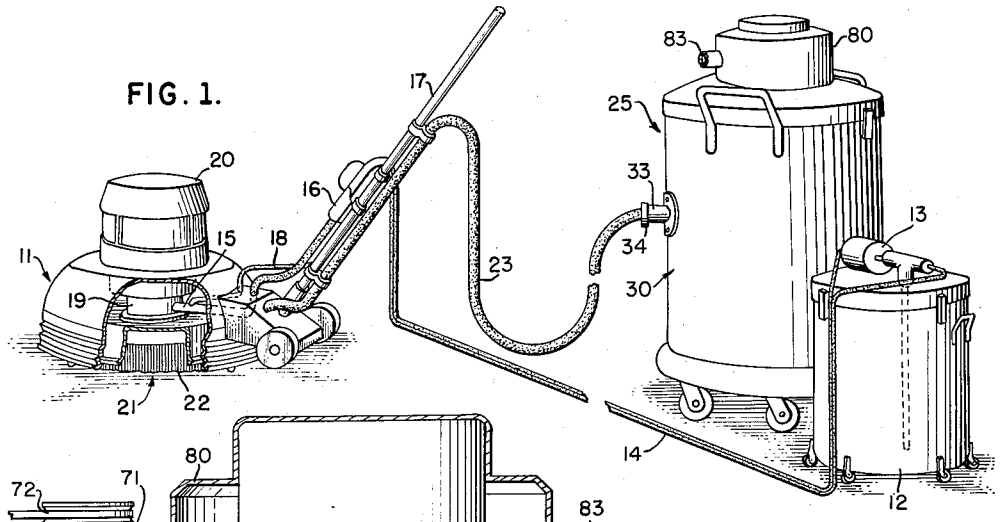
Feb. 28, 1961 E. J. KEATING ET AL 2,972,769

SCRUBBING MACHINE FOR ON-LOCATION CLEANING OF PILE-TYPE FLOOR COVERING

Filed July 24, 1959

FIG. 1.



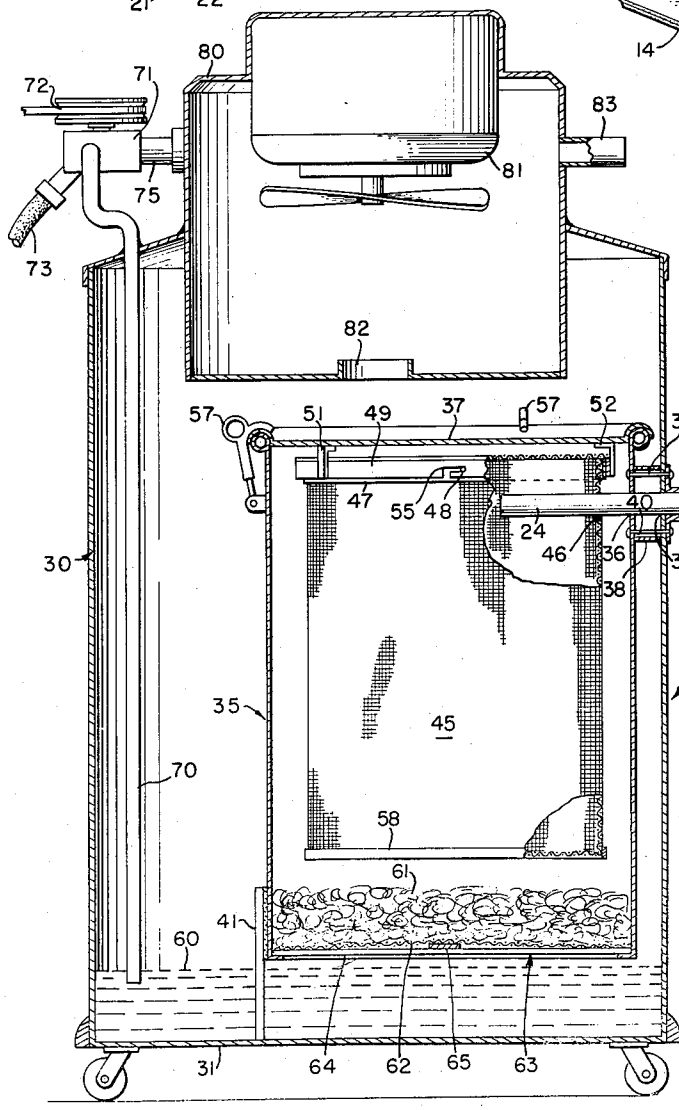


FIG. 2.

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SCRUBBING MACHINE FOR ON-LOCATION CLEANING OF PILE-TYPE FLOOR COVERING

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2 Claims. (Cl. 15—321)

(Granted under Title 35, U.S. Code (1952), sec. 266)

A non-exclusive, irrevocable, royalty-free license in the invention herein described, throughout the world for all purposes of the United States Government, with the power to grant sublicenses for such purposes, is hereby granted to the Government of the United States of America.

This invention relates to a scrubbing machine for on-location cleaning of pile-type floor coverings, such as pile-type rugs and carpets, and particularly to a scrubbing machine of the type disclosed in copending application Serial No. 618,654, filed October 26, 1956, and now Patent Number 2,923,956. The invention will accordingly be described with reference thereto.

The scrubbing machine described in said copending application provides a scrubber having means for receiving detergent solution and converting it to suds and having also a brush with downwardly projecting bristles, rotatable about a vertical axis, for scrubbing the floor covering with the thus-generated suds whereby the floor covering is cleaned and the suds pick up and hold soil and lint. Means for feeding the detergent solution to the scrubber are also provided.

The scrubbing machine further includes a receiver for receiving the soil-and-lint laden suds, resulting from the scrubbing of the floor covering, from the scrubber wherein the suds are reconverted to the liquid form. Means for conveying the soil-and-lint laden suds from the scrubber to the suds receiver are additionally provided.

The instant invention is a scrubbing machine of the type described above in which an improved suds receiver is provided for use in place of the one disclosed in said copending application and has as one of its objects the provision of a scrubbing machine having a receiver of the type described above which is adapted for continuous operation. Another object is to provide such a scrubbing machine in which the receiver is equipped with a screen trap adapted, by virtue of its structure, mounting, and positioning, to separate the lint from the soil-and-lint laden suds entering therein, in such a manner as to prevent the lint from contaminating a suds-breaking barrier, also contained therein, which is subsequently employed to reconvert the resulting lint-free suds to detergent solution. A further object is to provide such a scrubbing machine in which the reconverted detergent solution in the receiver is prevented from being re-aerated by suction means used to draw the soil-and-lint laden suds into the receiver thereby avoiding a re-sudsing or re-foaming of the detergent solution with the consequent undesired passage of such newly formed suds through the suction means. Other objects will be apparent from the description of the invention.

The invention will now be described with reference to the annexed drawing in which:

Fig. 1 is a three dimensional view, partially broken away, of the scrubbing machine illustrating the scrubber and the improved suds receiver, and

Fig. 2 is a cross-sectional view of the suds receiver of Fig. 1 in reverse position to that shown in Fig. 1.

Referring with more particularity to the drawing, the scrubbing machine is provided with a scrubber **11** having means for receiving detergent solution from a detergent solution supply container **12** and converting it to suds. Means for feeding the detergent solution to the scrubber are also provided and include a positive displacement pump **13**, driven by any prime mover (not shown), which conveys detergent solution from container **12** through hose **14** and discharges it into spray tube **15** of the scrubber. Air for generating spray is supplied by a blower fan **16**, mounted on scrubber handle **17**, having its discharge connected to spray tube **15** by hose **18**. Detergent solution is generated into a fine spray in spray tube **15** and the fine spray is blown into suds pregenerator section **19** which contains suds producing means (not shown), the structural details of which are disclosed in said copending application Ser. No. 618,654. The suds pregenerator section is mounted between prime mover **20** and brush **21**, the latter having downwardly projecting bristles **22**, and being rotatable about a vertical axis. The brush functions to scrub the floor covering with the suds generated by the said suds-producing means, whereby the floor covering is cleaned and suds pick up and hold soil and lint. The soil-and-lint laden suds are thereafter conveyed from scrubber **11** through flexible hose **23**, one end of which is flared, and then through communicating conduit **24**, one end of which is also flared, into suds receiver **25** where, as will be described hereafter, the lint is separated from the soil laden suds and the suds converted back to detergent solution and removed from the receiver.

The suds receiver **25** is provided with an outer container **30** having a solid bottom **31**, having an inlet port **32** in its wall through which the soil-and-lint laden suds are received from the scrubber, and carrying, on the outer surface of the wall, a nipple **33** having a threaded outer surface adapted to receive mating nut **34**. The suds receiver is also provided with an inner container **35** having an open bottom, an inlet port **36** in its wall, and a solid tight-fitting removable lid **37**. The inner container is mounted within, and spaced from the inner wall of the outer container by hollow spacer **38** which joins the walls of both the inner and outer containers through rivets **39** and **40**. The inner container is further supported by leg **41**, fixed thereto, as by welding, which is positioned within the outer container diametrically opposite spacer **38**. The passageways of port **32**, nipple **33**, port **36**, and spacer **38** are concentric thereby effecting through communication. The bottom of the inner container is spaced from the bottom of the outer container forming a reservoir therebetween for the collection of detergent solution as the suds are reconverted thereto, as will be explained hereinafter.

The suds receiver is further provided with a screen trap, detachably mounted within the inner container, for separating the lint from the soil-and-lint laden suds and holding the lint thereon thereby producing lint-free suds. Such screen trap is in the form of a detachable wire mesh basket **45** having a port **46** in its wall, the passageway of which is also concentric with those of port **32**, nipple **33**, port **36**, and spacer **38**. Means are provided for removably suspending the basket within the inner container so that it may be detached for the cleaning of the lint therefrom. Such means include a metal band **47** which surrounds, and is fixed to, the top of the basket, and which carries a pin **48** on its outer surface. Band **47** is adapted to fit snugly within a similar band **49**, secured to the underside of lid **37** by brackets **51** and **52**, whereupon pin **48** will engage a slot **55** in said band **49** and, when turned therein, will form a conventional "bayonet" mount suspending the basket from lid **37**. Spring-loaded clamps, as for example, clamps **57**, hold the lid

down tightly when the scrubbing machine is in operation and, when released by hand, permit the lid to be raised and the attached basket lifted from the inner container after which the "bayonet" joint may be disengaged and the basket detached and cleaned of lint. A band 58, similar to band 47, encircles the screened bottom of the basket 45. By virtue of this structure, mounting, and positioning, the basket 45 is adapted to separate the lint from the soil-and-lint laden suds entering the receiver without contaminating, with lint, the suds-breaking barrier, also contained therein, which is subsequently employed, as will be described hereinafter, to reconvert the resulting lint-free suds to detergent solution.

Also contained within the inner container, and positioned below, and communicating with, the basket, are means for reconverting the lint-free suds, upon contact therewith, to detergent solution which thereupon flows through the open bottom of the inner container and collects in the reservoir formed between the bottom of the inner container and the bottom of the outer container, as indicated by the liquid level 60. Such means are, for example, a porous suds-breaking barrier, such as bronze turnings 61 having a suitable defoaming agent disposed thereon. Means are also provided for supporting the suds-breaking barrier and include, for example, wire screen 62 which supports turnings 61, and which, in turn, is supported by spider 63 composed of crosspieces 64 and 65 which are crossed at right angles to each other and fastened at the intersection. Both screen 62 and spider 63 fit snugly at the bottom of the inner container.

Means are also provided for conveying the reconverted detergent solution, as it collects in the reservoir formed between the bottoms of the inner and outer containers, out of the receiver. In this operation, the reconverted liquid detergent solution which collects in the reservoir is pumped out of the outer container through conduit 70 by the action of pump 71 driven by a power source, as for example, one activated by V-belt pulley 72 and the solution then conveyed away from the outer container to another container or drain through drain hose 73. The conduit 70, the upper end of which passes through the top of the outer container, is sealably fixed thereto, as by welding. The lower or inlet end of conduit 70 is positioned within the outer container just below the bottom of the inner container and the action of pump 71 keeps the level of detergent solution below the bottom of the inner container. As a result of this structure, the use of the receiver is adapted for continuous operation. A further major advantage resulting from the maintenance of the level of the detergent solution below the bottom of the inner container is to prevent the detergent solution from being re-aerated by suction means, to be described hereafter, which is used to draw the soil-and-lint laden suds into the receiver, thereby avoiding a re-sudsing or re-foaming of the detergent solution with the consequent undesired passage of such newly formed suds through the suction means. Pump 71 and the V-belt pulley 72 attached thereto, are fixed by brace 75, to suction fan housing 80, the function of which will be explained hereafter.

Communication between hose 23, which conveys the soil-and-lint laden suds from the scrubber to the suds receiver, and the basket 45 is effected by conduit 24 which is positioned within the concentric passageways of port 32, nipple 33, port 36, spacer 38, and port 46, its flared end extending outside the outer container. Conduit 24 is fixed in this position by coupling its flared end with the flared end of hose 23 by means of nut 34 which screws tightly on the threaded surface of nipple 33 thereby effecting a leakproof joint.

A suction fan 81, positioned in fan housing 80 and communicating with inlet port 36 of the inner container, furnishes the suction means for drawing the soil-and-lint laden suds through the inlet port 32 of the outer container, then through the communicating inlet port 36 of the inner container, then through the screen trap, or basket 45, interposed between port 36 of the inner container and the suction fan, which thereupon traps the lint in its mesh, and the resulting lint-free suds thence drawn into contact with the suds-breaking barrier 61, interposed between the basket 45 and the suction fan, whereupon they are reconverted to detergent solution which flows into and collects in the reservoir. The fan housing is provided with an inlet 82 which communicates with the interior of the outer container and with the open bottom of the inner container, and also includes a vent outlet 83 for venting the exhausted air.

In the operation of the scrubbing machine, the suds are generated in the scrubber and the floor covering cleaned with the thus-generated suds. Thereafter, by the action of suction fan 81, the resulting soil-and-lint laden suds are conveyed to the suds receiver through hose 23 and conduit 24 whereupon they enter basket 45. Here the lint is separated from the suds and the resulting lint-free suds then contact the suds breaker 61 which converts the suds to detergent solution which collects in the reservoir. The collected detergent solution is then pumped through conduit 70 by pump 71 and led away from the outer container through drain hose 73 at a rate sufficient to maintain the level of the detergent solution below the bottom of the inner container.

When it is desired to clean the basket from accumulated lint, nut 34 is unthreaded to separate the flared ends of hose 23 and conduit 24, whereupon conduit 24 becomes free and may be withdrawn from its position, relative to basket 45. Clamps 57 are then manually released and the resulting freed lid 37 then raised to lift the attached basket out of the inner container which may then be detached from the lid and cleared of lint as hereinbefore described.

Having thus described the invention, what is claimed is:

1. A scrubbing machine for the on-location cleaning of a pile-type floor covering comprising a scrubber having means for receiving detergent solution and converting it to suds and having also a brush with downwardly projecting bristles, rotatable about a vertical axis, for scrubbing the floor covering with the thus-generated suds whereby the floor covering is cleaned and the suds pick up and hold soil and lint, means for feeding the detergent solution to the scrubber, a receiver for receiving the soil-and-lint laden suds from the scrubber, and means for conveying the soil-and-lint laden suds to the suds receiver, said receiver comprising an outer container having a solid bottom and having an inlet port in its wall through which the soil-and-lint laden suds are received from the scrubber, an inner container positioned and supported within said outer container and spaced from the inner wall of said outer container, said inner container having an inlet port in its wall communicating with said inlet port of said outer container for receiving the soil-and-lint laden suds therefrom, having an open bottom spaced from the bottom of the outer container thereby forming a reservoir between said bottoms of the inner and outer container for collecting detergent solution as the suds are subsequently reconverted thereto, and having a tight-fitting removable lid, a screen trap, detachably mounted within said inner container for separating the lint from said soil-and-lint laden suds and holding the lint thereon thereby producing lint-free suds, a suds-breaking barrier communicating with said screen trap for reconverting the lint-free suds, upon contact therewith, to detergent solution which thereupon flows into said reservoir and collects therein, means for supporting said suds-breaking barrier, and suction means communicating with said inlet port of the inner container, said screen trap being interposed between said inlet port of the inner container and said suction means, said suds-breaking barrier being interposed between said screen trap and said suction means, said suction means being adapted to draw the soil-and-lint laden suds through the inlet port of said outer container, then through the communicating

inlet port of said inner container, then through said screen trap, and thence through said suds-breaking barrier as a result of which the lint is separated from the soil-and-lint laden suds by said screen trap and collected therein thereby producing lint-free suds which are reconverted to detergent solution upon contacting the suds-breaking barrier, whereupon the resulting reconverted detergent solution flows into and collects in the reservoir, a conduit, the inlet end of which is positioned within the outer container below the bottom of the inner container, means for conveying the reconverted detergent solution, as it collects in the reservoir, through said conduit out of said receiver at a rate sufficient to maintain the level of the detergent solution below the bottom of the inner container, and means for removing the screen trap holding the accumulated lint collected therein for cleaning.

2. A receiver for soil-and-lint laden detergent suds comprising an outer container having a solid bottom and having an inlet port in its wall through which the soil-and-lint laden suds are received, an inner container positioned and supported within said outer container and spaced from the inner wall of said outer container, said inner container having an inlet port in its wall communicating with said inlet port of said outer container for receiving the soil-and-lint laden suds therefrom, having an open bottom spaced from the bottom of the outer container thereby forming a reservoir between said bottoms of the inner and outer containers for collecting detergent solution as the suds are subsequently reconverted thereto, and having a tight fitting removable lid, a screen trap, detachably mounted within said inner container for separating the lint from said soil-and-lint laden suds and holding the lint thereon thereby producing lint-free suds, a suds-breaking barrier communicating with said screen trap for reconverting the lint-free suds, upon contact therewith, to detergent solution which thereupon flows into the said reservoir and collects therein, means for supporting said suds-breaking barrier, and suction means communicating with said inlet port of the inner container, said screen trap being interposed between said inlet port of the inner container and said suction means, said suds-breaking barrier being interposed between said screen trap and said suction means, said suction means being adapted to draw the soil-and-lint laden suds through the inlet port of said outer container, then through the communicating inlet port of said inner container, then through said screen trap and thence through said suds-breaking barrier as a result of which the lint is separated from the soil-and-lint laden suds by said screen trap and collected therein thereby producing lint-free suds which are deconverted to detergent solution upon contacting the suds-breaking barrier whereupon the resulting reconverted detergent solution flows into and collects in the reservoir, a conduit, the inlet end of which is positioned within the outer container below the bottom of the inner container, means for conveying the reconverted detergent solution, as it collects in the reservoir, through said conduit out of said receiver at a rate sufficient to maintain the level of the detergent solution below the bottom of the inner container, and means for removing the screen trap holding the accumulated lint collected therein for cleaning.

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