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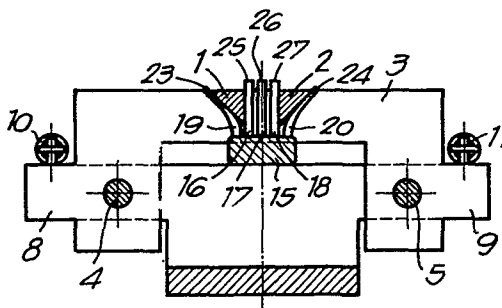
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54 **Device for separating rows of brush hairs.**

57 Device for separating rows of brush hairs, characterized in that it mainly consists of at least one knife (1) with a sharp end, whereby this knife (1) shows on one side a vertical or approximately vertical face (29) and on the opposite side, starting from the sharp end of the knife, a second side (21) extending at least along a part of the length, becoming more distant from the aforesaid first side, whereby this knife (1) has a backwards and forwards motion with respect to a brush (15), in such a way that a suchlike knife (1) can be very precisely introduced between two rows of brush hairs.



"Device for separating rows of brush hairs"

The present invention relates to a device for separating rows of brush hairs, in other words a device which allows to separate a row of so-called tufts of brush hairs from an adjacent row of tufts of hairs, in order to be able to perform certain operations separately on each of these rows.

More especially still the present invention relates to a device which allows to separate from each other the aforesaid rows of tufts in order, more especially in the course of the fabrication of brushes with rows of brush hairs the lengths of which are different the one from the other, to be able to process these rows of brush hairs in a simple way on one and the same machine, whereby one starts with rows of brush hairs of the same length, certain rows of which are being cut farther than other rows or at once with rows of brush hairs of different lengths.

It is a known fact that in the brush manufacturing industry, for instance in the course of the manufacturing process of tooth brushes, for various reasons, more and more brushes are in demand the rows of brush hairs of which have different lengths as compared with each other.

Until now this implies that brushes of this kind, when the rows and fibres introduced have different lengths, must be introduced and processed in separate machines, because it is

not possible to process a number of rows of brush hairs of different lengths on one and the same machine.

5 The object of the present invention is a device which allows to produce brushes the lengths of the rows of brush hairs of which are different and whereby, from the planting of the tufts of hairs up to and including the complete finishing of the brush, all operations can be carried out on one and the same machine.

10 The device according to the invention comprises for this purpose mainly at least one knife with a sharp end, whereby this knife shows on one side a vertical or approximately vertical plane and on the opposite side, starting at the sharp end of
15 the knife, a second side becoming more distant from the aforesaid first side, at least along a part of the length, whereby this knife can be moved backwards and forwards, in such a way that this knife can be very precisely introduced between two rows of brush hairs, through a parallel relative motion between
20 knife and brush, so that at least one row of brush hairs can be curved away to the side with respect to an adjacent row of brush hairs.

25 In order more clearly to show the characteristics of the invention, a preferred embodiment of the invention is described hereinafter, as an example without any limitative character, reference being made to the attached drawings, wherein :

30 Figure 1 shows a schematic view from above of a device according to the invention;
Figure 2 shows a view according to arrow F2 in Figure 1;
Figure 3 shows a section according to line III-III in Figure 2;
Figure 4 is a view similar to the one of Figure 1, but
35 in a second characteristic position;
Figure 5 shows a section according to line V-V in Figure 4;
Figure 6 shows a perspective view of the front part of a

knife according to the invention;

Figure 7 shows a variant of Figure 6;

Figure 8 shows a second variant of Figure 6;

5 Figure 9 shows schematically and in front elevation the various stages of the production on only one machine of a brush with rows of brush hairs of different lengths; Figure 10 shows a view from above of Figure 9.

10 In the Figures 1 through 5, the device according to the invention mainly consists in two tuft separators or knives, 1 and 2 respectively, which are fixed on a carriage, slide or similar 3, whereby this slide 3 can move along guides 4-5 respectively, through the cooperation of, for instance, a suitable cam 6 and a roller 7 mounted on the slide 3, whereby between
15 the supports 8-9 of the guides 4-5 and slide 3 drawback means, in this case return springs, 10 and 11 respectively, are provided for.

20 In front of the knives or tuft separators 1-2, a support 12 is provided for, on which suitable clamping means 13-14 are mounted, which serve the purpose of suitably clamping a brush body 15 against a thrust-block and with respect to the knives 1-2, whereby, in the present case, the brush body has three rows with short brush hairs, 16-17 and 18 respectively, and
25 two outer rows with long brush hairs, 19 and 20 respectively.

The knives 1 and 2 show at their front end a slanting face, 21 and 22 respectively, in order to obtain that when the knives are being moved from the position as in Figure 1 to the position as in Figure 4 the outer rows of brush hairs 19 and 20, through the penetration of the knives between the rows 19 and 16, on the one hand, and 20 and 18, on the other hand, as is clearly shown on Figure 5, be pushed towards the outside, whereby the knives have a width which is such that the tops, 23
30 and 24 respectively, of the rows of brush hairs 19 and 20 will be brought at a lower level than the level of the tops 25-26-27 of the rows 16, 17 and 18.

In Figure 7 there is further shown an embodiment of a knife 21-22 whereby, additionally, at the front end, the knives show each a slanting face 28 in order so to obtain that the separation for a same penetration of the knives between the hairs
5 be obtained sooner, in other words, along a shorter distance.

It goes without saying that the knives 1-2 may have any other shape and/or section, provided that this shape or section ensures that the aforesaid rows of brush hairs can be
10 pushed the one away from the other. An example of this is given in Figure 8.

The operation of the device according to the invention is very simple.

15 In the position according to Figure 1 the various brush hairs are in their normal state, whereby it is enough to move the slide 3 in any suitable way so that the knives 1 and 2 move towards the brush body, whereby one obtains that the slanting
20 faces 21, 22 of the knives shall exert an action on the rows 19, 20, whilst, due to the vertical inner face 29-30 of the knives, the adjacent rows of brush hairs 16 and 18 will not be influenced.

25 The slanting faces 21-22 of the knives 1 and 2 are made in such a way that the point of the knives exactly penetrates between the rows at the base of these rows, whereby the separation of the rows is made easier.

30 As a matter of fact, the distance between such rows at the top of the hairs is mostly non-existent, it may even be negative, whilst at the base, this distance however small, allows that the points of the knives 1 and 2 come in between the desired rows in order to push away the rows with long hairs.

35 In Figures 9 and 10, there is schematically shown how the device according to the invention can be used in order to

further treat the brush hairs after planting same, whereby it should be noted that planting brush hairs of different lengths is being generally done through conveying hairs of different lengths from two containers.

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In Figures 9 and 10 are schematically shown eight working stations, 31-32-33-34-35-36-37 and 38 respectively, whereby in the stations 31 and 32 the rows with long brush hairs are being shaved to length both to the left and to the right; in the stations 33 and 34 the brush hairs of short length are being shaved; in the stations 35 and 36 the ends of the brush hairs of short length are being rounded off, whilst in the stations 37 and 38 the ends of the brush hairs of long length are being rounded off.

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As may be seen from the drawings, it suffices to keep the knives 1 and 2 away from the brush body concerned in the working stages 31 and 32, which is also the case in the working stages 37 and 38, whilst under the action of the cam 6 the rows of brush hairs 19 and 20, by means of the knives 1 and 2 are kept distant from the rows of brush hairs 16 and 18 in the working stages 33 through 36.

25

It is clear that one obtains so that in a very simple way, in only one machine, not only can brush hairs of different lengths be planted in one and the same brush body, but also that these brush hairs of different lengths can always be treated further in this same machine, in order to be shaved and to have their fibre ends rounded off.

30

In a preferred embodiment, a number of devices can be mounted on an endless chain as described with the aid of Figures 1 through 5, whereby in each of these devices successively, starting at the brush manufacturing machine properly speaking, a brush body with rows of brush hairs of different lengths can be introduced, whereby the aforesaid endless chain is schematically shown in the present case with the reference 39. The chain

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37 passes along the various working stations 31 through 38, which are fixed on only one driving mechanism which is schematically shown with the reference 40. The latter obtains, during the operation of the machine, a backwards and forwards motion with respect to the devices according to the invention which are stopped at that moment.

As a matter of fact, this quite clearly appears from the Figures 9 and 10.

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Although the example described supposes the fact that one starts by introducing rows of brush hairs of different lengths, it is clear that through the application of the device according to the invention one may start in the same way by introducing rows of brush hairs of the same lengths, whereby adjacent rows, for instance in the devices according to the Figures 9 and 10 are treated in a different way in order, amongst others, to obtain different lengths of the brush hairs.

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It is clear that the present invention is not at all limited to the embodiment described as an example and shown in the attached drawings, but that a suchlike device can be carried into effect in various shapes and dimensions without going outside the frame of the invention.

Claims.

- 1.- Device for separating rows of brush hairs, characterized in that it mainly consists of at least one knife (1) with a sharp end, whereby this knife (1) shows on one side a vertical or approximately vertical plane (29) and on the opposite side, starting at the sharp end of the knife, a second side (21) becoming more distant from the aforesaid first side, at least along a part of the length, whereby this knife (1) has a backwards and forwards motion, in such a way that this knife (1) can be very precisely introduced between two rows of brush hairs (16, 19) through a parallel relative motion between knife (1) and brush (15), so that at least one row of brush hairs (19) can be curved away to the side with respect to an adjacent row (16) of brush hairs.
- 2.- Device according to claim 1, characterized in that in the case wherein a brush (15) is to be produced the two outer rows (19, 20) of brush hairs of which are formed by hairs of a length which is different from that of the hair tufts located between these two outer rows, two parallel knives (1, 2) are provided for, whereby the vertical sides (29, 30) of these knives which run parallel along the brush hairs are facing one another.
- 3.- Device according to one of the preceding claims, characterized in that the aforesaid knife (1) or knives (1, 2) is fixed (are fixed) on a slide which can obtain a backwards and forwards motion with respect to the brush body (15).
- 4.- Device according to one of the preceding claims, characterized in that the aforesaid slide (3) is movable along guides (4,5) which are parallel to the rows of brush hairs, whereby the aforesaid slide (3) is controlled by means of a suitable cam (6) and between this slide (3) and the fixed supports (8, 9) drawback means, for instance return springs (10, 11) are provided for, which keep the slide (3) permanently into contact with the aforesaid cam (6) or similar device.

5.- Device according to one of the preceding claims, characterized in that the aforesaid knife (1) has in transversal section a right angled or approximately right-angled triangular shape, whereby one right-angle side (29) is vertical or approximately vertical, while the second right-angle side is located on top, and at the front end a slanting face (21) is provided for, which extends sharply towards the free end and towards the vertical lateral side (29) or the knife (1).

10 6.- Device according to one of the claims 1 through 4, characterized in that the aforesaid knife (1) has in transversal section a triangular shape with an obtuse angle, whereby the obtuse angle is oriented towards the top and towards the inner rows of brush hairs.

15 7.- Device according to one of the claims 1 through 4, characterized in that one side face (29) of the knife (1) is vertical, whilst the opposite lateral face, at least at the place where the knife (1) comes into contact with the brush hairs, starting at the sharp end becomes progressively more distant from the aforesaid side face (29).

20 8.- Device according to one of the claims 1 through 7, characterized in that two of the right-angle sides of the knives are facing one another, whilst the two other right-angle sides are located at the top.

25 9.- Device according to one of the preceding claims, characterized in that the sharp end of the knife is located in a slanting plane (21).

30 10.- Device according to claim 8, characterized in that the slanting sharp end of the knife (1) is more prominent at its under side.

35 11.- Device according to claims 6, 7, 8 or 9, characterized in that the sharp end is provided with a supplementary slant-

ting face (29) in order to give this end a triangular shape
(28).

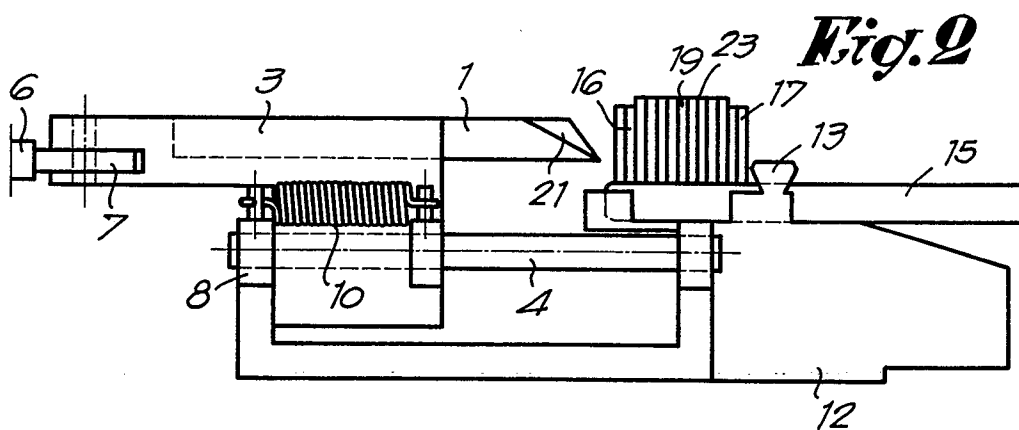
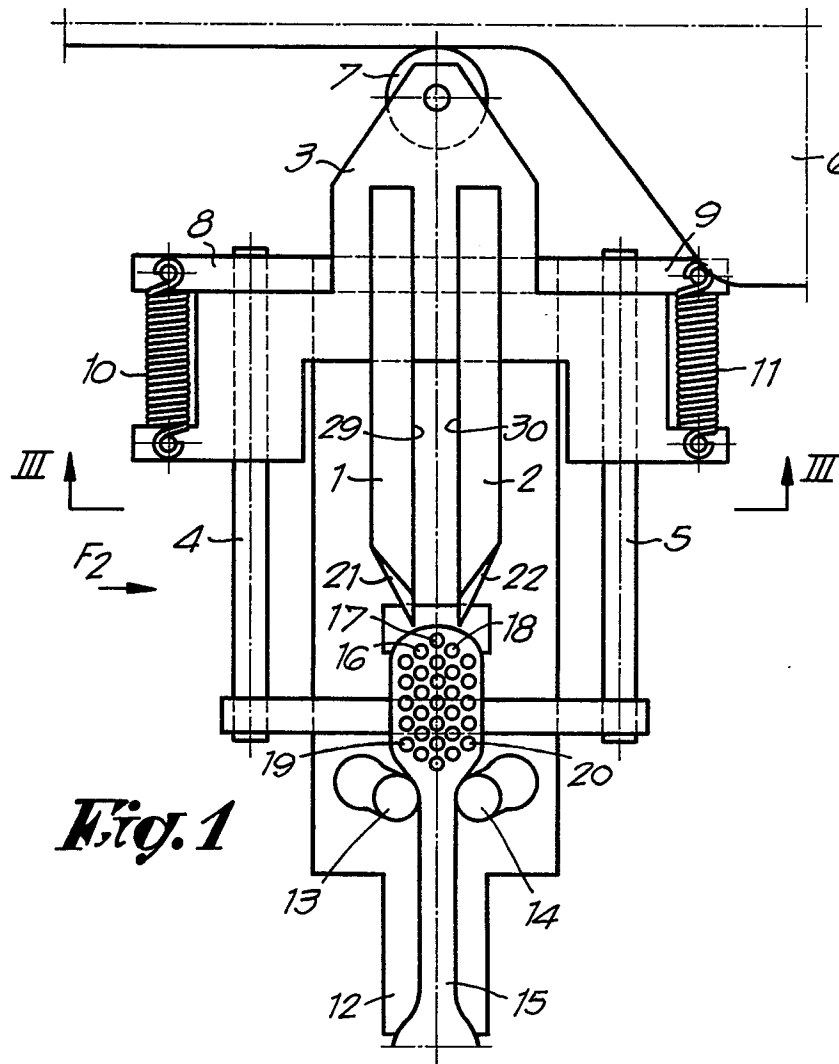
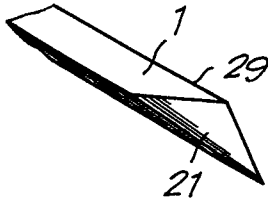
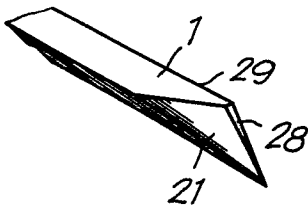
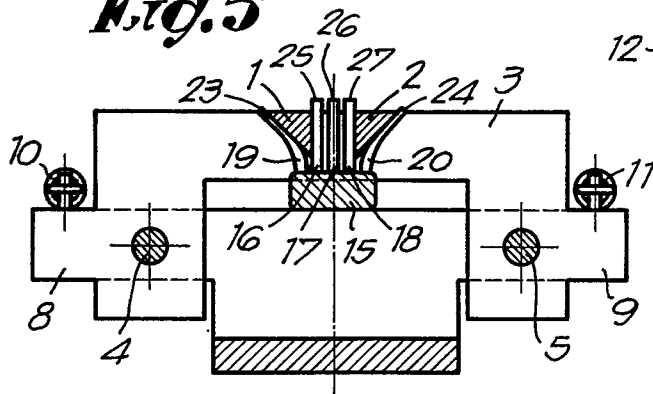
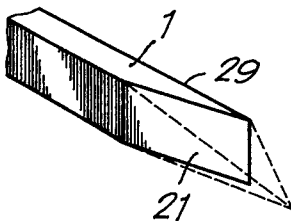


Fig. 6**Fig. 7****Fig. 5****Fig. 8****Fig. 3**