Dec. 26, 1933. W. EPP 1,941,343

APPARATUS FOR MAKING BRUSHES

Filed July 22, 1931 4 Sheets-Sheet 1

Fig.1

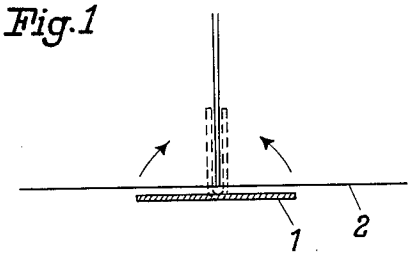


Fig.2

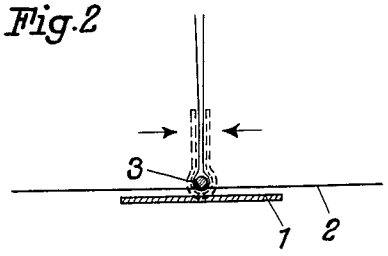


Fig.3

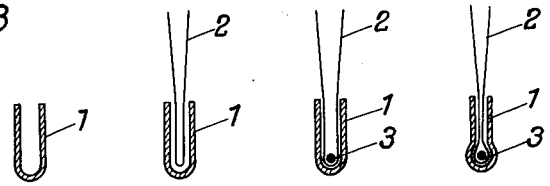


Fig.4

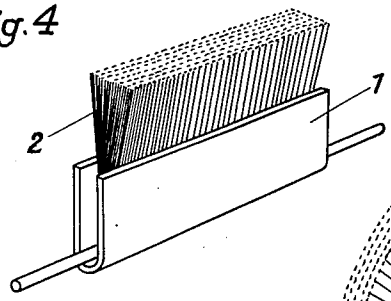


Fig. 5

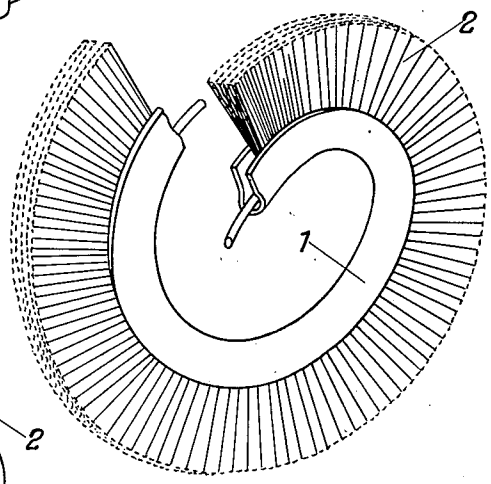
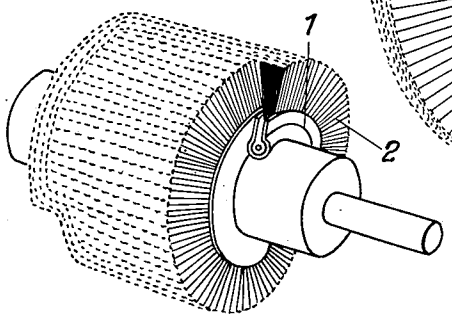


Fig.6



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APPARATUS FOR MAKING BRUSHES

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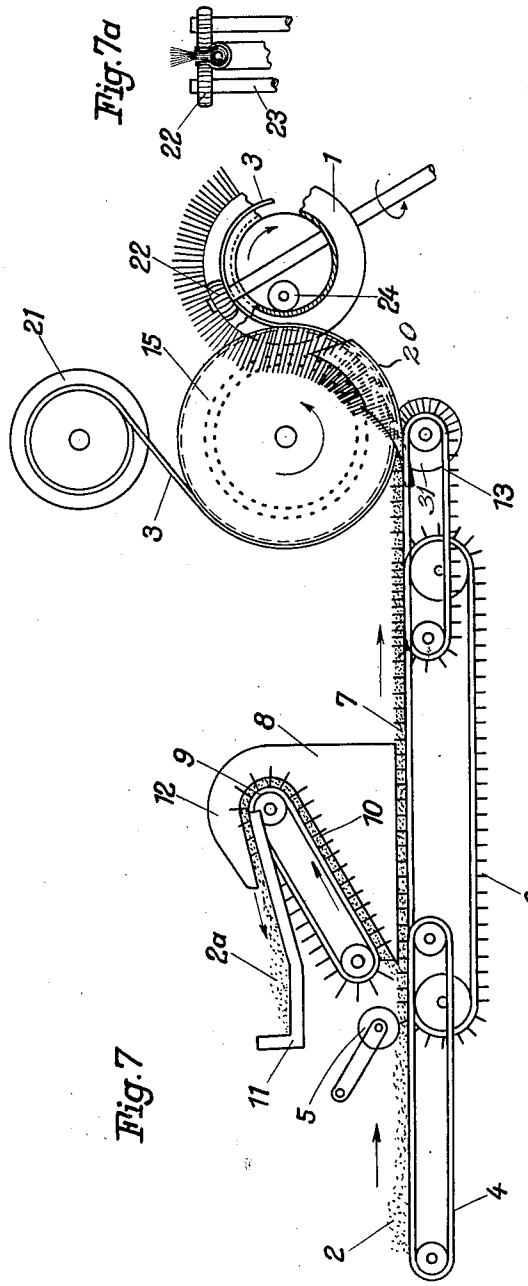


Fig. 7

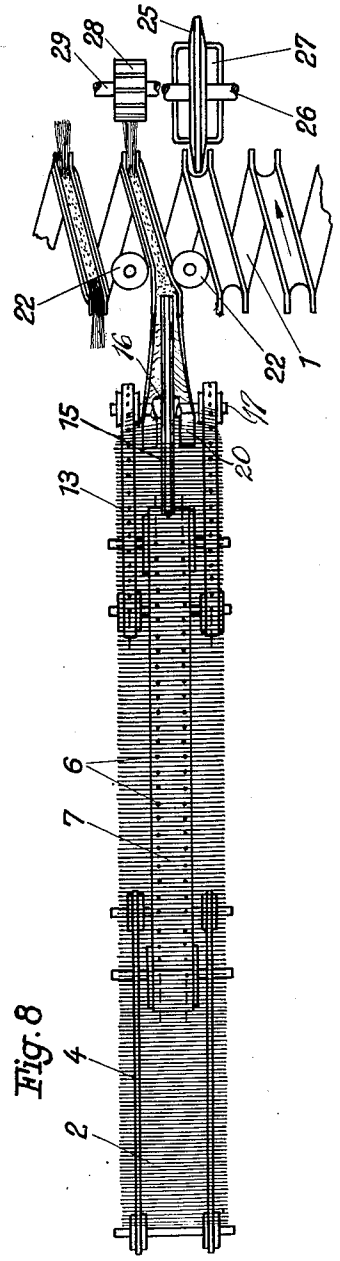


Fig. 8

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APPARATUS FOR MAKING BRUSHES

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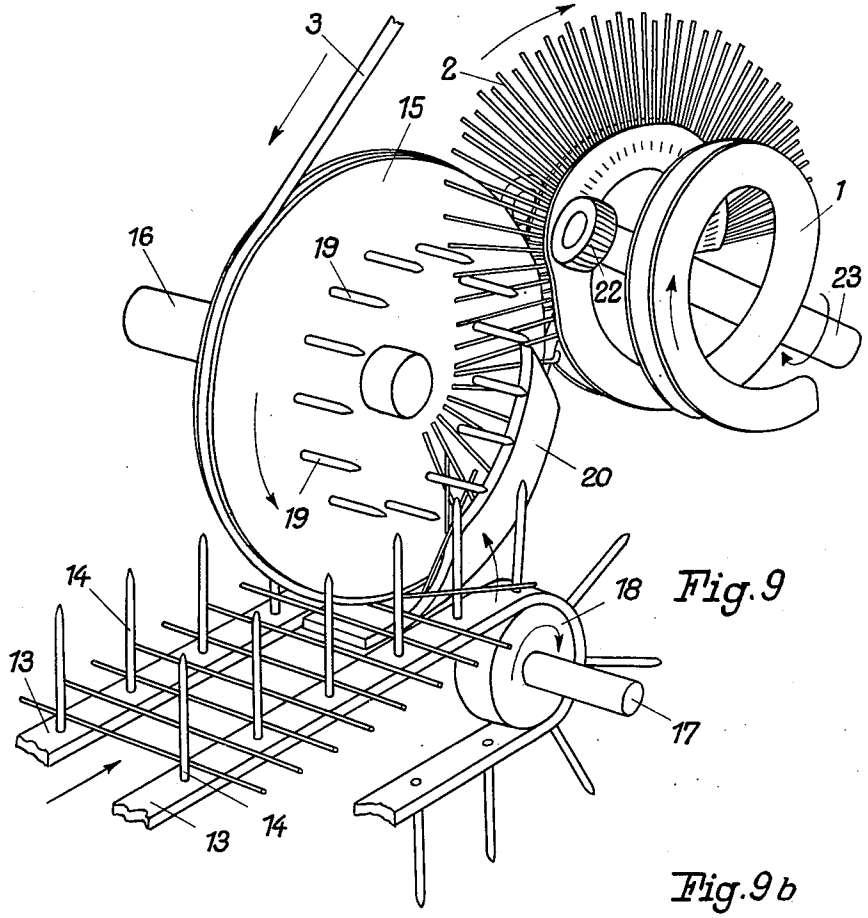


Fig. 9

Fig. 9b

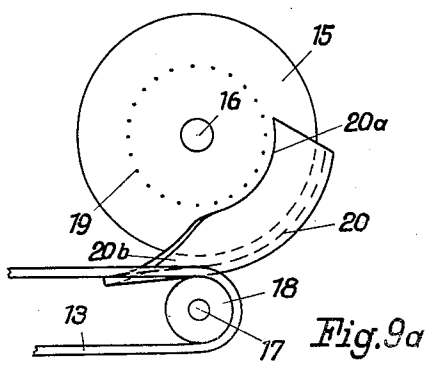
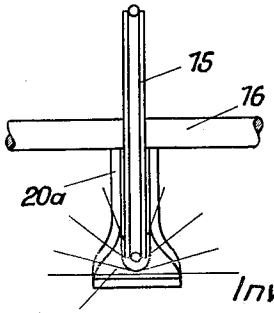


Fig. 9a



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APPARATUS FOR MAKING BRUSHES

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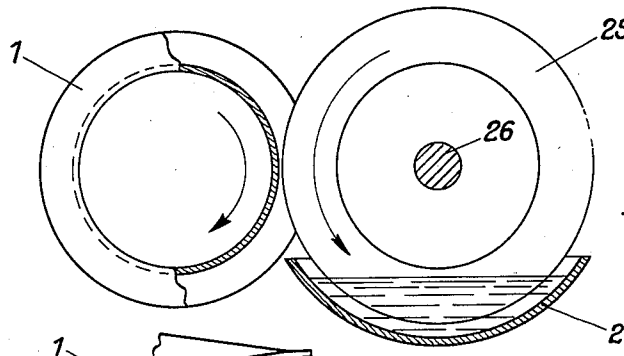


Fig. 10

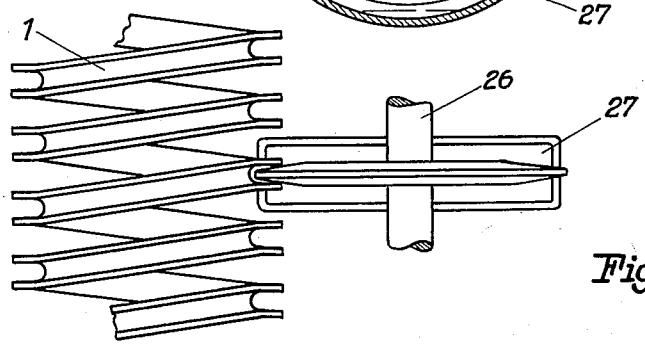


Fig. 11

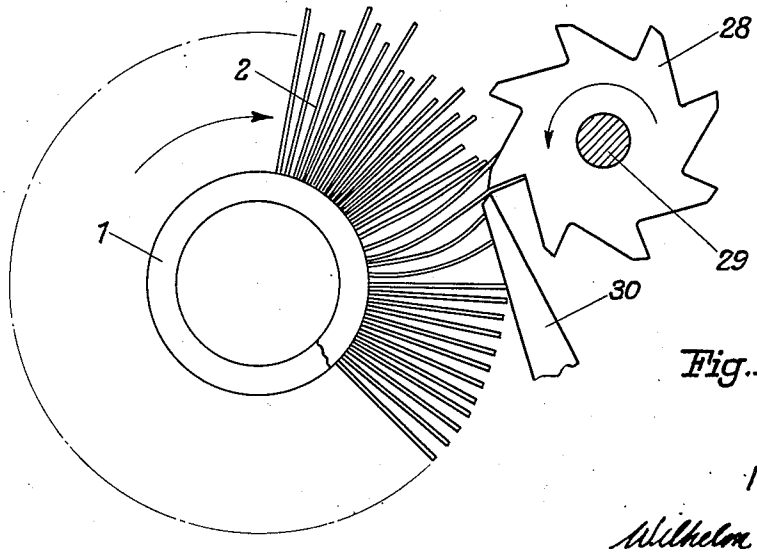


Fig. 12

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UNITED STATES PATENT OFFICE

1,941,343

APPARATUS FOR MAKING BRUSHES

Wilhelm Epp, Berlin-Pankow, Germany

Application July 22, 1931, Serial No. 552,455, and in Germany May 30, 1931

6 Claims. (Cl. 300—2)

The present invention relates to apparatus for making cylindrical brushes, wherein the bristle holders are of helical form.

A helical form of bristle holder is one which is wound as a helix after the holder has been folded into a U-shape to receive the bristles which are held in the holder by pressing the sides thereof together.

The main object of the present invention is to provide simple and efficient apparatus by which the bristles may be inserted and secured into the holder.

Other objects of the invention will be apparent from the description of drawings which follows and by means of which the invention will now be explained in detail.

By "bristles" in the present specification are to be understood bristles of any kind such as hair, fibre, wire or the like or mixtures, for example, of hair bristles mixed with wire and the like.

The drawings illustrate in Figs. 1 to 6, diagrammatically several forms of application of a series of methods for introducing folded bristles into a holder while

Figs. 7 to 12 are diagrammatic illustrations of a machine which introduces the bristles into a special holder body which consists of a strip of sheet metal which is folded over into U-shape and wound up into a helical form.

Fig. 1 shows diagrammatically a strip of metal 1, which is flat and onto which the bristles 2 are placed. When the ends of this strip of metal are bent upwards in the direction of the two arrows shown in the drawings, then the metal strip assumes a U-shaped cross-section, the walls of which enclose the bristles 2 in such a way that they are inserted in a folded position with their lower ends into the strip of metal and protrude with their free ends above the strip.

If now, as shown in Fig. 2, a round piece of metal, such as a wire, is placed above the bristles, and if either at the moment of bending over the walls of the strip of metal or after that, the walls are pressed together in the direction of the arrows shown in the drawings, then the wire 3 will hold the folded bristles in position in the groove which is formed at the lower end of the strip of metal which has been bent together. The bristles can be secured further by applying to one side of the metal strip an adhesive substance such as putty, glue or the like.

The bristles may also be inserted in the way shown in Fig. 3. In this case, as illustrated by the position *a*, the metal strip 1 is in the first place bent in to a U-shape. The next stage *b* shows the bristles 2 inserted in a folded condition; in the stage *c* the wire 3 has been inserted and in stage *d* the sides of the sheet metal 1 have been pressed together above the wire 3.

These different stages illustrated in Fig. 3 can be combined in any desired way, thus for example, the wire 3 can be inserted at the same time as the bristles 2, and the bending of the sheet metal can take place at the same time as the pressing together of the upper ends of the sides and so forth.

Fig. 4 shows a straight piece of U-shaped sheet metal forming the holder 1, while Fig. 5 shows the straight holder wound up into a helical form. These helically rolled strips of sheet metal are used in the manufacture of cylindrical brushes, for instance, machine brushes (Fig. 6), by placing the different windings of the sheet metal which in Fig. 5 are shown drawn apart, more or less closely together in an axial direction.

The device shown in Figs. 7 to 12 is used, for example, principally for the manufacture of such machine brushes as are shown in Fig. 6, in which the sheet metal holding strip is helically rolled up on the cylindrical brush body proper.

The metal strip 1 is bent on a special machine which is not shown in the illustration, into a U-shape and is at the same time wound up helically. Fig. 9 shows to an enlarged scale the holder which has been prepared in this way, the drawings being a general view. Into this holder the bristles are then inserted by means of a device which consists principally of a series of conveyor belts, a folding and inserting device, a conveying device for wire or the like, and a pressing device for the walls of the metal holder. In front of the folding and inserting device can also be arranged a device for removing surplus material.

The bristles 2 are placed on the conveyor belts 4 and are conveyed, passing preferably under a pressure roller 5 which is under the influence of a spring, on to a conveyor belt 7 which is provided with pins 6. Above this conveyor belt is arranged a piece of sheet metal or chute 8 which has a mainly triangular form and the point of which, facing the flow of bristles moving towards it, divides the latter so that if the layer of bristles is too thick, the surplus bristles are conveyed upwards by the conveyor belt 9 which is also provided with pins, along the upper inclined guide plane 10 of the sheet metal triangle, and are deposited on a table 11. To this end it is necessary that the direction of the movement of the bristles be turned in an opposite direction, and this is obtained by the fact that the sheet metal part

8 has a projecting piece 12, which on the inner side is cut out concentrically with the centre of the shaft of the conveyor belt 9 and extends above the table 11; in the table 11, there is in the paths of the pins of the conveyor belt 9, a slot through which the pins can pass. The surplus bristles are shown on the drawings and marked by 2a.

After the layer of bristles on the conveyor belt 7 has been reduced to a given thickness, the bristles come to lie on the two conveyor belts 13, each of which is provided with pins. These two conveyor belts 13 may also be combined into one conveyor belt having a double row of pins.

Between the rows of pins 14 (Fig. 9) rotates a disc 15, the shaft 16 of which lies parallel to the shaft 17 of the conveyor rollers for the belts 13. This disc 15 is provided with one or more rings of pins 19 which are arranged concentrically with the centre of the disc 15. These pins 19 form a bridging medium by which the bristles are carried or fed from the conveyor belts 13 to the holder 1.

A wheel 31 is arranged below the discs 15 and is mounted on the axle 17 (see Figs. 9a and 9b). This wheel has a groove with a fluted surface and is embraced laterally by the ends of a trough-shaped plate 20, which has a substantially U-shaped cross section. In Fig. 9, the wheel 31 has been omitted for the sake of clearness. The bristles lying on the band 13 are bent up between the wheels 15 and 31 and are then pushed into the trough-shaped plate 20 whose side walls are wide at the front and gradually taper, so that the bent up bristles are completely folded, the free ends of the bristles after folding being engaged by the pins 19, and, as hereinafter described, inserted into the plate 1.

At the same time as the bristles are folded a wire 3 is inserted which unrolls from a supply drum 21 (Fig. 7). This wire comes to lie in a groove on the disc 15 and is inserted into the holder 1 at the same time as the bristles, as soon as the disc is rotated by the pressing device which is described later on.

The holding wire is in a tangential position, on the one hand, on the disc 15 and, on the other hand, on the inner circumference of the holder 1 and thus carries along the bristles 2 as soon as the holder 1 is rotated and the wire is therefore drawn in.

In order to ensure that the bristles are held in position in the holder it is necessary to compress the latter after the insertion of the bristles and the wire 3 in such a way as is illustrated in Figs. 2 and 3. This is done by two pressing rollers 22 which are arranged on the shafts 23 and one opposite the other. These rollers compress strongly the free walls of the U-shaped metal strip cross-section and at the same time move along the metal strip 1, for which purpose they are provided with ribs. In order to ensure that the bristles are inserted right to the bottom of the holder 1 a counter-roller 24 (Fig. 7) is arranged in such a way that the metal strip 1 rotates so against it that the disc 15 reaches almost to the bottom of the strip.

In order to provide a further solid fixing of the bristles in the holder 1, a device for applying a cement may be arranged as shown in Figs. 8, 10 and 11. This cementing device is arranged, as can be seen in Fig. 8 just in front of the disc 15 (when seen in the direction in which the holder 1 moves) and consists, as Figs. 10 and 11 show, of a disc 25 which rotates on the shaft 26 and protrudes into the metal strip 1, while its lower end dips into a trough 27 which is filled with glue or putty. The rotation of the disc and the corresponding rotation of the metal strip 1 causes the putty or glue which has been carried along at the bottom by the disc 25 to be conveyed into the inner side of the metal strip, so that the bristles are held in place very firmly, especially after the walls of the metal strip have been pressed together.

Behind the place where the bristles are inserted a cutting device can be arranged, the position of which is shown in Fig. 8, while Fig. 12 shows its construction. This cutting device consists of a cutter 28 resembling a milling tool, which rotates on the shaft 29 and in a direction opposite to that in which the metal strip 1 with the bristles 2 moves. The cutting off of the protruding ends of the bristles takes place between the cutter 28 and a counter-piece 30.

What I claim is:—

1. Apparatus for making cylindrical brushes having U-shaped bristle holders of helical form, comprising in combination with a conveyor for the bristles, means for rotating and moving transversely of the conveyor one of said holders disposed in spaced relationship with the said conveyor, bridging means for continuously feeding bristles from the conveyor to the said holder, means for folding the bristles and inserting a wire between the folded bristles whilst being fed by the said bridging means, and means for pressing the sides of the holder together after the folded bristles and the wire have been fed thereinto.

2. Apparatus for making cylindrical brushes having U-shaped bristle holders of helical form, comprising in combination with a rotatable wire feeding disc, means on the said disc for continuous upward feeding of folded bristles with the wire between them to one of said holders supported for rotation and longitudinal movement with the walls of the holder engaging the periphery of the said disc, a conveyor for feeding bristles to the disc, means co-operating with the said disc for folding the bristles fed by the conveyor to the disc and means for driving the bristle holder and pressing the walls thereof together after the folded bristles have been fed thereinto.

3. Apparatus for making cylindrical brushes having U-shaped bristle holders of helical form, comprising in combination with a rotatable wire feeding disc, a ring of concentric pins on the said disc for continuous upward feeding of folded bristles with the wire between them to one of said holders supported for rotation and longitudinal movement with the walls of the holder engaging the periphery of the said disc, a conveyor for feeding bristles to the disc, means co-operating with the said disc for folding the bristles fed by the conveyor to the disc and means for driving the bristle holder and pressing the walls thereof together after the folded bristles have been fed thereinto.

4. Apparatus for making cylindrical brushes having U-shaped bristle holders of helical form, comprising in combination with a rotatable wire feeding disc, means on the said disc for continuous upward feeding of folded bristles with the wire between them to one of said holders supported for rotation and longitudinal movement with the walls of the holder engaging the periphery of the said disc, a conveyor for feeding bristles to the disc, means determining the thickness of the layer of bristles on the conveyor and carrying surplus bristles away from the con-

veyor, means co-operating with the said disc for folding the bristles fed by the conveyor to the disc and means for driving the bristle holder and pressing the walls thereof together after the folded bristles have been fed thereinto.

5. The combination with the apparatus according to claim 2 of a pointed chute disposed in front of the said disc facing the flow of the bristles on the said conveyor, and conveyor means for conveying upwardly the surplus bristles removed from the said conveyor by the said chute.

6. The combination with the apparatus according to claim 2 of a pointed chute disposed in front of the said disc facing the flow of the bristles on the said conveyor, conveyor means for conveying upwardly the surplus bristles removed from the said conveyor by the said chute, a surplus bristle receptacle disposed in front of the said conveyor means for the receipt of the surplus bristles therefrom, and an overhung member to said chute extending over the said receptacle and the end of the said conveyor means whereby the surplus bristles are deposited on the said receptacle.

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