

June 14, 1966

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3,255,479

ROTARY BROOM CONSTRUCTION

Filed May 5, 1964

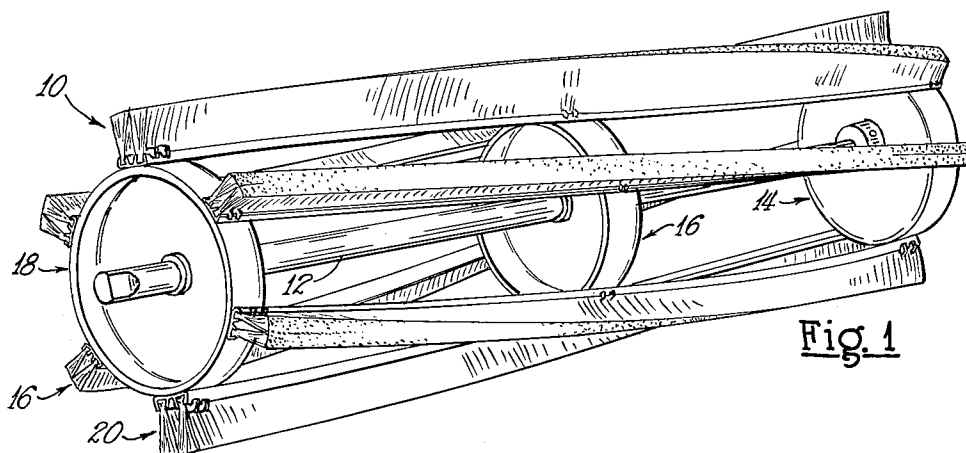


Fig. 1

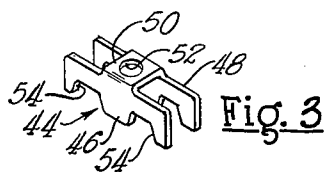


Fig. 3

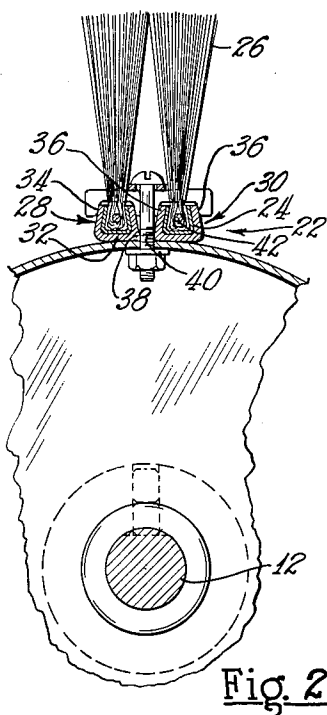


Fig. 2

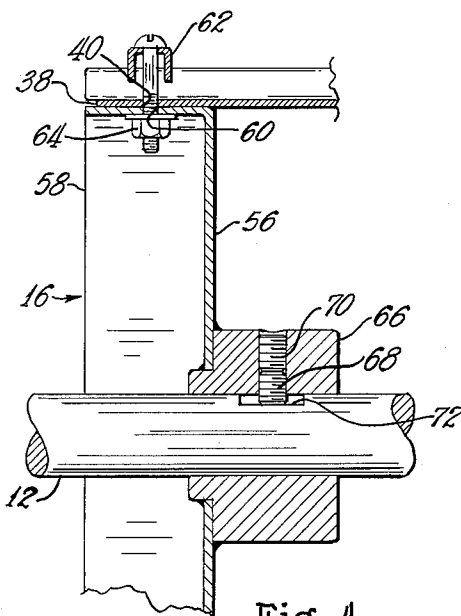


Fig. 4

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ROTARY BROOM CONSTRUCTION

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Filed May 5, 1964, Ser. No. 364,972
3 Claims. (Cl. 15-183)

This invention relates to a rotary broom, and more particularly to a low-cost rotary broom, which can be fabricated and rejuvenated quickly and with a minimum amount of equipment.

Rotary brooms commonly are used for many applications, particularly in sweeping machines used to clean large surfaces. Such brooms are of substantial length and diameter and require a large number of bristles, tending to make costly the manufacture of the brooms and the replacement of the bristles. Hence, the cost of using the rotary brooms is high, especially when the brooms are used on rough surfaces such as concrete, in which case, wear on the bristles is rapid and replacement frequent. Because of the problem in replacing bristles, many rotary brooms used today are designed to be disposed of entirely when the bristles are worn. In other instances, the entire broom must be sent back to the factory for replacement of the bristles, which is time consuming and expensive.

The present invention relates to a low-cost broom which not only is less expensive to manufacture, but the bristles of which can be replaced more easily with a minimum amount of equipment. The replacement can be effected by the user, a dealer, or a distributor, for example, rather than by the factory.

It is, therefore, a principal object of the invention to provide an improved rotary broom having the advantages outlined above.

Other objects and advantages of the invention will be apparent from the following detailed description of a preferred embodiment thereof, reference being made to the accompanying drawing, in which:

FIG. 1 is an overall view in perspective of a rotary broom constructed in accordance with the invention;

FIG. 2 is an enlarged, fragmentary view in transverse cross section of the broom shown in FIG. 1;

FIG. 3 is a view in perspective of a clip used to connect some of the components of the broom; and

FIG. 4 is a fragmentary view in longitudinal cross section of the parts of the broom shown in FIG. 2, without the bristles.

Referring to the drawing, and more particularly to FIG. 1, a broom 10 embodying the invention basically includes an axle 12, drum members 14, 16, and 18, and rows 20 of bristles. The number of drum members employed will depend upon the length of the broom 10, while the number of rows 20 of bristles employed will depend upon the diameter of the broom. The rows 20 are of helical configuration because they thereby provide an effect similar to a broom having the entire periphery filled with bristles. Even though the rows of bristles are comparatively few, there are always bristles in sweeping contact with the floor and substantially perpendicularly thereto so as to provide an effect similar to a broom completely covered with bristles. To achieve this result, it is only necessary that bristles at one end of a row are in contact, or about to contact, the surface being swept, at the time that the bristles at the opposite end of the preceding row are about to leave contact with the surface. This would mean, for example, with six rows of bristles, the bristles at one end of each row must be displaced an angle of at least 60° from the bristles at the opposite end of that row, since with six rows of bristles, they are spaced 60° apart.

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The bristle rows 20 include extruded double trough members 22 (FIG. 2), U-shaped strips 24, and bristles 26 of any suitable length, stiffness, and material. The trough members 22 include two substantially identical troughs 28 and 30, each having a bottom wall 32 and integral sidewalls 34 and 36 sloping inwardly toward one another. The bottoms 32 are integrally connected by a web 38 containing bolt openings 40. The trough member 22 preferably is of extruded aluminum, but can be of other materials. Further, more than two rows, or only one row, of bristles can be employed, with the number of rows in each of the main rows 20 depending on such factors as the stiffness of the bristles, their density, and the type of surface being cleaned, by way of example.

The bristle anchoring strips 24 generally are of similar configuration to the troughs 28 and 30 and are slidably held in the troughs 28 and 30 when initially inserted thereinto from one end. The bristles 26 are of U-shaped configuration and are wrapped around retaining rods 42 located in the U-shaped strips 24. This enables the bristles to be held very firmly when the sidewalls of the strips are squeezed together after the bristles and rods are inserted. Other means for anchoring the bristles in the strips can be used, however.

The bristles 26 and the strips 24 are securely anchored in the extruded members 22, after being assembled, by a unique clamp 44, shown in FIG. 3. The clamp 44 includes sidewalls 46 and 48 connected by a web 50 having a bolt opening 52 centrally located therein. The sidewalls 46 and 48 of the clamp 44 are substantially identical and include pairs of identical inverted U-shaped notches 54 having side edges or legs forming an included angle somewhat greater than the included angle formed between the sidewalls 34 and 36 of the troughs 28 and 30. The edges of the notches 54 also can form the same angle if spaced slightly closer together than the sidewalls 34 and 36 of the troughs. With either arrangement, when the clamp 44 is squeezed downwardly on the trough member 22, the sidewalls 46 and 48 of the clamp 44 will tend to squeeze together the sidewalls 34 and 36 of the trough members to hold the strips 24 securely in place.

Each of the drum members 14, 16, and 18 is identical, with the outer members 14 and 18 facing oppositely. Each of the drum members, as shown by the drum member 16 in FIG. 4, includes a disc 56 and integral flange 58 provided with suitable holes 60 through which bolts 62 extend, being drawn radially inwardly by nuts 64. This action causes the clamp 44 to move down on the troughs 28 and 30, thereby squeezing inwardly the sidewalls 34 and 36.

Each of the discs 56 is affixed to a hub 66 which, in turn, is mounted on the axle 12. As shown, the hub 55 is affixed to the axle in a predetermined position by a pair of set screws 68 and 70, the former being screwed against a flat 72 machined on the axle 12 in a predetermined position. The second set screw 70 then holds the first screw 68 securely in place. By machining the flats 72 for the three drum members 14, 16, and 18 in predetermined, peripherally-spaced positions, the drums can be held in predetermined peripherally-spaced positions on the axle 12. Rather than the use of the set screw 68 and the flat 72, however, other means can be used to affix the hubs in predetermined positions. For example, keys and keyways can be used with the axle keyways being formed in predetermined peripheral positions similarly to the flats 72.

While the axle 12 is shown as extending longitudinally beyond the end drum members 14 and 18, for some types of sweepers, different connections for supporting and rotatably driving the broom 10 can be used. In

such instances, the axle 12 might even be cut off at the discs 56 of the members 14 and 18 and other suitable connections might be affixed to the outwardly facing surfaces of these discs.

The method of fabricating the broom 10 is simple and requires a minimum of equipment. To accomplish the assembly, the three drum members 14, 16, and 18 are first placed on the axles in their approximate longitudinal positions with one of the drum members, such as the drum member 14, affixed to the axle 12 by the set screws in a given position. The six rows 20 of the bristles 26 are then loosely peripherally mounted on the flanges 58 of the drum members 14, 16, and 18 by means of the clamps 44 and the bolts 62 and nuts 64. With the rows of bristles in position, the opposite end drum member 18 is then rotated, or peripherally-displaced, a predetermined amount while the amount while the drum member 14 is held, with the drum member 18 then affixed to the axle 12 in the predetermined position by means of the set screw 68 which is screwed against the corresponding flat 72. The intermediate drum member 16, during this period, will assume an intermediate position approximately half-way peripherally-displaced between the end two drum members, and the drum member 16 is then affixed to the axle in the same manner as the other two. The set screws 70 can then be screwed into position to hold the inner set screws 68. At this time, the rows 20 of the bristles 26 are affixed to the flanges 58 by tightening down the bolts 62, thereby completing the broom 10.

After the brush is constructed, it frequently is desirable to trim the ends of the bristles 26 since they are slightly displaced from an overall cylindrical configuration when moved into their helical configurations.

When it is desired to replace the bristles 26 when worn, the clamps 44 are loosened by means of the bolts 62, at which time the bristles 26 and the U-shaped strips 24 can be pushed out the ends of the troughs 28 and 30. Similar rows of new bristles are then slid into place. In some instances, it may be necessary to also loosen the drum members 16 and 18 to straighten the rows of bristles before the strips 24 can be removed from the troughs 28 and 30. In either event, the time required for the replacement is a minimum and, since practically no equipment is required, the operation can be performed by the user or by a dealer or distributor, without shipping the entire broom 10 back to the factory.

Various modifications of the above-described embodiment of the invention will be apparent to those skilled in the art, and such modifications can be made without departing from the scope of the invention, if they are within the spirit and tenor of the accompanying claims.

We claim:

1. A rotary broom for use with a surface sweeping machine comprising a plurality of spaced drum members, means for maintaining said drum members in spaced, fixed positions, a plurality of elongate trough members, each of which has side walls forming two troughs extending longitudinally thereof, a row of bristles held by each of said troughs and extending continuously therealong, a clip for affixing each of said trough members to each of said drum members and comprising a pair of spaced side walls generally parallel to said bristles and perpendicular to said troughs, portions of each clip side wall having generally inverted U-shaped notches having

side edges forming an included angle greater than the included angle formed by said trough side walls to fit over and press against outer side walls of the troughs carrying the rows of bristles with said side wall portions extending between the bristles, a connecting web between intermediate portions of said clip side walls between said notch portions and holding said cap side walls in generally parallel, fixed relationship, and fastening means extending through each of said connecting webs and fastened to said drum members and urging said clips toward said hubs to hold the trough members and urge the side walls of said troughs inwardly, said clips being capable of fitting with said troughs anywhere along their lengths.

2. A rotary broom for use with a surface sweeping machine comprising at least three spaced drum members including two outer drum members and at least one intermediate drum member, each of said drum members comprising a disc portion and an integral cylindrical flange portion, hubs centrally affixed to said discs, said hubs having fastener means, a common axle extending through said hubs of all of said drum members and maintaining said members in axial alignment, said axle having means near each end for receiving said fastener means of said hubs of the outer drum members for holding said outer members in fixed positions, said fastener-receiving means being peripherally displaced with respect to one another, the intermediate hub of the intermediate drum member capable of being affixed to said axle in any peripheral position, a plurality of elongate trough members having side walls forming troughs extending longitudinally thereof, rows of bristles held by said troughs and extending continuously therealong, a clip for affixing each of said trough members to each of said cylindrical flanges of each of said drum members, and fasteners extending centrally through said clips to pivotally connect said clips to said flanges so that said clips and said trough members can be placed in positions other than perpendicular to the planes of said discs.

3. A broom according to claim 2 wherein said clip fastener means comprise bolts, said hub fastener means comprises screws extending through threaded passages in said hubs toward said axle, and said fastener-receiving means comprises flat portions on said axle.

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