Feb. 21, 1956 H. C. ERBS 2,735,125

FOAM GENERATING CLEANING DEVICE

Filed Feb. 23, 1952 2 Sheets-Sheet 1

FIG. 1

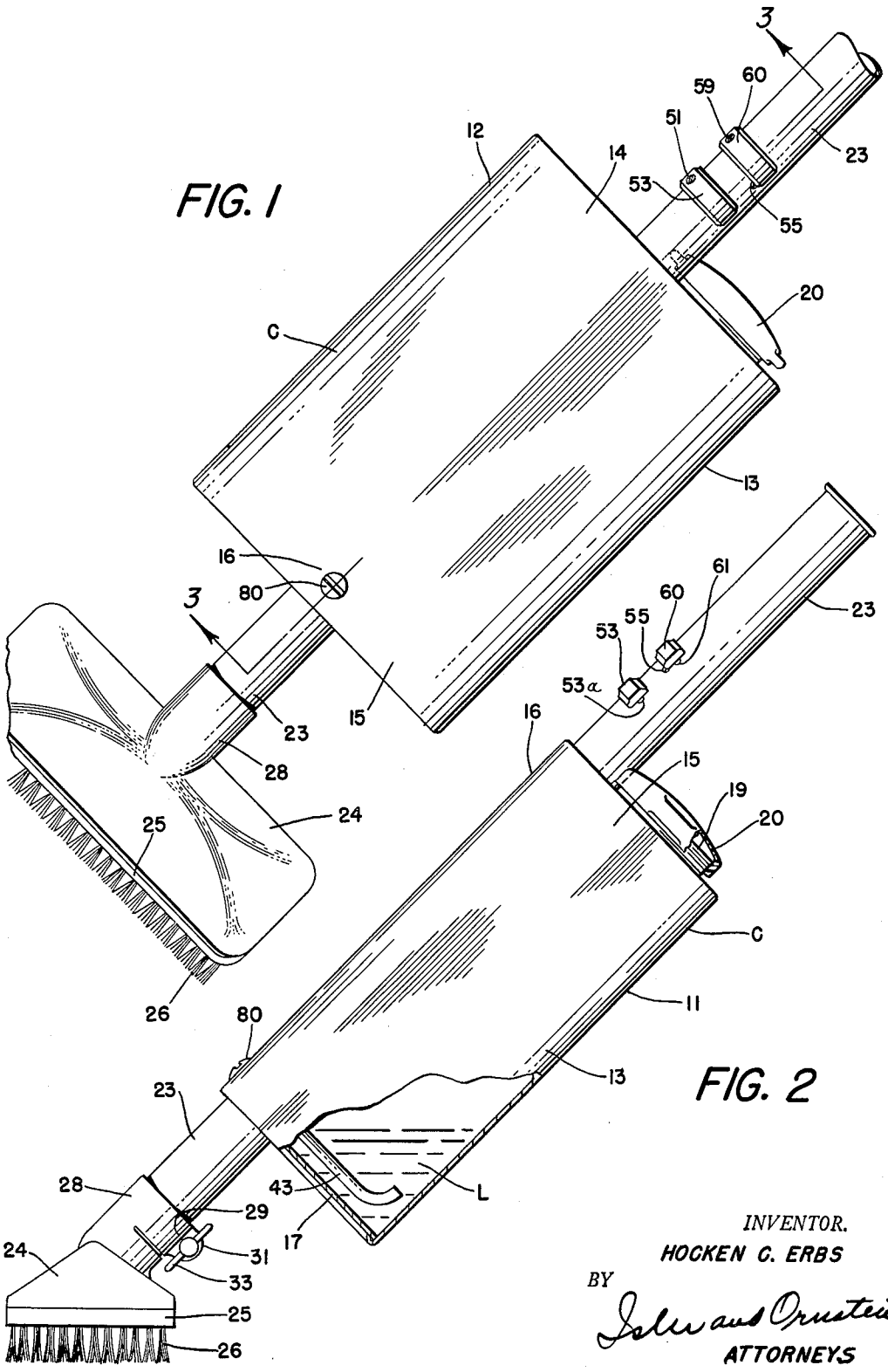


FIG. 2

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Filed Feb. 23, 1952 2 Sheets-Sheet 2

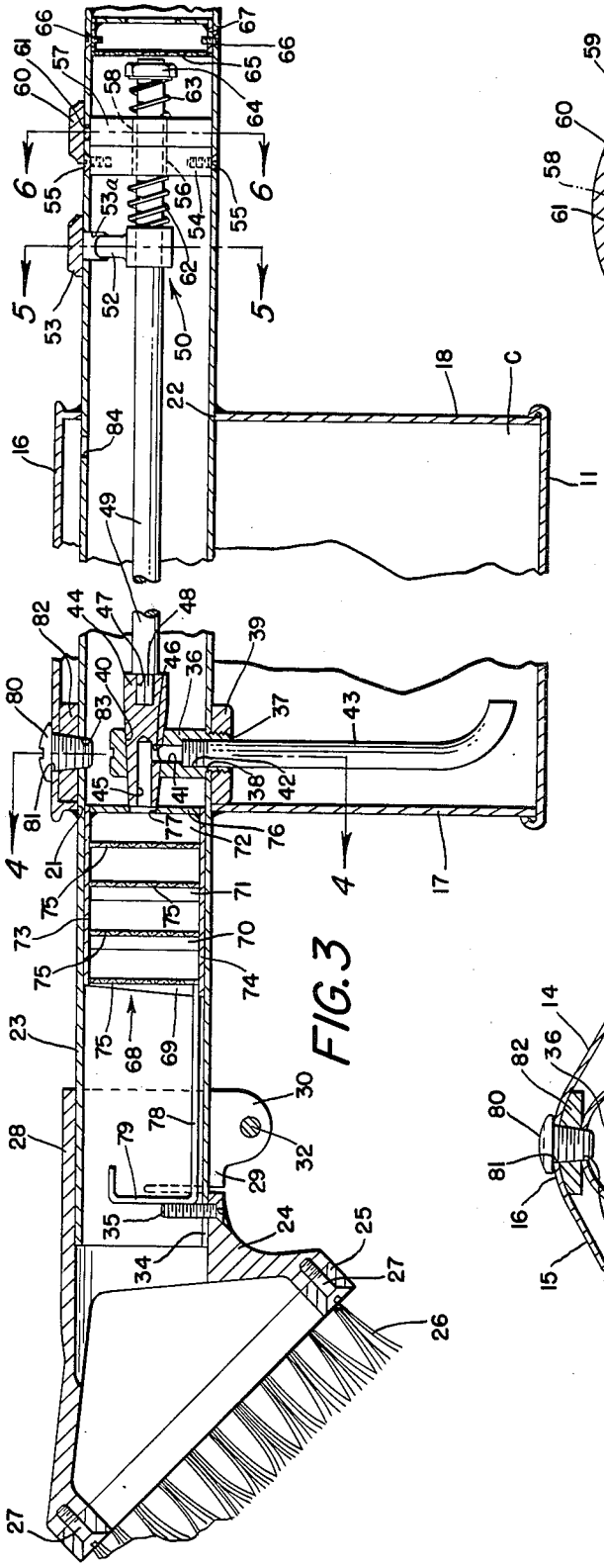


FIG. 3

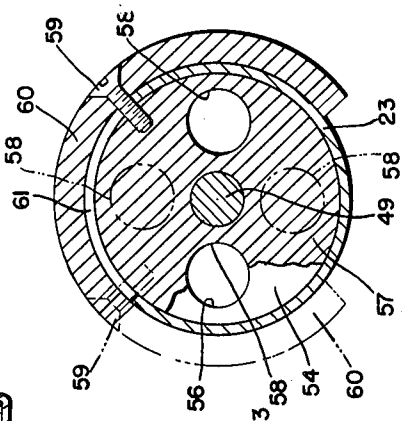


FIG. 6

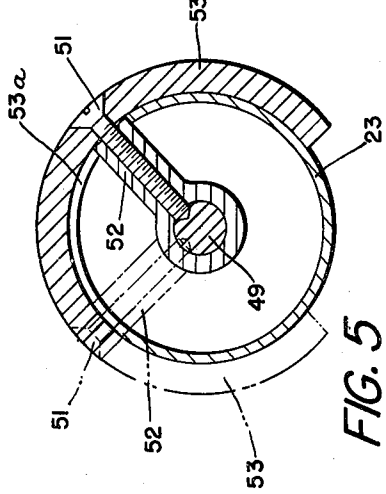


FIG. 5

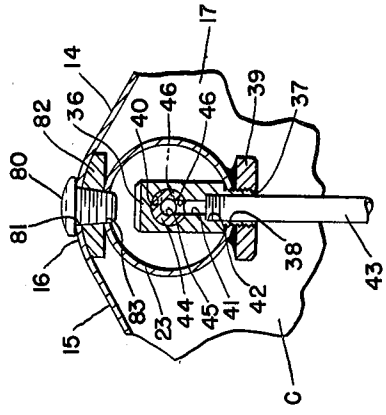


FIG. 4

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FOAM GENERATING CLEANING DEVICE

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Application February 23, 1952, Serial No. 273,034

7 Claims. (Cl. 15—131)

This invention relates, as indicated, to cleaning devices, but has reference more particularly to that type of cleaning device in which cleaning suds are produced and utilized to scrub or clean a surface by means of brushes.

A primary object of the invention is to provide devices of the character described, consisting of a minimum number of parts which are easily manufactured and capable of being made and assembled at low cost.

Another object of the invention is to provide devices of the character described, which are readily adapted for use in connection with home and commercial vacuum cleaners, and blowers, and with which cleaning may be accomplished inexpensively, efficiently, and in a fraction of the time required for conventionel methods of cleaning.

A further object of the invention is to provide devices of the charatcer described, which have embodied therein air and fluid controls which are easily accessible and easy to operate, and through the use of which the character or quality of the suds can be varied to a considerable degree.

A still further object of the invention is to provide devices of the character described, which are so constructed, that they can be quickly and easily disassembled for cleaning, or replacement of worn parts, and just as quickly and easily assembled.

Other objects and advantages of my invention will be apparent during the course of the following description. In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Fig. 1 is a top plan view of one form of cleaning device embodying my invention;

Fig. 2 is a side elevational view of the cleaning device;

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

Fig. 4 is a fragmentary cross-sectional view, taken on the line 4—4 of Fig. 3;

Fig. 5 is a transverse cross-sectional view, taken on the line 5—5 of Fig. 3, and

Fig. 6 is a transverse cross-sectional view, taken on the line 6—6 of Fig. 3.

Referring more particularly to the drawings, the cleaning machine will be seen to comprise a container, generally indicated by reference character C having a flat bottom 11, rounded sides 12 and 13, a top composed of oppositely sloping flat portions 14 and 15 and a rounded apex 16 formed by the juncture of the portions 14 and 15, a forward or front wall 17 and a rear wall 18. The rear wall 18 has an opening 19 adapted to be closed by means of a closure cap 20.

The walls 17 and 18 are respectively provided with axially aligned openings 21 and 22, just below the apex 16. A tube 23 extends through the container, below the apex 16 and through the openings 21 and 22, the tube extending forwardly of the opening 21 and rearwardly of the opening 22. The joints between the tube 23 and openings 21 and 22 are soldered or welded, so as to make them

leakproof and firmly and rigidly secure the tube to the container.

A brush head is provided consisting of a hollow metallic body 24 of generally rectangular conformation, and a rectangular metallic frame 25, in which brush bristles 26 are embedded. The frame 25 is removably secured to the body 24, as by means of screws 27, so that the frame 25 can be removed from the body when the bristles 26 are worn out, without replacing the entire brush head.

The body 24 of the brush head has a tubular extension 28 formed integrally therewith, a portion of which is split to form a clamping collar 29 having lugs 30 and 31 through which the threaded stem 32 of a wingnut 33 extends. By inserting the forward end of the tube 23 into the tubular extension 28, and tightening the nut 33, the brush head may be firmly clamped to the tube 23, yet is removable from the tube 23 for cleaning and storing purposes.

In order to insure that the brush head is properly positioned circumferentially with respect to the tube 23 and the fluid container C, the forward end of the tube 23 has a recess 34 cut in the lower wall thereof, for the reception of a screw 35 which is mounted in the tubular extension 28 of the brush head and extends radially inwardly of the tubular extension. The screw 35 not only determines the position of the head circumferentially in relation to the tube 23, but also, by virtue of the engagement of the screw with the bottom of the recess 34, determines the proper position of the brush head axially with respect to the tube 23. The screw 35 has a third function which will be presently described.

Disposed within the tube 23, at a point adjacent the front wall 17 of the fluid container C, is a valve body 36 having a reduced lower portion 37 which extends through an opening 38 in the wall of the tube 23. The portion 37 of the valve body is exteriorly threaded for the attachment thereto of a nut 39, which rigidly clamps the valve body to the inner wall of the tube and is soldered or welded to the tube (see Fig. 4).

The valve body 36 has a tapered or conical socket 40 extending transversely therethrough, which communicates with an axial bore 41, which is counterbored and threaded, as at 42, for the reception of the upper end of a fluid suction or supply tube 43, which extends to a point adjacent the bottom of the fluid container C and is curved at its lower end.

Mounted within the socket 40 of the valve body 36 is a valve 44 having an axial bore 45 in its forward end, which communicates with a radial passageway 46 adapted for registration with the bore 41 in the valve body 36. The valve 44 has a square socket 47 in its rear end for the reception of the squared forward end 48 of a control rod 49.

The control rod 49 extends axially through tube 23 to a point 50, where it has rigidly secured thereto, as by a set screw 51, a valve rod control post 52. An arcuate element 53, is secured to the post 52 by means of the screw 51 and snugly embraces the outer surface of the tube 23. This element extends through about 200 degrees, embraces the outer surface of the tube 23, and is rotatable about the tube through an angle of about 90 degrees, a slot 53*a*, about 90 degrees in length, being provided in the wall of the tube for passage of the upper end of the post 52, whereby such rotation is permitted. Rotation of the element 53 to the position shown in solid lines in Fig. 5 causes the rod 49 to be rotated, which, in turn, rotates the valve 44 to a position wherein the passageway 46 is in registration with the bore 41, and in this position, a maximum quantity of fluid can flow from the container C through the bore 45 of the valve. Rotation of the element 53 to the broken line position shown in

Fig. 5 causes the rod 49 to be rotated in the opposite direction, which, in turn, rotates the valve 44 to a position wherein the passageway 46 is completely out of registration with the bore 41, and in this position no fluid can flow from the container C through the bore 45 of the valve. Rotation of the valve 44 to positions intermediate the aforesaid extreme positions varies the quantity of fluid flow through the valve.

Rearwardly of the post 52, the rod 49 passes through the center of a disk 54 which is of the same diameter as the internal diameter of the tube 23, and is removably secured in position by screws 55 which extend through the wall of the tube and into the disk. The disk 54 is provided with a pair of openings 56, spaced circumferentially from each other 180 degrees.

Rearwardly of the disk 54 and in contiguity therewith is a second disk 57, through the center of which the rod 49 passes. The disk 57 is also provided with openings 58 of the same size as the openings 56 and spaced similarly to the latter. The disk 57 is rotatable about the control rod 49. A semi-circular element 60, similar to the element 53, is secured as by a screw 59, to the disk 57, and embraces the outer surface of the tube 23. The element 60 is rotatable about the tube through an angle of about 90 degrees, a slot 61 being provided in the wall of the tube for passage of the screw 59, whereby such rotation is permitted.

The disks 54 and 57 constitute an air control valve for permitting air volume and pressure changes, which control the amount of suds produced by the cleaning machine. Rotation of the element 60 to the position shown in solid lines in Fig. 6, causes the disk 57 to be rotated to a position wherein the openings 58 are in registration with the openings 56, and in this position, a maximum volume of air can flow through the valve. Rotation of the element 60 to the broken line position shown in Fig. 6, causes the disk 57 to be rotated in the opposite direction, and in this position, the openings 58 are completely out of registration with the openings 56, so that no air can pass through the valve. Rotation of the disk 57 to positions intermediate the aforesaid extreme positions varies the quantity of air flowing through the valve.

A compression coil spring 62 is mounted on the rod 49 between the post 52 and disk 54 and exerts a push on the rod 49 which is sufficient to maintain the valve 44 tightly in its socket 40. The slight movement of the rod 49 necessary for this purpose is permitted by virtue of the fact that the diameter of the upper end of the post 52 is slightly smaller than the width of the slot 53*a*.

A similar compression coil spring 63 is mounted on the rod 49 between the disk 57 and a nut 64 on the rear end of the rod. This spring, which is slightly weaker than the spring 62, exerts a pressure on the disk 57, maintaining the disk 57 in contact with the disk 54, so as to render the air valve air-tight when closed. The slight movement of the disk 57 necessary for this purpose is permitted by virtue of the fact that the screw 59 is of smaller diameter than the width of the slot 61.

An air filter or screen 65 is removably secured within the tube 23, rearwardly of the air valve, as by means of screws 66, which extend through the wall of the tube into an annular band or collar 67 to which the screen 65 is soldered. This screen functions to filter the air before it enters the machine.

A screen assembly or unit generally indicated by reference numeral 68, is disposed within the tube 23, forwardly of the valve 44. This assembly comprises a multiplicity of spaced annular bands 69, 70, 71 and 72, interconnected as by longitudinal bands 73 and 74, a woven wire screen 75 being soldered to each band. The band 72 has disk 76 soldered thereto at the rear, said disc having a central aperture 77 in which the nose of the valve 44 is received.

Secured to the band 69 is a rod 78 having an upturned forward portion 79. The screen assembly, including the screens, bands and rod, extends from the screw 35 to the nose of the valve 46, and is maintained in position by the screw 35, which thus has a three-fold function.

An inspection plug 80 is also provided, which is mounted in an opening 81 in the fluid container C directly above the valve body 36, and is secured in position, as by a nut 82 which is threaded onto the plug. The plug extends through an opening 83 in tube 23.

Pressure is effected on the liquid cleaner or detergent L in the container C by passage of air through a small orifice 84 in the tube 23 adjacent the rear wall 18 of the container. The portion of the tube 23 which extends through the container C is both air and watertight, with the exception of the orifice 84.

The operation of the aforesaid cleaning device will now be briefly described.

Assuming that the air and liquid control valves are open, and that the rear end of the tube 23 is connected to a source of compressed air, which may be derived from a vacuum cleaner (home or commercial), an air tank, an air pump, an air compressor, or the like, the air will pass through the air valve, through the orifice 84, and into the container C, which, as previously stated, contains a liquid cleaner or detergent L.

The pressure of air in the container C will force the liquid L up through the tube 43, bore 41, passageway 46, bore 45 and screens 72, 71, 70 and 69, in succession. In its passage through the screens, the fluid is broken up into extremely small particles, and turned into a dry suds, which is extremely effective for cleaning rugs, carpets, upholstery and all types of cleanable fabrics. The suds pass through the brush head and are distributed and rubbed into the material being cleaned by movement of the bristles 26 over the surface being cleaned. The cleaning is accomplished inexpensively, efficiently, and in a fraction of the time required for conventional methods of cleaning.

The air and fluid controls which have been provided are easily accessible, and easy to operate, and through the use of these controls, the character of the suds can be varied to a considerable extent.

The machine is so constructed that it can be quickly and easily disassembled for cleaning or replacement of worn parts, and just as quickly and easily assembled.

The air and liquid control valves can be quickly removed for disassembly and cleaning by first removing the air filter 65 and the screws 51, 55 and 59, after which the rod 49 and valves can be removed by withdrawal through the rear end of the tube 23. The disks 54 and 57 may be removed for cleaning by first removing the nut 64 from the rod 49. After this, the valve body 36 can be removed by removing the plug 80 and then unscrewing the valve body from the nut 39. The screen assembly or sudsing device can be removed for cleaning through the front end of the tube 23 by first removing the brush head.

It is to be understood that the form of my invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In a device of the character described, a fluid container having front and rear walls, a tubular element secured to said container and extending through said container and through the front and rear walls thereof, a rotary valve disposed in said tubular element and having an axial bore therein which is coaxial with the axis of said tubular element, a supply tube providing selective communication between the interior of said container and said axial bore, means for forcing fluid from said fluid

container into said axial bore, means for actuating said valve to control the quantity of fluid passing into said bore, said last-named means including a control rod extending axially through said tubular element and operatively connected to said valve to rotate said valve, said control rod being rotated by means of an element connected to said rod through an opening in said tubular element and embracing said tubular element, said fluid forcing means comprising a pair of discs disposed in said tubular element and in contiguity with each other, said discs having openings therein for admitting air under pressure, and means for rotating one of said discs relatively to the other.

2. A device, as defined in claim 1, in which said disc rotating means comprises an element connected to said rotary disc through an opening in said tubular element and embracing said tubular element.

3. In a device of the character described, a tubular element open at its forward end and having a valve therein through which fluid flows to said forward end, a hollow brush head removably secured to said tubular element adjacent said forward end and having open communication therethrough for said fluid from said forward end, a screen assembly unit disposed in said tubular element and having one end thereof in abutment with said valve, and a screw extending through said brush head and abutting the other end of said unit for maintaining said unit against axial movement.

4. A device, as defined in claim 3, in which said unit is provided with a rod having an upturned forward portion against which said screw bears.

5. A device, as defined in claim 3, in which said tubular element has a recess extending thereinto from its forward end, and said screw extends through said recess and bears against the bottom of said recess, whereby the screw not only determines the circumferential position of the brush head relatively to the tubular element, but also determines the position of the brush head axially with respect to said tubular element.

6. In a device of the character described, a fluid container, a tubular element secured to said container, a valve disposed in said tubular element and having an axial bore therein which is coaxial with the axis of said tubular element, a supply providing selective communication between the interior of said container and said axial bore, means for forcing fluid from said container into said axial bore, a control rod extending axially through said tubular element and operative to rotate said valve, an element connected to said rod through an opening in said tubular element and partially embracing said tubular element and rotatable about said tubular element to rotate said control rod, said fluid-forcing means comprising a pair of discs disposed in said tubular element and in contiguity with each other and each having openings therein for admitting air pressure, one of said discs being secured against rotation relatively to said tubular element, and an element connected to the other of said discs through an opening in said tubular element and partially embracing said tubular element and rotatable about said tubular element to rotate the other of said discs.

7. A device, as defined in claim 6, in which said control rod extends axially through said discs, and has abutting means at one end thereof in spaced relation to said other disc, a compression coil spring disposed about the control rod between said first disc and the connection of said first element to said rod and exerting pressure to maintain the control rod against axial movement, and a second compression coil spring disposed about the control rod between abutting means and said other disc and exerting pressure to force the other disc against the first disc.

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