

April 2, 1935.

D. B. JUSTICE

1,996,544

BRUSH

Filed Jan. 8, 1934

2 Sheets-Sheet 1

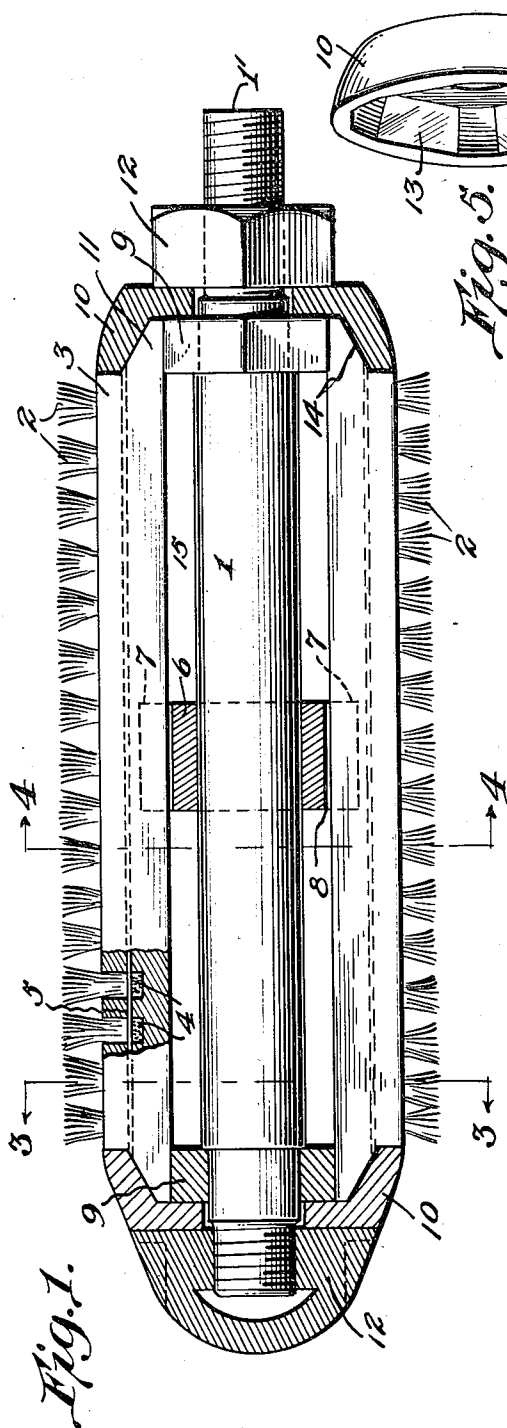


Fig. 1.

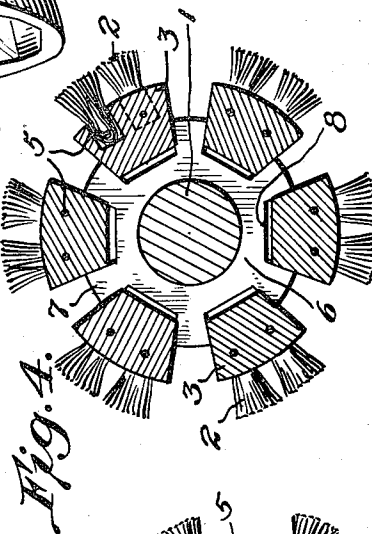
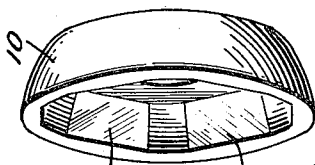


Fig. 4.

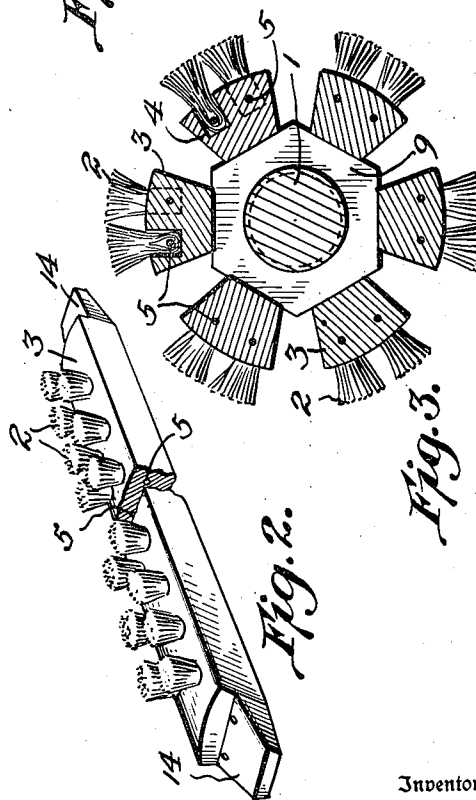


Fig. 2.

Fig. 3.

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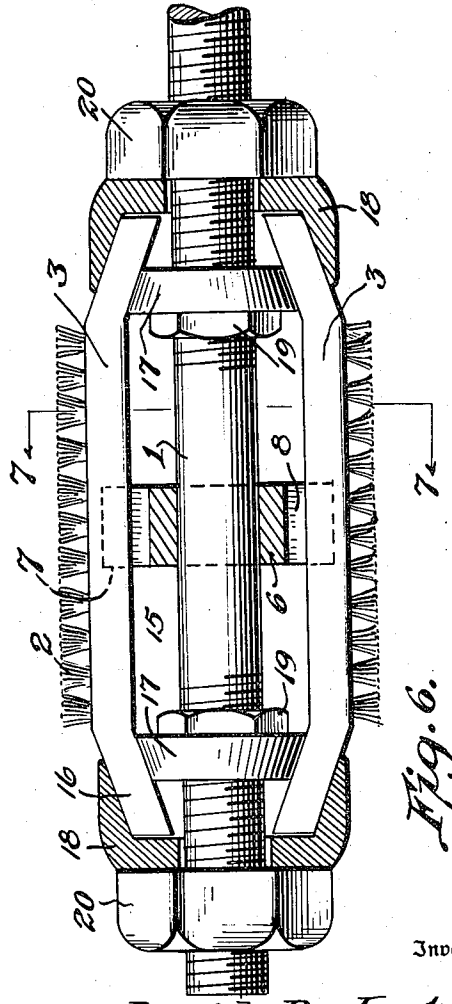
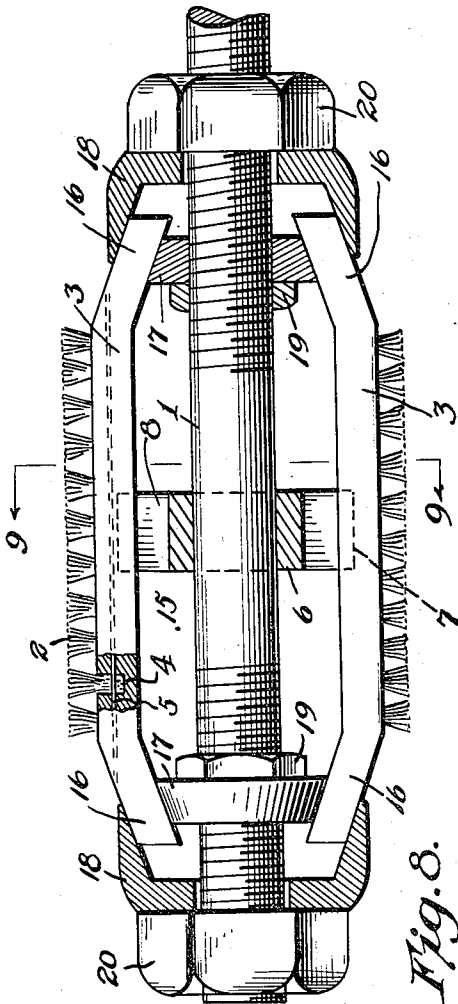
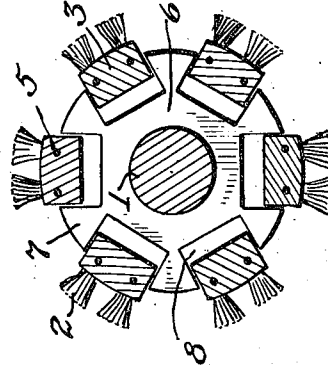
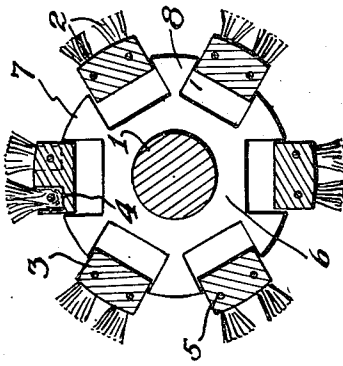
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UNITED STATES PATENT OFFICE

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BRUSH

David B. Justice, Charleston, S. C.

Application January 8, 1934, Serial No. 705,789

10 Claims. (Cl. 15—183)

The invention relates to improvements in brushes, more particularly in rotary brushes; and one of the objects of the invention is to provide new and improved means for securing the bristles in the holders.

Another object of the invention is to provide new and improved means for mounting the bristle holders in the brush.

A further object of the invention is to provide means by which any bristle holder can be removed and replaced easily and quickly.

Still another object of the invention is to provide means by which the brush can be expanded, for the purpose of taking care of the wear of the bristles, or for other purposes.

Another object of the invention is to provide a construction which permits the bristle holders to bend, to prevent binding action between the bristles and the element being cleaned.

Another object of the invention is to provide means by which the bristle holders can be mounted parallel to the axis of the brush or at any desired angle with respect thereto.

Other objects of the invention are to simplify the structure of brushes, with the consequent lowering of the cost thereof; to increase the strength of brushes, and to extend the life thereof.

Various other objects and advantages of the invention will be apparent to those skilled in the art from the following description when taken in connection with the accompanying drawings; in which,

Figure 1 is a vertical longitudinal sectional view of one form of the brush; parts being shown in elevation.

Figure 2 is a detail perspective view of one of the bristle holders.

Figure 3 is a transverse vertical sectional view taken on line 3—3 of Figure 1.

Figure 4 is a transverse vertical sectional view taken on line 4—4 of Figure 1.

Figure 5 is a detail perspective view of one of the end clamping members.

Figure 6 is a vertical longitudinal sectional view of another form of the brush.

Figure 7 is a vertical transverse sectional view taken on line 7—7 of Figure 6.

Figure 8 is a view similar to Figure 6, but showing the brush partly expanded; and

Figure 9 is a vertical transverse sectional view taken on line 9—9 of Figure 8.

Referring to the drawings in more detail, and particularly to Figs. 1, 2, 3, 4 and 5, the numeral 1 indicates the shaft or stem of the brush. This shaft may be driven by a motor or by any other

desired means; the driving means being connected to the end 1' of the brush shaft. As the means for driving the brush constitutes no part of the present invention, illustration thereof is unnecessary. At this point it may be mentioned that while the brush constituting the present invention is particularly adapted to the cleaning of boiler tubes, and for similar purposes, yet it will be apparent that the brush is of general application. And it will also be understood that the invention is in no manner limited to the specific forms shown and described hereinafter in detail, for it will be apparent the structures may be changed and modified in many respects without departing from the invention.

Numeral 2 refers to the bristles, which are mounted in the holders 3. These bristles may be of any preferred material, but for the purpose of cleaning the interior of boiler tubes and for similar purposes wire bristles are preferably employed. The bristle holders may be made of wood or metal.

In the preferred construction illustrated the bristles are doubled upon themselves and placed in sockets 4 formed in the holders 3; and the bristles are then locked in place by means of a wire 5 which extends throughout the length of the holder. In the specific form illustrated there are two rows of bristles in each holder and, of course, two of the locking wires 5. The bristles of the two rows are preferably arranged in staggered relation, as illustrated in Fig. 2.

The mounting of the bristle holders will now be described, and while six holders are shown in both forms, yet it is to be understood that this number can be increased or decreased as desired. Numeral 6 refers to a driver member which may be fixed to the shaft 1 by any desired means; though it is preferably pressed thereon. This center piece or driver member, if employed, is provided with a number of radially extending projections 7 forming therebetween recesses 8 to receive the bristle holders 3. In the specific form illustrated there are six of the projections with six corresponding recesses to receive the six bristle holders; but of course the number of projections and recesses will vary with the number of bristle holders employed in a particular brush. While in certain constructions I prefer to employ the driver member, yet it is to be understood that this element is not essential and may be omitted. Also, in some constructions it may be desirable to employ more than one driver member, in which event the two or more driver members would be uniformly spaced along the shaft.

Pressed or otherwise fixed against rotation on the shaft 1, and preferably on reduced portions of the shaft, are angular distance pieces 9, 9. In the specific form illustrated in Fig. 1 these distance pieces are hexagonal in cross-section; each of the six flat faces thereof serving as a support for an end of the flat bottom face of a bristle holder.

Loosely mounted on the shaft 1 beyond the distance pieces are end holders or locking members 10, 10; one of these members being shown in perspective in Fig. 5. These locking members are slipped loosely over the ends of the shaft 1 into engagement with the tapered ends 11 of the bristle holders, and the parts are then clamped together by nuts 12, 12, which are threaded on the ends of the shaft 1. Where the brush is to be employed for such work as the cleaning of the interior of boiler tubes the nut 12 on the leading end of the brush may have a rounded nose to facilitate entrance into the tubes.

The end holders or locking members 10, 10, may be rounded if desired, and in such event the top faces of the tapered ends 11 of the bristle holders would be similarly rounded. In such a construction the bristle holders would be locked securely in place by the clamping action between the distance pieces 9 and the locking members 10, and the flat bottom face of the holders would cooperate with the flat faces of the distance pieces. But in the form illustrated the interior of the locking members is also provided with flat faces, indicated by numeral 13, which cooperate with the flat inclined faces 14; thus holding all of the cooperating parts securely against relative movement.

By reference to Figure 1 it will be noted that when all of the parts are assembled there is a space 15 between the shaft 1 and the holders 3. This space adds a very desirable resiliency to the brush, and by permitting the holders to bend prevents any binding action between the bristles and the interior surface of a boiler tube or other element being cleaned.

The brush illustrated in Figures 1, 2, 3, 4 and 5, is assembled in the manner hereinbefore described. When it is necessary or desirable to replace some or all of the bristle holders, it is only necessary to back off the nuts 12, 12, so that the locking members 10, 10 can be slipped back. Any one or all of the bristle holders can then be removed and replaced easily and quickly; whereupon the nuts 12, 12 are again screwed up to clamp the parts in place, and the brush is again ready for use.

While I have shown the bristle holders as extending parallel to the shaft 1, yet it will be understood that they may be mounted to extend at any desired angle with respect thereto, and also the holders may be curved, if desired, to give a spiral effect.

Reference is now to be had to the form of brush illustrated in Figs. 6, 7, 8 and 9. In this form I have provided an expandible brush of extremely simple construction. Several of the parts of this brush are the same as the parts shown in the first-described form. Substantially the same shaft 1 is employed, except that it is threaded to a greater extent. The bristles 2 are mounted in the pockets 4 of bristle holders 3 by wires 5, just as described hereinbefore; though it is to be understood that in neither form is the invention limited to any specific mounting of the bristles. Also, the center piece or driving member 6, if

employed, is substantially the same as shown in the first-described form.

In the expandible form of brush the ends of the holders 3 are inclined inwardly as indicated by numeral 16; the inner and outer faces of these inclined portions being preferably parallel. These inclined ends cooperate with distance pieces 17, 17, and end holders or locking members 18, 18, by means of which the bristle holders are held in any desired position.

The distance pieces 17, 17, are preferably though not necessarily, threaded on the brush shaft 1, and are locked in place by the lock nuts 19, 19. In the specific form illustrated these distance pieces are round and tapered at the same angle as the ends of the holders 3; it being understood that in this specific construction the bottom faces of the ends are rounded to fit the contour of the end pieces. If preferred, the end piece may have a plurality of flat faces to cooperate with flat bottom faces of the holders, as shown in the first-described form; but whether the end pieces are round or angular they are preferably tapered to cooperate with the inclined ends of the holders.

The end holders or locking members 18 are loosely mounted on the shaft 1 and are substantially the same as the members 10 shown in the first-described form. The interior of the members 18 may be round to cooperate with rounded end portions of the bristle holders, or they may be provided with angular faces to cooperate with flat end portions of the bristle holders; but in the expandible form of brush the rounded or angular interior of the locking members 18 is inclined or tapered to cooperate with the inclined ends 16 of the bristle holders. The members 18 are secured in place by nuts 20, 20, threaded on the shaft 1.

By referring to Fig. 6 it will be apparent that the parts are assembled in the same manner as hereinbefore described in connection with the first form. It will be understood, however, that in this expandible form when a new brush is being assembled the distance pieces are first adjusted along the shaft 1 to the proper position to give the required diameter. Usually in a new brush the distance pieces are so positioned that the brush will have substantially its smallest diameter.

The bristles gradually wear down and after a certain amount of wear a brush becomes useless for cleaning the interior of boiler tubes and for similar work if the diameter of the brush cannot be increased. In the expandible form this is accomplished quickly and easily. It is only necessary to back off the nuts 20, 20, slip back the members 18, 18, and remove the holders 3. The lock nuts 19, 19, are then unlocked and the distance pieces 17, 17, are run out to such position that the outside diameter of the brush will be brought back to its original size. To assist in this adjustment a scale (not shown) may be provided on the shaft. The distance pieces are now locked in place by the lock nuts 19, 19, the bristle holders are placed in position, the locking members 18, 18, are slipped up to engage the ends of the bristle holders, and all parts are then securely clamped together by the nuts 20, 20. The brush is shown in Fig. 8 as expanded to almost its greatest size. It will be understood that this construction permits a considerable amount of expansion, and several settings may be made to compensate for the wear of the bristles before renewing the holder. It will be ob-

vious, however, that the bristle holders can be easily removed and replaced irrespective of the positions of the holders. While for ordinary operations both distance pieces will be fixed in the same relative position, and will be given identical adjustments, so that the brush will have a cylindrical shape; yet for special work one distance piece may be moved farther than the other to give a conical or tapering effect. And it should also be mentioned that while the brush holders are shown as parallel to the shaft they may be mounted to extend at any angle with respect thereto, and if desired the holders may be curved to give a spiral effect, as mentioned hereinbefore in connection with the first-described form. Also, the driver member 6 may be omitted from the expandible form if desired, as previously mentioned in connection with the description of the first form.

It will be apparent from the foregoing description, that the brushes constituting the present invention are simple in construction, inexpensive in manufacture, and possess numerous advantages over brushes heretofore known. And while I have described the specific construction of the brushes in detail, yet it is to be understood that many changes and modifications may be made without departing from the spirit of the invention; and the specific forms shown are therefore to be considered merely as illustrative rather than in any limiting sense.

What I claim is:

1. A rotary brush including a shaft, a plurality of bristle holders, distance pieces mounted on said shaft, a driver member intermediate the distance pieces and fixed to said shaft against relative rotary movement, said driver member engaging the bristle holders, and means for clamping the bristle holders on said distance pieces.

2. A rotary brush including a shaft, a plurality of bristle holders, distance pieces mounted on said shaft, a driver member intermediate the distance pieces and fixed to said shaft against relative rotary movement, said driver member provided with recesses to receive the bristle holders, and means for clamping the bristle holders on said distance pieces.

3. A rotary brush including a shaft, a plurality of bristle holders, distance pieces mounted on said shaft against relative rotation with respect thereto, said distance pieces being angular to provide flat faces, the bristle holders mounted on the distance pieces in spaced relation with respect to said shaft, the bottoms of the bristle holders having flat faces cooperating with the flat faces of the distance pieces, and a single clamping member at each end of the brush for clamping all of the bristle holders on said distance pieces.

4. A rotary brush including a shaft, a plurality of bristle holders, distance pieces mounted on said shaft, the ends of the bristle holders mounted on the distance pieces, a single locking member at each end of the brush, said locking members loosely mounted on said shaft beyond the distance pieces, flat faces provided on said locking members, said flat faces cooperating with the ends of the bristle holders to clamp the holders on the distance pieces, and nuts threaded on the shaft and securing the locking members in place.

5. A rotary brush including a shaft, a plurality of bristle holders extending longitudinally of

and spaced from said shaft, a driver member fixed to said shaft and engaging the bristle holders, and means for removably securing said bristle holders in place, said means including distance pieces fixed to said shaft, locking members loosely mounted on said shaft, and nuts threaded on the shaft and securing the bristle holders in clamped relation between the distance pieces and the locking members.

6. A rotary expandible brush including a shaft, a plurality of bristle holders extending longitudinally of said shaft, the bristle holders having portions turned inwardly toward the shaft, distance pieces adjustably mounted on said shaft, the peripheral face of the distance pieces cooperating with the intumed portions of the bristle holders, means for clamping the bristle holders to the distance pieces, and means for adjusting the distance pieces to vary the position of the bristle holders.

7. A rotary expandible brush including a shaft, a plurality of bristle holders extending longitudinally of said shaft, the ends of the bristle holders inclined inwardly, distance pieces mounted on said shaft, the bristle holders mounted on said distance pieces, means for clamping the bristle holders on the distance pieces, the peripheral faces of the distance pieces having substantially the same inclination as the ends of the bristle holders where the distance pieces contact with the bristle holders, and means for adjusting the distance pieces longitudinally of said shaft to expand the brush.

8. A rotary expandible brush including a shaft, a plurality of bristle holders extending longitudinally of said shaft, said bristle holders having inclined portions adjacent the ends thereof, means for removably and adjustably securing the bristle holders in place, said means including distance pieces mounted on the shaft, locking members mounted on the shaft beyond the distance pieces, the distance pieces and locking members having inclined portions cooperating with the inclined portions of the bristle holders, and means for adjusting the distance pieces and the locking members to adjust the position of the bristle holders.

9. A rotary expandible brush including a shaft, a plurality of bristle holders extending longitudinally of said shaft, a driver member fixed to said shaft and engaging the bristle holders, said bristle holders having inclined portions adjacent the ends thereof, means for removably and adjustably securing the bristle holders in place, said means including distance pieces mounted on the shaft, locking members mounted on the shaft beyond the distance pieces, the distance pieces and locking members having inclined portions cooperating with the inclined portions of the bristle holders, and means for adjusting the distance pieces and the locking members to adjust the position of the bristle holders.

10. A rotary expandible brush including a shaft, a plurality of bristle holders extending longitudinally of said shaft, the bristle holders having inclined portions, distance pieces mounted on the shaft, said distance pieces having inclined portions cooperating with the inclined portions of the bristle holders, means for clamping the bristle holders on the distance pieces, and means for adjusting one of the distance pieces independently of the other distance piece to give any desired angle to the bristle holders.

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