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 MANUFACTURE OF BRUSHES.  
 APPLICATION FILED OCT. 29, 1918.

1,413,211.

Patented Apr. 18, 1922.

2 SHEETS—SHEET 2.

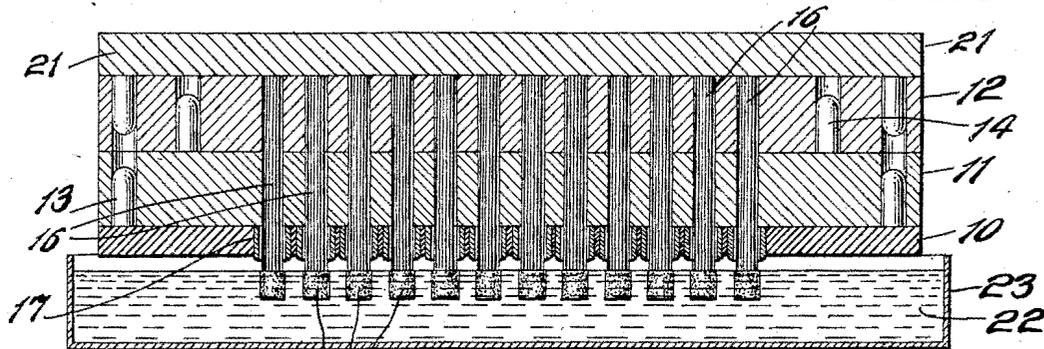


Fig. 6.

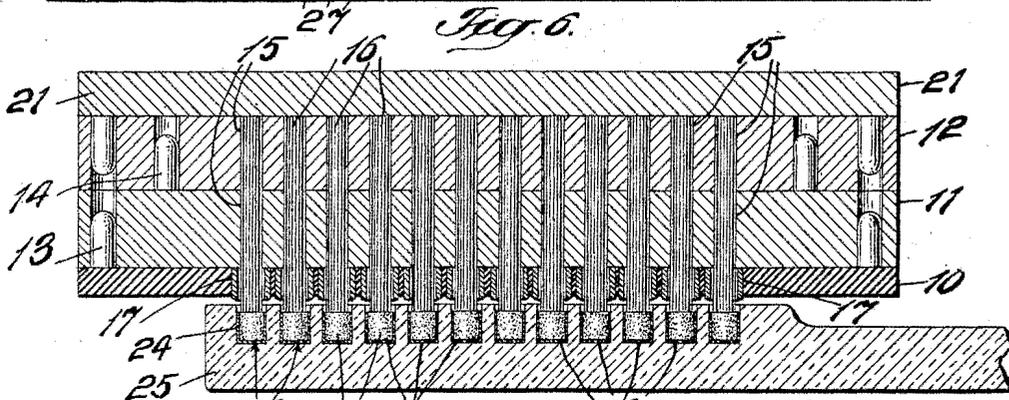


Fig. 7.

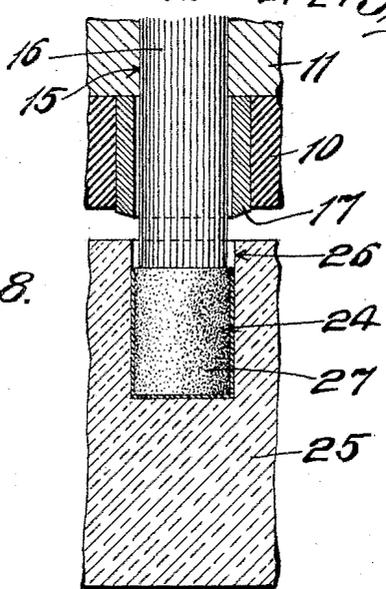


Fig. 8.

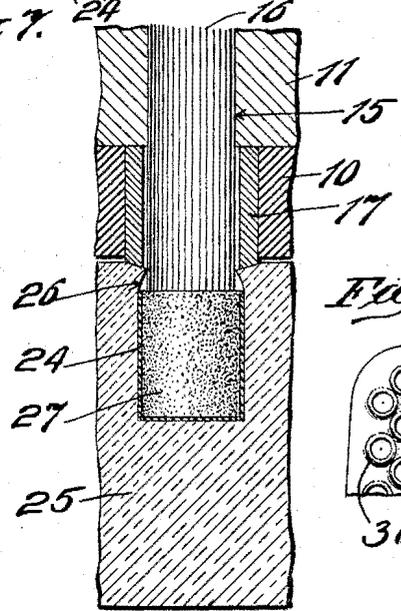


Fig. 9.

Fig. 12.

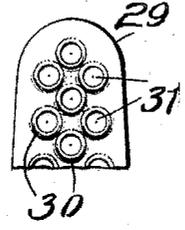
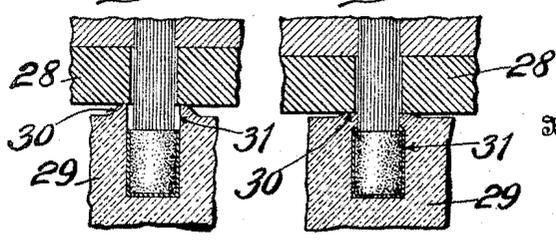


Fig. 10.

Fig. 11.



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# UNITED STATES PATENT OFFICE.

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## MANUFACTURE OF BRUSHES.

1,413,211.

Specification of Letters Patent. Patented Apr. 18, 1922.

Application filed October 28, 1918. Serial No. 259,929.

*To all whom it may concern:*

Be it known that I, ANDREW ALBRIGHT, Junior, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in the Manufacture of Brushes, of which the following is a specification.

The invention consists in a novel method of producing brushes.

The brush produced by my invention comprises a back or body portion of any suitable or desirable outline having a series of sockets or recesses therein, and a series of tufts of bristles secured within said sockets or recesses, said tufts having the bristles at the knot ends thereof secured together by rubber vulcanized thereon and said tufts thus formed being secured within said sockets or recesses by a cementitious material applied on the knot ends of the tufts and also by the material of the back or body portion of the brush surrounding the individual sockets or recesses being crowded or compressed inwardly against the said tufts above the knot ends thereof, the upper ends of said sockets or recesses being thereby closed against the tufts. The back or body portion of the brush will preferably be an integral piece of celluloid or other pyroxylin material, and the cementitious material applied on the rubber heads at the knot ends of the tufts will preferably be a pyroxylin cement adapted to adhere to and become integral with the walls of the sockets or recesses in the back or body portion of the brush. I find that celluloid is of a nature which will permit of its being crowded or compressed inwardly around the upper ends of the sockets or recesses in the back or body portion of the brush so as to close said sockets or recesses against the tufts and thereby aid in securing the tufts in rigid position.

In carrying out my invention by the preferred method, I provide a block or blocks formed with holes defining the outline of the brush and into which the bristles for the tufts are sifted or threaded, and at the bottom of the blocks I secure a metal mold or dieplate having apertures aligning with the holes in the aforesaid blocks, and into these apertures the bristles for the tufts extend. Primarily the bristles also extend above the forming block or blocks. After the bristles for the several tufts have been arranged in

the block, or blocks if two are employed in superimposed relation, and the aforesaid dieplate, the bristles for the tufts are pushed downwardly until their lower ends project below said die-plate, and thereupon all of said projecting ends of the bristles are dipped in a rubber solution. After the block and plate are lifted upwardly to carry the tufts from the solution, I preferably allow the whole to stand for a suitable time, say, over night, to give the rubber an opportunity to become partly dried or cured by exposure to the atmosphere, and thereafter the metal die-plate is slipped downwardly from the blocks and the knot ends of the tufts carrying the rubber become inclosed within the apertures in said plate, and thereupon I place the whole upon a steam or other heated table, said plate with the knot ends of the tufts and the rubber thereon confined in the apertures therein being placed directly on said table, upon which the whole is allowed to stand until the rubber has become properly vulcanized to form heads of definite outline on the ends of the tufts and securely bind the bristles of each tuft together. After the vulcanization of the rubber heads on the individual tufts, the block or blocks, plate and tufts are removed from the steam table, and thereupon the dieplate is slid upwardly on the tufts so that the knot ends of the tufts project below the same, and at this stage I dip the series of projecting knot ends of the tufts in a cementitious solution, preferably of pyroxylin character, and immediately thereafter insert all of said knot ends at one operation into the series of sockets or recesses provided in the back or body of the brush, and upon this having been done I crowd or compress the material of the said back or body around the upper ends of the sockets or recesses therein inwardly against the tufts and above the rubber heads formed on the knot ends thereof, thereby securing the tufts in said back or body.

The invention will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which:

Fig. 1 is a top view of certain superposed plates or blocks utilized by me for forming the tufts for and in carrying out other steps of my process in the manufacture of brushes;

Fig. 2 is a vertical longitudinal section through the same, taken on the dotted line

2—2 of Fig. 1, and illustrating the several blocks or plates with the bristles for the tufts threaded into the same, the upper ends of the tufts being shown as projecting above the upper block or plate of the series;

Fig. 3 is a corresponding view of the same showing a further step in the process, Fig. 3 illustrating the tufts as having been pressed downwardly until the lower ends thereof project below the lower or die-plate of the series and as dipped into a rubber solution;

Fig. 4 is a corresponding view of the same showing the plates and tufts after the knot ends of the tufts have received the rubber solution and the bristles of the respective tufts have become bound together thereby;

Fig. 5 is a corresponding view showing a still further step of the process, this consisting in the separation of the lower or die-plate from the two upper plates and the positioning of said die-plate to receive in the apertures therein the knot ends of the tufts carrying the rubber solution preparatory to the vulcanization of the rubber;

Fig. 6 illustrates, in vertical section, the series of plates or blocks as having been brought together and as having had a top plate placed thereon for maintaining the series of tufts with their knot ends projected below the die-plate and also illustrates that step of the process involving the dipping of the vulcanized knot ends of the tufts into a cementing solution, preferably a pyroxylin cement, preparatory to the tufts being applied to a celluloid or pyroxylin brush back;

Fig. 7 is a corresponding section illustrating the further step of the process which consists in applying the tufts while within the series of plates to the recesses or sockets in a brush back, the brush back being indicated in section;

Fig. 8 is an enlarged vertical section through a portion of the mechanism and brush back and illustrates the knot end of a tuft as being in a socket or recess of the brush back;

Fig. 9 is a corresponding view indicating a further step in the process which consists in forcibly moving the plates downwardly against the brush back so that the die-plate of the series may crowd or crush the material of the brush back annularly around the recesses therein and against the knot ends of the tufts;

Fig. 10 is a view substantially corresponding with Fig. 8 but illustrating a modified structure of the brush back, the back in this instance having a shoulder formed around each of the recesses therein to be crowded or crushed downwardly at the proper time for closing the upper end of said recesses and locking the knot ends of the tufts therein;

Fig. 11 is a view substantially corresponding with Fig. 9 and illustrates the die-plate,

in this instance having a smooth lower surface, as pressed downwardly on the shoulder surrounding the recesses of the brush back for the purpose of closing said recesses around the knots of the tufts, and

Fig. 12 is a top view of a portion of a brush back of the character shown in Fig. 10, said back having tuft receiving sockets or recesses surrounded by annular ribs or shoulders.

In the drawings, 10, 11, 12 denote three superimposed plates or blocks aligned together by means of pins 13, 14 of customary and known character, the plate 10 being a metal die-plate and the plates 11, 12, which may be wooden blocks, being formed with corresponding vertical holes 15 into which the bristles for the tufts 16 are threaded and which holes 15 are so disposed as to represent the outline of the bristle portion of a brush, as indicated in Fig. 1, in which the holes 15 for the tufts, approximately represent the outline of a tooth brush back. The die-plate 10 differs from the plates 11, 12 in that it is formed with holes which align with but are of greater diameter than the holes 15 in the blocks or plates 11, 12. In the preferred construction the die-plate 10 is equipped in its apertures or holes with bushings 17 which project below the plate 10 and have beveled lower edges, the lower annular edges of said bushings being tapered downwardly and inwardly, as clearly shown in the drawings. The holes within the bushings 17 align with the holes 15 in the blocks or plates 11, 12, but are greater in diameter than said holes 15, since the bushings are intended not only to receive the bristles for the tufts 16, but the rubber or other solution applied on the knot ends of said bristles to form the tufts and secure the bristles of each tuft together.

Fig. 2 illustrates the several plates or blocks as having had the bristles for the tufts 16 threaded into the holes thereof, said bristles terminating at the lower edges of the bushings 17 and extending above the upper surface of the block or plate 12, this being the normal condition of the bristles for the several tufts in the first step of the process of forming the tufts.

In Fig. 3 I illustrate the second step of my process, and in Fig. 3 it will be seen that the tufts of bristles 16 have been moved downwardly through the several plates until the upper ends of said bristles are on a level with the upper surface of the plate 12 and the lower ends of said bristles are correspondingly projected downwardly below the die-plate 10.

When the bristles for the various tufts are in the relation to the several plates shown in Fig. 3, I use said plates as a means for carrying the various tufts and in dipping the lower ends of said tufts into a rubber solution 18 contained within a suitable pan

or the like 19, so that the said ends of the bristles of the individual tufts may be secured together, the lower ends of the bristles of each tuft or bunch independently receiving the rubber or other binding solution so that on the lower end thereof a head is formed securing all of the bristles of the bunch or tuft together. When the lower ends of the tufts are dipped into the rubber solution, said solution will enter in between the bristles of the tufts and thoroughly coat the ends of the same and form heads of rubber on said tufts, as represented at the lower portion of Figs. 3 and 4. After removing the series of tufts from the rubber solution, I allow the rubber on the ends of the tufts to partly cure or oxidize by exposure to the air for a limited period, preferably allowing the blocks, die-plate and bristles to stand over-night, preparatory to the vulcanizing of the rubber on the ends of the tufts, this condition being represented in Fig. 4.

The next step in my process is to slide the die-plate 10 toward the lower ends of the tufts 16 until the knot ends of the tufts carrying the rubber are within the bushings 17, or to the position shown in Fig. 5, and thereupon I place the several plates when in the condition and relation to each other shown in Fig. 5, upon a steam or other heated table, which may be represented by the line 20 in Fig. 5, and allow the same to remain on said table until the vulcanization of the rubber has been completed. The heat of the table 20 will be imparted to the plate 10 and bushings 17, and first the heads of rubber at the ends of the tufts will become softened and conform to the shape of the bores of the bushings 17, and thereafter the continued action of the heat will result in the rubber of the heads becoming vulcanized and in said heads taking the form of the bores or openings in said bushings and firmly binding the bristles of each tuft together.

After the rubber on the ends of the tufts has become properly vulcanized I slide the plate 10 up against the plate or block 11 and apply a top plate or block 21 against the upper ends of the series of tufts, pressing said tufts downwardly with the aid of said plate or block 21 in an even manner until the knot ends of the several tufts project below the plate 10, as I represent in Fig. 6. I then utilize the several plates or blocks holding the series of tufts as a means for dipping the knot ends of the tufts into a cementitious solution 22 contained within a suitable pan or the like 23, as shown in Fig. 6, so that the rubber heads on the knot ends of the tufts may receive a thin coating, which I number 24 in Fig. 7, of the cementitious material. The material 23 will preferably be in the nature of a pyroxylin cement, especially when the tufts are to be

applied to a brush body or back 25 of celluloid or other pyroxylin material.

After the tufts have received their coating 24 of the cementitious material, all of the knot ends of the tufts, while the tufts are still held within the several plates or blocks, are introduced into the recesses or sockets 26 provided within the back or body 25, as shown in Fig. 7. The recesses or sockets 26 in the brush back or body 25 are of greater depth than the height of the heads, which I number 27, on the knot ends of the tufts, so that a space or clearance approximately about one-thirty-second of an inch is left in said sockets or recesses above the material on the knot ends of the tufts, as represented in Figs. 7 and 8.

The next step in my process of manufacture, from that shown in Figs. 7 and 8, is to forcibly press downwardly against the body or brush back 25 the several superposed blocks or plates and to thereby cause the lower beveled edges of the bushings 17 to crowd or compress the material of said body or back an annular lines surrounding the respective recesses or sockets 26 inwardly against the bristles of the tufts and above the heads 27 formed thereon, as shown in Fig. 9, whereby in addition to the action of the coatings 24 of cementitious material on the heads 27, the tufts become securely anchored within the body of the back 25 by the closing of the upper edges of the recesses or sockets 26 against the same. Thereafter the assembled plates or blocks may be stripped upwardly from the tufts, leaving the tufts in the brush body or back 25, thereby completing the operation of not only forming the tufts, but securing them in position in a brush back or body, all of the tufts being secured in position simultaneously and in the outline predetermined for the brush.

In lieu of employing the bushings 17 having the beveled lower edges, I may employ a die-plate of the modified form numbered 28 in Figs. 10 and 11, said plate having a smooth lower surface instead of the projecting beveled surfaces presented by the bushings 17.

In the employment of the plate 28 I will form around the upper edges of the recesses or sockets in the brush back or body, numbered 29 in Figs. 10 and 11, annular ribs or shoulders 30 surrounding the upper ends of the respective recesses or sockets in said brush back or body, and after the knot ends of the several tufts have been introduced into the recesses or sockets of the brush back or body 29, the series of plates will be forcibly pressed downwardly so as to crowd or crush the material of the annular ribs or shoulders 30 inwardly above the heads formed on the knot ends of the tufts, thereby moving a portion of the material of the back or body 29 inwardly against the tufts

and above said heads, as represented in Fig. 11, and securing the tufts in position. In Fig. 12 I illustrate a top view of a portion of a brush back or body 29 equipped around 5 the upper ends of its sockets or recesses 31 with the annular ribs or shoulders 30.

The plates 11, 12 may be in one piece or form a single block, but I preferably form the same in separate parts to be keyed together so that they may be adapted to tufts 10 varying in length in accordance with the style of brush desired. One plate or block, such as 11, would be sufficient for short length tufts, but when tufts of the custom- 15 ary length for tooth brushes are to be produced, I preferably use two plates or blocks 11, 12. The thickness of the blocks or plates 11, 12 or of one block, if one is made use of instead of two, will necessarily vary with the 20 lengths of tufts to be produced.

After all of the tufts have been applied to the brush back or brush body, the tufts may be trimmed, as usual, for the varying 25 styles of brushes and the back or body of the brush may be polished or otherwise treated, as may be desirable.

What I claim as my invention and desire to secure by Letters Patent is:

The improvement in the art of brush 30 making which consists in providing a brush

back in one integral piece of pyroxylin material having a series of tuft-receiving sockets extending inwardly from the face thereof, forming the tufts of bristles with 35 heads on their knot ends firmly holding the bristles of the respective tufts together, said heads being adapted to said sockets and less in height than the depth of the sockets and extending outwardly from and annularly 40 around the tufts, applying a pyroxylin cement on said heads, introducing the knot ends of the tufts into said sockets, and closing the upper ends of said sockets annularly 45 around said tufts by crowding the material of the brush back at the upper ends of the sockets inwardly against the tufts above the heads on the knot ends thereof, and thus close the sockets and secure the tufts, by 50 pressures applied to the face of the back simultaneously at and annularly around said ends of said sockets.

Signed at Newark, in the county of Essex, and State of New Jersey, this 23rd day of October, A. D. 1918.

ANDREW ALBRIGHT, JUNIOR.

Witnesses:

THOMAS F. BARRY,  
O. GARNETT BUDDISH.

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