

May 29, 1962

B. E. NELSON
BRUSH CONSTRUCTION

3,036,323

Filed Dec. 4, 1958

2 Sheets-Sheet 1

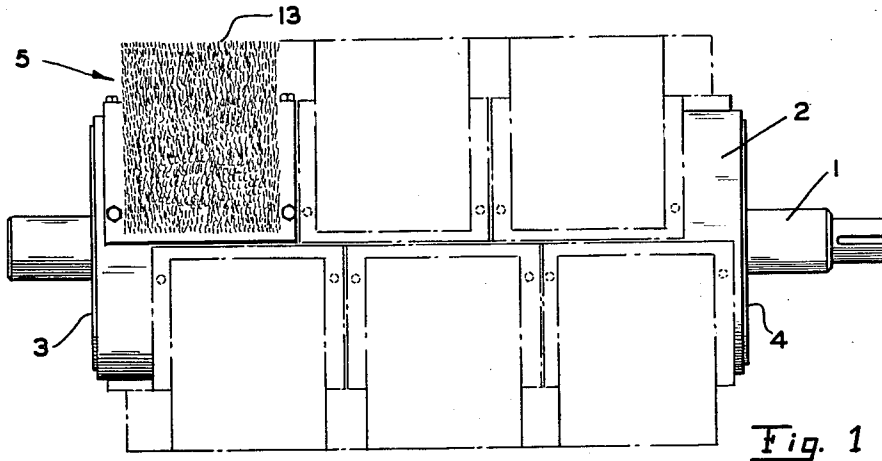


Fig. 1

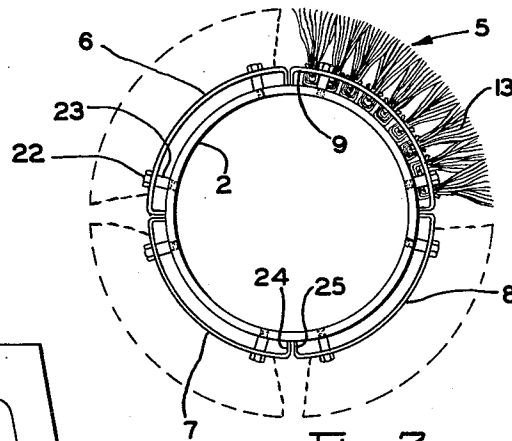


Fig. 2

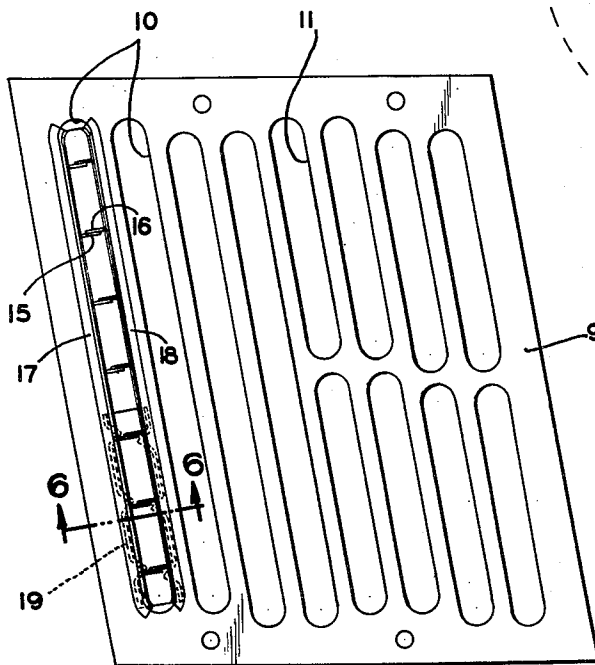


Fig. 3

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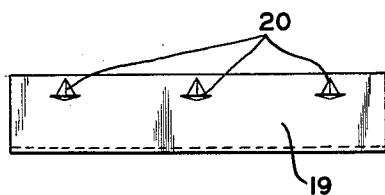


Fig. 4

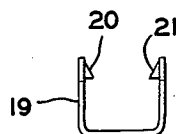


Fig. 5

Fig. 6

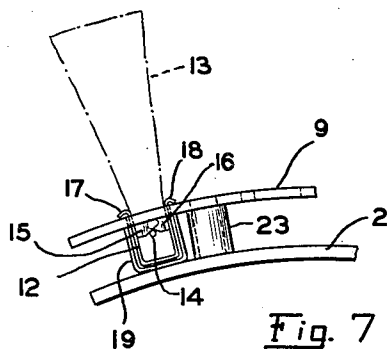
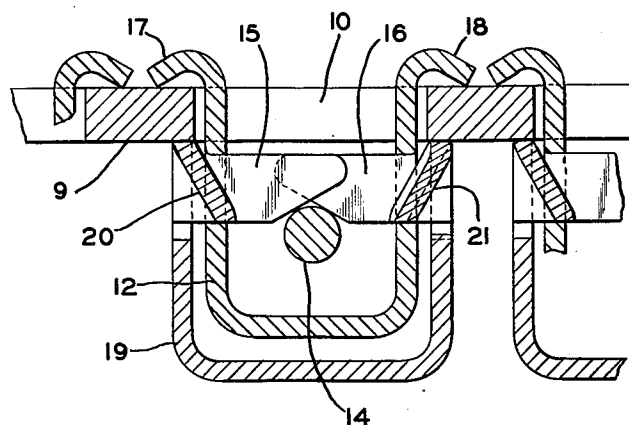


Fig. 7

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BRUSH CONSTRUCTION

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10 Claims. (Cl. 15—183)

This invention relates as indicated to a novel brush construction, and more particularly to a brush assembly utilizing lengths of brush strip mounted in a manner suitable for employment in cylindrical power driven rotary brushes, pipe cleaning pigs, and the like.

Brush strip is a well-known article of commerce and may desirably be of the type disclosed in Peterson Patent 2,303,386, Peterson Patent 2,757,400, or Benyak Patent 2,797,425 having a sheet metal channel back within which a layer of brush material is folded and retained by means of an elongated retaining element such as a metal wire. Brush strip of this type may be produced in continuous lengths on automatic machinery and is accordingly relatively inexpensive and of standardized form. It is well-known to wind such brush strip helically to form cylindrical rotary brushes, and lengths of brush strip have also been mounted generally parallel to the axis of rotation of hubs or equivalent rotatable supports.

It is an object of the present invention to provide a brush assembly utilizing lengths of brush strip in a manner suitable for incorporation of such assemblies in power driven cylindrical rotary brushes, pipe cleaning pigs and the like.

A further object is to provide such brush assemblies in which the lengths of brush strip are removably secured so that they may be replaced when damaged or worn.

A further object is to provide such brush assembly adapted to utilize straight lengths of brush strip so disposed that streaking of the work may be avoided in use.

Another object is to provide means for securing such lengths of brush strip in place without the necessity of welding.

Other objects of the invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, said invention then comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

FIG. 1 is an elevation of a power driven rotary brush composed of a plurality of arcuate segments mounted upon an appropriate cylindrical supporting structure;

FIG. 2 is an end view of the cylindrical shell and arcuate brush assemblies mounted thereon as shown in FIG. 1;

FIG. 3 is an enlarged plan or developed view of a modified form of supporting plate adapted to have lengths of brush strip secured therein in accordance with my invention;

FIG. 4 is an end view of a clip adapted to be employed to lock the lengths of brush strip in place;

FIG. 5 is an end view of the clip of FIG. 4;

FIG. 6 is a fragmentary enlarged transverse section taken on the line 6—6 on FIG. 3 showing the manner of securing a length of brush strip in a slot in one of the brush strip holding plates; and

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FIG. 7 is a fragmentary end view similar to FIG. 2 on an enlarged scale.

Referring now more particularly to the drawing, the embodiment of the invention there illustrated comprises a shaft or arbor 1 on which is mounted a concentric cylindrical metal shell 2 supported by annular end plates or discs 3 and 4 which may be welded thereto. A plurality of arcuate brush assemblies such as 5 are secured on shell 2 in longitudinal alignments parallel to the axis of shaft 1, the brush assemblies of each alignment being somewhat axially offset relative to those of adjacent alignments to avoid streaking of the work in use. For this reason, I ordinarily prefer to employ an even number of such alignments, in this case four.

As further shown in FIG. 2, each such brush assembly may comprise an arcuate metal plate such as 6, 7, 8 and 9 having a number of slots such as 10 and 11 (FIG. 3) therein. These slots are ordinarily disposed to extend parallel to the axis of shaft 1 although they may, if desired, be disposed at an angle thereto, ordinarily a long lead helical angle. Received in each slot is a corresponding length of brush strip having a sheet metal channel back 12 in which is retained a layer of brush material 13 doubled about a retaining wire 14 extending longitudinally within the channel back and secured in place by means of opposed teeth such as 15 and 16 punched in from the respective sides of the back. The longitudinally extending edge portions 17 and 18 of the brush strip channel back 12 are turned outwardly as shown in FIGS. 6 and 7 to engage the outer surface of the arcuate plate 9 and thus to seat the length of brush strip within the slot 10. Such outwardly curved lips also provide radii for flexure of adjacent brush material thereagainst, reducing any tendency of the brush material to be cut or broken in these regions in use.

When the lengths of brush strip have been inserted in the slots such as 10 as above described, they may be firmly but temporarily secured therein by means of channelform sheet metal clips such as 19 having a plurality of opposed protuberances or prongs 20 and 21 punched in from the respective sides thereof. Such prongs are positioned to enter the apertures left in the sides of the channelform brush back 12 by the punching in of teeth 15 and 16, as best shown in FIG. 6, the prongs 20 and 21 being inclined inwardly from adjacent the outer lips of the channelform clip 19 so that the clip may be simply pressed into position with resilient outward deformation of the sides thereof until the prongs 20 and 21 snap into the corresponding apertures in the sides of the channelform brush back 12. As well shown in FIG. 6, the edges of clip 19 engage the underside of arcuate plate 9 in opposition to the downturned or recurved lips 17 and 18 of the brush strip back, thereby securely locking the latter in place. The outwardly turned edge portions 17 and 18 are adapted resiliently to yield a very slight amount to ensure a tight fit of the prongs or protuberances 20 and 21 and consequent firm anchoring of the brush strip.

The arcuately curved plates or segments 6, 7, 8 and 9 may then be mounted on the metal cylindrical shell 2 by means of screws such as 22 which may pass through appropriate spacer sleeves such as 23 interposed between the arcuate plates and the outer surface of shell 2. It may also generally be preferred that the circumferentially opposed end portions of the respective arcuate plates such as 24 and 25 be turned inwardly against the outer surface of shell 2 further to brace the same.

As indicated in FIG. 3, the brush strip receiving slots such as 10 and 11 may be of different lengths as desired and the segments in flat or developed form may be of

parallelogram shape so that when mounted on the supporting shell 2 with the slots extending parallel to the axis of rotation, circumferentially disposed segments will in effect overlap, forming a helical series of segments in which, however, the individual lengths of brush strip extend parallel or generally parallel to the axis of rotation. A generally similar effect is, however, obtained as shown in FIG. 1 by axially offsetting the segmental brush assemblies of adjacent longitudinal alignments.

It will, of course, be understood that any desired brush material may be utilized in accordance with my invention, including natural animal and vegetable fibers such as horsehair and tampico fiber, metal wire such as crimped steel wire, stainless steel wire, and beryllium copper wire, plastic coated wire such as nylon coated steel wire, plastic coated glass fiber filaments such as nylon coated glass fiber, and plastic filaments themselves. Depending upon the particular installation, the shaft, hub, shell, segment plates and other metal parts may be of steel, stainless steel, aluminum or any other suitable material.

In some cases, it may be preferred to weld the retaining clips 19 to the segment plates such as 9, particularly when it is intended to discard the entire segment assembly if the latter should become worn or damaged. Segment assemblies of this type are suitable for employment in pipe cleaning pigs such as that disclosed and claimed in co-pending application Serial No. 741,492 of Brooks E. Nelson et al., "Pipe Cleaning Pig," now Patent No. 2,957,189, issued October 26, 1960.

It will be seen that I have provided a novel brush construction adapted to the employment of straight or substantially straight lengths of brush strip in a convenient and inexpensive manner. The segments may be arranged in a manner to avoid streaking of the work in use and both such segments and the lengths of brush strip mounted therein may be quickly and easily secured in place and removed and replaced as conditions warrant.

The arcuate plates or sheets forming the segments may desirably each encompass 90° of the brush circumference, as shown, but this may, of course, be varied as desired. The cylindrical shell or hub may be perforated to provide for outward flow of ventilating air or other fluid, the end discs likewise being apertured. The slots receiving the lengths of brush strip generally extend parallel to the axis of curvature of the plates and in some cases the brush strip backs may simply be press-fitted in the slots. For high speeds or rough work, however, it is very desirable to employ retaining means engaging the backs at the inner sides of the plates.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In a rotary brush having a central rotatable shaft, annular disc end plates mounted thereon, and a concentric cylindrical shell mounted on said end plates; arcuate plates curved through 90° mounted on the outer surface of said shell with four said plates thus encompassing the entire periphery of said shell, means spacing said arcuate plates outwardly from said shell, said arcuate plates having slots therein extending generally parallel to the axis of rotation of said shaft, lengths of brush strip having their back portions received in said respective slots with brush material extending generally radially outwardly therefrom, said brush strip having a sheet metal channel back with laterally outwardly flaring lip portions engaging the outer surface of said arcuate plates, a layer of said brush material folded about a wire retaining element within said channel back, teeth punched inwardly from the respective sides of said back closely overlying said wire to secure the latter and leaving corresponding apertures in

the channel sides, and sheet metal channel shaped clips having prongs projecting inwardly from the respective sides thereof, said clips embracing said brush strip channel backs on the undersides of said arcuate plates with said prongs entering said apertures, thereby holding said lengths of brush strip firmly in said slots.

2. The brush of claim 1, wherein said adjacent circumferentially disposed arcuate plates are axially offset relative to each other.

3. The brush of claim 1, wherein said adjacent circumferentially disposed arcuate plates are axially offset relative to each other, there being four axially aligned series comprising a plurality of said arcuate plate.

4. The brush of claim 1, wherein said laterally flaring lip portions of said brush strip channel back are turned downwardly to bear resiliently against the outer surface of said arcuate plates.

5. The brush of claim 1, wherein said arcuate plates are of parallelogram shape in developed form and arranged in alignments parallel to the axis of rotation, portions of said plates in adjacent circumferential series overlapping with consequent overlapping of the lengths of brush strip mounted therein to prevent streaking of the work in use.

6. In a rotary brush having a generally cylindrical sheet metal hub structure, said structure having elongated slots therein extending generally parallel to the longitudinal axis thereof, lengths of brush strip having their back portions received in said respective slots with brush material extending generally radially outwardly therefrom, said brush strip having a sheet metal channel back with laterally outwardly flaring lip portions engaging the outer surface of said structure, and retaining means secured to said channel back on the inner side of said structure effective to prevent withdrawal of said backs from said slots, individual lengths of said brush strip extending a part of the length of the brush only, and circumferentially adjacent lengths of said brush strip being axially offset to overlap and thereby avoid streaking of the work in use.

7. A brush comprising a plurality of arcuate sheet metal members mounted on and spaced outwardly from a central support about a common axis, and each of said members having a plurality of lengths of brush strip having their backs secured to said member generally parallel to such axis with brush material extending generally radially outwardly therefrom, said members being arranged in a plurality of alignments longitudinally of said brush with the members of one such alignment being axially offset relative to the members of another such alignment to overlap circumferentially and thereby avoid streaking of the work when said brush is rotated about such axis in use.

8. A brush comprising a plurality of arcuate sheet metal plate members mounted on and spaced outwardly from a central support concentric about a common axis, and each of said members having a plurality of lengths of brush strip having their backs secured to said member respectively generally parallel to such axis with brush material extending generally radially outwardly therefrom.

9. A brush assembly comprising a holder having an elongated slot therein, and a length of brush strip having its back portion received in said slot with brush material extending outwardly therefrom, said brush strip having a channel back with outwardly flaring lip portions engaging the surface of said holder, an elongated wire retaining member disposed longitudinally within said back to retain said brush material therein, teeth punched in from the sides of said back overlying said wire to secure the latter, thus also providing apertures in the sides of said channel back where said teeth are punched in, and retaining means engaged in such apertures on the other side of said holder from said lip portions effective to prevent withdrawal of said back from said slot.

10. The brush assembly of claim 9, wherein said re-

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taining means is resiliently detachably engaged in such apertures.

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