March 27, 1928. 1,663,584

G. C. CLEAVES

BRUSH

Original Filed Aug. 25, 1920 2 Sheets-Sheet 1

FIG. I

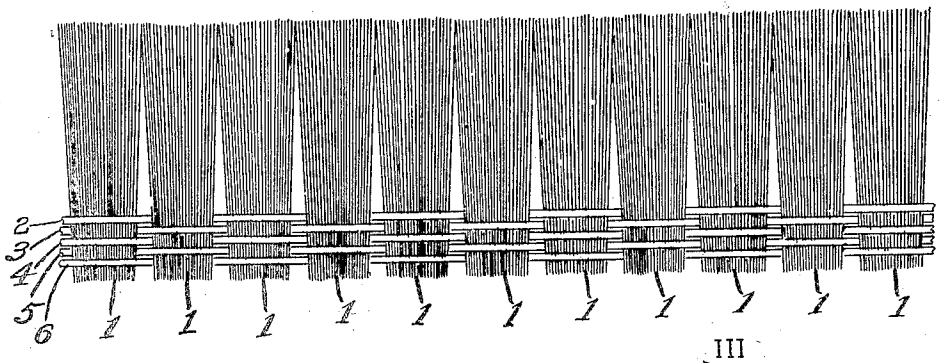


FIG. II

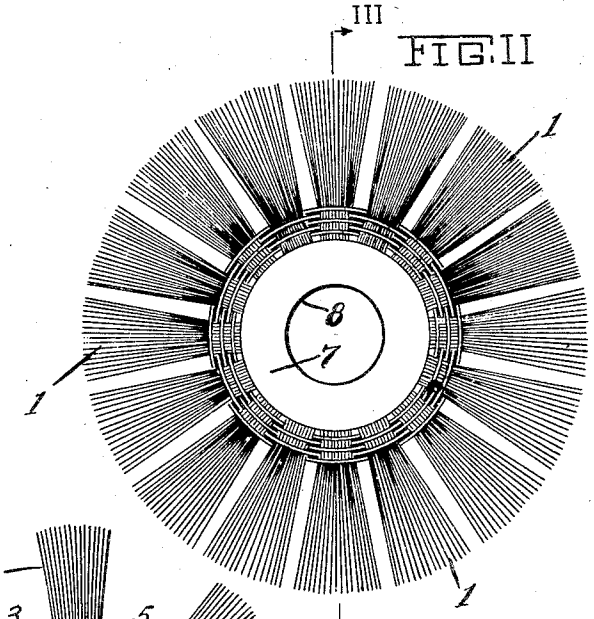


FIG. III

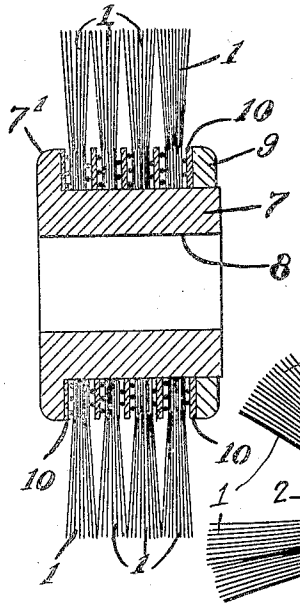
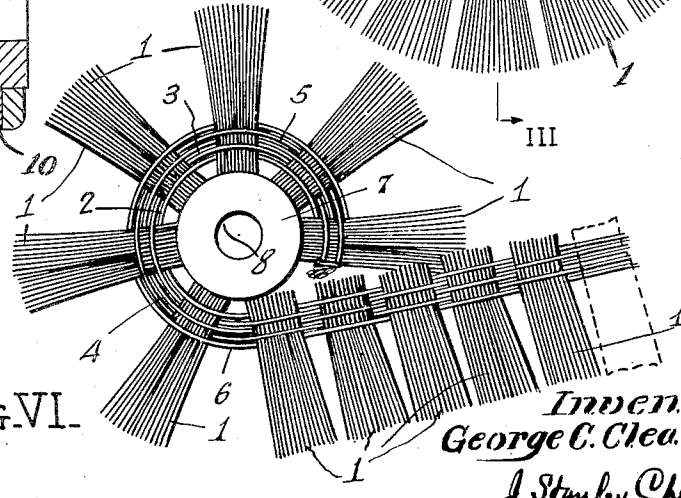


FIG. VI.



Inventor
George C. Cleaves
By J. Stanley Churchill
Attorney

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FIG. IV

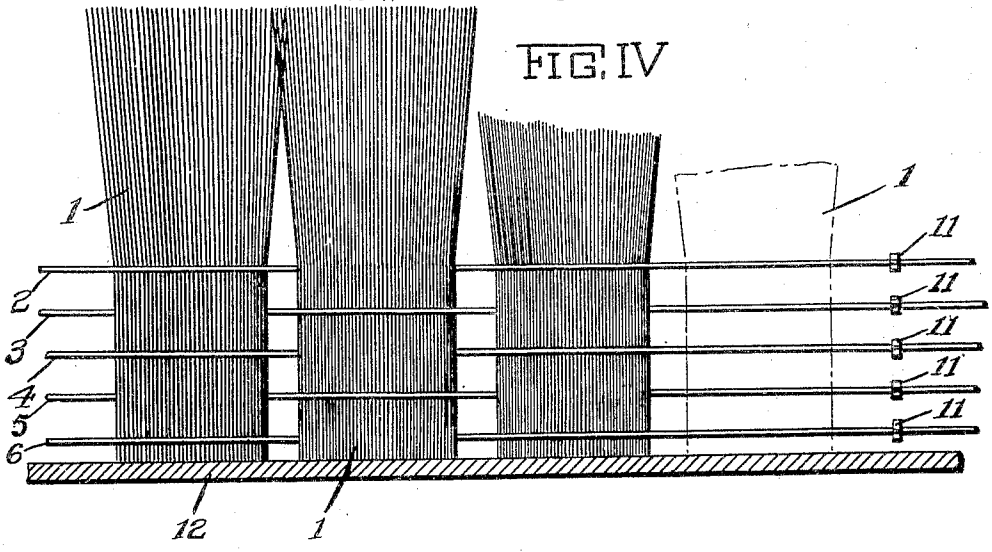


FIG. V

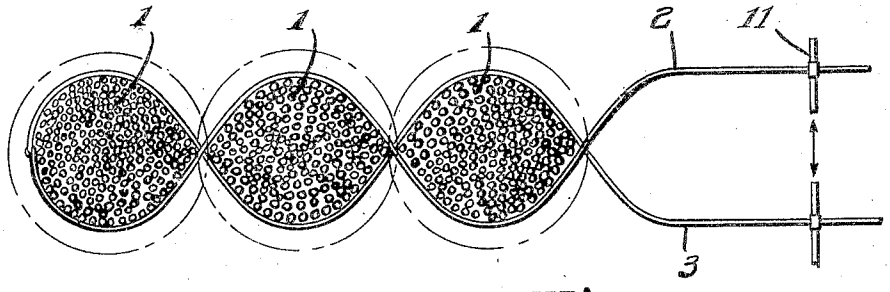


FIG. III A

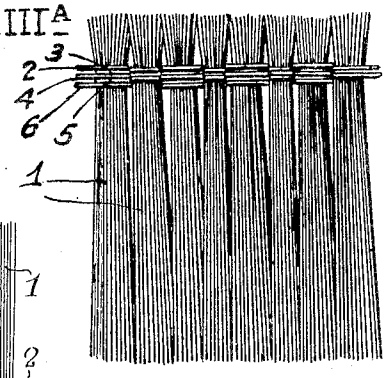
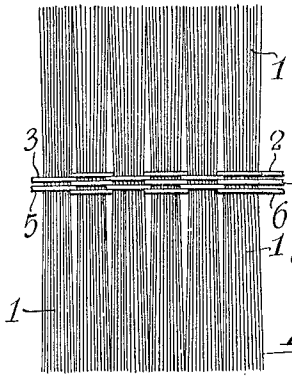


FIG. III b



Inventor
George C. Cleaves
By J. Stanley Churchill
Attorney

Patented Mar. 27, 1928. 1,663,584

UNITED STATES PATENT OFFICE.

GEORGE C. CLEAVES, OF WOLLASTON, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WILLIAM H. DOBLE, OF QUINCY, MASSACHUSETTS.

BRUSH.

Refiled for (abandoned) application, Serial No. 405,807, filed August 25, 1920. This application filed March 24, 1925. Serial No. 18,072.

This invention relates to brushes and to the manufacture of the same with a view to producing an improved article more rapidly and at less cost than is involved in the usual commercial article in the forms and manner now produced.

The invention has for its primary object to produce a novel web adapted for use in the manufacture of brushes and which itself is particularly adapted to be made by machinery. The improved web is also capable of embodiment in the brushes of different form.

A still further object of the invention is to provide a novel and improved construction of brush which may be economically manufactured and possesses superior strength and durability when compared with existing types of brushes.

With these objects in view, the invention consists in the web, brush, and methods of manufacturing both, as will be hereinafter described and particularly defined in the claims.

In the drawings which illustrate one embodiment of the invention, Figure I shows a tuft series characteristic of my invention; Fig. II a series disposed in circumferential arrangement as in a rotary brush; Fig. III a section as on the line III—III of Fig. II; Fig. III^a is a side elevation of a portion of the web of brush material embodying the present invention; Fig. III^b is a similar view showing a portion of an alternate form of web; Fig. IV illustrates in enlarged detail the weaving on the tufts in the web series; Fig. V is a sectional view of the same; and and Fig. VI is illustrative of the winding series to form a rotary brush.

Another feature of the invention contemplates a new article of manufacture comprising a novel web comprising as weft a plurality of bundles of bristles each containing a relatively large number of bristles flexible throughout their length and of small sectional dimension, and which are connected together to form the web by binding means preferably comprising binding strands woven about the individual bundles of bristles to form the web. This web is particularly useful in all of the different branches of the brush industry, as will be hereinafter described.

Referring now to the drawing, 1 represents a bundle of bristles containing a relatively large number of bristles each being flexible throughout its length and of relatively small sectional dimension, and which may in practice comprise any of the bristle stock used at present in the brush industry in the manufacture of commercial brushes. The bundles 1 may be formed manually or in any other convenient manner.

In accordance with the present invention a plurality of the preformed bundles 1 are connected together into the form of a web, and for this purpose as herein shown the adjacent bundles 1 are introduced into the shed or between the upper and lower sets of warp strands 2, 3, 4, 5, 6, forming a web in which the bundles all comprise the weft and the strands 2, 3, 4, 5, 6 comprise the warp. The shed may be formed in any suitable manner, and as herein shown treadles 11 are provided, see Figs. IV and V, which may be operated in the usual manner and by the usual mechanism, not shown. The individual bristles constituting the bundles 1 are preferably arranged so that the butt ends of the bristles lie substantially in the same plane and in practice the butt ends of the bristles are butted against a plane surface as the surface of a guide shelf or table 12. The bundles thus formed when embodied in the web are retained by the interlocking warp strands in this position.

It will be observed that the present web is of a construction such as to lend it particularly to manufacture by automatic machinery, and after the web is formed the individual bundles of bristles are maintained in predetermined position from which they may be removed when it is desired to manufacture any of the different types of brushes.

For example, in the paint brush industry the bundles 1 of bristles constituting the weft of the web are preferably of a size corresponding to the bundle of bristles which is to be introduced into the ferrule in the manufacture of the particular size of paint brush. A web is woven with bundles of the requisite size for this purpose and may be rolled up and stored and when used unrolled and the individual bundles of bristles removed one at a time by an operator from the web by unravelling the warp. The

bundles 1 of bristles thus removed from the web are in such a condition as to permit the operator to immediately introduce the butt end of the bundle into the ferrule without tapping down or otherwise altering the condition of the bristles in the bundle.

In the branch of the industry in which the set brushes are made and in which the bundles or knots of bristles are twisted into preformed holes or sockets in the brush block, the present web may be woven to include bundles 1 of a size corresponding to the size of the desired knot of bristle and the bundles stored in the form of the web and removed one by one by the operator in a preformed butted down condition ready to be twisted into the hole in the brush block. In addition to the economies effected by enabling the web to be formed by automatic machinery instead of by manual labor, the convenience in storage, and the preservation of the exact condition of the bristles constituting the individual bundles or knots 1 simplifies materially the handling of the knots and the operation of inserting them into the holes or sockets in the brush block. In the twisted wire brush industry and the wire drawn brush industry, the bundles 1 of bristles may be woven to form a web and in which the binding members are positioned midway the ends of the double length of bristles constituting the individual bundles. Even though the binding members be arranged near one end of the bristles in the manner illustrated in Fig. IV, the convenience in storing the bundles in the predetermined form in which they may be removed from the web and introduced between the bands of wire ready to be twisted, constitutes an important advantage, which when coupled with the fact that the manufacture of the present web may be readily made by automatic machinery, it will be seen that the present invention affords the basis of effecting important economies in these branches of the brush industry. In the twisted wire brush industry, the web may be woven or formed of bundles each containing a sufficient number of bristles to form an individual twisted wire brush, and in the use of the web the operator may select or remove a bundle from the web and spread out the bristle between the wires after which the wires may be twisted in the usual manner to form the brush. It will be observed that in this connection the improved web enables the large amount of weighings to be dispensed with and decreases the cost of the manufacture of twisted wire brushes accordingly.

In the drawings I have illustrated a rotary brush and a method of manufacturing the same involving the step of producing the improved web, and referring particularly to Figs. II, III and VI, as therein illustrated, the rotary brush is provided with a hub 7 having the usual mandrel opening 8. The hub 7 may be provided with the usual flange 7', and the web may be wound upon the mandrel in the manner illustrated in Fig. VI or individual lengths of web may be wound and spaced by the usual spacing disks 10 and the whole locked upon the hub by a ring or follower 9 of the construction at present employed in the manufacture of rotary brushes. In the manufacture of the brush, the butt ends of the bristles constituting the bundles 1 may and preferably will have cementitious or adhesive material applied thereto (not shown) and which may conveniently be applied by dipping a length of the web into the cement or like material, preferably as far as and including the binding members 2, 3, 4, 5 and 6. When the cementitious material dries and hardens, the cement serves to assist in imparting rigidity to the butt end of the brush structure.

From the description thus far it will be apparent that a web or fabric embodying the present invention is particularly adapted for use in various ways in the brush industry as it now exists, effecting important economies in the manufacture of the different kinds of commercial brushes now upon the market.

It will be observed by reference to the drawings, and particularly to Figs. I and IV, that the binding or warp strands 2, 3, 4, 5 and 6 comprise an odd number of binding strands and that they are so woven in and around adjacent bundles that each of the warp strands or members extends around and engages the same side of alternate bundles of the bristles and the opposite side of an intermediate bundle of bristles. This arrangement is important in order that in the finished web the bundles will arrange themselves in substantial alinement.

The term "bristle" as used throughout specification and the claims is intended to include those flexible relatively small members at present used by the brush industry in the manufacture of brushes including the natural bristles, fiber bristles, hair, wire, and the like.

While the preferred form of the invention has been illustrated and described, it is to be understood that the invention may be embodied in other forms within the scope of the following claims:—

1. A woven web for use in the manufacture of brushes comprising as weft a plurality of separate individual bundles of bristles arranged with the butt ends of the bristles lying in substantially one plane, and comprising as warp a plurality and an odd number of binding strands woven around said bundles near the butt ends of the bristles, each of said bundles of bristles containing a relatively large number of substan-

tially straight bristles flexible throughout their length, of relatively small sectional dimension and extending substantially parallel to one another and at substantially right angles to the binding warp, and each of the warp members extending around and engaging the same side of alternate bundles and the opposite side of an intermediate bundle.

2. A woven web for use in the manufacture of brushes comprising as weft a plurality of separate individual bundles of bristles, and comprising as warp a plurality and an odd number of binding strands woven around said bundles near the butt ends of the bristles, each of said bundles of bristles containing a relatively large number of substantially straight bristles flexible throughout their length, of relatively small sectional dimension and extending substantially parallel to one another and at substantially right angles to the binding warp, and each of the warp members extending around and engaging the same side of alternate bundles and the opposite side of an intermediate bundle.

3. A woven web for use in the manufacture of brushes comprising as weft a plurality of separate individual bundles of bristles arranged with the butt ends of the bristles lying in substantially one plane, and comprising as warp at least three binding strands woven around said bundles near the butt ends of the bristles, each of said bundles of bristles containing a relatively large number of substantially straight bristles flexible throughout their length, of relatively small sectional dimension and extending substantially parallel to one another and at substantially right angles to the binding warp, and each of the warp members extending around and engaging the same side of alternate bundles and the opposite side of an intermediate bundle.

In testimony whereof I have signed my name to this specification.

GEORGE C. CLEAVES.