

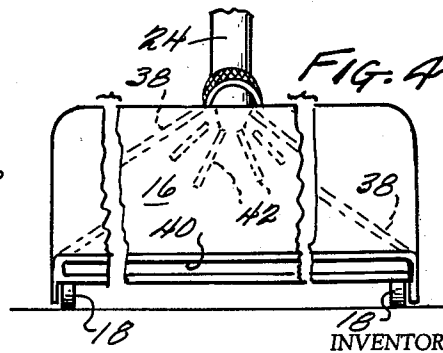
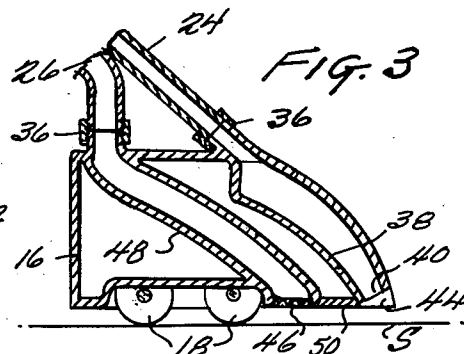
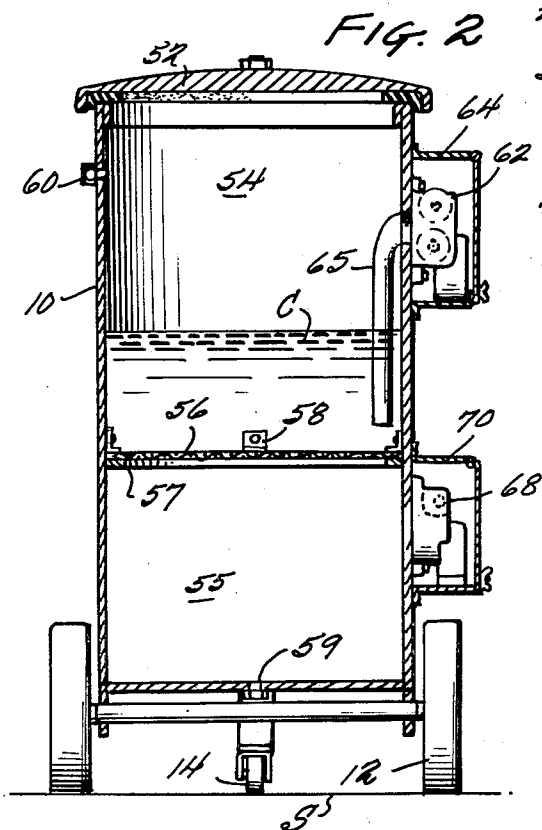
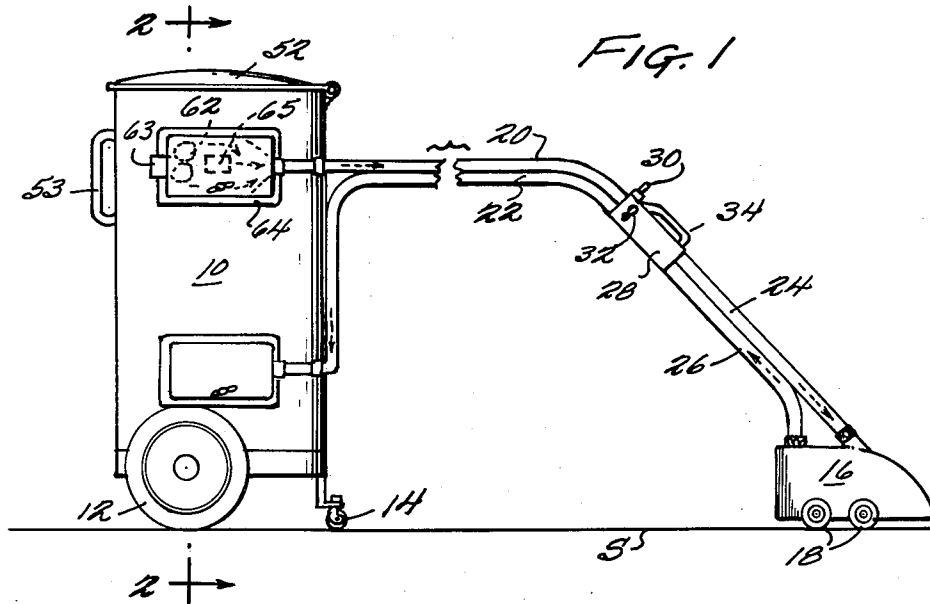
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FOAM TYPE SURFACE CLEANER AND METHOD OF CLEANING SURFACES

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FOAM TYPE SURFACE CLEANER AND METHOD OF CLEANING SURFACES

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This invention relates generally to cleaning apparatus and more particularly to a novel method of and apparatus for cleaning various surfaces such as floors, walls and ceilings of the type found in the home, in offices, or in institutions, etc.

Various methods of and apparatus for cleaning surfaces are well known in the art and in general, these usually involve two or more of a number of successive steps such as the application of a cleaning compound to the surface in question, the scrubbing or working into or around on the surface of the cleaning compound, the removal thereof together with the loosened dirt, the rinsing of the surface, and the final drying thereof with a final polishing step often being required.

Attempts have been made in the past to combine one or more of the above steps into single or less time-consuming operations and elaborate apparatus has been devised in conjunction with such attempts. However, insofar as is known, such attempts have not been wholly successful and the apparatus designed in connection therewith have, insofar as practical experience is concerned, left much to be desired.

The main object of the present invention therefore is to provide a novel, simple and practical method of and apparatus for cleaning surfaces such as floors, walls, and ceilings in a single operation to thereby effect real economies in labor costs as well as to readily and efficiently clean such surfaces.

An important object of the present invention is to provide a novel method of and apparatus for cleaning surfaces in a single operation by a fluid wiping action which will leave the surface clean and substantially dry and ready for use.

Another important object of the present invention is to provide a novel method of and apparatus for cleaning surfaces in which the apparatus is completely self-contained and may be readily moved along the surface being cleaned by a single operator with a minimum of effort and cover up to ten times the area as is possible with other methods and apparatus.

A further important object of the present invention is to provide a novel method of and apparatus for cleaning surfaces which will remove all dust, lint, germs, and dirt from cracks and crevices as found in wooden floors and sterilize the surfaces as it cleans.

A still further important object of the present invention is to provide an improved apparatus for cleaning floors which will be simple in construction, susceptible of ready and economic manufacture, and of light weight while being rugged and of long life in use.

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

In the drawings I have shown one embodiment of the invention. In this showing:

FIGURE 1 is an elevational view of one form of apparatus for carrying out the novel cleaning method of the invention;

FIGURE 2 is a central, vertical sectional view to an enlarged scale of the tank containing the cleaning compound and the fluid circulating elements, taken on the line 2-2 of FIGURE 1;

FIGURE 3 is a central, vertical sectional view of the

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cleaning head which traverses the surface to be cleaned; and

FIGURE 4 is a front elevational view thereof.

Referring to the drawings, the cleaning apparatus of the present invention comprises a tank 10 mounted on a pair of large wheels 12 and a caster wheel 14, a cleaning head 16 mounted on small, substantially concealed wheels 18, and a pair of flexible conduits 20 and 22 connecting the tank 10 to the cleaning head 16 by means of a pair of rigid conduits 24 and 26.

The rigid conduits are connected at their upper ends by a valve bracket 28 through which the operating levers 30 and 32 of a valve mounted in each of the rigid conduits 24 and 26, project. The valve bracket 28 is provided with a handle 34 by which the cleaning head 16 may be readily manipulated, the lower ends of the rigid conduits 24 and 26 being detachably connected thereto by means of couplings 36 including seals. The couplings enable the ready substitution of a smaller cleaning head for walls and ceilings than the larger floor type which may be three feet in width.

The cleaning head 16 includes a pressure conduit nozzle 38 (FIGURES 3 and 4) which flares outwardly and downwardly from its coupling 36 to its bottom, laterally elongated nozzle opening 40 which is held just above the surface S to be cleaned by the enclosed wheels 18. The cleaning compound delivered from the tank 10 to the cleaning head 16 by the conduits 20 and 24 is evenly distributed on the surface S by virtue of guiding and distributing plates 42 arranged in the cleaning head conduit 38 adjacent the connection with the conduit 24.

It is to be noted that the side edges of the nozzle opening 40 of the conduit nozzle 38 are closed by plates or housing extensions 44 which laterally confine the cleaning fluid to the area desired to be cleaned. Approximately four inches rearwardly of the pressure conduit nozzle opening 40 and parallel therewith, the cleaning head includes an elongated, transversely extending exhaust nozzle opening 46 of an exhaust conduit 48 which is connected at its upper end to the rigid conduit 26. The pressure conduit nozzle opening 40 and the exhaust conduit nozzle opening 46 are thus spaced and clearly separated by the cleaning head portion 50.

The tank 10 includes gasketed top 52, a manipulating handle 53, and is divided into an upper portion 54 and a lower portion 55 by a fine mesh screen 56 supported on an inner peripheral flange 57 and detachably secured thereon by fasteners 58. The screen 56 is smaller than the tank 10 and may be readily removed through the top for cleaning. The contents of the tank may be removed through a drain plug 59 when desired and any excess pressure within the tank is relieved by a safety valve 60.

The tank 10 is filled with a cleaning compound C which is delivered to the pressure nozzle 38 by way of the conduit 20, the valve and conduit 24 in the form of an atomized foam having an instantaneous cleaning and sterilizing action on the surface to which it is delivered. Such delivery is effected by a high pressure pump 62 having an air intake 63 in an enclosing and supporting housing 64, the cleaning compound C being aspirated through the pipe 65 into the pressure air and atomized.

The cleaning compound C may be a mixture of liquid detergent and water and a disinfectant. Where the nature of these is such as not to be adversely affected, a liquid, self setting and polishing wax may be incorporated in the cleaning compound in small amounts.

After being deposited on the surface to be cleaned in amounts which can be regulated by the rate of forward movement of the cleaning head 16, the cleaning compound is almost immediately picked up from the surface together with the particles of dirt, lint, etc., by the ex-

haust nozzle 48, 46 and returned to the lower portion 55 of the tank 10 by way of the conduits 26 and 22 by means of a high vacuum pump 68 enclosed in a supporting housing 70. The returned cleaning compound raises the level in the tank 10 and it is continually reused, the dirt particles, etc., being trapped below the screen 56.

It will now be readily apparent that surfaces of any type may be readily cleaned and disinfected by the substantially closed fluid circuit method described by a single operator who can cover up to ten times as much area as formerly. The cleaning fluid circulates continuously and the atomized fluid deposited immediately acts to loosen the dirt and sterilize the surface, upon which the now dirty cleaning fluid which, in effect, has been confined on the surface by the head 16, is picked up by the exhaust nozzle and returned to the tank 10 for filtering by the screen 56 and reuse. A fluid wiping action is thus attained on the surface by the air-carried cleaning compound particles.

It will be noted that the valve levers 30 and 32 enable the depositing of cleaning fluid independently of the action of the exhaust nozzle and vice versa. Thus, the fluid may be deposited without being immediately picked up and conversely, the exhaust may be operative to further clean or dry a surface without the deposit of fluid. The pumps 62 and 68 are electric motor driven and may be readily plugged into conventional power outlets by electric cords (not shown).

It will be apparent that the spacing between the openings of the nozzles 38 and 48 determines—in conjunction with the forward speed of the cleaning head 16—how soon after deposition on a surface S that the atomized foam will be removed therefrom by the exhaust nozzle. Thus, the forward movement of the cleaning head 16 as controlled by the operator, with the tank 10 being readily trailed along by means of the flexible conduits 20 and 22, should be slower for surfaces which are dirtier than others.

It is to be understood that the cleaning method and form of the apparatus 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 the invention or the scope of the subjoined claims.

I claim:

1. A method of progressively cleaning surfaces comprising the steps of providing a mobile supply of liquid cleaning fluid, moving the supply along the surface while continuously depositing an elongated generally rectangular flow of said fluid under high pressure along the area of surface to be cleaned to effect a fluid wiping action thereon and to form a temporary stationary, mixed layer

of said fluid and dirt particles, continuously withdrawing successive, contiguous, elongated, generally rectangular portions of the mixed layer from the thus cleaned surface area and returning it to the supply, and filtering the dirt particles from said mixed layer to condition said fluid for subsequent deposit as a continuation of said flow onto a further area to be cleaned.

2. A mobile apparatus for cleaning an area of a surface as it travels thereover comprising a cleaning head arranged closely adjacent the surface, an elongated cleaning-liquid discharge nozzle arranged in the forward portion of said head and at right angles to the direction of movement thereof, an exhaust nozzle arranged in said head and spaced rearwardly of, parallel to, and coextensive with said discharge nozzle, a tank adapted to have cleaning fluid therein, supply and exhaust conduits respectively connecting tank and said discharge and exhaust nozzles of said head, means mounted on said tank for delivering cleaning fluid under high pressure to said discharge nozzle for deposit on the surface to form a temporary, stationary, mixed layer of fluid and dirt particles thereon, and additional means mounted on said tank for withdrawing successive, contiguous, elongated portions of said mixed layer as said exhaust nozzle moves thereover, the spacing of said discharge and exhaust nozzles substantially defining said stationary mixed layer.

3. An apparatus as recited in claim 2 wherein said means and said additional means comprises high pressure and high vacuum pumps in communication with the cleaning fluid and with said supply and exhaust conduits.

4. An apparatus as recited in claim 2 wherein said supply and exhaust conduits include means for controlling the flow of fluid therethrough.

5. An apparatus as recited in claim 2 wherein a portion of said conduits adjacent said cleaning head are of rigid material and joined to form a manipulating handle for said head.

6. An apparatus as recited in claim 2 wherein screen means are positioned in said tank to filter the fluid returned from said head.

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