2 Sheets—Sheet 1.

B. L. BUDD.

BRUSH.

No. 190,120. Patented May 1, 1877.

Fig. 1.

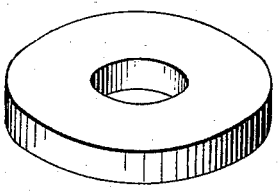


Fig. 2.

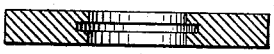


Fig. 3.

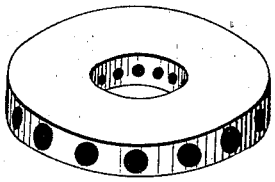


Fig. 4.

Fig. 5.

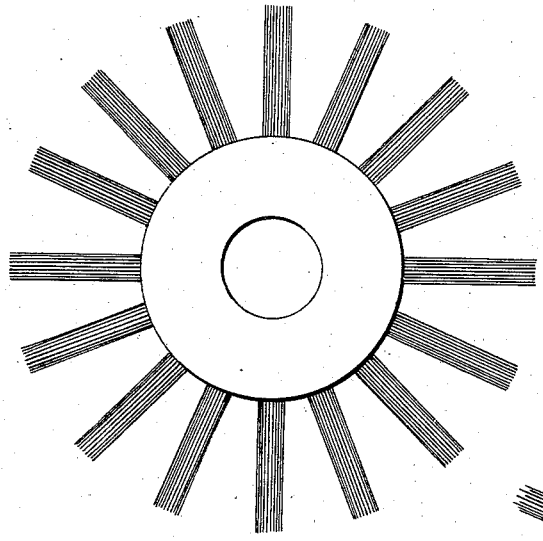


Fig. 8.

Fig. 6.

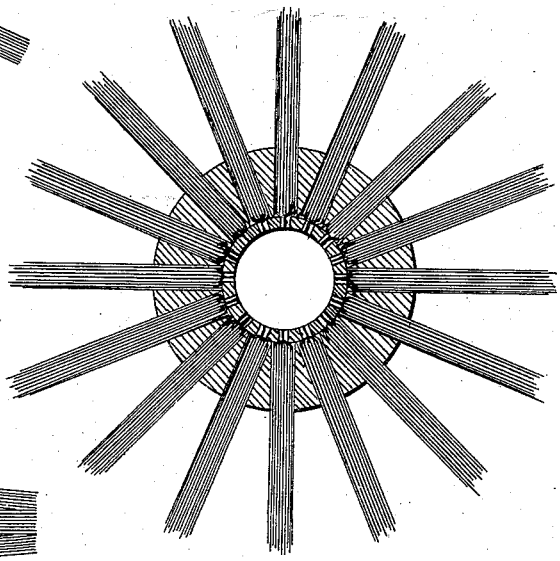
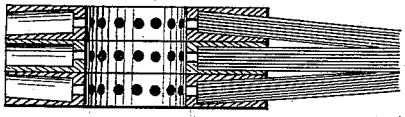


Fig. 9.



Witnesses:

T. C. Brecht.

Sam'l Stone

Inventor.

Benj. L. Budd

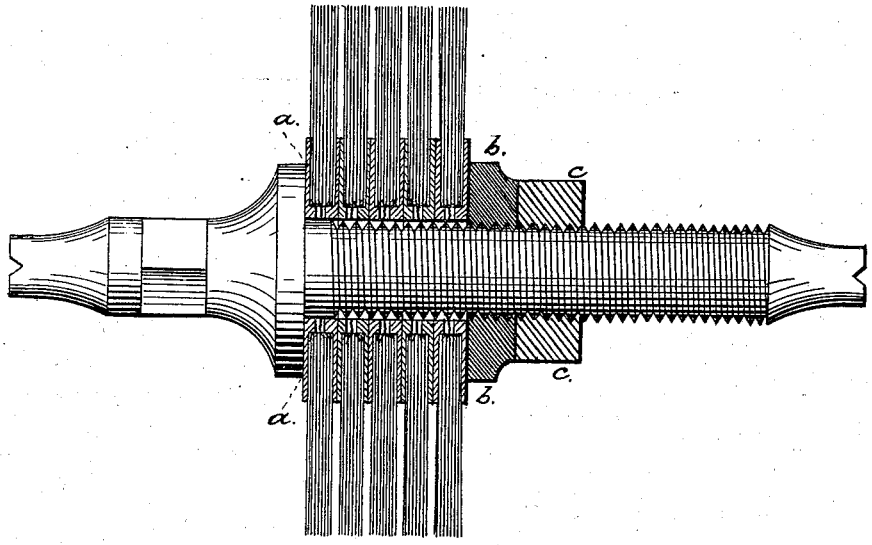
2 Sheets—Sheet 2.

B. L. BUDD.

BRUSH.

No. 190,120. Patented May 1, 1877.

Fig. 7.



Witnesses:

T. C. Brecht.
Sam'l Stone

Inventor:

Benj. L. Budd

UNITED STATES PATENT OFFICE.

BERN L. BUDD, OF FAIRFIELD, CONNECTICUT.

IMPROVEMENT IN BRUSHES.

Specification forming part of Letters Patent No. **190,120**, dated May 1, 1877; application filed March 21, 1877.

To all whom it may concern:

Be it known that I, BERN L. BUDD, of the town and county of Fairfield, in the State of Connecticut, have invented a new and useful Improvement in Rotary Wheel-Brushes, which improvement is fully set forth in the following specification, reference being had to the accompanying drawing.

This invention relates to that class of brushes used by watch and clock makers, jewelers, metal-workers, platers, engravers, glass-cutters, polishers, and in the arts generally, and are what are ordinarily known in the trade as "wheel-brushes." They have heretofore been made upon wooden hubs, having the number of rows of "knots" required, all drilled into the one hub. It has generally been the custom, too, to hold these knots into the perforations with melted pitch, or the like. They are sometimes, however, drawn in with brass wire. By this method of using a solid hub it is almost impossible to make a full brush, as the holes cannot be drilled into a block so closely but that a considerable space must exist between the "knots," this space being greater or less, according to the size of the perforations, the diameter of the hub, &c.

My invention consists of one wheel-brush, or of a series of them, made by drawing but a single row of knots into the periphery of a hub only thick enough to hold a single row, and having no more substance around or between the knots than just sufficient to support them. For the reason that when metal is used this septum between the knots may be so much thinner, and consequently the knots brought so much nearer together, I prefer to make the hub or disk of metal, and in selecting metal give the preference to Britannia or pewter over others for several reasons: First, it is more easily worked. If required to be cast, metal molds may be used, and a large number rapidly cast in them, without being obliged to mold from a pattern in sand each time one is needed. Again, when very small brushes are used, as by watchmakers or jewelers, the hubs or disks may be punched out of sheet metal. Then they drill easily, and are more readily fitted to receive the knots of bristles, hair, tampico, wire, or other substance. These single-row wheel-brushes are then arranged upon a suitable mandrel, and the finished wheel-brush may consist of any number, from one upward, depending upon the width of brush required, and the kind of work to be done with it.

To manufacture these brushes I proceed as follows: I first prepare the hubs or disks, which may be of wood, bone, ivory, horn, hard rubber, or the various compositions resembling these substances, or, of what I prefer, metal. I then, with a tool for the purpose, turn a groove on the outer circumference of the central hole.

Figure 1 gives a view of the plain hub or disk. Fig. 2 gives a sectional view of the same after the groove has been turned on the circumference of the central hole.

In a machine which I have devised and constructed for the purpose, these hubs or disks are drilled accurately and rapidly upon their periphery, with any number of holes required. In drilling these holes I ordinarily use a double-pointed drill, so that at one operation I drill holes of two sizes, running through the hub from its outside circumference to the circumference of the central hole. The small hole runs all the way through, the larger hole not quite all the way, so that a shouldered hole is formed. This shouldered hole is to prevent the knots of bristles, or of such substance as may be used in the construction of the brush, from being pulled through into the central hole for the mandrel.

Fig. 3 shows a hub or disk drilled upon its periphery in the manner I have named. Fig. 4 shows a cross-section of this hub or disk, showing the shouldered hole for receiving the knot.

After preparing the hub or disk in the manner described, I now, by the ordinary methods in brush-making, draw into the peripheral perforations, using generally fine wire for drawing, either bristles, hair, tampico, wire, or such other substance as may be required. The use of the groove shown in Fig. 2 is now seen to be to receive the wire used in drawing in the knots. This wire is continuous, commencing with the first, and finishing with the last, knot, and as we pass from one knot to another the wire is, so to speak, hidden, or rather it is sunken so far, or far

enough below the surface of the circumference of the central hole that it offers no impediment to the introduction of the mandrel.

After filling the peripheral holes with knots in the manner I have described I take them to a machine I have devised and constructed for the purpose, and cut the bristles or knots to a uniform length. This is accomplished by placing the disk upon an adjustable gage, which moves in and out toward or away from the cutting-edges of a peculiarly-constructed pair of shears, so that the length of the bristles used, and consequently the diameter of the finished brush, may be of any size from a trifle larger than the disk up to two, four, six, or more inches in diameter.

Fig. 5 shows one of the disks filled with knots, which are trimmed to a uniform length.

Fig. 6 shows a similarly-filled disk with one surface removed, so that the shouldered holes, the knots resting against the shoulders, and the wire used in drawing the knots issuing from the smaller hole at the bottom, are all seen.

After the disks containing the knots are trimmed of a uniform length any number of them from one upward, depending upon the breadth of brush required, are placed one against another and a mandrel run through them. They are then held by some suitable device acting from the ends of the mandrel toward its center. It may be a mandrel with a thread cut from each end or, what I prefer, a mandrel, as seen in Fig. 7, with a fixed shoulder, *a*. The filled disks are then, as many as may be required, placed on the mandrel, shoved up to the shoulder *a*, a loose washer, *b*, placed against them, and a nut, *c*, screwed onto the mandrel, and the whole number of disks clamped firmly together. The Fig. 7 shows this arrangement. Five disks are arranged upon a mandrel, which is fitted toward one end, *a*, to receive a wrench by which it may be held against rotation. Now, I am prepared to show the advantages of my brush over ordinary wheel-brushes, where the knots are all drawn into a solid hub, instead of being in separate disks or sections.

In different kinds of work it is desirable to have different arrangements of the knots of the brush. Some require a very thick brush, with the knots close set and alternating. Others need a brush with the knots spirally arranged; in others, two reverse spirals meet at the center; in others still, the knots are best arranged in zigzag lines; while, finally, straight longitudinal lines are most suitable in a limited class. Moreover, owing to the wear coming unequally upon the face of the brush, it is desirable that the relations of the knots to each other and the position of the disks upon the mandrel should be capable of alteration, to bring the surfaces which have undergone least wear in position for action. Where the knots are not fixed, or their bases are exposed and in contact with each other, only one of these objects can be attained in a single brush. Where the disks carry more than one series of knots, said knots being set alternately and fixed, and their bases kept from contact with each other, and a number of disks are used, held on a mandrel between clamps, the device is susceptible of a limited number of permutations, chiefly to compensate for wear. Where the disks carry a single row of independent knots, and a number of disks are used, under the conditions immediately above stated, the device is susceptible of an indefinite number of permutations. Hence, in my device the knots in each disk being permanently held in position therein, and their bases being protected and kept from contact with each other by the thin septum of the disk in which they are held, by loosening or removing the nut their relations may be changed, they may be taken off and replaced in different order, or their number diminished or increased, whereby the advantages hereinbefore indicated as desirable are conveniently attained at will in the same brush.

In clamping up and holding in desired position the sections or disks by aid of the nut, the superiority of the white metal is seen, in that it, being yielding and soft, clamps more readily and firmly than a harder metal or alloy would do. Another advantage is in the fact that, in drawing in the knots into the holes, if the hubs or disks are made of hard metal it is apt to cut the brass wire with which the knots are drawn, and it is particularly desirable that the wire should be in a continuous unbroken piece from the first to the last knot. The advantage which metal has over other substances in making the hubs or disks is in the fact that the brushes may be used as well wet as dry.

A valuable modification of this brush can be made by altering the direction of the radial perforations. In some instances it is desirable to have a brush made thin on the edge but quite full of bristles. This is accomplished in the following manner: I take a disk radially perforated and filled in the ordinary method with the bristles inserted at right angles with the hole for the mandrel. I then place on each side of this disk which has been radially drilled the knots placed at an angle, as shown in Fig. 8.

In Fig. 9 is a section showing how the disk, filled in the ordinary way, is flanked on either side with a disk which has been drilled and the knots drawn in diagonally. The effect of this, as will be seen, is to make the brush very firm and very full upon the edge.

The metallic disks or hubs made to receive the knots, instead of having the central perforation for the pin or mandrel round, may have it square, triangular, or of any number of sides, and be set upon a mandrel of corresponding shape, being removed for each adjustment; but in such case the number of adjustments and of combinations formed is

necessarily more limited than where the central perforation is circular and the mandrel also circular, so that the disks may be turned freely thereupon.

I do not claim a single disk provided with knots irrespective of the number of rows of said knots; nor do I claim a brush consisting of a number of disks provided with knots, when said knots come in contact with each other at the base, or are not fixed and permanently held in position in the disk, or when said disks bearing knots are not adapted to be rotated on the mandrel, or removed or changed in position without temporary appliances to hold the knots; but

What I do claim as new, and desire to secure by Letters Patent, is—

1. A disk or hub having a single row of radial perforations and provided with a series of independent knots set in said perforations, substantially as and for the purpose described.

2. The combination of a series of disks, each having a row of radial perforations and provided with fixed and independent peripheral knots with a mandrel and suitable clamping devices, substantially as described.

3. The combination of a series of disks, each provided with peripheral knots, with a mandrel upon which they may be individually rotated or changed in relative position, and with clamping devices, whereby they may be held positively in reference to each other when adjusted, substantially as described.

4. The combination of a series of disks, each having peripheral knots, with a shouldered mandrel, whereupon their relation to each other may be altered, which is adapted to be held at one end against rotation, and at the other end having a nut, whereby the disks may be clamped and held in position, substantially as described.

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Witnesses:
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SAML. GLOVER.