Feb. 9, 1954 J. D. CONWAY 2,668,310

NOZZLE STRUCTURE FOR ROTARY BRUSHING DEVICES

Filed Dec. 10, 1948 2 Sheets-Sheet 1

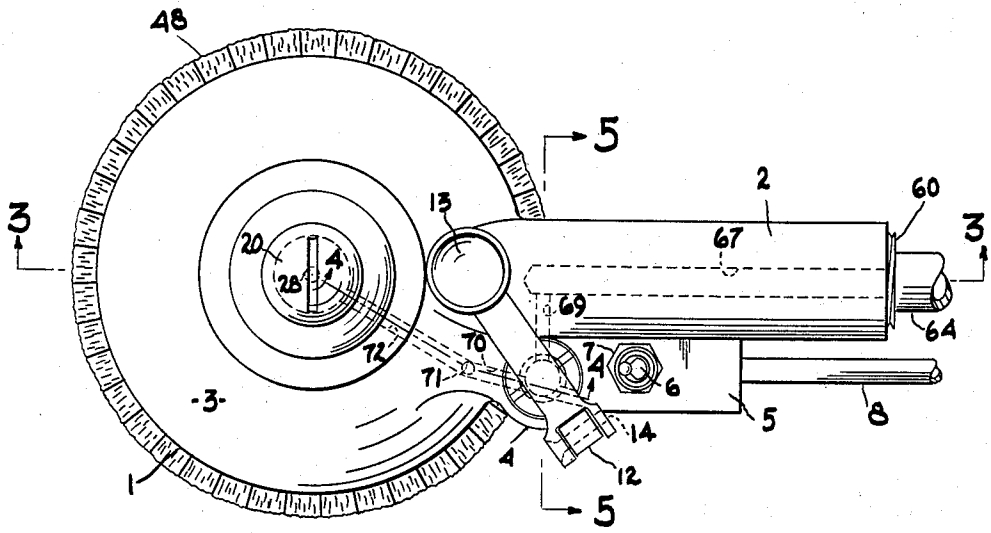


FIG. 1

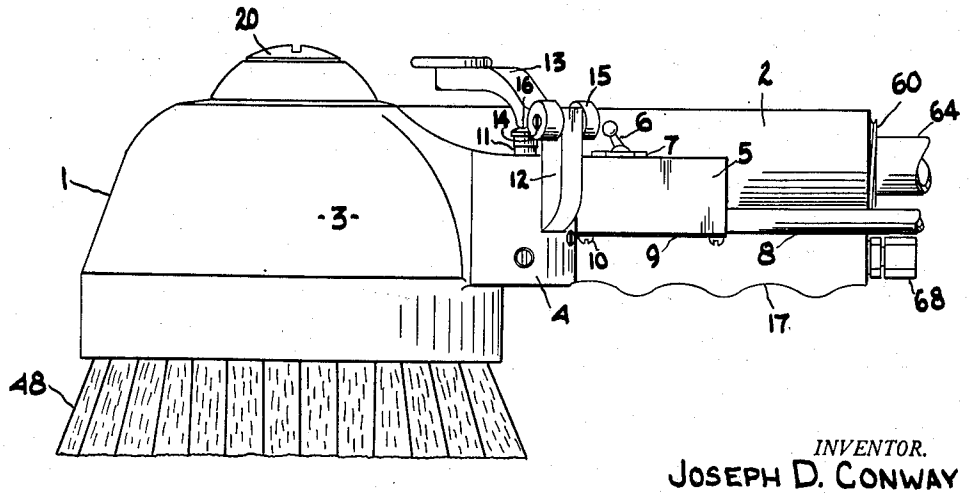


FIG. 2

INVENTOR.
JOSEPH D. CONWAY
BY
William Isler
ATTORNEY

Feb. 9, 1954 J. D. CONWAY 2,668,310

NOZZLE STRUCTURE FOR ROTARY BRUSHING DEVICES

Filed Dec. 10, 1948 2 Sheets-Sheet 2

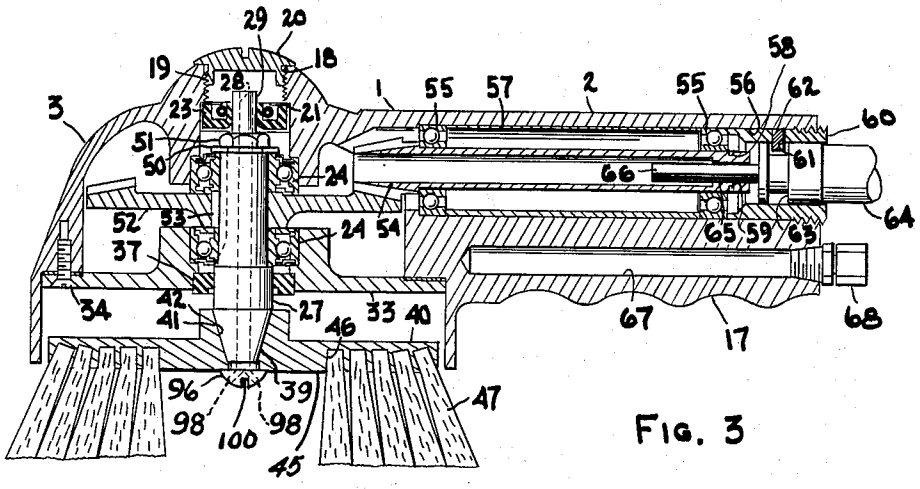


FIG. 3

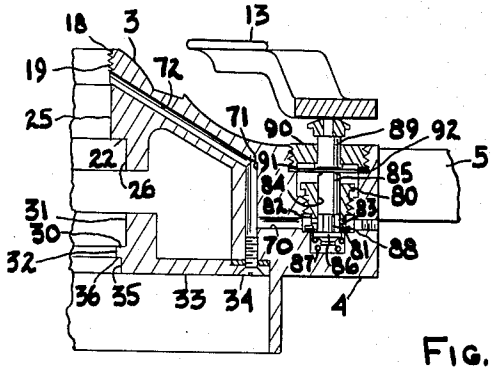


FIG. 4

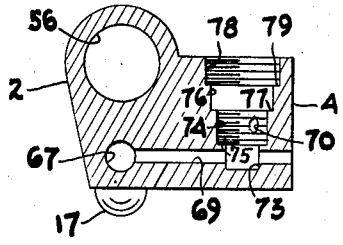


FIG. 5

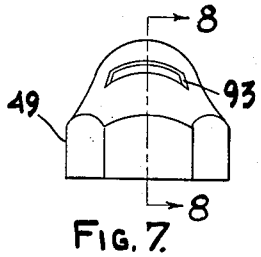


FIG. 7

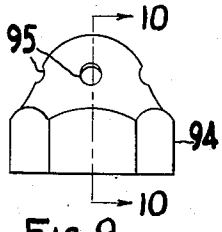


FIG. 9

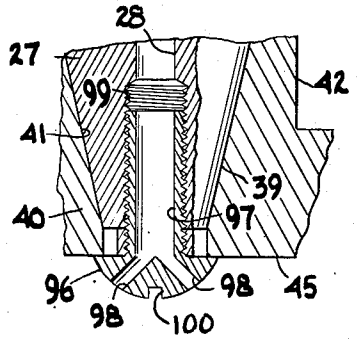


FIG. 6

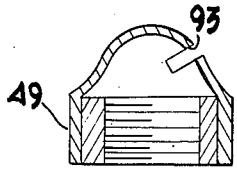


FIG. 8

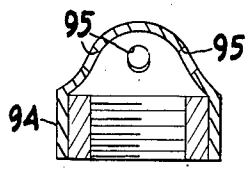


FIG. 10

INVENTOR.
JOSEPH D. CONWAY
BY
William Soler
ATTORNEY.

Patented Feb. 9, 1954

2,668,310

UNITED STATES PATENT OFFICE

2,668,310

NOZZLE STRUCTURE FOR ROTARY BRUSHING DEVICES

Joseph D. Conway, Cleveland Heights, Ohio

Application December 10, 1948, Serial No. 64,470

1 Claim. (Cl. 15—180)

1

The present invention relates generally to rotary brushing devices as used in combination with cleansing fluids or the like to clean upholstered surfaces of furniture and walls, and more particularly, to improved means for distributing the cleansing fluid to the brushed surfaces.

Although rotary brushing devices of the type herein described have been successfully used by upholstery cleaners on horizontal surfaces, a good deal of difficulty has been encountered when the device is employed on vertical or sloping surfaces. This results from the fact that on vertical surfaces the cleansing fluid tends to escape from the confines of the brushes before the brushes have been afforded the opportunity of working the fluid into the upholstery or of lathering it, if the fluid be of the soap type.

The prior art devices eject the cleansing fluid directly onto the brushed surface. On horizontal work this poses no problem as there is little or no tendency for the fluid to flow across the surface. However, when the fluid is thus ejected onto a vertical surface, it rapidly flows downwardly, away from the brushes and may cause a streaking of the surface being cleaned, as well as being wasteful of the fluid itself.

It is the primary object of my invention to provide a device of the character described which is particularly adapted to be employed on vertical surfaces.

Another object of my invention is to provide such a device in which the cleansing fluid is not ejected directly onto the surface being worked.

Still another object of my invention is to provide a device of the character described, in which the cleansing fluid is caused to be entrapped by the brushes before it is permitted to contact the surface being worked.

A further object of my invention is to provide a device of the character described, in which the path of fluid flow is so arranged as to cause the cleansing fluid to be sprayed directly onto the revolving brushes.

Other objects and advantages of my invention will become apparent during the course of the following description.

In the drawings, annexed to this specification and forming a part thereof, and in which like numerals designate like parts throughout the same,

Fig. 1 is a top plan view of a rotary brushing device embodying the features of my invention and particularly showing the path of fluid travel in the device.

Fig. 2 is an elevational view of the device shown in Fig. 1.

2

Fig. 3 is a longitudinal cross-sectional view of the device taken on line 3—3 of Fig. 1.

Fig. 4 is an enlarged fragmentary sectional view taken on line 4—4 of Fig. 1, showing details of the valve construction, the other parts being removed.

Fig. 5 is a view taken on line 5—5 of Fig. 1 with the parts removed to show portions of the fluid flow channels.

Fig. 6 is a cross-sectional view of the nozzle shown in Fig. 3.

Fig. 7 is a front elevational view of a modified form of nozzle which is used in my invention.

Fig. 8 is a sectional view taken on line 8—8 of Fig. 7.

Fig. 9 is an elevational view of another modified form of nozzle.

Fig. 10 is a cross-sectional view taken on line 10—10 of Fig. 9.

Referring more particularly to Figs. 1 and 2 of the drawings, the device is seen to comprise a housing 1 which may be a casting and which, in turn, consists of a handle portion 2, a hemispherical shell 3, a valve housing 4, and a switch housing 5.

Contained within the switch housing 5 is a toggle switch 6 which is secured thereto by means of a nut 7. An electric cord 8 leads from the switch 6 to an electric motor pump assembly (not shown) which is utilized to pump the cleansing fluid to the housing and also serves to rotate the brushes by means of the mechanism which will be fully described hereinafter.

In order to prevent dirt from entering the switch housing 5, it is provided with a cover plate 9 which is secured thereto by means of screws 10.

In the housing 4 is contained a valve assembly 11, which will be described in detail hereinafter, and integrally formed on the exterior of the housing 4 and extending upwardly therefrom is a pivot post 12 on which is hingedly mounted a valve lever 13 by means of a screw 14 which extends through the post 12 and the bifurcated portion 15 of the lever 13. The lever 13 is provided with a camming surface 16 which is adapted to engage the valve assembly 11 and cause the valve to be opened when the lever is depressed.

The handle 2 is provided on the underside thereof with suitable finger notches 17 for convenience in handling the device.

Referring now more particularly to Fig. 3, it will be seen that the shell 3 is provided with a centrally located vertical bore 18 which is threaded as at 19 to receive a cap 20. The bore 18 is counterbored as at 25 to provide a shoulder 21 on which is seated an oil seal 23, and is counter-

bored as at 26 to provide a shoulder 22 against which seats a ball bearing 24.

A hollow shaft 27 provided with a longitudinal bore 28 has a portion 29 of reduced diameter which extends through the oil seal 23 into the space defined by the bore 18. The shaft 27 is journalled in two ball bearings 24, one of which, as heretofore mentioned, seats against the shoulder 22 and the other of which seats against a shoulder 30 formed by a counterbore 31 in the bore 32 of a circular cover-plate 33.

The cover-plate 33 is secured to the interior of the shell 3 by means of circumferentially spaced screws 34 and is further counterbored as at 35 to provide a shoulder 36 against which seats an oil seal 37 which is mounted on the shaft 27.

The lower extremity of the shaft 27 is conically tapered as at 39 to provide a seat for a brush plate 40 which has formed in the hub 42 thereof a tapered bore 41 which is complementary to the taper 39 on the shaft 27.

The face 45 of the brush plate is also provided with a plurality of radially and circumferentially spaced openings 46 which are adapted to receive and contain the bristle units 47 which comprise the brush 48.

The brush plate 40 is retained on the shaft 27 by means of an acorn nut or nozzle 96 which is threadedly secured to the end of the shaft. The acorn nut is of special form and will be described more fully hereinafter.

The upper of the bearings 24 is positioned on the shaft 27 by means of a washer 50 and a jam nut 51 which is threadedly secured to the shaft. A bevel gear 52 is mounted on the shaft 27 intermediate the bearings 24 and is keyed thereto by means of a key 53.

The bevel gear 52 is driven by a bevel pinion 54 which is journalled in ball bearings 55 which are contained in the longitudinal bore 56 of the handle 2. A spacer tube 57 is interposed between the bearings 55 to position the bearings on the shaft of the pinion 54 and a retaining ring 58 is mounted in a circumferential groove 59 on the shaft to prevent axial displacement of the pinion relatively to the bearings 55.

The bearings 55 are secured against axial movement relatively to the bore 56 by a retainer nut 60 which is threaded into the bore 56 and abuts one of the bearings 55. The nut 60 is slotted as at 61 to receive a key 62 which is adapted to enter a circumferential recess 63 on a flexible shaft assembly 64 and serves to prevent axial movement of the flexible shaft assembly.

The end of the pinion shaft is provided with an opening 65 of square cross-section which is adapted to key the pinion with a square extension 66 of the flexible shaft.

Directly beneath the bore 56 in the handle 2 is provided a bore or channel 67 of somewhat smaller diameter which is threaded to receive a hose union 68 and which serves to convey the cleansing fluid into the device.

By also referring to Figs. 1, 4 and 5, it will be seen that the channel 67 communicates with a traversing channel 69 which leads into the valve housing 4. Another channel 70, which is elevated above the channel 69, leads out of the valve housing 4 to a vertically extending channel 71 in the shell 3, which, in turn, communicates with an angularly extending channel 72 which leads into the space defined by the bore 18 and sealed by the cap 20.

In the description of operation of the device which will follow, I will describe the path of travel of the fluid, however, I wish now to refer more particularly to Fig. 4 and the details of the valve assembly 11 therein disclosed.

The valve housing 4 is bored as at 73 and is counterbored and threaded as at 74 to form the shoulder 75. It is further counterbored at 76 to form shoulder 77 and is counterbored and threaded as at 78 to form shoulder 79.

A valve body 80 is threadedly secured in the bore 74 and seats on the shoulder 75. The valve body has secured thereto at its lower extremity a resilient washer 81 which serves to isolate the bore 73 from the bore 74. The body has an annular recess 82 in which are formed a plurality of openings 83 which communicate with the bore 84 of the valve body 80.

A valve stem 85 is slidably mounted in the bore 84 of the valve body and has a flanged portion 86 which extends into the bore 73 and overlies the washer 81. A coil spring 87 is seated in the bore 73 and yieldably maintains the stem 85 in sealing engagement with the washer 81.

The stem is undercut as at 88 to provide a clearance for the passage of fluid through the bore 84 when the stem is depressed.

A plunger 89 is assembled to a retainer nut 90 for limited sliding movement therein, and the retainer nut is threadedly secured in the bore 78 and seats against the shoulder 79 through the intermediary of a washer 91 and a flexible diaphragm 92 which is interposed between the abutting portions of the valve stem 85 and plunger 89. The diaphragm thus prevents leakage of any fluid out of the valve housing 4.

As heretofore mentioned, the valve lever 13 is utilized to depress the plunger 89 and open the valve 11.

In Figs. 3 and 6, I have shown a nozzle 96 which is formed of a machine screw which is machined to provide a longitudinal bore 97 and angularly disposed openings 98 branching off therefrom to direct the fluid onto the brush. In utilizing this form of nozzle, the shaft 27 is provided with a threaded opening 99 which communicates with the bore 28 and which is adapted to receive the nozzle 96. The fluid flows from the bore 28 into the bore 97 and is ejected through the openings 98. The head of the nozzle 96 also serves to secure the brush plate 40 to the shaft 27, as best shown in Fig. 6. The head of the nozzle 96 is also provided with a slot 100 for the reception of a screw driver whereby assembly and removal of the nozzle for repair or replacement purposes is greatly facilitated.

In Figs. 7 and 8 I have shown a modified form of nozzle in which I utilize and acorn nut 49 to secure the brush plate 40 to the shaft 27. It will be noted that a slot 93 is provided in the wall of the nut and that this slot is formed in a plane which would direct the fluid ejected therefrom at an angle such as indicated by the arrow in Fig. 3. Although I have indicated only one slot 93, it will be apparent that a plurality of slots could be used if a greater volume of fluid flow is desired.

In Figs. 9 and 10, I have shown, as an illustrative example, a modified form of nut. In this embodiment, the acorn nut 94 is provided with circular openings 95 which, like the slot 93, are angularly disposed so as to eject the fluid onto the brush 48.

As in the case of the nozzle 96, the nozzles 49 and 94 also serve to secure the brush plate 40 to the shaft 27.

The operation of the device will now be briefly described. It will be apparent that when the flexible shaft **64** rotates the pinion **54**, it, in turn, will cause the bevel gear **52** to be rotated. As the bevel gear is keyed to the shaft **27**, the shaft **27** will also be rotated and will cause the brush plate **40** and nozzle **96** to rotate therewith.

The cleaning fluid is pumped through a hose (not shown) to the handle **2** of the device where it enters the channel **67**. From the channel **67** the fluid flows to channel **69** and into the bore **73** in the valve housing **4**. If the valve **11** be closed, the fluid cannot pass out of the bore **73** as the flanged portion **86** of the valve stem **85** is in sealing engagement with the washer **81** which seats on the shoulder **75**.

However, if the valve lever **13** is depressed, the plunger **89** causes the stem **85** to move downwardly against the action of the spring **87** and thus opens a path for the fluid flow between the washer **81** and the flanged portion **86** of the valve stem. The fluid can then flow into the bore **84** of the valve body and through the openings **83** into the bore **74** of the valve housing.

As the channel **70** communicates with the bore **74**, the fluid flows through the channel **70**, through channel **71** and then through channel **72** which opens into the bore **18** in the shell **3**.

The only outlet provided for the fluid is through the bore **28** of the hollow shaft **27** and it is ejected from the device through the nozzle **49** or through the modified forms of nozzles heretofore described.

As indicated by the arrow in Fig. 3, the fluid is ejected onto the rotating brush **48** instead of being ejected directly onto the surface being brushed. This permits the fluid to be worked or lathered by the brushes and to be evenly distributed among the bristles before it contacts the upholstered surface.

Thus, the possibility of the fluid running down a vertical surface and the consequent danger of streaking or of over-wetting is obviated.

From the foregoing description it will be observed that I have provided a compact, easily handled rotary brushing device which is particularly useful on vertical or inclined surfaces and which successfully attains the objections which I have heretofore set forth.

It is to be understood that the embodiments of my invention, herein shown and described, represent preferred examples of the same, and that various changes in the shape, size and arrangement of the parts may be resorted to without departing from the spirit of my invention or the scope of the subjoined claim.

Having thus described my invention, I claim:

In a device of the character described, the combination of a hollow rotatable shaft, a conical end portion provided on said shaft, a brush assembly having a conical recess mounted directly on the end portion of said shaft, and a fastening element having a hollow stem portion threadedly secured to said shaft and a head abutting said brush assembly to maintain said assembly locked frictionally to said shaft, said head having a spherical outer surface and having openings extending angularly therethrough to direct a fluid under pressure from said hollow shaft and stem to said spherical surface and onto said brush assembly, said head being also provided with a slot adapted for the reception of a screw driver, whereby assembly and removal of said fastening element is facilitated.

JOSEPH D. CONWAY.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,191,860	Wesley	July 18, 1916
1,231,825	Weller	July 3, 1917
1,418,088	Liddel	May 30, 1922
1,869,179	Yutzler et al.	July 26, 1932
1,927,226	Woods	Sept. 19, 1933
1,931,893	Fleming et al.	Oct. 24, 1933
1,971,790	Mall	Aug. 28, 1934
2,232,493	Stuckey et al.	Feb. 18, 1941
2,358,119	Wilson	Sept. 12, 1944
2,367,900	Stine	Jan. 23, 1945

FOREIGN PATENTS

Number	Country	Date
467,873	France	Apr. 8, 1914