

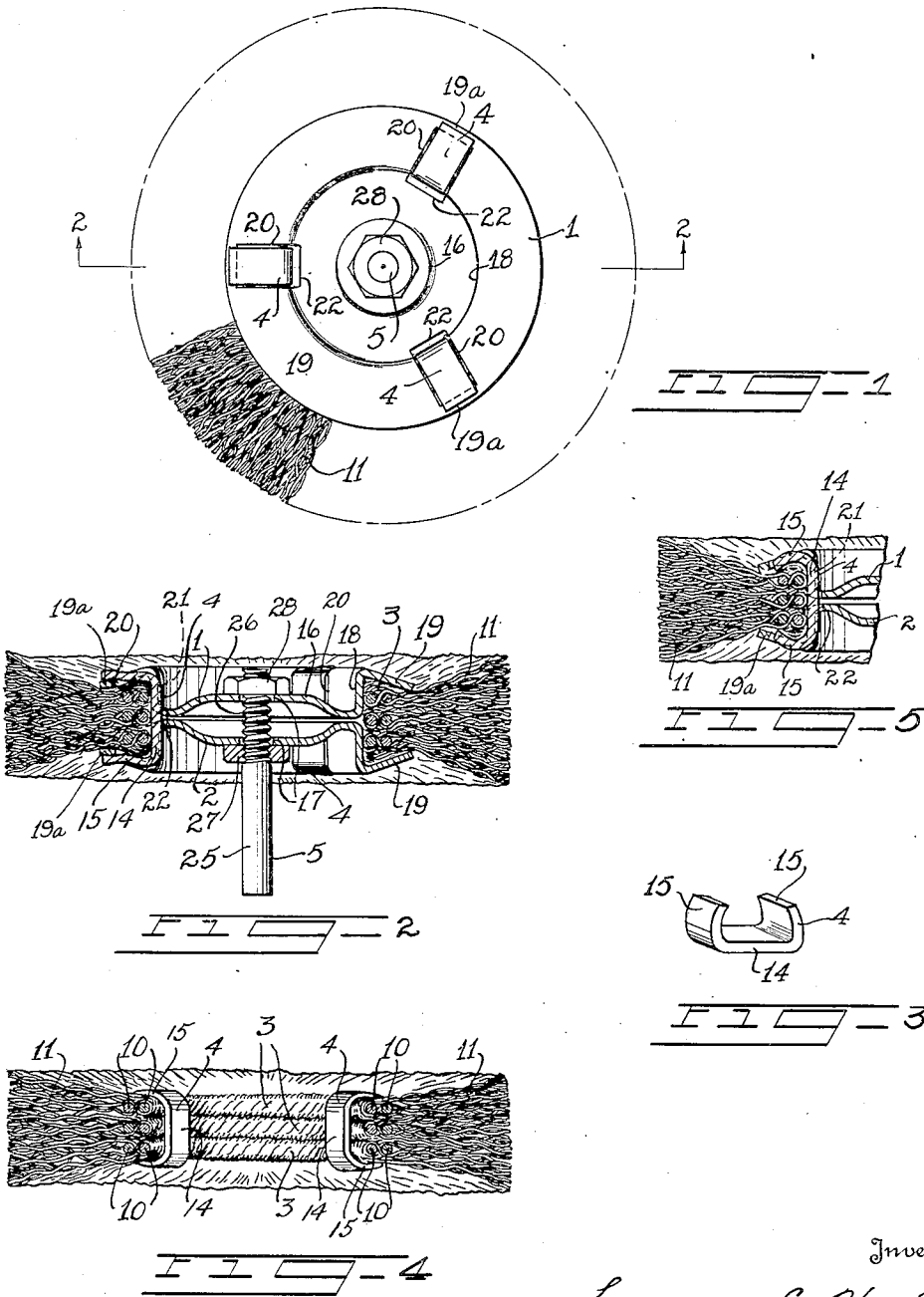
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ROTARY BRUSH

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## UNITED STATES PATENT OFFICE.

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## ROTARY BRUSH.

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This invention relates to rotary brushes for cleaning and buffing purposes, and particularly to a rotary wire bristle brush. The embodiment of the invention illustrated is similar in some respects to the structure shown in the prior patent to M. X. Gardner, No. 1,059,858, issued April 22nd, 1913, in which patent I hold an interest.

Brushes made in substantial accordance with the showing of this patent have been in general use for years. One limitation of the construction is that the side plates which function as bristle supporting members while affording a driving hub, have to be fastened together as by the use of clamping members on the drive shaft, whereas by the use of the present invention I am able to hold a pair of plates together on the brush without additional manufacturing expense, and without such a shaft. A further practical limitation of the prior construction is that when the device is mounted on a shaft, both ends of such shaft protrude beyond the general plane of the bristles. This is, of course, necessary on one end of the brush to provide sufficient length of the shaft to drive the brush, but where the brush is used for endwise cleaning, for example, as in cleaning a recess in a large casting, the protruding end opposite the drive portion interferes with the most effective use of the brush. This was practically essential in the previous construction in order to provide sufficient hub strength. The necessity for having the shaft protrude from both ends of the brush is overcome by the present construction as will be presently shown while still maintaining sufficient hub strength.

A further disadvantage of the previous construction was that the parts had to be machined after being originally formed, whereas the present device which is made of pressed metal needs no machining operations after its original formation by dies, and in addition the present construction affords a much lighter mounting for a given size.

In the former construction the bristle elements are held together by U-shaped clamping members which rest in recesses in the driving discs in order to form an inter-lock between the bristle elements and such driving discs. In the present construction, I provide "through" openings in the driving discs which not only permits the clamping members to be of any thickness as determined by

the length of the brush, but also permits the ends of the clamping members to extend in overlapping relation to the discs on the outside, thereby holding the entire mounting together as a rigid unit without the use of retaining means, such as clamping nuts on a drive shaft, as was necessary in the previous constructions.

With the above in mind, the general object of the invention may be stated to be the provision of a better as well as a more simplified rotary brush construction. A further specific object is to provide a brush construction including side plates for bearing against opposite ends of a gang of annular bristle elements which arrangement will permit the use of simple clips for either binding the bristle elements together without the side plates to be later applied, or for binding the side plates and bristle elements into a self sustaining assembly.

A further object is to provide a brush mounting wherein the bristle element clamping members may vary in thickness as determined by the length of the brush to be supported and which, regardless of such variation, will fit end plates of a single size and form equally well.

Further objects and features of the invention will become apparent from the following description relating to the accompanying drawing. The essential characteristics are summarized in the claims.

In the drawing, Fig. 1 is an end view of the preferred form of brush made in accordance with my invention; Fig. 2 is a substantially central transverse sectional view, as indicated by the line 2-2 on Fig. 1; Fig. 3 is a perspective view of the preferred form of bristle clamping device; Fig. 4 is a longitudinal central cross sectional view of the brush gang assembly, exclusive of the hub members; and Fig. 5 is a fragmentary view similar to Fig. 2, but showing a modification as to the bristle retaining means.

Referring in detail to the drawing, the brush comprises generally two substantially identical discs indicated at 1 and 2, a series of bristle elements, three in number as shown, designated 3, combination clamp and key members 4, and a driving shaft 5, engaging the discs 1 and 2.

The discs 1 and 2 serve primarily as mountings for holding the bristles in proper relation to a driving shaft. The discs are pref-

erably formed of pressed metal with oppositely dished hub portions proper designated 16, thereby providing spaced bearing contact with a shaft. The portions 16 are centrally apertured as at 17 to receive such shaft. The discs have substantially cylindrical portions 18 leading laterally from the hub portions 16, the outer edges of the cylindrical portions being flanged outwardly as at 19, but each flange converging toward the other at the outer edges to form, with the portions 18, an annular channel restricted at the outward edges of the flanges. The outwardly restricted peripheral channel holds the gang of bristle elements with the outer edges of the flanges bearing directly on the bristles and the more enlarged inner portion affording room for the heavier central portions of the bristle elements which will be hereinafter described in detail.

The engagement between the side flanges 19 and the adjacent bristle elements, due to clamping the discs together, is not of itself sufficient to insure against slippage between the brush proper and discs, and the clamp members 4 provide keys between the bristle elements and the discs. This key effect is brought out particularly in Figs. 1, 2 and 5, wherein it will be seen that "through" openings are provided in the flange and cylindrical portions of the members 1 and 2, the openings extending inwardly somewhat along the portions 16 of the discs. The different portions of these openings are designated 20 as to the flanges 19, 21 as to the cylindrical portions, and 22 as to the outer edge of the portions 16. The base portion 14 of each clamp member (see Fig. 3) lies along the through opening portion 21, bridging from one disc to the other, thus forming a key between the two discs while at least portions of the bent up ends 15 of the clamp members lie in the through opening portions 20 forming a direct key effect between the discs and outermost bristle elements. The outer or peripheral surfaces of the cylindrical portions 18 of the discs preferably fit snugly against the bristle elements throughout their entire extent, except of course, at the openings for the clamp members 4.

Referring particularly to Fig. 4, each bristle element preferably comprises two comparatively heavy strands of wire 10 forming a base, the two strands being twisted together, the ends of the wire being joined as by welding. The bristles 11 may be individual open loops of comparatively light wire bound between the twisted base wires, the free ends extending outwardly away from the axis of the base ring. The individual bristle elements so formed are self-sustaining and only one, if properly supported, may form a complete brush. It is desirable in order to make a brush thick enough for many purposes, to

superimpose several of these elements as shown in Fig. 4. Any convenient number of these may form a self-sustaining assembly by binding them together as by the clamping members 4. The clamping portions 15 of these members 4 are bent tightly against the outer sides of the outermost bristle elements, and may either stop short of the bridging portions 19<sup>a</sup> of the flanges 19, as in Fig. 5, or may be long enough to overlap these bridging portions, and thus clamp the discs together with the bristle elements, as shown in Figs. 1 and 2. Three of these members 4 have been found sufficient to clamp as high as ten of the bristle elements in the proportions shown. More may be required for a brush of unusually large diameter.

It will be seen that the arrangement described has several advantages, for example, the clamp members 4 may be of any desired gauge, depending on the number of brush elements to be supported, since in the case of a comparatively long brush, say five to ten elements, a heavier clamp member will be needed. This extra gauge is accommodated simply because, in case thicker stock is used, the clamp members 4 simply extend a greater distance beyond the outer surfaces of the discs, and at the center will occupy more of the portions 22 of the through openings than would thinner clamp members.

A more striking advantage of the arrangement will be appreciated from a comparison of Figs. 2, 4 and 5. Figs. 4 and 5 show the unitary character of the bristle assembly when held by the clips 4 alone. If the ultimate user wishes to he may use a pair of side plates over and over again, simply replacing the worn out brush with a new unit, such as shown in Fig. 4. If, on the other hand, the user finds more economy in having his brushes ready for replacement, as a complete assembly, then by simply making the members 4 long enough to overlap the disc flanges 19 this complete self sustaining assembly may be supplied with practically no additional expense to the manufacturer, and without having to use such means, for example, as a "dummy" shaft to hold the discs in place. In following out the practice last outlined the discs on the worn out brushes are not wasted, but may be salvaged later, without having suffered damage in disassembly, and used again.

An additional advantage of the through openings is that if at any time the metal of any one of the members 4 becomes weakened, causing the gripping portions 15 to withdraw from the bristles this may be readily detected at a glance from an inspection of the outside of the brush, and the defect may be at once remedied either by replacing the clamp members or by repinching the end portions 15 against the brush. The brush does not neces-

sarily have to be dismantled to effect either replacement or reconditioning of the members 4.

The preferred form of adapter for attaching the brush to a hand chuck, as in connection with a flexible drive shaft, is shown in Fig. 2. This is very simple and comprises the shaft 5, which may be cylindrical at 25 and which is threaded at 26. The threaded portion extends through and beyond both discs. The threaded portion immediately adjacent the smooth portion 25 carries a nut 27 engaging the disc 2, and jammed against the non-threaded portion. This provides in effect a shoulder for the shaft. The outer end of the shaft carries a clamp nut 28 by which the discs may be drawn forcibly toward each other. The arrangement does away with the necessity for machining a shoulder on the shaft, thereby saving considerable expense both in machining operations and quantity of stock. The expense of the extra nut 27 is negligible in comparison.

It will be noted that with the present arrangement the end of the shaft opposite the driving end is well below the transverse plane of the bristles at this end, while at the same time, adequate two point bearing is had between the mounting and shaft by reason of the outwardly dished portions of the discs at 16.

I claim:

1. In a rotary brush, a series of annular bristle elements, circular binder members at the bases of the bristles, a pair of side plates having openings therein forming a support for the bristles and overlying the binder members, and U-shaped clips, positioned within said openings, embracing said binder members and having their ends extending in overlying relation to the side plates and holding the plates together.

2. In a rotary brush, a pair of retaining members, a series of annular brush elements retained between the members, said members having radially spaced through openings in mutual registration, clamping means extending through the openings in both retaining members, and frictionally engaging the side surfaces of the elements to prevent relative rotation of the elements and retaining members, said clamping means being in overlying relation to portions of both retaining members to hold the members together.

3. A rotary brush support, comprising a pair of retaining members, a series of brush elements retained between the two members, and clamping members extending across said elements from one side of the brush to the other, said clamping members having end portions overlying said retaining members, and intermediate portions in direct binding engagement with the outermost brush elements.

4. A rotary brush support, comprising a pair of pressed metal retaining members, a series of brush elements having base rings retained between the two members, said members having through openings respectively adjacent opposite side surfaces of said elements, and clamping members having portions extending across the entire series and portions clampingly engaging the elements at the surfaces thereof exposed by the through openings, said latter portions lying within the openings to thereby prevent relative rotation between the elements and said members.

5. A rotary brush support comprising a pair of pressed metal members drawn and flanged to provide an annular peripheral channel, portions of the flanges and the channel bottom portions being sheared out to provide through openings, a series of bristle elements having base rings embraced by the channel flanges and seated on the said channel bottom portions, and a strip member, having its ends bent to clampingly engage the sides of the outermost elements of the series, the strip lying within the through openings to serve as a key for preventing relative rotation between the pressed metal members and the brush elements.

6. A rotary brush support comprising a pair of pressed metal members drawn and flanged to provide reinforced hub portions and an annular peripheral channel, portions of the flanges and the channel bottom portions being sheared out to provide through openings, a series of bristle elements having base rings embraced by the channel flanges and seated on the said channel bottom portions, a strip member having its ends bent to engage adjacent sides of the series as a clamp, said through openings being continued along the hub portions materially inwardly from the innermost surface of the channel portion whereby the thickness of the clamping strip may vary in proportion to the number of elements retained between a given pair of such first mentioned pressed metal members.

7. A rotary brush comprising a series of bristle elements in superposed relation, and having annular base rings, sheet metal supporting members for the series comprising portions perforated to receive a shaft, and pressed outwardly to engage the shaft at materially spaced points, the central portions being continued into cylindrical portions and inwardly bent flanges to receive and support the elements, the flanges and cylindrical portions being provided with through openings in respective registration, and there being combination key and clamping members lying in these through openings and tightly clamping against the bristle elements.

In testimony whereof, I hereunto affix my signature.

LAWRENCE C. HEROLD.