March 6, 1934. C. E. STURGIS 1,949,665

BRUSH

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Fig. 1.

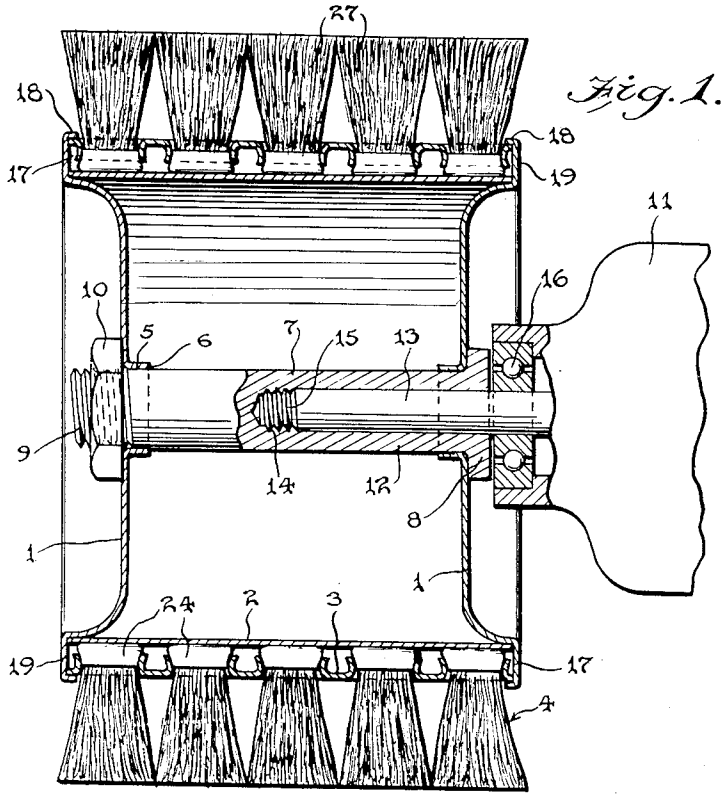


Fig. 8.

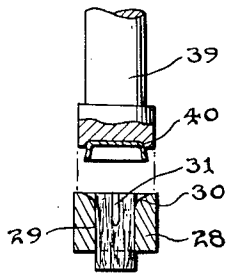


Fig. 9.

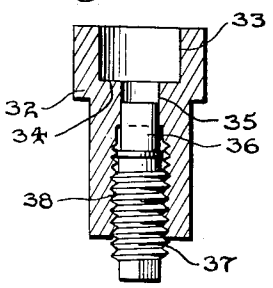


Fig. 2.

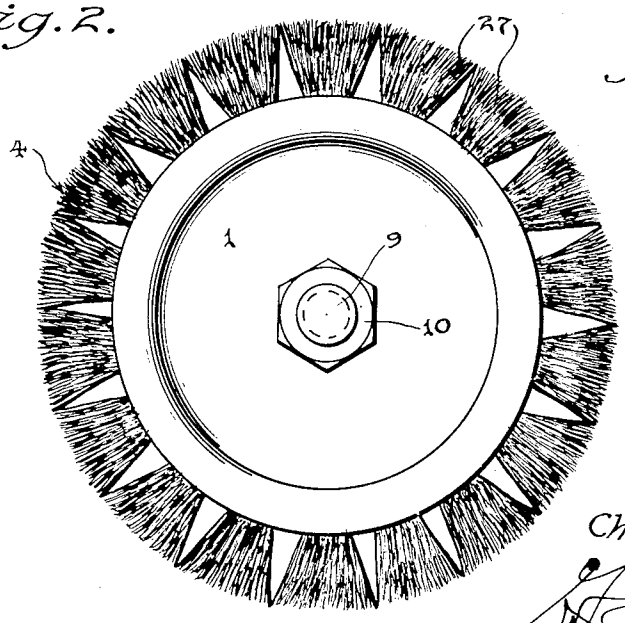
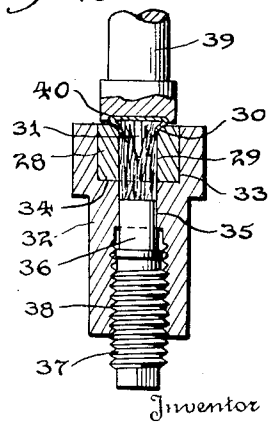


Fig. 10.



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Fig. 3.

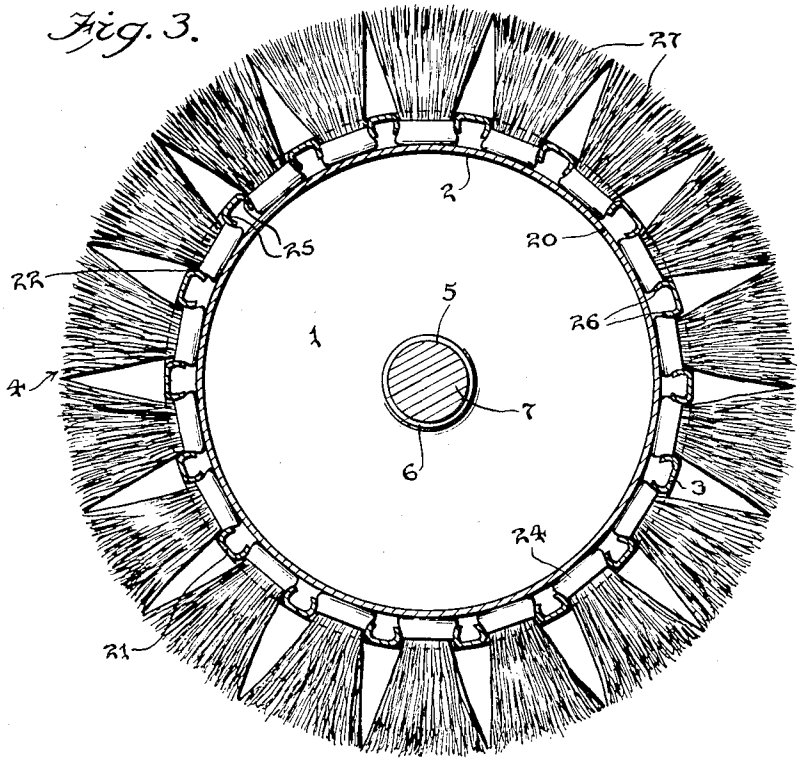


Fig. 4.

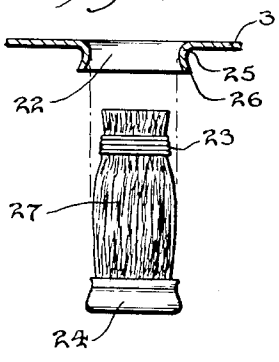


Fig. 5.

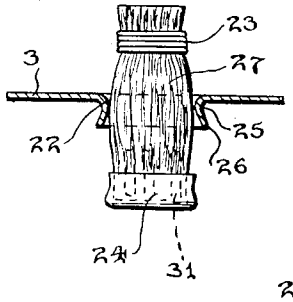


Fig. 6.

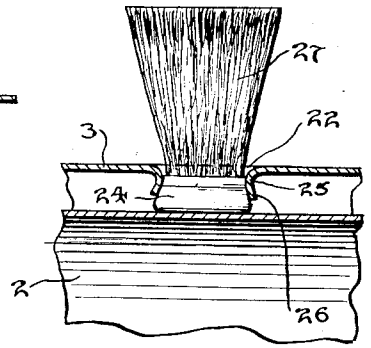
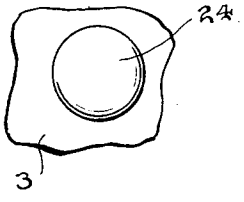


Fig. 7.



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UNITED STATES PATENT OFFICE

1,949,665

BRUSH

Charles E. Sturgis, Rochester, N. Y.

Application June 22, 1932, Serial No. 618,769

7 Claims. (Cl. 300—21)

The invention relates to a rotary brush and a method of assembling bristles in caps for making replacement sections for the same.

The object of the present invention is to provide a simple, practical and efficient rotary brush designed for cleaning and polishing tanks or containers for milk, coca-cola, ginger ale and other liquids, and equipped with replaceable bristle sections capable of rotary movement independently of the rotary movement of the brush whereby the life of the brush, and particularly the individual sections thereof, is materially prolonged.

It is also an object of the invention to provide a separate brush structure adapted to permit the individual bristle sections to be readily removed when worn and replaced by new bristle sections so that the brush may be readily maintained at all times at maximum efficiency.

It is also an object of the invention to provide a simple and efficient method of assembling the bristles in metal caps in a perfectly tight and waterproof condition with means incorporated in the bristle sections for preventing the bristles from drying out and deteriorating.

With these and other objects in view, the invention consists in the novel construction, combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended, it being understood that various changes in the form, proportion, and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:

Figure 1 is a longitudinal sectional view of a rotary brush constructed in accordance with this invention and is shown applied to an electric motor.

Fig. 2 is an end elevation of the rotary brush.

Fig. 3 is an enlarged transverse sectional view of the rotary brush.

Figs. 4, 5 and 6 are detail views illustrating the manner of assembling or replacing the bristle sections in the rotary brush.

Fig. 7 is a detail plan view of a portion of the outer circumferential plate showing one of the circular bearing openings for the bristle sections.

Fig. 8 is a longitudinal sectional view of the tools by which the bristles are assembled in the metal cap.

Fig. 9 is an enlarged detail view of a portion of the tools showing the bristles and the metal cap in position for compressing the metal cap on the bristles.

Fig. 10 is a similar view illustrating the arrangement of the parts after the tools have been operated to shape and compress the metal cap on the bristles.

In the accompanying drawings in which is illustrated the preferred embodiment of the invention, the rotary brush comprises in its construction inwardly dished end disks 1 and inner and outer circumferential plates 2 and 3 which receive and support bristle sections 4 arranged around the periphery of the rotary brush and extending radially therefrom as clearly illustrated in Fig. 3 of the drawings, and the end disks are provided with central openings 5 and have inwardly extending annular flanges 6 forming the walls of the opening and adapted to receive a brush shaft 7 provided at its inner end with a head 8 for engaging the inner end disk and exteriorly threaded at its outer end 9 for the reception of a nut 10 which engages the outer end disk.

The rotary brush which is adapted for cleaning and polishing liquid containing tanks and various other cleaning and polishing operations is designed to be operated by an electric motor 11 but any other suitable motive power may, of course, be employed as will readily be understood. The brush shaft 7 is provided with an inner tubular portion 12 to receive the motor shaft 13 and it is interiorly threaded at 14 and is engaged thereat by the exteriorly threaded end 15 of the motor shaft 13. By this construction, the rotary brush may be readily mounted on and removed from the motor shaft and the threads are arranged so that the rotation of the motor shaft operates to screw the motor shaft into the brush shaft so that the brush will remain perfectly tight on the motor shaft during the operation of the motor.

The motor shaft 13 is mounted in suitable ball bearings 16 and with the motor constitutes a portable rotary brush which may be readily handled for cleaning and polishing tanks and receptacles and for similar operations.

The end disks are provided at their inner faces with circumferential channels or grooves 17 formed by the dish-shaped portions of the disks and by annular flanges 18 arranged in parallelism with the dished portions and connected with the same by flat web portions 19. The annular grooves or channels 17 receive the side edges of the inner and outer circumferential plates 2 and 3 which have abutting end edges 20 and 21 located at diametrically opposite points on the

brush as clearly illustrated in Fig. 3 of the drawings. The inner and outer circumferential plates 2 and 3 are arranged in spaced relation; the inner circumferential plate forms a seat or support for the bristle sections 4 and the outer circumferential plate is provided with circular openings 22 forming bearings for the bristle sections which are inserted in the openings 22 from the inner face of the outer circumferential plate 3 as clearly illustrated in Figs. 4, 5 and 6 of the drawings. The bristles are confined adjacent their outer ends temporarily by a rubber band 23 to facilitate their ready insertion in the circular openings 22 as clearly indicated in Figs. 4 and 5 of the drawings and after a bristle section has been inserted in an opening 22, the confining band 23 is removed to permit the bristles to expand as illustrated in Fig. 6 of the drawings.

The tuft or group of bristles constituting a bristle section are confined at their inner ends within a metal cap 24 and the outer circumferential plate is provided at each of the openings 22 with an inwardly extending annular bearing flange 25 which conforms to the configuration of the metal cap and which has its edge 26 extended laterally to prevent the same from contacting with and wearing the metal cap of the bristle section. The annular bearing flange 25 is curved in cross section and the laterally extended edge forms a flaring portion which conforms to an expanded portion of the metal cap. The metal cap fits against the inner circumferential plate and is supported by the same as clearly shown in Fig. 6 of the drawings, and each individual bristle section is capable of a rotary or turning movement independently of the rotary movement of the brush so that all portions of the bristles will be presented to the surfaces being cleaned or polished. This will result in a uniform wear of the bristle sections and will tend to increase the length of the life of the bristle sections. The parts of the rotary brush are readily assembled and are firmly secured in their assembled relation between the brush shaft 7 and the nut 10 and when it becomes necessary to remove any of the bristle sections, the nut 10 may be readily removed from the brush shaft to permit the end disks to be separated from the inner and outer circumferential plates and the latter may be opened out sufficiently to permit access to any of the bristle sections. This will enable any of the bristle sections to be removed and replaced by new bristle sections.

Each of the bristle sections consists of a group or tuft of bristles 27 and the metal cap 24, which is compressed on the inner ends of the bristles and shaped substantially as the metal cap shown and described in my copending application, filed August 13, 1930, Serial No. 474,908. The bristles which may consist of horse hair, hog bristles, Tampico or similar brush material are first wet and shrunk in luke warm water and alum. The bristles are then cut and assembled in a die 28 consisting of a cylindrical sleeve having a cylindrical bore or opening 29 slightly enlarged or flared at the upper portion at 30.

The bristles are then tightened by driving one or more wooden pegs 31 into the bristles from the upper end of the bristles. The pegs, or any other suitable material, may, of course, be employed and the metal cap 24 which is snugly fitted on the upper ends of the bristles before being compressed and shaped is cylindrical and forms an annular bristle-confining band and an end wall against which the inner ends of the bristles abut. The annular enlargement 30 of the opening 29 permits the cap to be fitted on the upper ends of the bristles. After the bristles have been assembled and tightened, the die 28 is placed in a holder 32 provided at the upper portion with a cylindrical socket 33 to receive the die and forming a shoulder or seat 34 upon which the die rests during the cap compressing and shaping operations.

The holder which is preferably of cylindrical formation is provided with a reduced bore or opening 35 extending downwardly from the socket centrally thereof and receiving an adjustable core 36 which is adjusted upwardly and downwardly in the reduced opening 35 by means of an adjusting screw 37 engaging an interiorly threaded portion 38 of the opening 35 of the holder. The space above the adjustable core permits the bristles in the cap shaping operation to move downwardly into the upper end of the opening 35 and the core forms a stop or abutment for the outer ends of the bristles.

Before applying the cap to the ends of the bristles, the upper ends of the bristles are covered with glycerine which fills the space around the upper ends of the bristles. Glycerine prevents the bristles from hardening and besides acting as a softener it also maintains the bristles water-tight in the cap after the latter has been compressed around the bristles. The metal cap is compressed around the bristles by a punch 39 provided in its lower end with a depression 40 and adapted to fit over the top of the cap. When the punch and the holder are moved together or toward each other, the cap and the bristles are forced downwardly within the die, thereby compressing a portion of the band around the bristles and at the same time causing the band adjacent the top wall of the cap to expand within the groove or enlargement 30 of the die.

The band is exteriorly compressed intermediate its edges to clamp the bristles and is expanded between the compressed portion and the inner ends of the bristles which become laterally deflected and spread within the expanded portion of the band. The inner end of the band and the cap extends over the inner ends of the bristles. When the bristles are assembled within the die, their upper ends are slightly below the upper end surface of the die so that there is ample space to receive a sufficient quantity of glycerine or other softening liquid to prevent the bristles from hardening and to maintain them in a waterproof condition.

When the punch forces the cap into the die, there is a limited longitudinal movement of the cap and the bristles as the die is maintained relatively stationary with the holder by the seat thereof and this longitudinal movement enables the metal to flow into this compressing and shaping operation so that the metal caps are compressed around the bristles and are also expanded at the inner ends of the bristles without rupture of the metal of the cap.

What is claimed is:

1. The method of assembling bristles in caps which comprises wetting and shrinking the bristles, arranging the bristles in a die, and securing the cap on the inner ends of the bristles in the presence of a material to soften the inner ends of the bristles.

2. The method of assembling bristles in caps which comprises wetting and shrinking the bristles in luke warm water and alum, arranging

the bristles in a die, and compressing the cap on the inner ends of the bristles.

3. The method of assembling bristles in caps which comprises wetting and shrinking the bristles, arranging the bristles in a die, covering the inner ends of the bristles with a bristle softening liquid, and compressing the cap on the inner ends of the bristles and confining a portion of the liquid within the cap.

4. The method of assembling bristles in caps which comprises wetting and shrinking the bristles, arranging the bristles in a die, covering the inner ends of the bristles with glycerine, and compressing the cap on the inner ends of the bristles and confining a portion of the glycerine within the cap.

5. The method of assembling bristles in caps which comprises arranging the bristles in a die, and compressing the cap on the inner ends of the bristles and simultaneously imparting a lengthwise movement to the cap and the bristles within the die to exteriorly compress a portion of the cap and expand another portion of the cap while permitting the material of the cap to flow to avoid rupture of the cap.

6. The method of assembling bristles in caps which comprises arranging the bristles in a die, and compressing the cap on the inner ends of the bristles and simultaneously imparting a lengthwise movement to the cap and the bristles within the die to exteriorly compress the cap intermediate of its edges to clamp the bristles and to expand the cap between the compressed portion and the inner ends of the bristles to deflect the said inner ends of the bristles.

7. The method of assembling bristles in caps which comprises wetting and shrinking the bristles, arranging the bristles in a die, tightening the bristles by driving one or more wooden pegs in the bristles at the inner ends thereof, covering the bristles and the pegs with a liquid, and compressing the cap on the inner ends of the bristles and confining a portion of the liquid within the cap.

CHARLES E. STURGIS.