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R. O. PETERSON

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ELECTRICALLY CONDUCTIVE BRUSH

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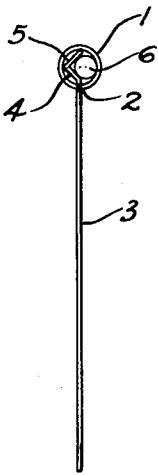


Fig. 2

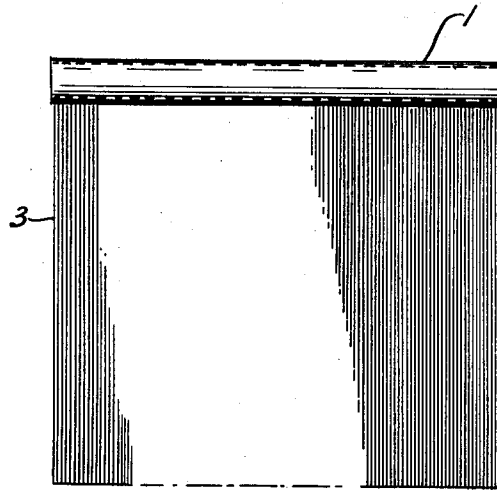


Fig. 1

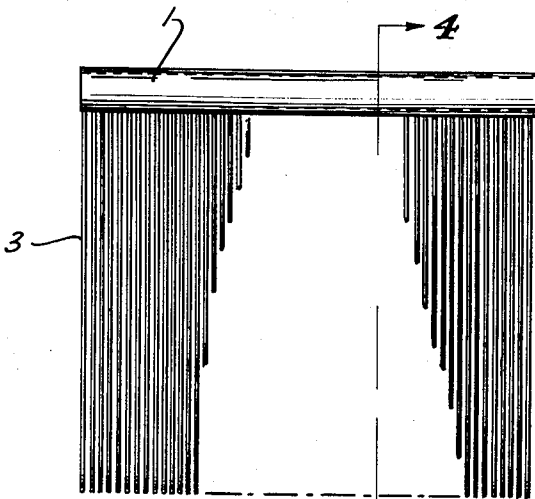


Fig. 3

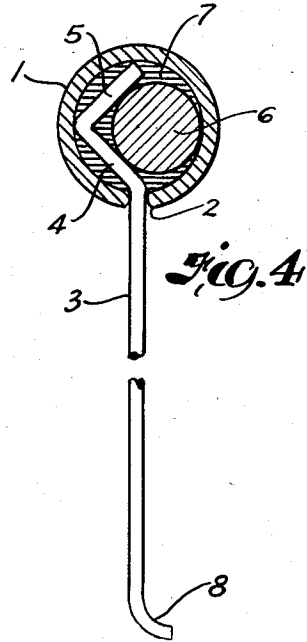


Fig. 4

INVENTOR.
RUBEN O. PETERSON

BY

Oberlin + Limbach
ATTORNEYS.

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ELECTRICALLY CONDUCTIVE BRUSH

Ruben O. Peterson, University Heights, Ohio, assignor to The Osborn Manufacturing Company, Cleveland, Ohio, a corporation of Ohio

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10 Claims. (Cl. 339—273)

This invention relates as indicated to a novel brush, and more particularly to a brush having a single row of brush bristles ordinarily arranged in a straight line and uniformly spaced.

In certain types of automatic machines using continuously traveling strips of paper provided with electrically conductive areas adapted to actuate signal means, as in certain types of business machines, electrically conductive brushes are desirably employed bearing against the traveling paper strip to detect such electrically conductive areas or regions. It has been found desirable to utilize brushes having a very thin layer of wire bristles, preferably but one bristle thick, with such bristles being closely but uniformly spaced. It is accordingly a principal object of my invention to provide a novel brush of this general type which will be inexpensive of manufacture but at the same time very uniform in construction and precise and regular in operation.

Another object is to provide such novel brush having extremely good and reliable electrical conductivity.

Still another object is to provide such novel brush in which the bristles will maintain their desired orientation throughout a long period of use.

Other objects of the invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, said invention then comprises the features herein after fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

Fig. 1 is a side view of one embodiment of my invention wherein a flat layer of brush bristles, one bristle thick, extends from an elongated tubular back or holder;

Fig. 2 is an end view of such Fig. 1 embodiment;

Fig. 3 is a side view of another embodiment of my invention generally similar to Fig. 1 but wherein the brush bristles are slightly but uniformly spaced one from another and the outer ends thereof bent or curved in the same direction; and

Fig. 4 is an enlarged section taken on the line 4—4 on Fig. 3.

Now referring more particularly to said drawing and especially Figs. 1 and 2 thereof, the embodiment there illustrated comprises a tubular metal back or holder 1 having a narrow longitudinally extending slot 2 therein from which the wire bristles 3 extend. The inner end portion of each such bristle is bent at approximately a 45° angle to the body of the bristle at 4 and then rebent at a 90° angle to such first portion at 5 to bring the extreme inner end of the bristle generally in line with the straight body portion thereof extending from the holder 1. The row or layer of bristles 3 is then inserted in such holder as best shown in Fig. 2 and a round metal

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rod 6 inserted therein dimensioned to fit snugly within the space defined by the inner wall of tubular holder 1 and bent portions 4 and 5 of the bristles. It will thus be seen that such bristles are locked against withdrawal from slot 2 and also held against rotative or swinging action within the holder. Solder or other conductive metal will then ordinarily desirably be poured into the openings remaining within holder 1 to fill the same and provide a rigid unitary assembly.

For some purposes it is preferred that the bristles 3 be slightly but regularly spaced apart in the manner illustrated in Fig. 3 of the drawing. Such uniform spacing may best be obtained by clamping the row of bristles in proper arrangement and then pouring in the molten metal 7 to secure them thus oriented. For many purposes the extreme outer end portions 8 of the bristles may desirably be bent or curved as shown in Fig. 4 (all in the same direction laterally of the layer of bristles) to ensure smooth running contact with the traveling paper strip, for example.

Brush elements of the type described may also be employed as guides, spreaders, seals, etc., and for many such purposes a suitable plastic may be substituted for the metal filler 7. Indeed, it is not always essential that such filler be utilized since the bristles are mechanically locked against withdrawal and the ends of tube 1 may be closed. Rod or large wire 6 should desirably fit quite snugly in place. The brush may also be made utilizing only the inner plastic or metal filler 7 and omitting the rod or wire 6, but use of the latter is much preferred. The employment of a fusible metal alloy as the filler 7 ensures the obtaining of good electrical contact. Such filler matrix, of course, also serves to hold the bristles against wobbling. It is desirable that the bristles fit snugly in slot 2 with their inner ends desirably being rebent to engage the inner side of the tubular holder element at a point generally diametrically opposite to such slot. While the tubular holder will ordinarily be of metal as previously indicated, it may be of other material such as the well-known plastics and the like. Rod or wire 6 will ordinarily be of circular cross-section as shown but may be of square or other cross-section if desired. In some embodiments of the invention, the brush bristles may be relatively stiff and in the Fig. 3 form, for example, somewhat resemble a comb.

The preferred method of assembling the component members is to arrange and clamp the bristles in a flat row or layer with their offset end portions similarly oriented, then slide the slotted length of tubing over such offset end portions with the bristles extending from and closely fitting such slot, and then axially insert the tightly fitting elongated element such as rod or wire 6. A matrix material such as solder, poly-vinylidene chloride, poly-vinyl plastics, and the poly-styrenes may thereafter be intruded and solidified, if desired, to assist in maintaining the desired orientation, especially when the bristles have been arranged in slightly spaced relationship to one another.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I therefore particularly point out and distinctly claim as my invention:

1. An electrically conductive brush comprising a continuous unitary tubular holder element having a narrow longitudinally extending slot the length of the same, a single flat layer of wire bristles having their ends inserted in said holder through such slot and closely fitting the latter, the end portions of said bristles within said

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holder being bent 45° from the main body portions thereof to engage the inner side of said holder and then rebent 90° to cause their extreme ends to engage the inner side of said holder diametrically opposite such slot, a rod of circular cross-section inserted longitudinally within said holder engaging the wall of the latter and also both said bent portions of said bristle end portions to hold said bristles against wobbling and withdrawal, and solder filling the remaining interstices within said holder to afford a solid unitary structure of good electrical conductivity.

2. An electrically conductive brush comprising a metal tubular holder element having a narrow longitudinally extending slot the length of the same, a single flat layer of wire bristles having their ends inserted in said holder through such slot and closely fitting the latter, the end portions of said bristles within said holder being bent and rebent to fit snugly within said holder, a metal rod inserted longitudinally within said holder engaging the wall of the latter and also both said bent portions of said bristle end portions to hold said bristles against wobbling and withdrawal, and solder filling the remaining interstices within said holder to afford a solid unitary structure of good electrical conductivity.

3. A brush as defined in claim 2, wherein said bristles are all of the same length and have their outer end portions turned in the same direction at an angle to said flat layer of bristles.

4. A brush comprising a tubular longitudinally continuous holder element of circular cross-section having a longitudinal slot therein, a single flat layer of wire bristles having their ends inserted in said holder through such slot and closely fitting the latter, the portions of said bristles within said holder being bent to engage the inner side of said holder laterally of such slot with the extreme inner portions of said bristles engaging the inner side of said holder generally diametrically opposite such slot, and a rod inserted longitudinally within said holder tightly engaging the latter and said bent inner bristle portions to hold said bristles against wobbling and withdrawal.

5. The method of forming a brush member which comprises slotting a length of tubing, bending the end portions of a plurality of wire bristles to offset the same,

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holding such bristles in a flat layer with such end portions offset in the same direction and said bristles slightly laterally spaced from one another, sliding such length of tubing over such offset end portions with such bristles extending through such slot, thereafter inserting a tight-fitting rod axially within such tubing to bear against such offset end portions of such bristles and hold them against wobbling and withdrawal and intruding a matrix material in such length of tubing and solidifying the same to assist in securing such bristles in such oriented relationship.

6. A brush comprising a tubular holder element having a narrow longitudinally extending slot therein, a single flat row of parallel bristles having portions extending into such slot closely fitting the latter and bent to one inner side of said tubular holder and then rebent to form angular offset portions, and a rod inserted longitudinally within said holder engaging the other side of said holder relative to said slot and also engaging said bent offset portions of said bristles effective thus to hold said bristles against such inner side of said tubular holder to resist their withdrawal therefrom.

7. The brush of claim 6 wherein adjacent bristles are spaced from one another a slight and uniform amount.

8. The brush of claim 6, wherein the remaining interstices within said holder are filled with a matrix material.

9. The brush of claim 6, wherein adjacent bristles are spaced from one another and held in such spaced relationship by said matrix.

10. The brush of claim 6, wherein adjacent bristles are spaced from one another and held in such spaced relationship by said matrix, said bristles having their outer end portions turned in the same direction at an angle to said flat row.

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