

[54] STEAM CLEANING MACHINE

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[22] Filed: Feb. 15, 1972

[21] Appl. No.: 226,408

[52] U.S. Cl. 15/320, 15/50 C, 15/79,
15/83

[51] Int. Cl. A47I 7/00

[58] Field of Search 15/50 C, 79, 82,
15/83, 314, 320, 321

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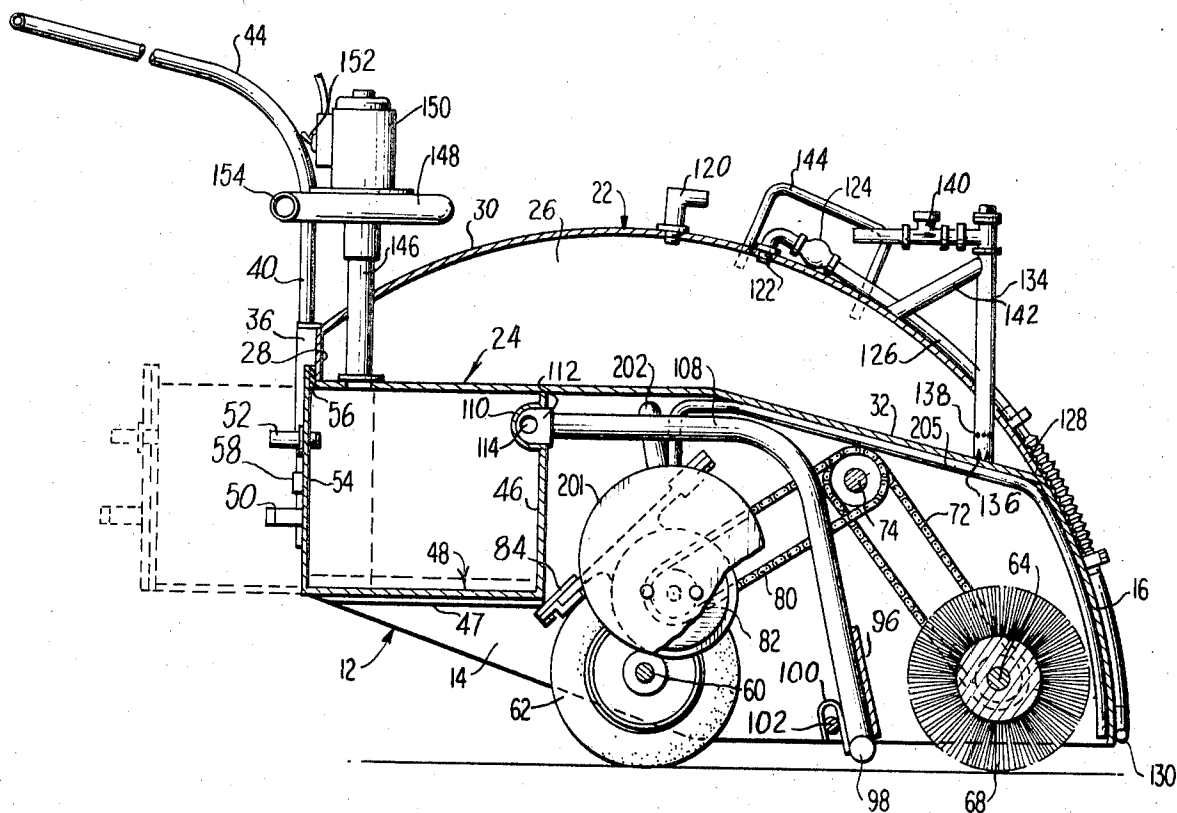
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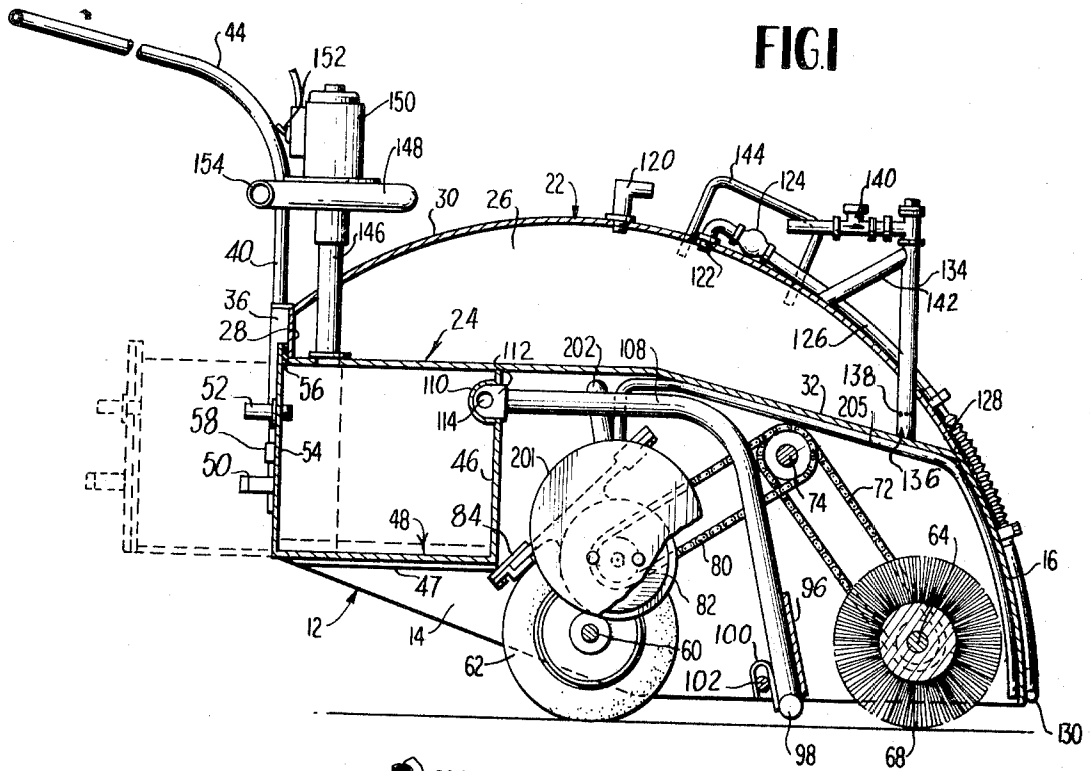
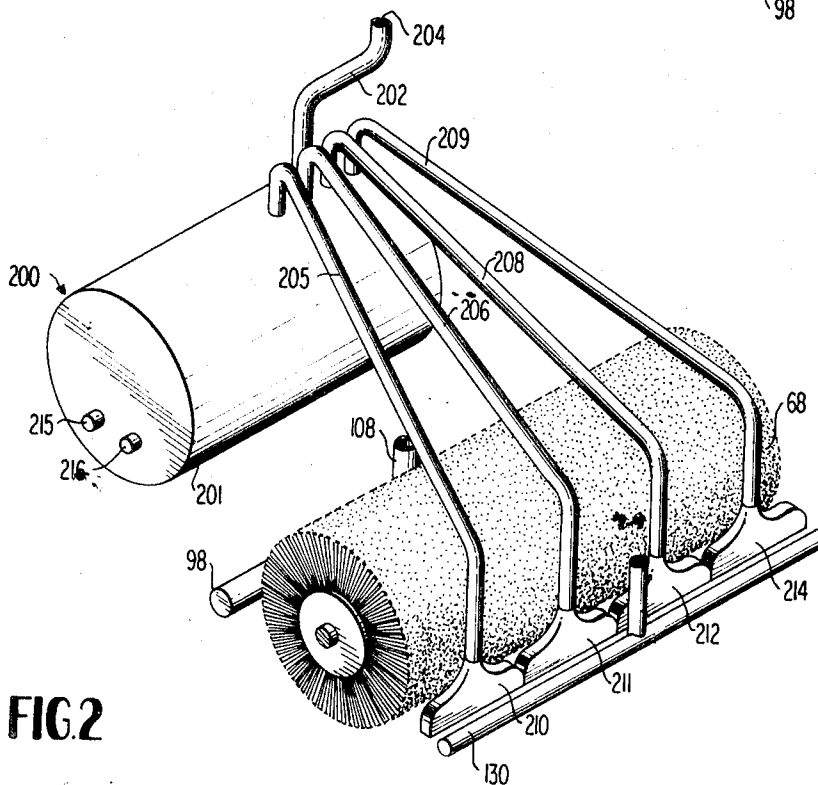
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ABSTRACT

A combination rug, upholstery and surface cleaner of the type in which detergent suds are deposited on a surface by a machine and the detergent suds are worked into the surface by a moving brush, the dirt and suds there being removed from the surface by a vacuum in which the surface is bathed in steam immediately after the suds are deposited on the surface.

5 Claims, 2 Drawing Figures





STEAM CLEANING MACHINE

This invention relates to a combination rug upholstery and surface sweeper, cleaner, dry washer or dyeing machine and more specifically provides a single machine for performing one or more of these functions.

It is known to provide a machine that will dispense a detergent, use that detergent to clean a rug or the like, and vacuum the detergent from the rug in a single, continuous operation. One form of these machines provides a detergent solution from which suds are generated, and the suds are dispensed to the surface to be cleaned.

The device of the present invention is an improvement over the above-described machine in that the machine remains basically quite simple while the effectiveness of the cleaning operation is enhanced. Improved cleaning is brought about by the use of steam which is applied to the surface to be cleaned; further, the steam is applied immediately after the detergent suds and immediately before the scrubbing action to provide a very efficient and thorough cleaning process.

These and other features and advantages of the present invention will become apparent from a consideration of the following specification when taken in conjunction with the accompanying drawings in which:

FIG. 1 is a longitudinal cross-sectional view through a machine made in accordance with the present invention; and,

FIG. 2 is a perspective view showing the steam generator, nozzles and scrubbing device.

Referring now specifically to the drawings, the machine includes a frame generally indicated by the numeral 12 and formed by vertically disposed side walls such as side wall 14, an arcuately curved end wall 16 and a rear wall thereby forming a hollow enclosure.

The side walls 14 of the frame 12 have means (not shown) for retaining a tank 22 on the upper edges of the enclosure forming the frame 12. The tank 22 includes a bottom 24, side walls such as side wall 26, an end wall 28 at one end thereof and an arcuate upper wall 30 which forms a top and forward end. The bottom 24 is provided with a horizontal section, and a downwardly inclined section as indicated by the numeral 32.

At the rear of the frame 12, there are tubular members such as that indicated by numeral 36 to receive the vertical portion 40 of a handle having a right angle bend 44 wherein the vertical portion 40 is inserted into the tubular members 36 to assist in holding the tank 22 in proper alignment on the frame 12.

A vertical wall 46 is provided between the side walls 14, and a pair of longitudinal members such as the member 47 is provided, disposed between the vertical wall 46 and the rear of the frame 12 to slidably receive a drawer-type container 48 having a handle 50 on the outer surface thereof for manipulation of the container 48. A tube 52 projects through the rear wall 54 of the container 48 and the edge of the rear wall 54 is provided with a sealing gasket 56 for sealing the container 48 in the opening in the rear wall 18 of the frame 12. A pair of latch members 58 is provided at each side of the periphery of the rear wall 54 wherein the container 48 will be retained on the longitudinal members 47 and the sealing gasket 56 is securely positioned against the periphery of the opening in the rear wall of the frame 12 thereby securing the container 48 in the frame 12 in airtight condition due to the engagement of the latch members with the other surface of the wall 54.

A transverse axle 60 is disposed between the side walls 14 adjacent the lower center portion thereof and a rotatable supporting wheel 62 is positioned adjacent each end of shaft 60 wherein the machine can be moved over a supporting surface as desired. Forwardly of the shaft 60 is another transverse shaft 64 mounted in suitable bearings and supporting a cylindrical brush 68. One end of the shaft 64 is provided with a sprocket for engagement with a chain 72 that is driven through a lay shaft 74 having sprockets thereon driven through a chain 80 from an electric motor 82 whereby the brush 68 will be rotated by operation of the motor 82. The motor 82 is mounted on a base plate 84 secured to the side walls and the vertical wall by suitable brackets. Suitable electrical power is supplied to the motor 82 through a suitable switch wherein the rotation of the brush 68 can be controlled.

A transverse baffle plate 96 is secured between the side members 14 rearwardly of the rotating brush 68 and a transverse pipe 98 having hooks 100 on the ends thereof is positioned rearwardly of the baffle plate 96 with the hooks engaging over a transverse rod 102 for support of the transverse pipe 98. The transverse pipe 98 is provided with an elongated slot adjacent its bottom and is provided with closed ends, and a pipe 108 is in communication therewith and extends rearwardly into a recess 110 in the vertical wall 46 at the forward portion of the container 48.

The recess 110 in the wall 46 receives an enlarged portion 112 of the pipe 108 and the recess 110 and the enlarged portion 112 are provided with aligned apertures 114 whereby the material cleaned from the rug by the vacuum pipe 98 will be discharged into the interior of the container 48 and the material will have to change directions whereby the solid particles will be deposited at the bottom of the container 48 by the action of gravity.

The tank 22 is provided with an L-shaped pipe 120 adjacent the central portion of its upper surface and a second L-shaped pipe 122 is positioned forward of pipe 120 on the upper surface of the tank 22 and is connected through a valve 124 to a conduit 126 having a removable accordion type rubber hose portion 128 for connection with a transverse manifold 130. The manifold 130 is provided with a plurality of discharge apertures for dispensing soap suds and the like forwardly of the brush 68. A vertical stand pipe 134 extends through the arcuate upper wall 30 of the tank 22 and terminates adjacent the lowest portion of the downwardly inclined bottom wall 32. The vertical pipe 134 is provided with a plurality of V-shaped notches 136 at its lower end and a plurality of apertures 138 vertically spaced slightly therefrom for purposes described hereinafter. A check valve 140 is positioned in the inlet line for the conduit 134. Suitable braces 142 may be provided for anchoring stand pipe 134 and handle members 144 may be provided for lifting and manipulating the tank 22. At the rear portion of the tank 22 is another vertical pipe 146 which extends through the tank 22 and is in communication with the interior of the container 48. The pipe 146 is secured to the central inlet portion of a centrifugal type blower 148 driven by a suitable electric motor 150 with a switch 152 thereon for controlling operation of the motor 150 and blower 148 and a discharge nozzle 154 is provided on the blower 148 for discharge of the air therefrom.

Discharge nozzle 154 is connected by tubing (not shown) to the inlet port of stand pipe 134. Upon energization of motor 150, air is pumped by blower 148 from container 48 through nozzle 154, into stand pipe 134 and out of notches 136 and apertures 138. Air flowing out of these notches and apertures agitates a detergent solution within tank 22. The agitation of the detergent solution causes the generation of soap suds which are discharged through pipe 122 to be deposited on the surface to be cleaned.

A tapered rubber stopper can be provided for use in the L-shaped pipe 120 during use of the device at certain times. An elongated flexible hose can be provided with a suitable discharge brush for discharging soap suds or the like through pipe 120 onto a piece of furniture or the like.

The present improvement in the above-described machine includes a steam generator 200 which is mounted within housing 12 below tank 22 substantially between wheels 62. The steam generator 200 includes a boiler 201 having a fill spout 202 in communication with boiler 201. Spout 202 extends upwardly and out through the side of the housing 12, to terminate in opening 204 which should have an appropriate closure means.

Four tubes 205, 206, 208 and 209 extend from boiler 201, along the machine beneath tank 22, and curve downwardly to be substantially contiguous with front wall 16 of housing 12. The tubes 205, 206, 208 and 209 terminate in four nozzles 210, 211, 212, and 214. The nozzles are flared outwardly into a horn shape until they abut one another to provide a substantially continuous nozzle from one side of the machine to the other. The total length of the group of nozzles is preferably substantially the same length as the nozzle 130 from which the detergent suds are discharged.

Boiler 201 contains a pair of electric immersion heaters 215 and 216 extending through a side wall thereof in order to provide the heat necessary to boil water or other liquid therein and produce steam to be discharged through tubes 205, 206, 208 and 209.

The general operation of the device is as follows: Tank 22 is filled with a detergent solution and the boiler 201 is filled with water. The blower 148 is then operated to supply air to the tank 22 and cause the detergent solution to produce suds which are forced through tube 122, valve 124 and tubing 128 and out through nozzle 130 to be deposited on a surface to be cleaned.

Heaters 215 and 216 in boiler 201 are energized to cause water in the boiler to boil and produce steam, which is allowed to escape through tubes 205, 206, 208 and 209 and discharge through nozzles 210, 211, 212 and 214 onto a surface to be cleaned. The machine is pushed across the surface to be cleaned so that, as the detergent is deposited on the surface, the cylindrical brush 68 vigorously works the surface to assure a thorough cleaning. Immediately after the brush 68 passes over an area of the surface, nozzle 98 vacuums up the detergent along with any dirt and debris on the surface. This dirt and debris along with the detergent is collected in the container 48 where it can be removed at any convenient time.

It will thus be seen that, with the present invention, a detergent is placed on the surface to be cleaned, the detergent being in the form of substantially dry suds. After the suds have been placed on the surface, the sur-

face is bathed in steam which will tend to cause the detergent to penetrate pores of the surface. The steam will have a certain cleaning effect of its own since the steam is necessarily at a somewhat elevated temperature and dissolves and loosens certain forms of dirt, oil and grease.

After the detergent has been applied to the surface, and its effectiveness increased by the application of steam, the surface is thoroughly scrubbed by the brush 68 which thoroughly works the detergent into the surface to be cleaned and allows the detergent to act to its greatest extent. Next, the detergent along with any dirt either dissolved in the detergent or in the form of loose particles on the surface will move into the vacuum nozzle 98, up the pipe 108 and into the chamber 48.

It should be understood that an alternative embodiment of the present invention concerns the use of a gasoline fired steam generator and either a steam driven or gasoline fired motor in place of electric motor 82. In addition, the boiler may be fitted with an additional steam take-off port for the operation of associated equipment such as steam cleaning implements.

In one application of the present invention, brush 68 includes extremely stiff and durable bristles such as nylon or wire bristles and the machine is driven by a gasoline fired motor which additionally serves to supply heat to the boiler for production of steam. Such a self-contained unit may be used to clean concrete and asphalt surfaces in and around automobile service stations, shopping center parking lots and other large areas of paved surfaces.

While this invention has been described in detail with particular reference to preferred embodiments thereof, it will be understood that variations and modifications can be effected within the spirit and scope of the invention as described hereinbefore and as defined in the appended claims.

I claim

1. A cleaning machine comprising a frame forming a hollow enclosure, a transverse brush rotatably journaled on said frame for contact with a surface to be cleaned, a closed tank mounted on the frame and having a sloping bottom wall for receiving a cleaning mixture, an air inlet pipe extending downwardly into said tank, said pipe having a plurality of notches at the lower end thereof with the lower end engaging the bottom wall of the tank adjacent the lowest point thereof, said tank having a discharge opening in the top thereof, an air blower having a discharge connected solely to the pipe for forcing air into the tank through the notches in the pipe for agitating the cleaning mixture contained in the tank and mixing air therewith for forming suds whereby the suds will be discharged through the discharge opening, means guiding the suds discharged through the discharge opening onto a surface to be cleaned forwardly of the brush, supporting wheels mounted on said frame, power means on said frame for driving said brush, a steam nozzle located between said means guiding the suds and said brush, means for generating steam, and means for directing the steam from said means for generating steam to said steam nozzle, a transverse vacuum manifold disposed rearwardly of the brush for collecting dirt and suds from the surface to be cleaned after the dirt has been loosened by the brush, said air blower being mounted on said frame, means interconnecting said manifold and the intake of the air blower for providing a suction

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in said vacuum manifold, said means interconnecting the vacuum manifold and the intake of the air blower including a separation chamber for removing dirt entrained in the air, and a removable container in said chamber for receiving the dirt thereby permitting disposal of the dirt removed from the surface being cleaned.

2. A machine for cleaning surfaces including a tank to contain a detergent solution, a source of air to form suds within said tank from said detergent solution, a detergent nozzle to deposit said suds on a surface to be cleaned, and means to connect said detergent nozzle with said tank, a brush rearwardly disposed from said detergent nozzle, drive means to rotate said brush, the surface of said brush being arranged to contact said surface to be cleaned, a vacuum manifold rearward of

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said brush in close proximity to said surface to be cleaned, and a vacuum source in communication with said vacuum manifold, means for generating steam, a steam nozzle located between said detergent nozzle and said brush, and means for connecting said steam nozzle to said means for generating steam.

3. A device according to claim 2 in which said means for generating steam includes a boiler within said machine, and heating means for said boiler.

4. A device according to claim 3 in which said heating means includes an electric immersion heater within said boiler.

5. A device according to claim 2, said steam nozzle comprising a plurality of nozzles abutting one another along a substantially straight line.

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