April 19, 1932. C. C. GERHARDT 1,855,046

BRUSH

Filed Feb. 3, 1930

Fig. 1.

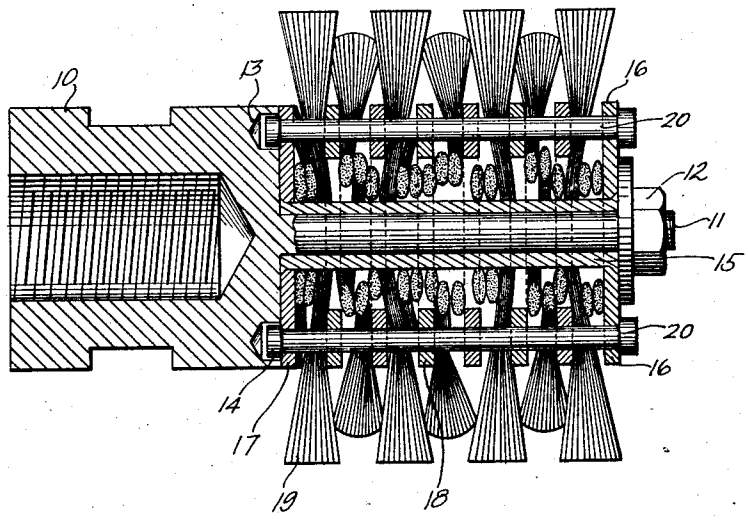
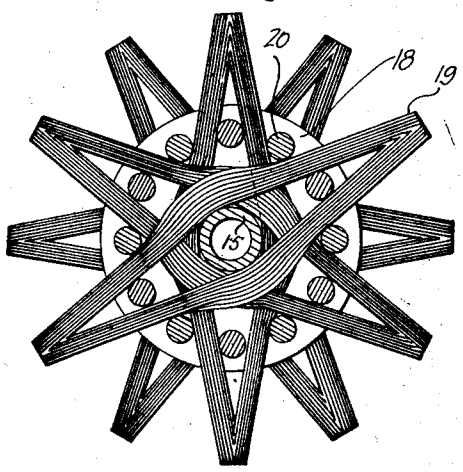


Fig. 2.



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BRUSH

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This invention relates to a brush, and more particularly to a brush of generally cylindrical shape in which the bristles project outwardly toward the circumference. A more specific embodiment of my invention relates to rotary brushes of the type adapted for cleaning concave surfaces.

This invention represents an improvement upon the brush described and claimed in Patent No. 1,703,510 of Joseph A. Charette and is designed to provide for more economical manufacture and use as well as to provide a structure in which the bristles are even more securely held.

It is an object of this invention to provide a brush adapted to be used as a rotary brush in which the body of the brush proper is separate and is removable from all connected parts which are required for its manipulation when in use and which may therefore be readily replaced when worn or damaged with a minimum of effort and expense.

Another object of the invention is to provide a brush structure in which the bristles are securely clamped in a double-flexed relation so that they will not be dislodged during use.

Other objects of the invention will be apparent from this specification.

In the accompanying drawings I have shown in

Figure 1 a longitudinal section of the brush structure and the driving connection; and in Figure 2 a cross section through the brush.

The driving connection, as illustrated in Figure 1, comprises a standard hub 10 adapted to be connected to any suitable driving connections such as the shaft of an electric motor or a flexible shaft or other source of rotary power. From one end of the hub 10 a central shaft 11 projects for a distance somewhat greater than the length of the brush and it is threaded at its outer end for the reception of the nut 12. Surrounding this central shaft are a series of depressions 13, circularly arranged. These depressions are adapted to receive and closely fit projections 14 on the bottom of the brush and serve to transmit a driving torque when the brush is connected to a rotating source of power.

The brush proper which is adapted to be detachably secured to the hub 10 is built up around a central tubular post 15 around which are secured clamping spacers 16, 17 and 18. The end clamping spacers 16 and 17 are each formed with central openings closely fitting the post 15 while the intermediate spacers 18 are formed with larger openings adapted to leave an annular space between the post 15 and the spacers 18 at least as wide as the diameters of the groups of bristles 19 when held in compact relation. Each of the clamping spacers 16, 17 and 18 is drilled at spaced intervals on a circle concentric with its central opening to receive the longitudinal members 20. These longitudinal members in the present example serve at once to laterally confine the bristles of each group, to hold the spacers 16, 17 and 18 in compressed clamped relation and by virtue of their integral heads 14 to transmit the driving torque to the clamping spacers and the bristles.

In one way of assembling the brush the bottom clamping spacer 17 is first placed over the central post 15 and the longitudinal members 20 and three pairs of bristle groups 19 are placed so as to lie approximately along three diameters spaced 60° from one another, as clearly shown in Figure 2. The fact that they are laterally confined near each end between pairs of longitudinal members 20 and the fact that they must bend around the central post 15 requires that they be centrally flexed, and this flexing in a transverse plane serves to very materially assist in holding the bristles in place. In the present form of the invention these bristles are made of steel wire which, although relatively elastic, is permanently deformed to a greater or less extent by the central flexing. Alternatively, the wires might be made of more highly elastic material and given a permanent bend during their process of manufacture or obviously the flexing need not be permanent but may result entirely from the stress placed upon the bristles by the longitudinal members 20 and the post 15.

In addition to the flexing in a transverse plane there is also a flexing in an axial direction, which results both from the overlap-

ping of different groups of bristles around the central post 15 and also from the fact that all of the bristles are tending to assume a position as close as possible to the post 15 in order to require a minimum amount of flexing. This axial flexing serves to expand the bristles into the annular space between the post 15 and the spacers 18 and thus to form a central core of bristles which is held in place by the annular spacers 18. This central core of bristles is pressed against the post 15, both by the inherent elasticity of the bristles themselves and by the longitudinal crowding of the central part of the bristles between the post 15 and the annular spacers 18. This results in a very perfect engagement between the post 15 and the body of the brush. This engagement becomes particularly important when, as hereinafter suggested, the driving torque is transmitted through the post.

As shown in Figure 2 there are two groups of bristles placed along each diameter on opposite sides of the post 15. In this manner the tendency of each group of bristles to assume a V shape is opposed by the same tendency of the other group of bristles in the pair and the result is that at each end each pair of bristles forms a single tuft which is very nearly radial. When the brush is in use the opposing groups of these pairs tend to prevent the bristles in the center of these tufts from becoming bent further in the same direction in which they are bent by the joint action of the longitudinal members 20 and the post 15, while the bristles on the outside of the tufts being unsupported are very likely to become bent back so as to fill the space which is shown in the drawing as open. The effect of this is to form a triple flexing first around one of the longitudinal members 20, then around the post 15 and again around the opposite longitudinal member 20, which locks the bristles even more securely into the brush. Obviously, therefore, the bristles do not lie exactly along the geometrical diameter, and accordingly the phrase, "substantially diametrical" is used herein to describe the positioning of the bristles so that they pass through the central body of the brush, without intention to limit the invention to brushes in which the bristles lie along the geometrical diameter.

As has been already pointed out above the brush is particularly adapted for use as a rotary brush and when so used is advantageously driven through the longitudinal members 20 by means of the depressions 13 and the projections 14. Obviously, this method of driving may have some tendency to twist the brush so that the longitudinal members might tend to assume a spiral form. This, however, is not objectionable but, on the contrary, may prove advantageous, particularly since it tends to further compress the brush longitudinally.

Obviously, although the brush is particularly advantageous for use as a rotary brush it may also be used with important advantage either as a hand brush or to be driven with a reciprocating or unidirectional movement or in any other way.

Although I have described above a preferred embodiment of my invention and although I find that the use of such embodiment possesses advantage over other forms for many kinds of work, nevertheless it will be readily understood that many changes may be made within the scope of my invention and which will fall within the claims. Thus, instead of the driving connections illustrated in the drawings, the central shaft 11 may engage the brush by any other of many ways which will suggest themselves to those skilled in the art. Obviously if the brush is to be used for a reciprocating motion where rotation is of no particular importance such engaging means may be unnecessary and the shaft 11 with its nut 12 or other equivalent holding means will be sufficient to transmit the longitudinal torque. Instead of the nut 12 and the riveted ends of the post 15 and the longitudinal members 20, other means may be used for securing the ends of these parts over the ends of the brush body. Although I have shown the brush as pressed together and held thus in clamping relation by the riveted ends of the post 15 and of the longitudinal members 20, it is not necessary that the brush be so secured when assembled but may be delivered in a relatively loosely assembled condition and the clamping effect of the nut 12, or other equivalent means, may be relied upon entirely to hold the parts in clamping relation. This, however, will ordinarily not be desirable, particularly with brushes of small diameter where the central shaft 11 must be of correspondingly smaller diameter and therefore should not be given the added load of holding the brush in its clamped condition.

Where the longitudinal members 20 are not relied upon for driving or for holding the brush in clamping relation or where a comparatively few of such members are relied upon, some means other than the members 20 may be used for laterally confining the groups of bristles.

Many other changes may also be made and the brush may be put to many uses in many ways not specifically described herein.

What is claimed as new is:

1. A rotatable brush comprising a hub and a relatively thin shaft secured centrally thereto, a removable brush body comprising a central tube, the bore of which receives said shaft, groups of bristles extending substantially diametrically through the brush body,

spacing members pressed together longitudinally so as to clamp groups of bristles between them, longitudinal members serving to confine laterally a group of bristles near its ends between substantially opposite pairs thereof whereby to hold said group of bristles substantially diametrical of the brush body and centrally flexed about said tube, and means for holding said brush body onto said shaft.

2. A rotatable brush comprising a hub and a relatively thin shaft secured centrally thereto, a removable brush body comprising a central tube, the bore of which receives said shaft, groups of bristles extending substantially diametrically through the brush body, spacing members pressed together longitudinally so as to clamp groups of bristles between them, longitudinal members serving to confine laterally a group of bristles near its ends between substantially opposite pairs thereof whereby to hold said group of bristles substantially diametrical of the brush body and centrally flexed about said tube, and means for detachably holding said brush body onto said shaft.

3. A rotatable brush comprising a hub and a relatively thin shaft secured centrally thereto, said hub having brush engaging means faced toward the direction in which the shaft extends and spaced radially outward from said shaft, a removable brush body comprising a central tube, the bore of which receives said shaft, groups of bristles extending substantially diametrically through the brush body, spacing members pressed together longitudinally so as to clamp groups of bristles between them, longitudinal members serving to confine laterally a group of bristles near its ends between substantially opposite pairs thereof whereby to hold said group of bristles substantially diametrical of the brush body and centrally flexed about said tube, means on said brush body adapted to cooperate with the engaging means on the hub to transmit rotary power from said hub to said brush, and means for holding said brush body onto said shaft and in torque-transmitting relation to the engaging means on said hub.

4. A rotatable brush comprising a hub and a relatively thin shaft secured centrally thereto, a removable brush body comprising a central tube, the bore of which receives said shaft, groups of bristles extending substantially diametrically through the brush body, spacing members pressed together longitudinally so as to clamp groups of bristles between them, longitudinal members serving to confine laterally a group of bristles near its ends between substantially opposite pairs thereof whereby to hold said group of bristles substantially diametrical of the brush body and centrally flexed about said tube, means for holding said brush body onto said shaft, and means on said hub and said brush body adapted to transmit rotary torque therebetween.

5. A brush as defined in claim 3 in which the engaging means comprise spaced depressions in the hub, the cooperating means on the brush body comprise projections integral with the longitudinal members and adapted to fit into said depressions, and said longitudinal members are secured to the spacing members and between the groups of bristles in such way as to transmit driving torque to said spacing members and groups of bristles.

6. A brush comprising a central post, clamping spacers surrounding said post and spaced therefrom on all sides a substantial distance, bristle groups of diameter not substantially greater than the space between said post and said spacers laid closely about said post and transversely thereto, and longitudinal members positioned so as to confine the bristles of said groups to substantially diametric positions centrally flexed about said post, said spacers being held together so that the groups of bristles are clamped therebetween.

7. A brush as defined in claim 6 in which the longitudinal members also serve to hold the spacer elements compressed together so that the groups of bristles are clamped therebetween.

8. A brush as defined in claim 6 in which a plurality of groups of bristles placed along different directions cross each other adjacent said central post between each pair of clamping spacers whereby some at least of said bristles will be transversely flexed over one another along said post and thereby further secured against longitudinal displacement.

9. A brush comprising a central post, clamping spacers mounted thereon, groups of bristles arranged substantially diametrically of said brush and centrally flexed around said post, means to confine the groups of bristles laterally near their ends whereby to hold them against too great flattening under influence of the clamping spacers and to hold them in substantially diametrical position, and means adapted to press on the end clamping spacers whereby to hold all of said spacers in clamping relation on said groups of bristles.

10. A brush as defined in claim 9 in which a plurality of groups of bristles arranged in different directions cross each other adjacent said central post between each pair of clamping spacers.

11. A brush as defined in claim 9 in which the groups of bristles are arranged in pairs of which one goes on each side of the central post and their ends press together so as each

to hold the other against continuing along the course which is followed around the central post and the ends of said pairs of groups together form radial tufts of bristles.

Signed at New York, N. Y., this 23rd day of January, 1930.

CHARLES C. GERHARDT.