

[54] **RINSE METHOD AND MACHINE**

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Related U.S. Application Data

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[58] Field of Search **15/300 A, 320, 321, 302, 15/347, 352, 353, 413**

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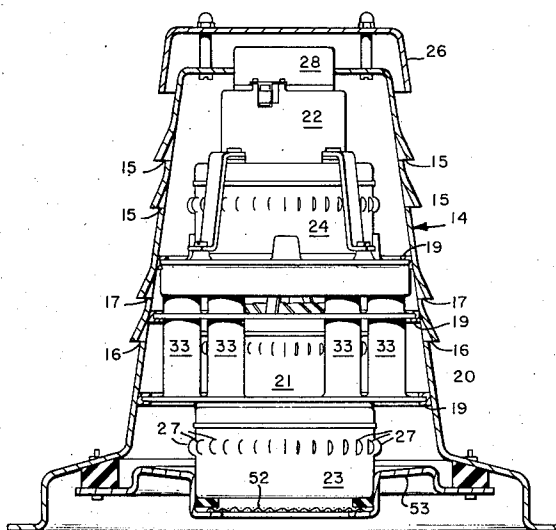
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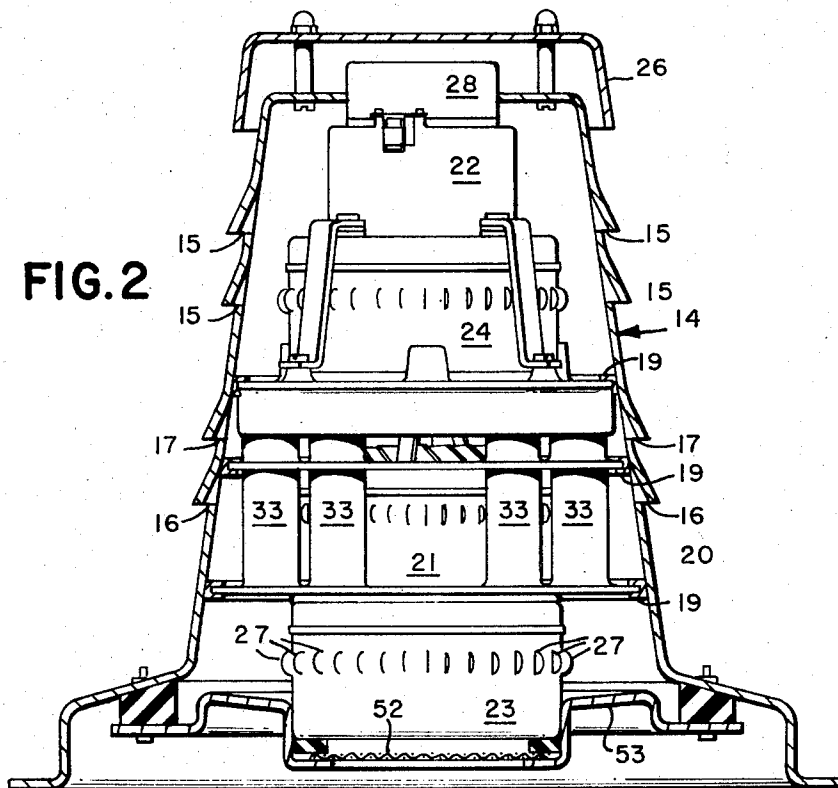
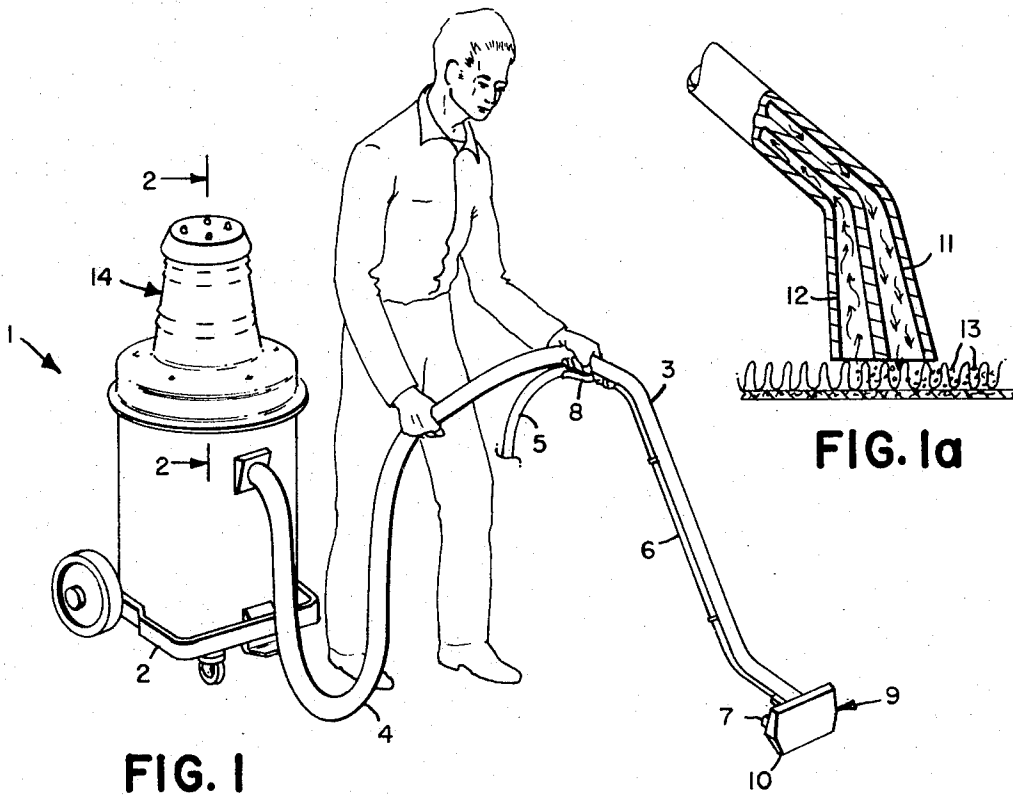
Attorney, Agent, or Firm—Hubert E. Dubb, Esq.

[57] **ABSTRACT**

A machine for applying a cold rinse to carpets, artificial turfs and the like, and for removing the rinse water with dissolved dirt and, if rinsing follows shampooing, shampoo suds. Tap water is sprayed directly onto a carpet through one channel in a wand applicator. A powerful suction is then applied through another channel in said wand to force rinse water, dirt and suds through said wand to a settling tank. The suction is generated by two electric motors each having fans attached thereto, one of said motors being mounted within a novel bypass housing so that the flow of damp air does not reach its windings and the other motor being mounted on the exterior of said housing so the fan associated with said other motor receives the flow from said bypass housing and expels it from the rinse machine.

2 Claims, 6 Drawing Figures





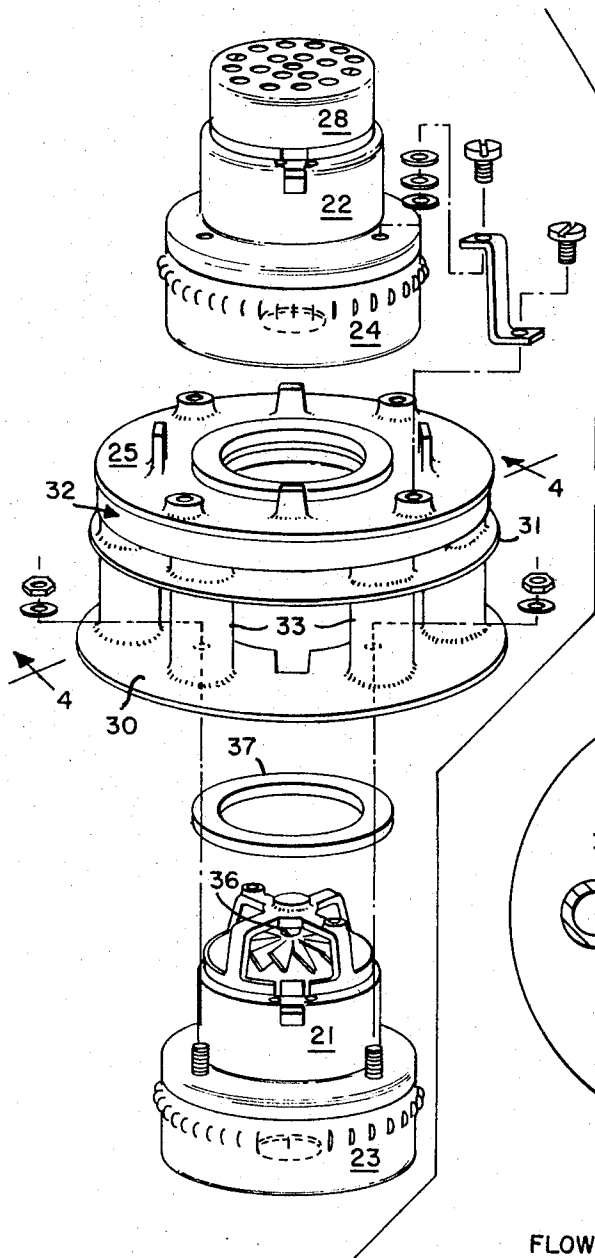


FIG. 3

FIG. 5

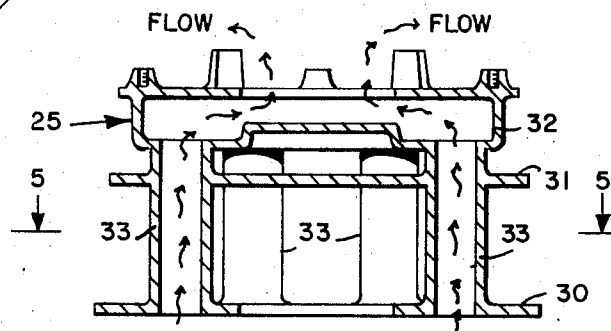
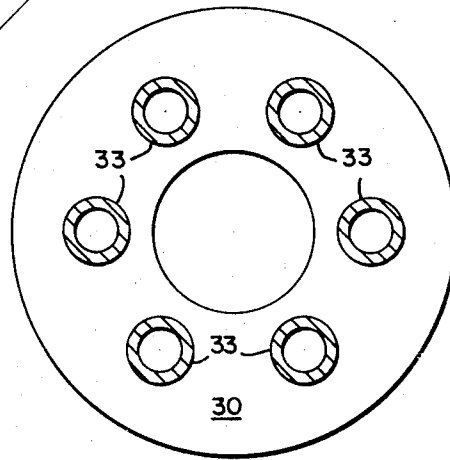


FIG. 4

RINSE METHOD AND MACHINE

This is a continuation, of application Ser. No. 212,587, filed Dec. 27, 1971 and now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to a rinse machine for rinsing carpets, artificial turfs and the like and, more specifically, for a rinse machine which utilizes a powerful suction to pick up rinse water, said suction being generated by one motor mounted in a novel bypass housing and another motor mounted exteriorly on said housing.

The traditional method of cleaning carpets is to apply a shampoo detergent to the carpet and use a rotary brush shampooing machine to agitate the detergent into the strands and onto the backing of the carpet. The shampooing machine is then removed, leaving a suds-filled carpet. Most often the carpet is left to dry on its own, leaving residual detergent in the carpet. Sometimes a so-called wet vacuum cleaner, typically employing flowthrough motors, is then used to vacuum the suds and water from the carpet. The wet vacuum cleaner typically filters the water-air-suds mixture and collects the water in a storage tank and expels damp air into the room. Since the damp air flows through the motor and reaches the windings they are subject to deterioration and motor replacements are frequent occurrences with these machines. At times, unless check valves are provided, the water storage tanks fill up and water is taken up into the motor windings thereby shorting out the motor. Even when check valves are provided they are not effective to prevent the intake of suds due to the low density of suds. And suds contain enough water to cause rapid deterioration of the motor windings.

Wet vacuum machines currently available do not have a powerful enough suction and do not take up enough water to dry the carpet sufficiently. This problem is compounded by the fact that wet vacuum machines are not used after a carpet has been completely scrubbed, in conjunction with or immediately after the application of shampoo. The time delay allows the suds and water to settle into the carpet and it is nearly impossible to remove the suds and moisture without a powerful suction. Consequently, the carpet does not dry completely for several days and most of the shampoo applied to the carpet is left in the carpet leading to a more rapid deterioration of the carpet. The limited suction is primarily due to the size of motor that can be accommodated by residential electrical circuits. 15 ampere fuses or circuit breakers are commonly encountered so that no motor that draws more current or has an initial or terminal current surge greater than 15 amperes can be used in a cleaning machine.

A recent innovation in carpet cleaning is the use of so-called steam cleaning machines. A volume of hot water is taken from a hot water tap in a container and transferred to a hot water reservoir in a steam cleaning machine. Often, the steam cleaning machine has a heater which further heats the water. Detergent or other surfactant is then added to the hot water and it is sprayed onto a carpet. Hot water containing detergent, not steam, is then sprayed onto the carpet and subsequently picked up by a cleaner having a significant suction. In most cases a residue of detergent is left in the carpet, leading to a more rapid deterioration of

the carpet. At times, the so-called steam cleaners are used after rotary shampooers because steam cleaners alone will not sufficiently break down the soil or dirt. And, the use of hot water can cause carpets to shrink and can cause the seams between carpet sections to split. Also, so-called steam cleaners are so bulky and complex as to require at least two men to operate.

The practice in the carpet cleaning industry has been to clean carpets when they begin to darken due to the accumulation of dirt or, at best, at infrequent intervals. This practice has arisen because of the unavailability of a machine which permits a single operator to simply clean carpets without leaving residual detergent or without overwetting them. Overwetting causes the color from the jute backing to rise to the surface of the carpet strands—a phenomenon known as "brownout" in the industry—and also can result in a carpeted area being too wet to use for an unacceptable period of time. Residual detergent can cause carpet strands, especially natural fiber strands, to disintegrate more rapidly than they would with natural wear. Remedial cleaning, then, not preventive maintenance, has been the practice.

It is therefore an object of this invention to provide a machine and method for cleaning carpets, artificial turfs and the like, which applies a cold water detergent-free rinse thereto after the use of a rotary shampooing machine or other application of a cleaning compound.

It is a still further object of the present invention to provide a cold water rinse machine and method which cleans carpets without leaving a residue of detergent therein.

It is an additional object of this invention to provide a cold water rinse machine utilizing two electric motors arranged in tandem alignment each of said motors driving a fan means to produce a rinse take up suction of greater than 130 inches of water so that all rinse water and substantially all of a previously applied shampoo or detergent solution is picked up.

It is a further object of this invention to provide a carpet cleaning method and machine which applies a minimal volume of cold water to rinse a carpet.

It is also an object of this invention to provide a cold water rinse machine utilizing two electric motors each of said motors driving a fan means, one electric motor being mounted within a novel bypass housing to prevent moist air from reaching said motor and the other being mounted externally on said novel bypass housing so that said fan associated with said other motor is positioned to receive the flow of damp air discharged from said housing and to expel it from the rinse machine.

SUMMARY OF THE INVENTION

A cold water rinse machine for cleaning carpets, artificial turfs and the like, utilizes two electric motors arranged in tandem, each of said motors driving a fan means, to produce a powerful suction to pick up a cold water rinse which is sprayed onto the carpet. A wand, preferably a unitary wand, is connected directly to a cold water tap so that cold water can be sprayed onto a carpet through a channel in said wand. The aforementioned powerful suction is communicated to the carpet through another channel in said wand. The water spray and suction channels are placed in close proximity (in a unitary wand they are contained in the

same structure) so that a substantially simultaneous rinse spray and pick up operation is carried out.

In a preferred embodiment, one vacuum cleaner motor is mounted within a novel bypass housing which directs the flow of damp air around and away from the windings of the motor to prevent the motor from burning out. An intake duct and an exit duct are provided in said bypass housing to conduct dry air to said motor mounted in said housing to cool said motor. A second motor is mounted on the exterior of said housing, the fan driven by said second motor being positioned to receive the flow of damp air from said bypass housing and to expel it from the cold water rinse machine through a discharge duct.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a pictorial illustration of the operation of the cold water rinse method and machine of the present invention.

FIG. 1a is a detailed cross sectional view of one embodiment of a unitary wand containing water rinse spray and suction take up channels for use with the cold water rinse machine and method of the present invention.

FIG. 2 is a side view of the powerful suction generation unit of the present invention illustrating two vacuum cleaner motors mounted in tandem.

FIG. 3 is an exploded view of the powerful suction generator unit shown in FIG. 2 illustrating in perspective view the novel bypass housing of a preferred embodiment of the present invention.

FIG. 4 is a side cross sectional view, taken from FIG. 3 of the novel bypass housing illustrating the wet air flow pattern through the novel bypass housing of the invention.

FIG. 5 is a top cross sectional view of the novel bypass housing of the present invention taken from FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1 it can be seen that the rinse cleaning machine 1 of the present invention is portably mounted on a moveable chassis 2. The operator grasps the wand 3 at the upper end thereof. For additional control and in order to pull the rinse cleaning machine the operator may grasp the vacuum hose 4 with his other hand. Cold water is delivered via hose 5 from a water closet tap or outdoor garden tap to rinse tube 6. By manipulating handle 8 the operator can cause a rinse spray to emanate from jets 7 positioned behind wand fixture 9. Liquid picked up by the wand fixture 9 and transported through wand 3 and vacuum hose 4 is retained in a large tank which forms the lower portion of the rinse cleaning machine 1. The air flow continues up into the powerful suction generation unit 14.

In operation, the operator will depress handle 8 and draw wand fixture 9 towards him so that the cold water rinse sprayed through jet 7 will immediately be picked up by the suction transmitted through suction slit 10. As shown, suction slit 10 is elongated and thin to permit a strong suction to be applied over a limited area immediately behind the rinse spray. In a preferred embodiment, not claimed in this application and tentatively to be the subject of an application to be filed, the upper portion 51 of wand fixture 9 is weighted to weigh

at least about 12 pounds to create a seal between the edges of suction slit 10 and the carpet being cleaned. The seal is highly desirable since carpets, and especially shag carpets, tend to have uneven surfaces so that a good deal of the suction is wasted unless the suction slit of the wand fixture is held close to the carpet strands and backing. The thin vertical shape of wand fixture 9 is also highly desirable since it permits the operator to spray and pick up rinse water exceedingly close to the edges and corners of a carpet whereas conventional industrial carpet cleaners do not readily permit the operator to clean up to the edges of wall-to-wall carpets.

An alternative weighted wand is shown in FIG. 1a. Cold rinse water is transmitted to a carpet through channel 11 and is taken up by suction through channel 12. The same weighted feature may be built into such a unitary wand by constructing it from heavy gage metal. It is clear that the close proximity of the rinse spray channel and the suction pickup channel provides a nearly simultaneous rinse and pickup operation so that dirt particles 13 are taken up by a continuous action and the carpet is not left in an overwetted condition.

The heart of the present invention resides in the means for generating a powerful suction. FIG. 2 is a side view section of the suction generation unit of the rinse cleaning machine of FIG. 1. Electric motors 22 and 21, e.g., motors of the vacuum cleaner type, are mounted in tandem within external cover 20 having cap 26. Lower centrifugal blower fan 23 is attached to motor 21 and upper centrifugal blower fan 24 is attached to motor 22. Almost twice the suction is generated by the two fans in tandem as would be generated by a single motor and fan. In the preferred embodiment illustrated in FIG. 2 the lowermost motor 21 is shown to be mounted within the novel bypass housing 25 of FIGS. 3 and 4, said novel bypass housing having vertical conduits or channels 33 through which the damp air is taken into centrifugal fan 23 at the bottom thereof and expelled around the periphery 27 thereof thereby passing around motor 21 without coming in contact therewith. In those embodiments of the present invention in which the moist air is allowed to come in contact with the lowermost motor there has been a problem with deterioration of the windings. To obviate this problem and yet preserve the tandem feature of the present invention a novel bypass housing is included in the preferred embodiment. Novel bypass housing 25 does not enhance the suction generated by the suction generating unit 14 and in fact may detract slightly from the suction generated due to the flow resistance introduced by corners around which the air must flow.

The detailed construction and operation of the novel bypass housing can be seen by reference to FIGS. 3, 4, and 5. In FIG. 3 it can be seen that novel bypass housing 25 consists of a base plate 30, a conduit divider plate 31, and a collection chamber 32. Cylindrical channels 33 terminate in base plate 30 inwardly of the periphery thereof and communicate with openings in base plate 30 to permit the introduction of a flow of damp air at the downstream end of cylindrical channels 33. From FIG. 4 it is evident that cylindrical channels 33 communicate at their downstream end with a collection chamber 32 which has a single opening at the downstream end to permit the discharge of the cumulative flow from the cylindrical channels 33. The pattern of flow is indicated clearly in FIG. 4. When reference

is made to the upstream end it is intended that this be construed as the end nearer the settling tank and wand and, when reference is made to the downstream end it is intended that this be construed as the end farthest away from the settling tank and wand. It is clear that cylindrical channels 33 pass through conduit divider plate 31 through openings molded therein.

It is desirable to cool motors 21 and 22. This is accomplished by providing an impeller 36 mounted on the upper end of the driveshaft of motor 21. Centrifugal blower fan 23 is mounted on baseplate 30 by means of a fixed bolt and washers as shown. An intake duct is defined by the region between collection chamber 32 and conduit divider plate 31. Dry cooling air is provided to the intake duct through louvered openings 17 in cover 20. An exit duct is defined by the region conduit divider plate 31 and base plate 30. Cooling air may be forced from the exit duct through louvered openings 16 in cover 20. A gasket 37 is provided to seal lower motor 21 to conduit divider plate 31 at the opening provided for impeller 36. This seal forces all air circulated by impeller 36 to pass from intake duct 17 through motor 21 and out openings in the protective casing thereon so it may flow through the exit duct and out louvered openings 16. Both ducts are sealed, as indicated in FIG. 2, by gaskets 19 made of vinyl material or the like which mate the circular edges of base plate 30, conduit divider plate 31 and collection chamber 32 with external cover 20, and by the use of a neoprene seal made of neoprene rubber or the like between centrifugal blower fan 23 and base plate 30 and the fact that collection chamber 32 serves as a sealed wall except for its communication with the cylindrical channels 33. The cooling of electric motor 22 is accomplished by a flow of dry air which is produced by an impeller located within impeller shield 28. The air is pulled in through the gap between cap 26 and cover 20, forced through electric motor 22, expelled through openings at the bottom of the protective casing of motor 22 and then expelled via louvered openings 15 in suction generation unit cover 20.

Referring to FIGS. 2 and 4, a first motor 21 provides a portion of the force to cause a gas harmful to said first motor, 21, e.g., moist air, to flow through the conduits 33 and thereby around and away from said first motor 21. The second motor 22 serves to increase the force of flow of said harmful gas. Second motor 22 is located downstream flow-wise of said first motor 21. The direction of flow is clearly shown in FIG. 4. Preferably, a harmless gas, e.g., dry air is flowed into and out of the interior cavity in which said first motor 21 is mounted to cool said first motor 21. More preferably, at least a portion of the force which causes said harmless gas to flow, thereby cooling first motor 21, is provided by said first motor 21. Also, more preferably, the flow of said harmful gas is directed away from said second motor 22.

The fans 23 and 24 which are illustrated in FIGS. 2 and 3 are conventional centrifugal blower fans. Incoming air is taken up by the fan through a circular opening in the bottom and is forced out of the numerous openings around the circumference of the fan at considerable speed due to the centrifugal force supplied by the fan. Other types of fans may be used so long as they serve to impart a significant differential force to the column of moist air in the upward direction. Alternatively, reciprocating displacement pumps could be used

in tandem to provide the powerful suction needed for the present invention. It is highly unlikely that a single pump however or a single electrical motor and fan could produce enough suction to permit a nearly simultaneous rinse and pickup operation which removes substantially all water which is sprayed onto a carpet. This results from the fact that residential electrical circuits typically having 15 ampere fuses or circuit breakers so that large motors which draw more than 15 amperes or which have initial or terminal surges greater than 15 amperes cannot be used. In practice it has been found that two 5/8ths horsepower motors mounted in tandem and driving conventional centrifugal blower fans will produce a suction equivalent to 140 inches of water. This has been found to be eminently suitable for rinsing carpets after a rotary shampooer has been used or after a spot detergent has been applied directly to the carpet. Lamb Electric, a division of Ametek, Inc., of Kent, Ohio, for example, supplies motors (Model 115407) useful in the practice of this invention (See U.S. Pat. Nos. 2,748,301 and 2,786,624 for a partial description of said motors).

While the preferred embodiment of the present invention utilizes cold water to apply the rinse to a carpet, the great advantage of the powerful suction provided by the tandem motor arrangement could be applied to practice modified versions of conventional processes. For example, for some applications, warm, rather than cold water could be used so that dirt and soil and other undesirable residual constituents left in carpets, e.g. residual detergent which was left from previous cleaning attempts by traditional methods, are more readily taken up by the rinse solution. The disadvantages described above which exist for hot water treatment are not nearly as applicable when the warm water stays in the carpet for only a limited period of time as per the present invention. Further, although it is undesirable as a general rule to employ detergents or other surfactants in rinsing a carpet there might be occasions in which the application of a detergent would be required. For example, with a particularly soiled carpet it might be desirable to apply the detergent by means of the nearly simultaneous spray rinse and powerful take-up action of the machine of the present invention in order to force the detergent against the strands and carpet backing at a higher rate of speed. In such a case a detergent solution could readily be introduced into the cold water stream by any conventional pressure insertion means as, for example, are used to spray fertilizer or insecticides.

While specific embodiments of the cold rinse machine and method of the present invention including preferred embodiments have been described herein it is the intention of the applicant for Letters Patent that the description herein not be construed in a limiting manner but rather that the scope of this application be limited solely by the scope and spirit of the appended claims.

I claim:

1. An improved carpet cleaning machine of the type adapted to deposit and retrieve rinse liquid from carpets for the purpose of cleaning the carpet, comprising:

a hand-held implement having a handle positioned to be grasped by the operator and having one end adapted to be moved across the carpet being cleaned;

means carried by the one end of the implement and adapted to deposit rinse liquid onto the carpet from a source for spraying said liquid onto the carpet; means adjacent said implement for controlling the quantity of rinse liquid being sprayed onto the carpet, said implement also including at said one end channel means adapted to retrieve the rinse liquid from the carpet and transmit the liquid away from the carpet;

a portable liquid holding tank attached to the implement to receive the rinse liquid retrieved from the carpet for retaining the majority of said rinse liquid;

a suction power unit affixed immediately adjacent to said holding tank for creating a vacuum flow directed through said one end of said implement for pulling the rinse liquid from the carpet and through the implement into the holding tank and for sucking wet air upwardly from said holding tank, said power unit comprising a rigid unitary frame adapted for attachment to the holding tank, the frame including a base plate having an opening centrally thereof and an interior cavity extending from said base plate, a plurality of conduits having the upstream end of each opening into said base plate, said conduits surrounding said interior cavity and serving to prevent a flow of wet air from entering said interior cavity, each of said conduits opening at the downstream end into an exhaust manifold, and a conduit divider plate having openings to accommodate said conduits, said conduit divider plate being positioned intermediate the upstream and downstream ends of said conduits and orthogonally thereto, the second end of said hand-held implement being attached through a flexible hose to said holding tank at a point above the normal full level of liquid within said holding tank, whereby a liquid-air combination is drawn through the one end of the implement, then passed through said second end of the implement and into the holding tank by air being sucked through said implement by the power unit whereby the great majority of the liquid upon entry of the liquid-air combination into the holding tank drops from the air into the container portion of the holding tank while the wet air is sucked upwardly;

a first electric motor-fan combination mounted to said base plate with the motor portion thereof within said interior cavity and the fan portion thereof extending outside said interior cavity adjacent the upstream ends of said conduits and in position to pump wet air through said conduits around said interior cavity and into said exhaust manifold,

the wet air exiting the fan of said first electric motor-fan combination being thrown out therefrom in a direction substantially perpendicular to the direction of flow through said conduits;

a second electric motor-fan combination rigidly mounted exteriorly to said rigid unitary frame and centrally on said exhaust manifold, to receive and further pump the air from said holding tank, the motor portion of said second motor-fan combination being within a protective housing to prevent contact with the wet air being propelled by the fan portion of said second motor-fan combination;

a cover attached over said rigid unitary frame and conforming in mated vapor seal relationship to the edges of said base plate, said conduit divider plate and said exhaust manifold, the space between said cover, said exhaust manifold and said conduit divider plate defining an intake duct and the space between said cover, said base plate and said conduit divider plate defining an exit duct, said cover having discharge openings thereon above the mating of said cover with said exhaust manifold to permit discharge of the flow of wet air driven from said fan of said second motor-fan combination, said cover also having a set of intake openings thereon above the mating of said cover and said conduit divider plate and below the mating of said cover and said exhaust manifold, said cover further having a set of exit openings thereon above the mating of said cover and said base plate and below the mating of said cover and said conduit divider plate, said intake openings permitting inflow and said exit openings permitting outflow of air to cool the windings of said first motor, said cover still further having an opening adjacent the upper end thereof to permit an impeller on the drive shaft of said second motor to draw dry air to cool said second motor, said dry air after cooling said second motor being mixed with the flow of wet air leaving the fan of said second motor-fan combination and exiting therewith through said discharge openings, said cover extending beyond said base plate and being attached to said holding tank.

2. An improved carpet-cleaning machine as in claim 1 wherein said first motor includes an impeller mounted on the drive shaft thereof opposite the end on which said fan of said first motor is attached, said impeller serving to pull a flow of dry cooling air through said intake openings and said intake ducts and over the windings of said first motor and then to propel said dry cooling air from the windings of said first motor through said exit duct and out of said exit openings.

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