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2,190,206

ROTARY BRUSH

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Fig. 1.

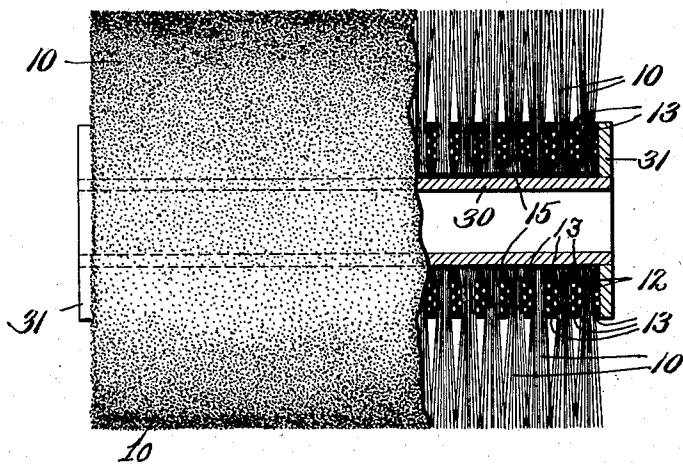


Fig. 2.

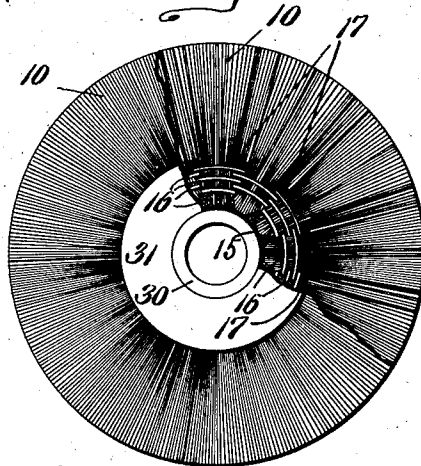
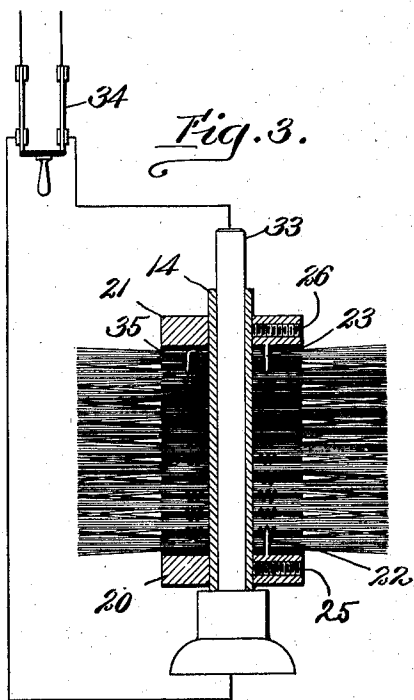


Fig. 3.



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ROTARY BRUSH

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1 Claim. (Cl. 15—179)

This invention relates to rotary brushes and particularly to rotary brushes for use in the industrial arts for cleaning, polishing, coloring, finishing and burnishing metals and other materials. Rotary brushes when used for some kinds of work are rotated at speeds varying from 1700 revolutions per minute to 4000 revolutions per minute, at which speeds there is danger of the bristles being thrown out and disintegration of the brush being effected by centrifugal force under conditions of use.

The present invention has for one of its objects to provide a rotary brush in which the bristles are so firmly secured as to enable the brush to be rotated at substantially high speeds without dislodgment of the bristles or disintegration of the brush under conditions of use.

The invention further has for its object to provide a brush in which the density of the bristles is controllable, so that brushes most efficient or suitable for a particular kind of work may be made by varying the density of the bristles.

The invention also has for its object to produce a brush of the character described, which is inherently balanced, is waterproof, oil proof, and durable.

The invention is especially adapted for the production of rotary brushes employing non-metallic bristles such as Tampico, horsehair, china bristles and the like, and when bristles of this character are employed a superior working surface may be obtained, in that the bristles may be firmly held at their butts and the free ends of the bristles be of like character so as to provide the rotary brush with a uniform working surface capable of performing uniform and superior work for each kind of work for which the rotary brush is made.

These and other features of this invention will be hereinafter described and pointed out in the claim at the end of this specification.

In the accompanying drawing:

Fig. 1 represents in elevation and section one construction of rotary brush embodying this invention.

Fig. 2, an end elevation of the rotary brush shown in Fig. 1, with a portion of the end layer of bristles broken away, and

Fig. 3, a longitudinal section of the rotary brush on a smaller scale and a portion of an apparatus with which the rotary brush may be made.

In accordance with this invention, the rotary brush is provided with a plurality of rows or sections 10 of bristles separated from one another at the inner or butt portions 12 of the bristles by one or more layers or members 13 of rubber or like

initially thermo-plastic material capable of being softened and rendered plastic by heat and capable of hardening when cold. Such thermo-plastic materials will be hereinafter referred to as rubber.

It is preferred to separate adjacent rows or sections 10 of bristles by a layer or member 13 of rubber which is normally in an unvulcanized condition, and to heat the rubber layers or members 13 so as to render them soft or sufficiently plastic to enable portions of the rubber layers to be compressed and forced into the bristles at or near their inner or butt ends, so that when the rubber is vulcanized, the bristles of each row or section will be embedded in a rubber hub provided with a plurality of sockets in which the rows of bristles are firmly held by the rubber and form with said hub a unitary structure.

The rows or sections 10 of bristles are assembled upon a suitable mandrel or tube 14 with their butt ends substantially close to the tube or mandrel, and as more or less space is left between the butt ends of the bristles and the tube or mandrel, more or less of the rubber layers or members 13, when softened and compressed, will be forced between the bristles and the mandrel 14 as well as into the bristles, with the result that adjacent layers 13 of rubber are united and form a rubber hub having sockets in which the butts of the rows of bristles are firmly held or set by the rubber.

The inner wall of the rubber hub is represented by the heavy black line 15 in Figs. 1 and 2.

It is preferred to use in the manufacture of the rotary brush a length or strip of bristles connected at their butt ends with means which not only tie the bunches or bristles together but also reinforce them. One means for this purpose consists of a plurality of wires 16, herein shown as five in number, which are woven in such manner as to encompass and grip substantially equal bunches of bristles 10 and form a strip of bunched bristles. It is also preferred to employ a strip or length of rubber or the like of a width sufficient to cover the bristles from their butt ends to and preferably slightly beyond the reinforcing wires 16, so that when the rubber layers between the rows of bristles are softened and compressed, the softened rubber beyond the reinforcing wires 16 may be forced into the spaces between adjacent bunches or bundles of bristles and overlap the reinforcing wires 16 and, when cold, form fingers or keys 17 between the bunches of bristles and reinforcing members for the weaving wires 16, to resist breaking of the weaving wires under the influence of centrifugal force at high speeds, and which also

resist movement of the bristles outward under the influence of centrifugal force at high speeds.

The weaving wires 16 are arranged near the butts of the bristles but slightly removed from the ends thereof, so that a small end portion of the bunches of bristles projects beyond the weaving wires and is less compressed than the portion of the bristles with which the weaving wires are engaged, with the result that the bunches of bristles are provided with enlarged tapered or wedge-shaped butt end portions, which serve to assist in resisting movement of the bristles by centrifugal force.

The strips of bristles and rubber may be of such length as to form a plurality of rows of bristles and a plurality of rubber layers, and to simultaneously wind both strips about the mandrel or tube 14, so as to form a plurality of convolutions or annular rows of bristles separated at their butt portions by a plurality of convolutions or ring-like members or layers of rubber or like material which is initially thermo-plastic.

The strips of bristles and rubber are simultaneously wound upon the mandrel 14 and confined between heads 20, 21, which may and preferably will be provided with devices, shown as pins 22, 23, for anchoring the free ends of the strips after the manner shown in Fig. 3.

The anchoring devices 22, 23 enable the rubber strip and the strip of bristles to have their opposite ends located in such manner as to assist in balancing the brush.

The head 20 may be secured to the mandrel 14 by one or more set screws 25 before the strips of bristles and rubber are wound upon the mandrel, and after the strips are wound thereon, the head 21 is placed on the mandrel and moved under pressure toward the stationary head 20, so as to subject the bristles and rubber to an initial compression, and when so compressed the head 21 may be secured to the mandrel by one or more set screws 26 or otherwise.

The rubber and bristles on the mandrel are then subjected to heat below a temperature at which the bristles will be burnt or charred and for such length of time as will render the rubber relatively soft or plastic and in a condition in which by increasing the pressure it can be forced between the butt ends of the bristles and the mandrel and into the outside bristles of each bunch, so as to connect adjacent convolutions of rubber and form the rubber hub having a plurality of annular sockets extended inwardly from the outside of the hub, in which sockets are located a plurality of rows of bristles which are set or firmly held in said sockets by the rubber against movement by centrifugal force under conditions of use.

As stated above, the rubber strip is preferably made of sufficient width to extend beyond the reinforcing wires 16, so that portions of the rubber strip near the outer edge thereof, when in plastic condition under heat, may be forced into the spaces between adjacent bunches of bristles beyond the reinforcing wires 16 and form keys or anchoring devices 17 for the bristles and also for the reinforcing wires 16.

After the rubber has been rendered plastic and compressed, heating of the rubber is resumed and continued at a temperature below the point at which the bristles will char or burn, and for such length of time as will properly vulcanize the rubber.

After the rubber has been properly vulcanized, the heat is withdrawn and the brush thus formed

is allowed to cool, and when cooled, it is removed from the mandrel and may and preferably will be provided with a finishing hub 30 and with flanges or heads 31 of wood, fiber, or any other desired material as shown in Figs. 1 and 2.

The temperatures to which the rubber and bristles are subjected may vary according to the character of the bristles, and the length of time required to properly vulcanize the rubber may vary according to the composition of the rubber.

In Fig. 3 I have represented on a smaller scale one form of apparatus for heating and vulcanizing the rubber, which consists of an electrical unit or member 33 capable of being inserted into the hollow mandrel 14 and connected in an electric circuit controlled by a suitable switch 34.

This form of heating apparatus is preferred, in that the vulcanizing of the rubber is effected from the butts of the bristles outwardly, which results in a gradient in hardness of the rubber strip which is a maximum at the butts of the bristles and decreases toward the outer side of the rubber strip.

In this manner, the rubber member between adjacent rows of bristles may be subjected at its outer edge to a less heat than that necessary to vulcanize the rubber member at the butt ends of the bristles, with the result that the outer edge of the rubber strip may be slightly yielding to enable the bristles to bend and avoid being broken, especially when the brush is used on work in which it is necessary for the operator to press the work against the rotating brush with considerable force.

It is also preferred to provide the butt ends of the bristles with a thin layer or coating of a material with which the rubber strip may bond or unite to more effectively bond or affix the bristles to the rubber. To this end the strip of bristles may have the butt side of the strip covered with a thin layer of rubber cement, shellac or like substance.

It is preferred to wind the bristles in the form of a strip as by so doing the rotary brush is provided with a plurality of convolutions which are helically arranged on the brush, which helical arrangement prevents streaking on the surface of the work, especially on silver, steel, brass and like surfaces.

It will be observed that a rotary brush having a working surface of any desired width within limits may be made by means of strips of bristles and rubber of a length greater than the circumference of the mandrel and the cost of production may thus be materially reduced. The strips of rubber may be of any desired thickness.

While it is preferred to use the bristles in strip form, it is not desired to limit the invention in this respect, as the bristles may be laid by hand upon the rubber layer on the mandrel or they may be stapled or otherwise secured to the rubber.

It will also be observed that the density of the working surface of the brush may be adjusted to the particular kind of work which is to be performed by the brush. Some kinds of work require a brush in which the bristles are dense, and other kinds require a brush in which the bristles are not so dense, and these conditions may be met by varying the number of bristles in the bunches and the thickness of the rubber layer for a given width of brush.

It will further be observed that the butt ends of the bristles are embedded or set in a rubber

hub, which renders the brush water and oil proof, and the bristles are permanently affixed in the hub and dislodgment of the bristles or disintegration of the brush by centrifugal force under conditions of use is avoided.

5 The free end of the strips of bristles and rubber of greater length than the circumference of the mandrel may be secured before the head 21 is placed on the mandrel by a staple 35 or otherwise so as to prevent said strips from unwinding more or less while the head 21 is being placed on the mandrel.

10 It is preferred to connect the bristles together by the weaving wires 16, but it is not desired to limit the invention in this respect, as they may be connected together by sewing or in any other suitable manner.

15 What is claimed is:

In a rotary brush adapted for high speed ro-

tation, an integral substantially cylindrical hub of vulcanized rubber having an axial aperture therethrough by which the hub may be mounted for rotation, a plurality of bunches of bristles arranged in at least one row extending around said hub, each of said bunches extending substantially radially of said hub and having one end extending a substantial distance into said hub, the rubber of said hub extending into said bunches between the bristles thereof and actually between said bunches so that said end of each said bunch is embedded in the rubber of said hub to secure the same against the action of centrifugal force under high speed rotation, the rubber of said hub being softer adjacent the periphery thereof than adjacent said aperture so as to cushion said bunches against circumferential forces.

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