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VACUUM FLOOR SCRUBBER

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This invention relates to an electric mop, and it concerns more particularly a hand tool for use in scrubbing floors having resilient scrubbing means engageable with a floor and having electrically operable water collecting means coaction with said resilient scrubbing means for collecting water from the floor during the scrubbing thereof.

The invention contemplates a hand tool as described which includes an enclosed vessel adapted to contain a small quantity of water having resilient scrubbing means secured to its underside for engagement with a floor, and having means establishing fluid communication between the underside of the resilient scrubbing means and the interior of the vessel, above a predetermined water level therein. The tool further includes an elongated handle having a tubular end portion having flexible tubular connecting means whereby said tubular end portion is flexibly connected to an upper portion of the vessel, in fluid communication therewith, and having other, rigid connecting means whereby said tubular end portion is pivotally connected to opposite sides of the vessel below its center of gravity, and an electrically driven rotary air blower operatively connected in the handle to intermediate its ends and having its suction communicating with said tubular end portion and arranged to discharge air from one side of the handle to thereby apply a partial vacuum to the interior of the vessel, above the water level therein, sufficient to draw water into the vessel from the floor but insufficient to exhaust substantial quantities of water from the vessel thru the handle.

An object of the invention is to provide such a tool which is characterized by its light weight as well as its convenience and efficiency, and which may be produced inexpensively and is durable in use.

The invention will be readily understood by referring to the following description and the accompanying drawings, in which:

FIG. 1 is a side elevational view of a floor scrubbing and water collecting tool embodying the invention;
FIG. 2 is a bottom plan view on an enlarged scale;
FIG. 3 is a fragmentary sectional elevational view taken on the line 1—1 of FIG. 2;
FIG. 4 is a fragmentary sectional elevational view on an enlarged scale taken on the line 4—4 of FIG. 3;
FIG. 5 is a fragmentary sectional view on an enlarged scale taken on the line 5—5 of FIG. 2;
FIG. 6 is a bottom plan view of a modified form of the invention having several parts combined as one;
FIG. 7 is a fragmentary sectional elevational view taken on the line 7—7 of FIG. 6;
FIG. 8 is a fragmentary sectional elevational view taken on the line 8—8 of FIG. 6;
FIG. 9 is a bottom plan view, partly broken away to show details of construction, of another modified form of the invention in which the scrubbing means comprises a common sponge; and
FIG. 10 is a fragmentary sectional elevational view taken on the line 10—10 of FIG. 9.

Referring to the invention as illustrated in FIGS. 1 to 5 of the drawing, the numeral 1 designates generally an enclosed vessel as hereinafter described, which is adapted to contain a small quantity of water, of the order of a quart, more or less, when filled.

The vessel 1 has a flat bottom and is adapted to rest on a floor surface, and as shown is generally circular, although it may be of any desired shape. The vessel 1 advantageously may be formed of molded plastic material, and consists of a base portion 2 having an upstanding peripheral flange 3 and a relatively thin walled, dome shaped upper portion 4 which has its lower edge secured by press fit in a groove therefor in the upper surface of the flange 3. At least the upper portion 4 of the vessel 1 advantageously may be formed of clear plastic material whereby the water level therein may be readily determined by visual inspection.

A drain opening 5, which is normally closed by a plug 6, is provided in one side of the base portion 2 whereby water may be drained from the vessel 1 as it becomes filled.

A disc 7, which is formed of molded resilient material and has integral scrubbing elements 8 and 9 as hereinafter described depending therefrom, is removably secured to the under side of the base portion 2 by a plurality of screws 10.

The scrubbing elements 8 consist of a pair of arcuate wiper blades which are oppositely curved and extend across the bottom of the base portion 2 on opposite sides of a transverse line bisecting the base portion 2. The middle portions of the arcuate wiper blades 8 are joined together, and the opposite end portions thereof extend forwardly and rearwardly, respectively, relative to the direction of movement of the vessel 1 as hereinafter described.

The scrubbing elements 9 consist of two pairs of relatively short, radially extending straight edged wiper blades which are positioned near the circumference of the disc 7, between the ends of the respective arcuate wiper blades 8, in spaced apart relation to each other and to the arcuate wiper blades 8.

The arcuate wiper blades 8 each have a longitudinal groove 11 in its under side, coextensive with its length, and a plurality of relatively shorter, longitudinally spaced transverse grooves 12 communicating with the longitudinal groove 11 and extending outwardly from opposite sides thereof. A series of upstanding circular bosses 13, which are formed on the disc 7 opposite each of the arcuate wiper blades 8, in longitudinally spaced relation there to, are secured in openings therefor in the base portion 2 by press fit. The circular bosses 13 have circular holes therein communicating with the bottoms of the corresponding longitudinal grooves 11. A plurality of tubular elements 15, the length of which determines the maximum water level in the vessel 1, each have one of its ends secured in one of the holes 14 and extend upwardly therefrom.

The numeral 16 indicates generally an elongated handle having a tubular lower end portion 17 and a hollow upper end portion 18. The tubular lower end portion 17 is connected by a flexible tubular connecting member 19 to an upper portion of the vessel 1, as at 20, in fluid communication therewith, and is connected to one end of a pair of elongated, rigid connecting members 21 which are pivotally connected at their opposite ends to opposite sides of the vessel 1, as at 22, below its center of gravity,
whereby the vessel 1 may be moved across a floor surface in opposite directions by pushing and pulling the handle 16.

An electrically driven rotary air blower, indicated generally by the numeral 23, is operatively connected in the base 22 intermediate its ends and has its suction communicating with the tubular lower end portion 17 thereof. The blower 23 is arranged to discharge air from one side of the handle 16, as at 24, to thereby apply a partial vacuum to the interior of the vessel 1, above the water level therein, indicated by the line 25, sufficient to draw water into the vessel 1 from the floor but insufficient to exhaust substantial quantities of water from the vessel 1 thru the handle 16.

A molded baffle element, indicated generally by the numeral 26, is secured by press fit in the upper portion 4 of the vessel 1, above the water level 25, to remove any particles of water which may be entrained in air exhaused from the vessel 1 thru the handle 16.

The baffle element 26 includes a cylindrical portion 27 having a diameter corresponding to the inside diameter of the upper portion 4 of the vessel 1, a frusto-conical portion 28 extending upwardly and radially inwardly from the cylindrical portion 26, and a peripheral flange 29 extending downwardly and radially inwardly from the cylindrical portion 27. A plurality of circumferentially spaced circular openings 30 are provided in the upwardly and radially inwardly inclined area of the frusto-conical portion 28. The blower 23 has a pair of lead wires 31 extending thru the hollow upper end portion 18 of the handle 16 and is controlled by a switch 32 near the upper end of the handle 16, which has a hand grip 33 thereon.

A handle bar 34 extends across the connecting members 21 for use with the hand grip 33 in picking up the tool. Referring to the form of the invention shown in FIGS. 9 and 10 of the drawing, a circular sponge 35, which corresponds to the scrubbing elements 8 and 9 shown in FIGS. 1 to 5, is cemented to the under side of a circular backng plate 36, which is perforated as at 37. A base 38, which is formed of molded resilient material and corresponds to the base 2 shown in FIGS. 1 to 5, has a series of concentric circular grooves 39 and a series of circumferentially spaced radially extending grooves 40 in its under side, in fluid communication with the portion 37 of the backng plate 36. A plurality of upstanding elements 41, which correspond to the circular bosses 13 and replace the tubular elements 15 shown in FIGS. 1 to 5, and which have circular holes 42 therein corresponding to the holes 14 shown in FIGS. 1 to 5, are formed on the top side of the base 38. Each of the holes 42 communicates with one of the circular grooves 39 and with one of the radially extending grooves 40 at their intersection. The holes 42 are staggered relative to each other.

In the form of the invention shown in FIGS. 6 to 8 the disc 7, which as illustrated in FIGS. 1 to 5 has the scrubbing elements 8 and 9 thereon, and the tubular elements 15, which as shown in FIGS. 1 to 5 are inserted in the holes 14 of the disc 7, are molded in one piece with the base portion 2. In addition, the tubular elements 43, which are similar to the tubular elements 15 shown in FIGS. 1 to 5, each have a slot therein in place of a circular hole.

As shown in FIGS. 3 and 7, a dowel pin 44, which is secured in a recessed portion of the base 2 surrounding the plug 6, slidably engages a slot therefor in the plug 6 to thereby limit longitudinal movement of the plug 6 in an outward direction and to prevent complete displacement of the plug 6 from the opening thereof in the base 2.

The invention may be modified in various ways without departing from the spirit and scope thereof.

I claim:

1. In a hand tool for scrubbing floors and for collecting water therefrom simultaneously with the scrubbing operation, the combination of an enclosed vessel adapted to contain a small quantity of water having resilient scrubbing means secured to its under side for engagement with a floor, the resilient scrubbing means consisting of a pair of intermediate washers and having its suction communicating with the lower end portion of the vessel, the resilient scrubbing means consisting of a pair of intermediate washers and having its suction communicating with the vessel carried in the handle, the washer blades having fluid channels in their under sides extending longitudinally and transversely thereof and the bottom of the vessel having fluid passages communicating with the bottoms of said longitudinally extending channels, a plurality of upstanding tubular elements in the vessel having their lower ends in fluid communication with said passages and extending upwardly above a predetermined water level in the vessel, an elongated handle having a tubular end portion having flexible tubular connecting means whereby said tubular end portion is flexibly connected to an upper portion of the vessel, in fluid communication therein, and having other, rigid connecting means whereby said tubular end portion is pivotally connected to opposite sides of the vessel below its center of gravity, and an electrically driven rotary air blower operatively connected in the handle intermediate the suction for drawing air from one side of the handle to thereby apply a partial vacuum to the interior of the vessel, above the water level therein, sufficient to draw water into the vessel from the floor but insufficient to exhaust substantial quantities of water from the vessel thru the handle.

2. In a hand tool for scrubbing floors and for collecting water therefrom simultaneously with the scrubbing operation, the combination of an enclosed vessel adapted to contain a small quantity of water having resilient scrubbing means secured to its under side for engagement with a floor, the resilient scrubbing means consisting of a sponge and the bottom of the vessel having a plurality of uniformly spaced fluid passages therein in fluid communication with the upper surface of the sponge, a plurality of upstanding tubular elements in the vessel having their lower ends in fluid communication with said passages and extending upwardly above a predetermined water level in the vessel, an elongated handle having a tubular end portion having flexible tubular connecting means whereby said tubular end portion is flexibly connected to an upper portion of the vessel, in fluid communication therewith, and having other, rigid connecting means whereby said tubular end portion is pivotally connected to opposite sides of the vessel below its center of gravity, and an electrically driven rotary air blower operatively connected in the handle intermediate its ends and having its suction communicating with said tubular end portion and arranged to discharge air from one side of the handle to thereby apply a partial vacuum to the interior of the vessel, above the water level therein, sufficient to draw water into the vessel from the floor but insufficient to exhaust substantial quantities of water from the vessel thru the handle.

3. In a hand tool for scrubbing floors and for collecting water therefrom simultaneously with the washing operation, the combination of an enclosed vessel adapted to contain a small quantity of water having a wiper element secured to its under side for engagement with a floor, said wiper element having fluid passages therein communicating with its under side and extending upwardly and out of the body thereof, the bottom of the vessel having openings therein communicating with said passages, a plurality of upstanding tubular elements in the vessel having their lower ends in fluid communication with said openings.
and extending upwardly above a predetermined water level in the vessel, an opening in an upper portion of the vessel, above said water level, and an electrically driven rotary air blower having its suction communicating with said last mentioned opening and arranged to discharge air from one side thereof, exteriorly of the vessel, to thereby apply a partial vacuum to the interior of the vessel, above said water level, sufficient to draw water into the vessel from the floor but insufficient to exhaust substantial quantities of water from the vessel through said last mentioned opening.