Nov. 2, 1954 F. K. MINERLEY 2,693,000

SUCTION OPERATED FLOOR TOOL

Filed July 21, 1951

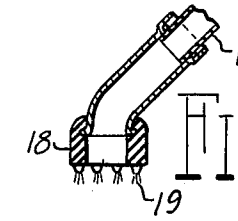


FIG. 9.

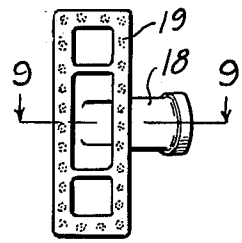


FIG. 8.

FIG. 1

FIG. 2.

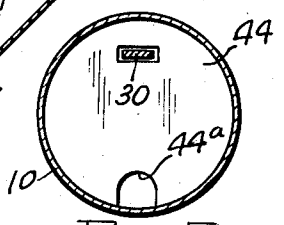


FIG. 7.

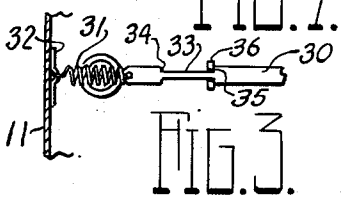


FIG. 3.

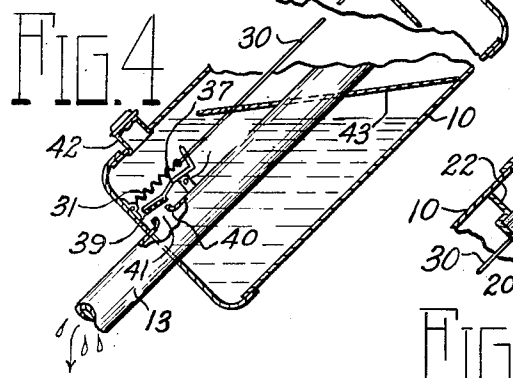


FIG. 4

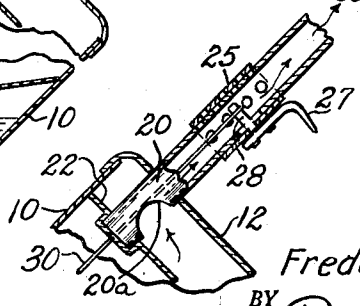


FIG. 5.

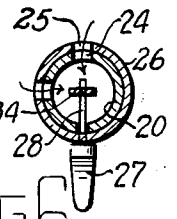


FIG. 6.

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SUCTION OPERATED FLOOR TOOL

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Application July 21, 1951, Serial No. 237,973

6 Claims. (Cl. 15—320)

This invention relates to a tool particularly adapted for the cleaning of floors such as terrazzo, linoleum, marble or tile, but more particularly to a suction operated floor cleaning tool employing liquid, such as water, which is spread upon the surface to be cleaned, whereupon the tool may be used for brushing or scrubbing the surface and finally the liquid with which the dirt is mixed is drawn into a tank forming part of the tool.

An object is to produce a hand operated tool of the above character, which is self-contained and is so constructed and arranged that the liquid is effectively baffled to militate against moisture passing into the air stream and thus into the vacuum cleaner with which it may be used. The tool is provided with new and improved valve means, which upon manipulation, renders the suction means ineffective so that the tool can be used for scrubbing purposes, the valve means being adjustable to a further position by which the liquid carried by the tool is allowed gravitationally to flow in a controlled manner upon the surface to be cleaned. The valve means can still further be adjusted to such position that vacuum or suction means is rendered effective to draw the liquid mixed with the dirt from the floor surface into the tool, thereby leaving the floor surface clean and practically dry.

Another object is to produce a tool of this character, which is simple in construction, relatively inexpensive to manufacture on a quantity basis, efficient in operation, and capable of being produced essentially from sheet material, such as sheet metal.

Other objects and advantages of the invention will hereinafter appear, and for purposes of illustration but not of limitation, an embodiment of the invention is shown in the accompanying drawings, in which:

Figure 1 is a side elevation of the tool in position of use;

Figure 2 is an enlarged longitudinal sectional fragmentary view of the body or tank portion of the tool, the valve mechanism being disposed in the position in which the vacuum means is rendered ineffective and the liquid is retained within the receptacle enabling the tool to be used for scrubbing purposes;

Figure 3 is an enlarged fragmentary sectional view on the line 3—3 of Figure 2;

Figure 4 is a longitudinal sectional view in fragment showing the mechanism adjusted to the position in which the vacuum or suction means is rendered ineffective and liquid is allowed gravitationally to flow therefrom upon the surface to be cleaned;

Figure 5 is a fragmentary longitudinal sectional view showing the valve mechanism adjusted to the position rendering the suction means effective for drawing the liquid from the floor surface;

Figure 6 is an enlarged transverse sectional view on the line 6—6 of Figure 2;

Figure 7 is a transverse sectional view on the line 7—7 of Figure 2;

Figure 8 is a bottom plan view of the floor tool; and

Figure 9 is a sectional view of the floor tool taken substantially on the line 9—9 of Figure 8.

The illustrated embodiment of the invention comprises a hand operated tool for use in the cleaning of floors particularly those of linoleum, tile, terrazzo and the like, although it can be used to advantage in the cleaning of carpets and rugs. As shown, the tool has a sheet metal cylindrical body portion or tank 10, the ends of which are closed by caps 11 and 12. Suitably secured to the cap 11 and extending well inside of the container 10 is a tube 13, the inner end of which is secured in the socketed

portion 14 of a supporting plate 15, the latter being suitably fixed to the inside of the container 10. Adjacent the inner end of the tube 15 is a lateral opening 16 through which liquid is drawn into the tank. The outer end of the tube 13 fits within a sleeve 17, to which a floor tool 18 is suitably connected. The floor tool 18 is hollow and may be provided with bristles 19 for floor scrubbing purposes, although a rubber squeegee may be used if desired, as well as other forms of floor tools such as sponge or fabric as may be desired in the scrubbing, cleaning or waxing of floor surfaces.

Projecting through the cap 12 at the opposite end of the body 10 is a tube 20. The portion on the inside of the container has a lateral port 20a and is secured at its end to a socketed portion 21 in a supporting plate 22 which is suitably fixed to the inner walls of the container. In this instance the tool is adapted to be connected by a flexible hose 23 to a portable type vacuum cleaner or other suction producing source. The tube 20 is provided with rows of spaced ports 24 and slidable over this perforated portion is a sleeve valve 25, which has rows of ports 26 adapted to register with or be disposed between the perforations 24. The sleeve is actuated by a handle or finger piece 27 fixed to the outside of the sleeve and has a post 28 projecting inside of the tube 20 through a longitudinally elongate slot 29. A flat metallic rod 30 has one end connected to the post 28 and the opposite end connected to a helically coiled spring 31, which is anchored to a bracket 32 secured to the inside of the lower container cap 11.

The rod 30 is reduced in width adjacent its lower end, as indicated at 33, providing shoulders 34 and 35 at opposite ends. Fitting the reduced portion 33 is a U-shaped yoke 36, which forms a part of a valve arm 37 pivotally mounted on a bracket 38 on the tube 13. A rubber valve disc 39 on the under side of the free end of the valve arm 39 seats against an upwardly bent rim 40 of a port 41 in the upper side of the tube 13. It will be apparent that upon upward movement of the valve operating finger piece 27, and upon engagement with the shoulders 34 by the yoke 36, the valve arm 37 is rocked in a clockwise direction (Figure 4) to open the port 41 and allow liquid within the tank 10 to pass through the tube 13 and floor tool 18 upon the floor surface to be cleaned. A cap closed filling opening 42 in the lower end portion of the tank enables a quantity of liquid to be poured into the tank.

When liquid is allowed to flow from the tank 10, the source of vacuum so far as the inside of the tank is concerned, must be rendered ineffective and for this reason, the ports 26 in the sleeve 25 must be brought into registration with certain of the ports 24 in the tube 20 so that air is drawn from the outside into the tube 20, instead of from the inside of the tank. Upon release of the finger piece 27, the coil spring 31 moves the valve 39 to its closed position, the shoulder 35 acting against the yoke 36 to effect this movement. In the closed position of the valve, which is the normal position, certain of the ports 26 of the sleeve 25 and the ports 24 in the tube 20 are in registration. Thus, air is drawn from the outside into the tube 20 without subjecting the interior of the tank 10 to the source of suction. In this position, the tool may be used for scrubbing purposes to loosen any dirt on the floor surface or for spreading the liquid previously fed from the tank, on the floor surface.

There is a third position of the sleeve valve 25, which is an intermediate position to those described above, and which is attained by moving the sleeve 25 outwardly so that the ports 26 and the ports 24 are out of registry. This movement of the sleeve 25 can be effected without imparting any movement to the pivoted valve arm 37 because of the lost motion afforded by the reduced neck portion 33 of the rod 30. Valve 39 remains closed, however, because of the suction effect then prevailing within tube 13. Since the ports in the sleeve and the tube are thus closed, the interior of the tank 10 is subjected to the source of suction creating an expansion chamber, which operating through the port 16, the lower tube 13 and the floor tool 18, causes the liquid on the floor to be sucked into the tank. The liquid thus discharged into the tank 10, due to its upright or upwardly

inclined position, flows into the lower portion of the tank as will more fully appear hereinafter. Upon release of the handle **27**, the spring **31** returns the handle and the sleeve valve **25** to its normal position, shown in Figure 2, in which the ports **26** and **24** are in register so that no suction or vacuum is imposed on the interior of the tank.

It is important that moisture be prevented from entering the air stream during the sucking of liquid from the floor surface when the tool is coupled to a portable household vacuum cleaner employing disposable dirt collecting paper filter bags. Manifestly if liquid or moisture is allowed to enter the air stream, it will not only moisten the paper filter bags rendering them useless but also enter the working parts of the vacuum cleaner causing rust and costly damage. In order to militate against this objectionable condition, a series of baffle plates **43**, **44** and **45** are arranged inside of the tank **10**. The lowermost baffle plate **43** is downwardly inclined and has its upper end secured to the inner wall of the tank approximately in the vicinity of the tube receiving socket **14**. The plate **43** is apertured to accommodate both the tube **13** and the valve operating rod **30** and the lower end is cut away to provide an opening **43***a*. Since the tool is used in an upright or upwardly inclined position, as shown in Figure 1, liquid sucked into the tank is discharged from the tube **13** through the port **16** upon the downwardly inclined baffle plate **43** and thence flown downwardly, through the opening **43** and collecting in the space beneath the baffle plate.

The intermediate baffle plate **44** extends diametrically across the inside of the tank a little above the central portion and is also imperforate except for a notch **44***a* in the lower or right-hand portion of the tank (Figure 2) and an aperture for the rod **30**. Thus the notch **44***a* is diametrically opposed to the cut-out **43***a* in the baffle plate **43**, thus requiring a circuitous or tortuous path for any liquid which might pass from the liquid collecting chamber upon inverting the tank or sloshing of the liquid due to the to and fro movement of the tool when in use.

The other baffle plate **45** is in downwardly inclined position adjacent the upper end of the tank **10** and is suitably secured to the adjacent inside walls of the tank. The upper end of the baffle **45** is disposed in the region opposite the port **20***a* of the tube **20** and the lower end terminates slightly short of the valve rod **30** (Figure 2).

The baffle plates **43**, **44** and **45** are thus arranged to form a labyrinth defining a serpentine path from one end of the tank to the other so that the liability of moisture entering the air stream is reduced to a minimum even when the tool is violently reciprocated, dropped or laid on the floor surface. Although some liquid may spill over the baffle plate **43**, it can not reach the tube port **20***a* due to the inclination and arrangement of the baffle plate **45**. Manifestly if the tool is inverted so that the side of the tank having the filler nozzle **43** is lowermost, the imperforate wall of the baffle plate **44** keeps liquid from flowing to the suction tube **20**.

The above described tool is particularly advantageous in the cleaning of hard surfaced floors such as those of tile, linoleum, terrazzo, and the like, enabling the work to be accomplished quickly and with a minimum amount of effort. A small quantity of liquid is first introduced into the tank and with it may be mixed a suitable detergent. This liquid can be reused, and after the floor has been cleaned in the manner above described, it is left almost entirely dry since the suction will withdraw practically all of the liquid from the floor surface. A very thin film of liquid that remains dries very readily. In addition to the cleaning of floor surfaces, this tool is admirably adapted for applying and spreading a thin coat of liquid wax over the floor surface and under such circumstances, the floor tool may be provided with a polishing head suitable for that use. The operation of the tool is exceedingly simple and can be used satisfactorily by an unskilled person, the simple manipulation of the finger piece **27** being all that is required. An important feature resides in the baffling of the interior of the tank to militate against the entrance of moisture to the air stream thereby obviating damage to the vacuum cleaner which would otherwise occur.

It is to be understood that numerous changes in details of construction, arrangement and operation may be effected without departing from the spirit of the invention especially as defined in the appended claims.

What I claim is:

1. In a floor cleaner, a floor tool, a tank disposed in upwardly inclined position when in normal use and having a lower end portion providing a liquid reservoir and an upper end portion providing a vacuum chamber, tube means extending inside the lower and upper ends of said tank, said tube means having a lower outer end portion connected to said floor tool and an upper outer end portion adapted to be connected to a source of suction, first port means in said tube means inside and next to the lower end of said tank, second port means in said tube means inside said tank and spaced above the first port, third port means in said tube means inside and adjacent the upper end of said tank, and fourth port means in said tube means outside and adjacent the upper end of said tank, a labyrinth formed of baffle plates within said tank and extending from opposite sides of said tank generally transverse of the interior thereof, said baffle plates defining a serpentine path from one end of said tank to the other for militating against the upward flow of liquid from the lower end of said tank to the third port means, said baffle plates being disposed between the first and third port means, valves controlling said first and fourth port means, manually movable operating means including linkage connecting said operating means and said valves whereby said valves may be selectively opened and closed and jointly opened and closed, said tank being closed but for said tube means.

2. In a floor cleaner as claimed in claim 1, in which the tube means comprises an individual tube at each end of the tank and arranged out of axial alignment.

3. In a floor cleaner as claimed in claim 1, in which the valve controlling the fourth port means comprises a longitudinally slidable ported sleeve, said fourth port means comprising a plurality of individual ports with which the ports in the sleeve selectively register, and the operative connection between the valves comprises a rod connected at one end to the sleeve and extending interiorly of the tank, spring means tensioning the rod, and means providing a lost motion between said rod and the valve within the tank enabling sliding movement of the sleeve independent of the said last valve.

4. In a floor cleaner, a floor tool, a tank disposed in upwardly inclined position when in normal use and having a lower end portion providing a liquid reservoir and an upper end portion providing a vacuum chamber, tube means extending inside the lower and upper ends of said tank, said tube means having a lower outer end portion connected to said floor tool and an upper outer end portion adapted to be connected to a source of suction, first port means in said tube means inside and next to the lower end of said tank, second port means in said tube means inside said tank and spaced above the first port means, third port means in said tube means inside and adjacent the upper end of said tank, and fourth port means in said tube means outside and adjacent the upper end of said tank, a spaced pair of similarly downward inclined baffle plates respectively arranged within said tank below said second and third port means, each of said inclined baffle plates having an opening therepast adjacent the lower end thereof, and a third baffle plate disposed between the inclined baffle plates, said third baffle plate closing off the opposite ends of said tank except for an opening therepast diametrically opposite the openings in the inclined baffle plates, thereby providing a serpentine air passage from one end to the other of said tank while militating against the upward flow of liquid from the lower end of said tank, valves controlling said first and fourth port means, manually movable operating means including linkage connecting said operating means and said valves whereby said valves may be selectively opened and closed and jointly opened and closed, said tank being closed but for said tube means.

5. In a floor cleaner including a floor tool, an elongate tank providing a liquid reservoir and disposed in upwardly inclined position when in use and having opposite upper and lower ends, a first substantially rigid tube providing a connection between the floor tool and the lower end of said tank, said first tube extending generally upwardly from the floor tool during normal use of the cleaner and extending inside the tank, said first tube having lower and upper ports inside the tank, a valve for said lower port, a second substantially rigid tube in the opposite end of the tank having portions

inside and outside thereof and opening inside the tank, said second tube having a plurality of spaced ports outside the tank, a sleeve slidable on said second tube and having ports adapted to register with said tube ports and being movable to another position in which the ports are out of registry, baffle means within said tank for militating against liquid in the lower end flowing to the upper end, and a connection between said first valve and sleeve valve so that the former is opened when the sleeve valve is moved to one of its positions in which the sleeve and tube ports are in registry, said connection enabling lost motion of said sleeve relative to said first valve to position the sleeve ports out of registry with the tube ports, said tank being closed but for said tube means.

6. In a floor cleaner including a floor tool, an elongate tank providing a liquid reservoir and disposed in upwardly inclined position when in use and having lower and upper ends, a first substantially rigid tube providing a connection between the floor tool and the lower end of said tank, said first tube extending generally upwardly from the floor tool during normal use of the cleaner, and extending inside the tank, a closure plate secured to the inside of the tank for the upper end of the first tube, a port in said first tube adjacent the lower end of said tank enabling liquid to flow gravitationally from the tank to the floor tool, a valve for said port, an arm for said valve pivoted intermediate its ends to said first tube and having an upturned yoke at one end, a downwardly inclined baffle plate secured to the inside of the tank and disposed in the space between the closure plate and the lower end of the tank, said baffle plate providing a barrier except for an opening between the lower end of the plate and tank, said first tube having a port therein between said baffle plate and said closure plate, a second substantially rigid tube in the opposite end of the tank having portions inside and outside thereof and having a port on the inside of the tank, the outside portion of said second tube being adapted to be connected to a source of suction, said second tube being parallel to but spaced laterally from said first tube, a

closure plate secured inside the tank for the lower end of said second tube, a baffle plate inclining downwardly from said last closure plate secured to the inside of the tank and providing a barrier except for an opening between the lower end of the plate and tank, a transverse baffle plate in said tank between said last baffle plate and said first closure plate and providing a barrier except for an opening at the side of the tank opposite to that of said last baffle plate, said second tube having a plurality of spaced ports on the outside of the tank, a sleeve slidable on said second tube having spaced ports adapted to register with the second tube ports in two positions of adjustment, operating means for actuating said sleeve, a rod connected at one end to said operating means and extending longitudinally within said tank, a coil spring connecting the opposite end of said rod to the lower end of said tank, a reduced portion on the lower end of said rod receiving said valve arm yoke, the arrangement being such that normally said first valve is closed and the ports in the sleeve valve and tube are in registry, and upon outward movement of the sleeve valve to the extent allowed by the reduced rod portion, the sleeve and tube ports are out of registry enabling air to be drawn from the inside of the tank, and upon further outward movement of the sleeve the valve arm yoke is moved by the rod to swing its valve open and the sleeve and tube ports are again in registry, said tank being closed but for said tube connections.

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