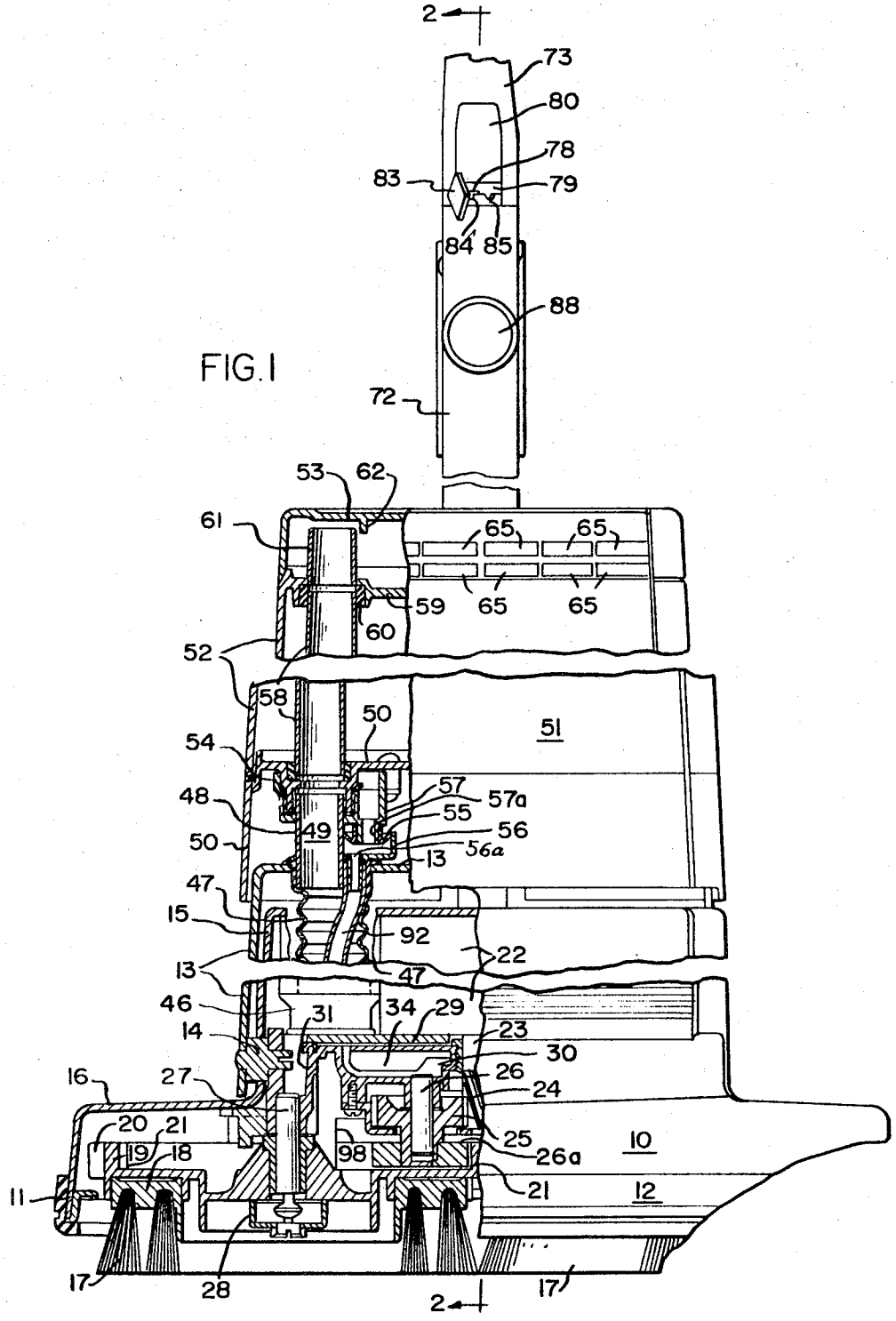
May 20, 1969 D. G. KOLAND 3,444,577

FLUID DISPENSING MEANS FOR A FLOOR SCRUBBER AND POLISHER

Filed May 9, 1967 Sheet 1 of 3

FIG. 1



FLUID DISPENSING MEANS FOR A FLOOR SCRUBBER AND POLISHER

FIG.2

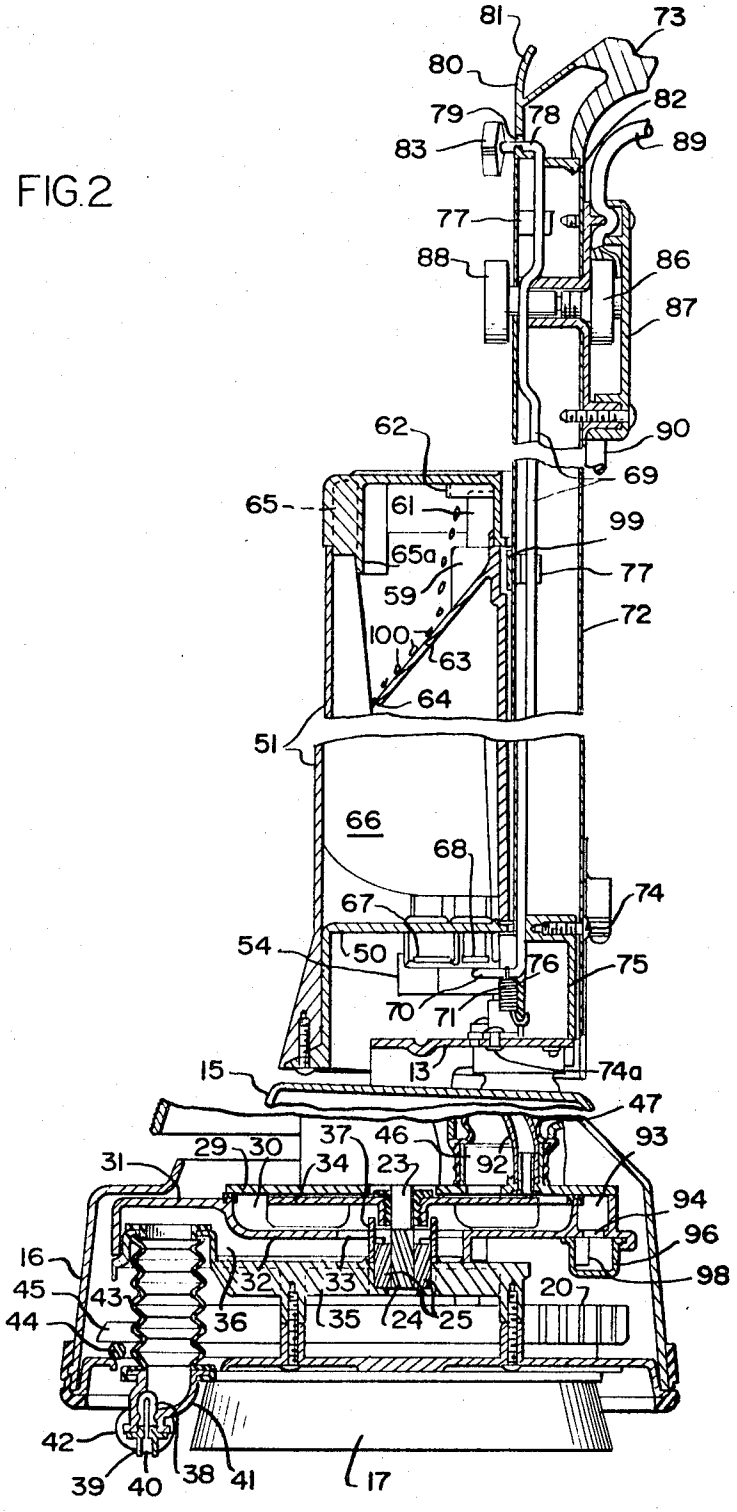


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FIG.4

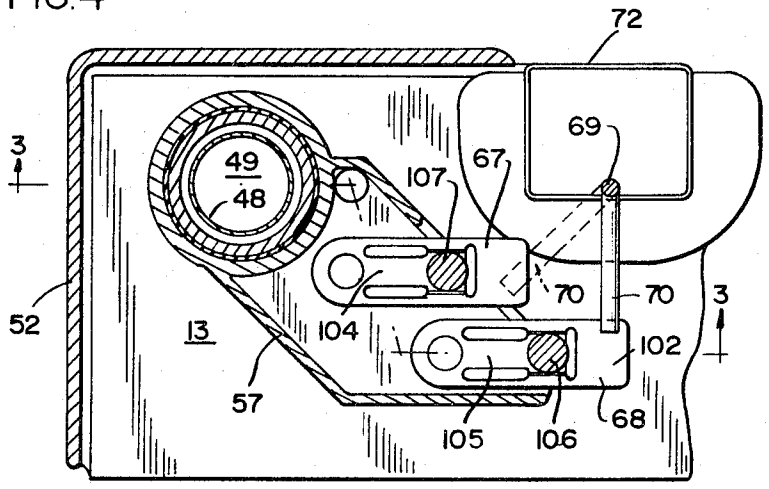


FIG.3

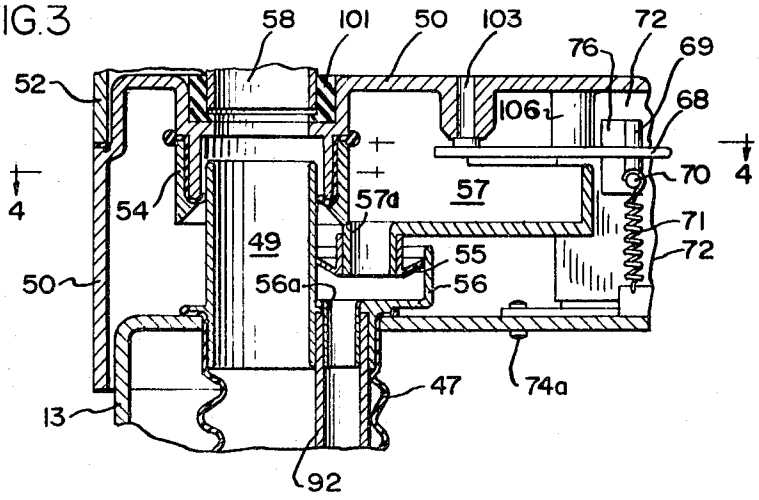
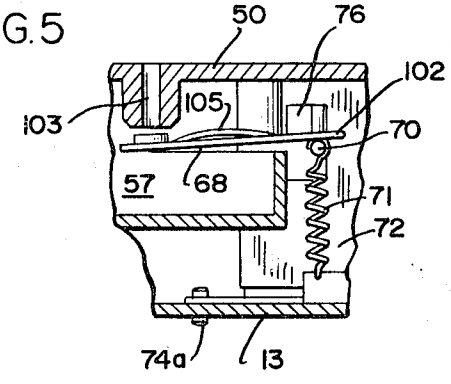


FIG.5



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FLUID DISPENSING MEANS FOR A FLOOR SCRUBBER AND POLISHER

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Int. Cl. A47l 11/03
U.S. Cl. 15—50 8 Claims

ABSTRACT OF THE DISCLOSURE

Flow control valve means for selectively supplying cleaning liquid and polish liquid from a combination floor scrubber and polisher apparatus to the floor surface with means for preventing supplying of both liquids simultaneously.

CROSS REFERENCES TO RELATED DISCLOSURES

Schmitz et al. application Ser. No. 637,178, filed May 9, 1967 which discloses and claims the scrubber and polisher disclosed herein per se, and Pauler et al. application Ser. No. 504,546, filed Oct. 24, 1965, which relates to the motor drive for the brushes, both applications being assigned to the same assignee as the present application.

SUMMARY OF THE INVENTION

This invention relates to a combination floor scrubber and polisher apparatus and particularly to flow control valve means for selectively supplying either cleaning liquid of polish liquid, but not both simultaneously, from sources of these liquids in the apparatus to the floor, when means are provided for selectively moving a valve operating means into operating engagement with one but not both of the valve means for the two liquids in order that the corresponding liquid will be supplied to the floor as desired.

One embodiment of the invention is shown in the accompanying drawings of which:

FIGURE 1 is a shortened front elevational view partially in section of a combination floor scrubber and polisher apparatus embodying the invention.

FIGURE 2 is a shortened longitudinal section view taken substantially along line 2—2 of FIGURE 1.

FIGURE 3 is a fragmentary vertical sectional detail of a portion of the apparatus of FIGURE 1 in the area surrounding and including the tube bracket 48 but with the enlarged detail of this FIGURE 3 being somewhat changed in a few minor respects, and taken substantially along line 3—3 of FIGURE 4 but showing only one valve 68.

FIGURE 4 is a sectional plan view taken substantially along line 4—4 of FIGURE 3.

FIGURE 5 is a fragmentary detail sectional view similar to a portion of FIGURE 3 but showing the valve 68 in open position.

The combination floor scrubber and polisher apparatus shown in the accompanying drawings comprises a housing 10 having an open bottom defined by a peripheral edge 11 around which is extended a bumper strip 12. Rotatably mounted on opposite sides of the housing 10 are the two sides of a maneuvering bail 13 with each side rotatable about a pin 14. The pins 14 are held in the upper part of the housing 10 which constitutes a machinery enclosing hood 15.

Located within the bottom enlarged part 16 of the housing 10 are a pair of rotatable brushes 17 that are circular and arranged side-by-side. The brush bases 18 are each releasably held in a circular mounting 19 each of which is provided on its outer periphery with gear teeth 20 and on its inner periphery with gear teeth 21.

The brushes 17 are driven by an electric motor 22 located within the hood 15. The motor 22 rotates a motor shaft 23 which has an outer helical gear area 24. The gear 24 drives a circular helical gear 25 that is mounted on a pinion shaft 26 for rotation therewith. Keyed to the pinion shaft 26 is a spur gear 26a which engages the inner teeth 21 of one brush mounting 19. The outer gear teeth 20 of each brush mounting are inter-engaged so the brushes 17 are driven in opposite directions as is explained in greater detail in the above-mentioned Pauler et al copending application. Each brush 17 is rotatably mounted about a shaft 27 whose bottom is enclosed by a shaft shield 28.

The motor 22 is mounted on a cover 29 for a fan chamber 30 with the cover 29 being supported on a base 31. The top of the fan chamber 30 as shown in FIGURE 2 is defined by the cover 29 and the bottom of the chamber is defined by a wall 32. The wall 32 is provided with a fan inlet opening 33 to the fan 34 that is within the chamber 30. The fan 34 is mounted on the motor shaft 23 for rotation therewith.

As can be seen in FIGURE 2, the fan inlet 33 has a bottom cover 35 spaced downwardly therefrom to define a chamber 36. In order to protect the gears the gear area 24 of the motor shaft 23 and the helical gears 25 for driving the pair of brushes are located within a cover 37 at the fan inlet opening 33.

Located at one side of the pair of brushes 17 and within the housing 16 is a vertically movable floor contacting nozzle means that is illustrated as a squeegee nozzle 38. This nozzle 38 has a bottom flexible blade 39 for contact with the floor and it is preferably made of rubber. The blade 39 has an interior opening 40 and is held in a rigid hollow housing 41. The nozzle 38 is supported when in contact with the floor or in lowered position as shown in FIGURE 2 by end supporting wheels 42.

The upper end of the nozzle housing 41 or the end opposite the bottom blade 39 is connected to an extensible and retractable bellows tube 43 whose upper end is attached to the fan inlet cover 35 to communicate with the chamber 36. In FIGURE 2 the nozzle 38 is shown in lowered floor engaging position. It may be raised from the floor by a lever (not illustrated) such as a foot pedal which raises a lift rod 44. The lift rod 44 raises the nozzle 38 by means of a lift bracket 45.

The nozzle 38 is the floor contacting part of a fluid moving suction means that comprises the rotary fan 34, the fan chamber 30 in which the fan is located and having an inlet 33, recess chamber 36, the bellows tube 43 and the nozzle 38. This fluid moving suction means which has its entrance at the nozzle 38 has an outlet 46 that connects to a tube 47 which is arranged vertically within the hood 15. The upper end of the tube 47 is connected to the lower end of a hollow tube bracket 48 that has a vertical passage 49 therein that receives fluid from the tube 47. The bracket 48 and thus the upper end of the inlet tube 47 are held by the top of the bail 13.

The tube bracket 48 is located within a base 50 for a container means 51 that comprises an enclosing container body 52 closed on its upper end by a top 53.

Located at the upper end of the tube bracket 48 is a valve cover 54. This valve cover 54 is provided with a sealing gasket 55 that extends over a trough 56 formed as a part of the tube bracket 48. The trough 56 is adapted to receive liquid in a manner to be described hereinafter by way of an overlying trough 57 that forms a part of the valve cover 54.

Communicating with the passage 49 in the bracket 48 to receive fluids therefrom is a vertically arranged inlet tube 58 located within the container body 52 and having its lower end sealed to the base 50 by a gasket 101 (FIGURE 3). The upper end of this tube 58 is sealingly held

by a ledge 59 located at the top of the container body 52. The ledge 59 which has a sealing gasket 60 that supports and seals the upper end of the tube 58 also carries a short vertical tube 61 that is aligned with tube 58 and extends thereabove to receive fluid therefrom.

Extending downwardly from the inner surface of the container top 53 is a barrier wall 62 that has its bottom below the top of the short top tube 61. Wall 62 changes the direction of air-water flow which thereby aids in separating the water from the air.

Within the container 51, as shown in FIGURE 2, is a downwardly inclined baffle 63 that extends across the upper part of the container from side-to-side thereof but with a bottom 64 spaced from the container. This downwardly inclined baffle extends from the ledge 59 and is beneath the upper end of the tube 61 and the barrier 62.

At the top of the container 51 and at the front thereof opposite the short upper tube 61 there are provided fluid outlet means in the form of a plurality of openings 65 that are above the inclined baffle 63. A vertical barrier wall 65*a* prevents direct flow of air across the top of container 51. Wall 65*a* directs the air downwardly before allowing it to exit through openings 65 thereby providing additional water separating qualities to the separating system.

Located within the container 51 is a source of cleaning liquid such as an aqueous detergent solution and a source of polish liquid. Each of the pair of liquids is contained in a separate collapsible bag one of which is illustrated diagrammatically at 66 in FIGURE 2 with the flow from each of the two bags being controlled by a spring valve 68 for the cleaning liquid and a spring valve 67 for the polish liquid. Each valve is adapted to be selectively opened by a longitudinally movable vertical control rod 69 that has a bottom valve engaging projection 70 on its lower end that is adapted to be moved beneath either of the valves 67 or 68 on rotation of the control rod 69 about its vertical longitudinal axis. Then, when the rod 69 is raised against the urging of a retracting spring 71 the particular valve 67 or 68 which overlies the projection 70 is opened.

The control rod 69 is positioned within an upwardly extending hollow handle 72 that is provided at its upper end with a hand grip 73.

The handle 72 is attached by means of screws 74 to a bracket 75 which in turn is mounted on the bail 13 by means such as rivets 74*a*. The lower end projection 70 on the control rod 69 extends forwardly through an opening 76 in this bracket 75.

The control rod 69 is guided in its vertical longitudinal movement by guide brackets 77. The upper end operating portion 78 of the rod 69 extends over the top of the handle 72 by way of an opening 79 in a hand operated pivot lever 80. This lever 80 has an upper operating part 81 adjacent the hand grip 73 so that the lever can be pivoted in a clockwise direction from the position shown in FIGURE 2 about its pivot point 82.

The outer end of the projecting part 78 of the rod 69 is provided with a knob 83 which may be grasped to move the projecting end 78 of the lever into engagement with either a first notch 84 or a second notch 85 (FIGURE 1) that are laterally spaced apart and formed in the opening 79. When the rod end 78 is in one notch 84 the lower end 70 of the rod 69 is beneath the one spring valve 67. When the projecting end 78 of the control rod is moved laterally from the position shown in FIGURE 1 to the other notch 85 the rod end 70 is then beneath the other spring valve 68. The bottom spring 71 yieldably retains the upper end 78 of the rod in the respective notches 84 and 85.

The structural details of the flow control valve means and means for selectively operating the valve means are disclosed more completely in FIGURES 3–5. As is shown here, the flow control valve means 67 which controls the polish liquid from its receptacle or bag such as illustrated at 66 and the similar flow control valve means 68 for the cleaning liquid are laterally spaced apart as shown in FIGURE 4. The bottom projection 70 of the control rod 69 projects beneath the operating end 102 of the valve 68 when the upper or operating end 78 of the control rod is in its notch 85, as shown in FIGURE 1. The spring 71 urges this projection 70 away from the valve 68 as shown in FIGURE 3. Then, when the control rod 69 is raised by pushing down on the operating part 81 of the lever 80 the valve is turned in a counterclockwise direction to the position shown in FIGURE 5 to open the valve passage 103 for the cleaning liquid. When the pressure is released on the lever 80 the spring 71 pulls the control rod projection 70 away from the valve 68 to the position shown in FIGURE 3 so that the valve then closes to the position shown in FIGURE 3.

As explained above, the control rod 69 in the position shown is arranged so that the rod projection 70 is ready to open the valve 68 on raising the control rod 69 longitudinally on rotation of the lever 80. When this is done there is no possibility of accidentally opening the other valve 67 at the same time because they are spaced apart and the operating projection 70 can only be placed beneath one valve at a time. In order to dispense liquid through the valve 67 the control rod projection 70 must be laterally moved to the dotted line position of FIGURE 4 in order to be beneath the valve 67. When this is done the projection 70 is of course out from beneath the other valve 68. By this means only one of the valves can be opened at a time and this means for accomplishing this is simple yet foolproof.

Valve 67 and 68 are each made of spring steel. Thus, as shown in FIGURE 4, valve 67 has a split, flat middle portion 104 of springy metal while valve 68 has a similar middle portion 105 and these portions are mounted on bosses 106 and 107.

At the rear of the upper end of the handle 72 there is located a speed control switch 86 held within a switch housing 87. This switch 86 is operated by a control knob 88 at the front of the handle 72 so that the motor 22 and thus the fan 34 and brushes 17 can be rotated at any of a plurality of preselected speeds desired. Extending from the top of the switch housing 87 is an electric cord 89 which is adapted to lead to a power source such as an electric outlet while from the bottom of the housing 87 there is an electric cord 90 leading to the motor 22.

Each of the spring valves 67 and 68 when opened provides for liquid flow therethrough into the trough 57. From this trough the liquid flows down into a lower trough 56 through passage 57*a* and from there into a liquid dispenser tube 92 through opening 56*a*. This tube 92 comprises a common liquid conduit from both the above-mentioned sources of liquid and empties into a first trough 93 that is integral with the base 31. This first trough 93 empties through an aperture 94 into a second trough 96. This second trough has a pair of outlets 98 which cooperates with brushes 17, as described in the above-identified Schmitz et al. application. Each outlet 98 is adapted to direct the liquid flowing therethrough within the peripheral confines of a brush 17.

The container 51 is releasably held on the handle 72 by means of a latch 99.

The operation of the apparatus is as follows. With the nozzle 38 in raised position from the position shown in FIGURE 2 or out of contact with the floor the motor 22 is energized at the desired speed by the control knob 88. The rotation of the motor rotates the pair of brushes 17 in opposite directions. The control rod 69 is raised from its position shown in the drawings against the urging of the spring 71 and moved from the notch 84 to the notch 85 where it is under the cleaning liquid valve 68. The lever 80 is rotated about its pivot point 82 in a clockwise direction by thumb pressure on the operating portion 81 of this lever.

This opens the valve 68 so that cleaning liquid flows from its collapsible container illustrated by the container

66 in FIGURE 2 into the trough 57 and through the trough 56 and dispenser tube 92 into the first outlet trough 93. From here the cleaning liquid flows by gravity through the aperture 94 into the second dispenser trough 96 and out its outlets 98 into each of brushes 17. The combination of the cleaning liquid and the rotating brush serves to clean the floor.

At the conclusion of the cleaning operation the nozzle 38 is lowered to the position shown in FIGURE 2 where it is in contact with the wet floor. The fan 34 which during this time has been rotated by the rotating motor 22 so as to set up a suction through the nozzle 38 draws cleaning liquid from the floor through the nozzle opening 40, the bellows tube 43, the liquid collecting chamber 36, the fan inlet opening 33 and the fan chamber 30 into the outlet tube 47 by way of the outlet 46 to which the bottom end of this tube is connected. From the upper end of the outlet tube 47 the rotating fan 34 forces the mixture of soiled cleaning liquid and air up through the tube passage 49, through the container inlet tube 58 and out the top of the short upper tube 61. From the top of this tube 61 the cleaning liquid overflows to fall onto the top surface of the inclined baffle 63 as indicated by the liquid droplets 100 of FIGURE 2. In the meantime the air is separated from the overflowing liquid 100 and escapes into the atmosphere by way of the fluid openings 65.

When the cleaning liquid in the container 51 which of course surrounds the two collapsible bags 66 reaches a desired level it may be removed from the container by tilting the container and pouring the liquid out the openings 65.

After the cleaning liquid has been removed from the floor to the desired degree, in the manner just described, the control rod 69 is arcuately moved about its longitudinal axis by grasping the knob 83 and moving the forwardly projecting upper part 78 of the rod 69 from the notch 85 to the notch 84, as shown in FIGURE 1. The lever 80 is again rotated about its pivot point 82 by pressing to the right, as shown in FIGURE 2, on the operating part 81. This again lifts the rod 69 against the urging of the spring 71 and opens the valve 67 to dispense polish liquid from its bag such as illustrated at 66. In the meantime, of course, the retractable nozzle 38 has been raised from the position shown in FIGURE 2 where it is in contact with the floor to above the floor where it will not interfere with the polishing operation.

Liquid polish is fed through the open valve 67 into the peripheral confines of the rotating brushes 17 in the same manner as the previously described cleaning liquid. Thus the polish liquid flows from its collapsible container 66 through the trough 57, trough 56, dispenser tube 92 and lower troughs 93 and 96 into the rotating brushes. These brushes spread the polish on the floor in the customary manner.

As can be seen from the above description, the combined floor scrubber and polisher is a self-contained unit that performs four operations. Thus, it functions as a floor scrubber where the rotating brushes scrub the floor while the cleaning liquid is being dispensed. It also functions to dry the floor as it is used for picking up excess liquid from the floor. Then it functions as a waxer or polisher applicator when the rotating brushes spread the liquid polish or wax over the floor. Then, as a fourth operation, the rotating brushes with both liquid valves closed can be used to apply a high gloss to the polish covered floor.

Actual tests have shown that the apparatus of this invention effects a considerable saving in time and energy. Thus in one test the apparatus of this invention required only one and a half hours to scrub and wax a floor 13 feet by 18 feet while to scrub and wax the same floor with conventional equipment required three and a half hours or over twice as long.

Furthermore, tests have proven that there is substantially less interruption of normal floor traffic because with this apparatus the floor can be cleaned and the floor dried immediately by the picking up of the excess liquid. Furthermore, the apparatus is very efficient as the two liquid dispensers including the collapsible bags can be filled at the start of the operation and the floor can be scrubbed, dried, waxed and polished without further delay. In addition, because the liquid is directed into the peripheral confines of the rotating brushes the liquid goes directly to the desired floor areas and there is substantially no spattering. A considerable saving in time and effort is accomplished by using the same brushes for scrubbing, applying polish and buffing. Thus the self-contained apparatus of this invention is a total floor cleaning tool.

Having described my invention as related to the embodiment shown in the accompanying drawings, it is my intention that the invention be not limited by any of the details of description, unless otherwise specified, but rather be construed broadly within its spirit and scope as set out in the accompanying claims.

The embodiment of the invention in which an exclusive property or privilege is claimed is defined as follows:

1. Apparatus for applying liquids to a floor while being moved over the floor, comprising: a source of cleaning liquid; a source of polish liquid; floor control valve means for supplying liquid from each source to the floor; a movably mounted operating means for both said valve means; and means for selectively moving said operating means into operating engagement with one but not both of said valve means for said supplying of the corresponding liquid.

2. The apparatus of claim 1 wherein there are provided means for spacing said valve means apart a sufficient distance for preventing engagement of said operating means with both valve means simultaneously.

3. The apparatus of claim 1 wherein there are provided a handle for moving said apparatus over the floor with the operating means having an upper end operating portion adjacent the top of said handle.

4. The apparatus of claim 3 wherein said handle is hollow and said operating means is located therein.

5. The apparatus of claim 4 wherein said operating portion projects from said handle and there are provided means for releasably retaining said operating portion in each of a pair of spaced positions in one of which said operating means is in position for opening one of said valve means and in the other of which the operating means is in position for operating the other of said valve means.

6. The apparatus of claim 5 wherein said handle is provided with a hand engageable portion and said means for moving comprises a lever adjacent said portion.

7. The apparatus of claim 5 wherein means are provided for urging said operating means into engagement with said means for releasably retaining said operating portion in each of a pair of spaced positions and away from said operating engagement.

8. The apparatus of claim 5 wherein said handle is provided with a hand engageable portion, said means for moving comprises a lever adjacent said portion, and means are provided for urging said operating means into engagement with said means for releasably retaining said operating portion in each of a pair of spaced positions and away from said operating engagement.

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