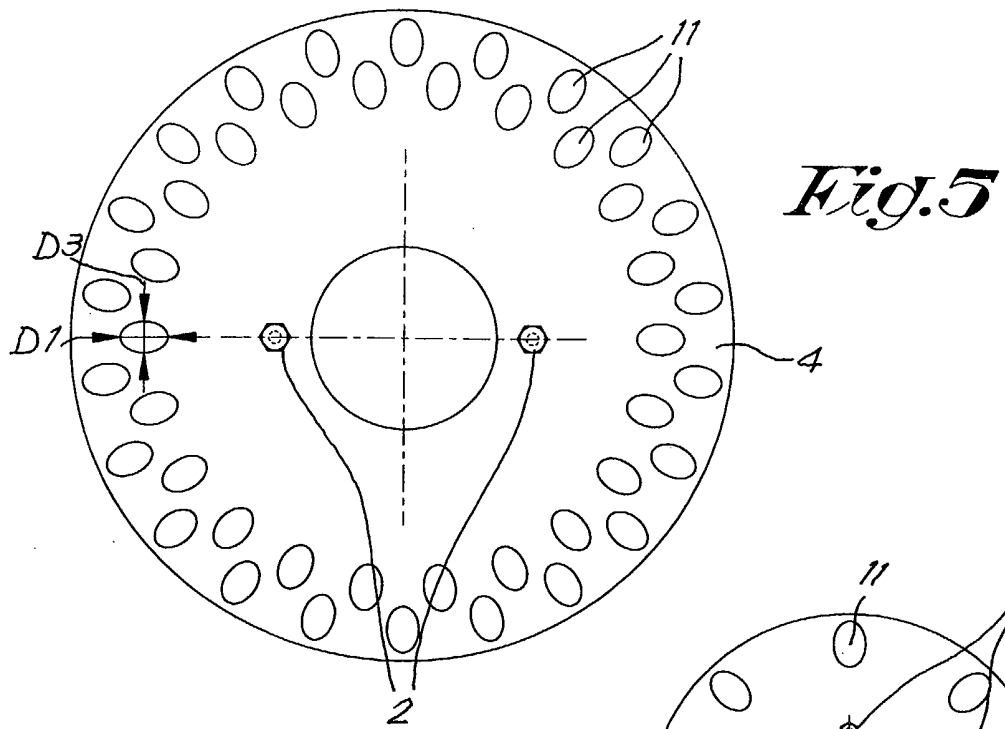


Fig. 11

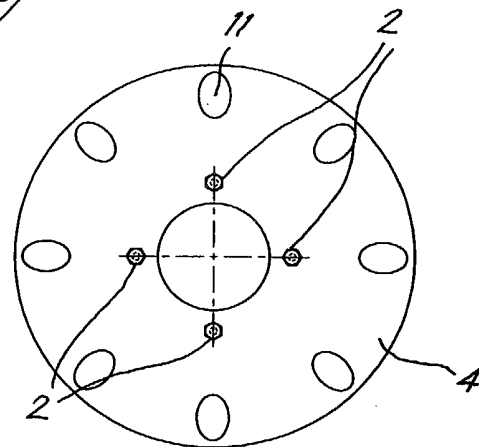


Fig. 10



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EUROPEAN SEARCH REPORT

Application Number
EP 03 07 6183

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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27 August 2003	Examiner Triantaphillou, P
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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EP 03 07 6183

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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