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Emus, Jr.

[11] **3,774,260**

[45] **Nov. 27, 1973**

[54] **VACUUM PICK-UP SYSTEM**

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[52] **U.S. Cl.** **15/321**, 15/353

[51] **Int. Cl.** **A47l 7/00**

[58] **Field of Search** 15/321, 319, 353; 417/40

[56] **References Cited**

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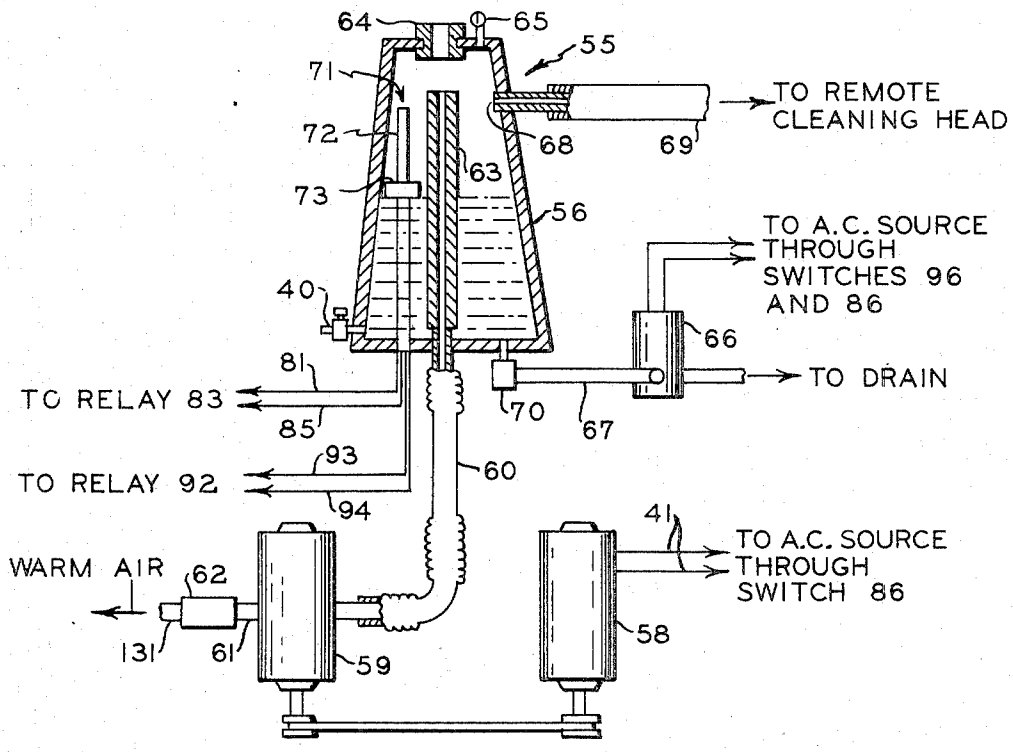
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Assistant Examiner—C. K. Moore
Attorney—Melvin E. Frederick

[57] **ABSTRACT**

There is disclosed apparatus for cleaning carpets, upholstery and the like utilizing a motor driven separate reservoir system for supplying a cleaning solution to a remote cleaning head adapted to apply the cleaning solution to the material being cleaned, and a separate motor driven vacuum pick-up system for storing cleaning solution and entrained dirt picked up via the cleaning head. The reservoir system may typically include in combination with a reservoir tank, a cleaning fluid pumping circuit comprising fluid heating means, a fluid pump for supplying fluid from the reservoir tank to the heating means, pressure sensitive valve means for returning heated cleaning fluid to the reservoir tank when the fluid circuit to the cleaning head is closed, and flow sensitive means disposed between the reservoir tank and the fluid pump effective to disconnect the pump drive motor and shut down the fluid pump and heater when the supply of cleaning fluid in the reservoir tank is exhausted. The vacuum system includes a vacuum tank, a vacuum pump driven by an electric motor for evacuating the tank, a dump pump driven by an electric motor for emptying the vacuum tank, a float actuated switching unit disposed in the vacuum tank, and switching means actuated by the switching unit effective to control the dump pump motor and disconnect the vacuum pump drive motor when the vacuum tank is full of fluid.

10 Claims, 6 Drawing Figures



3 Sheets-Sheet 1

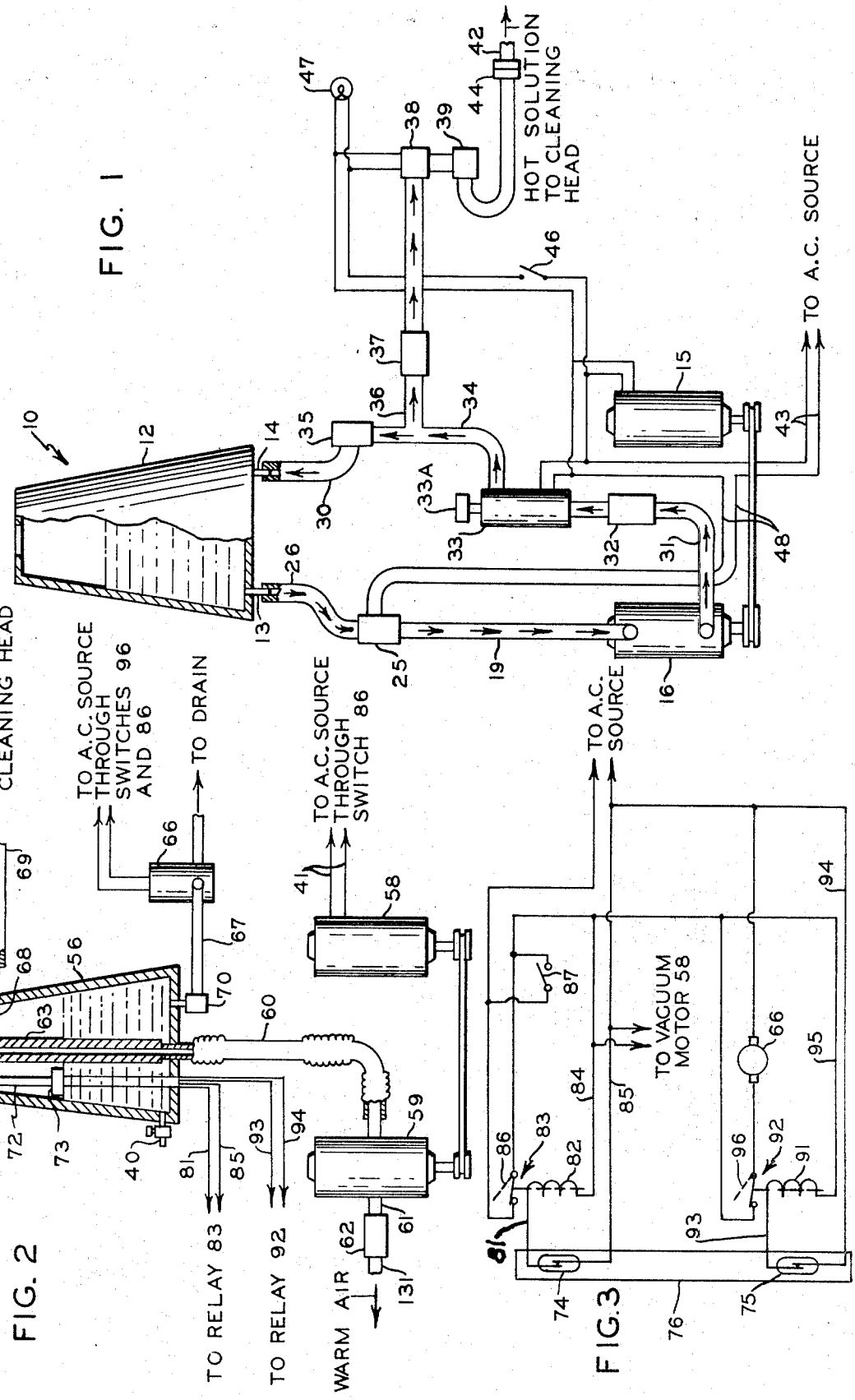


FIG. 1

FIG. 2

FIG. 3

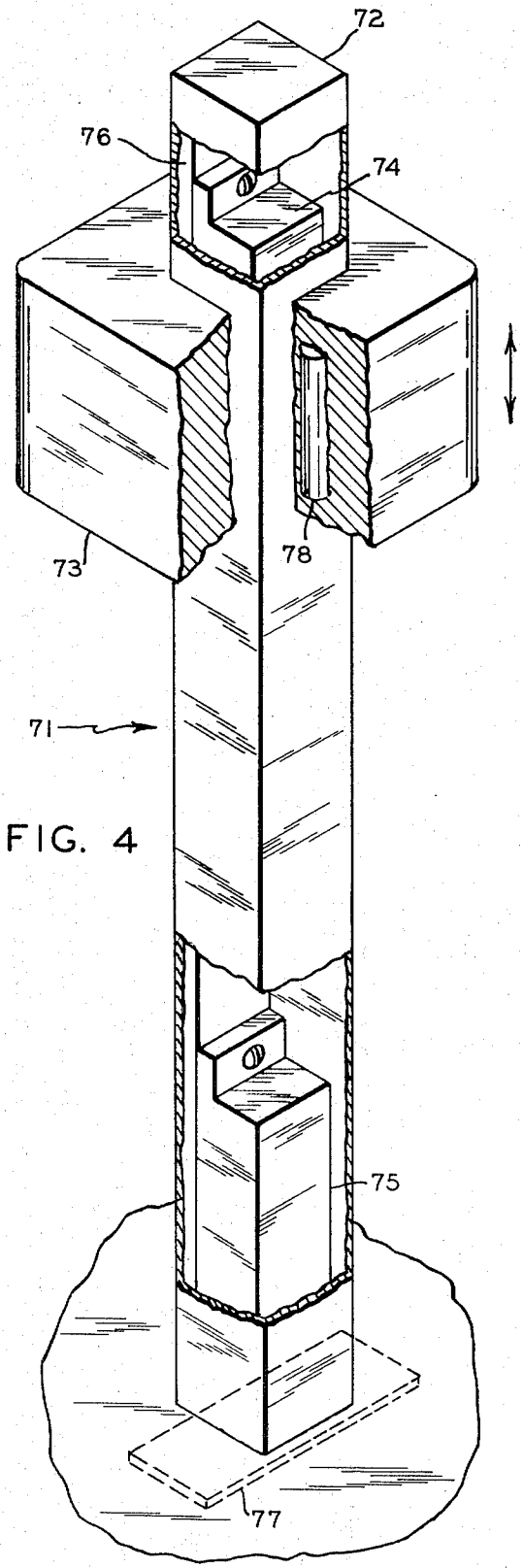


FIG. 4

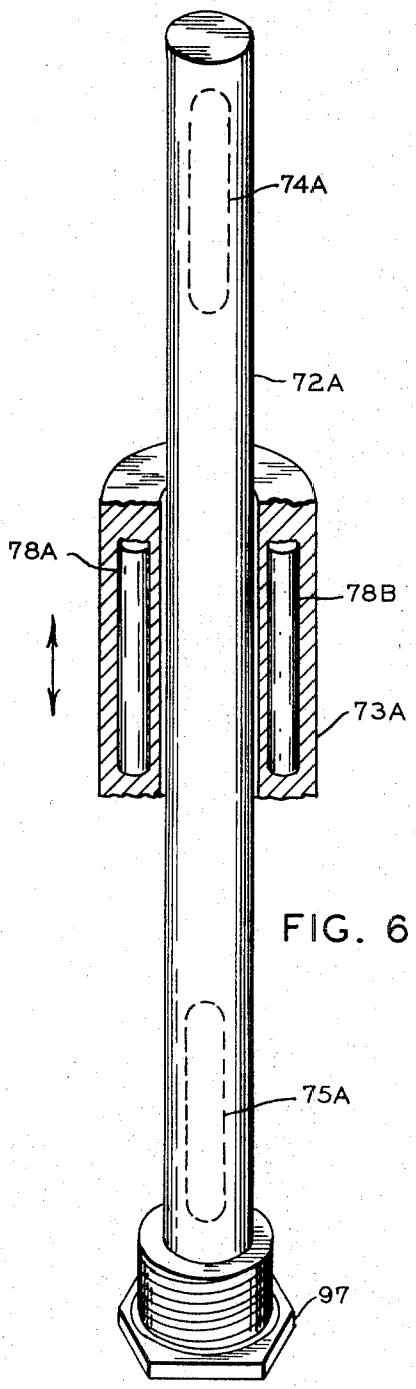


FIG. 6

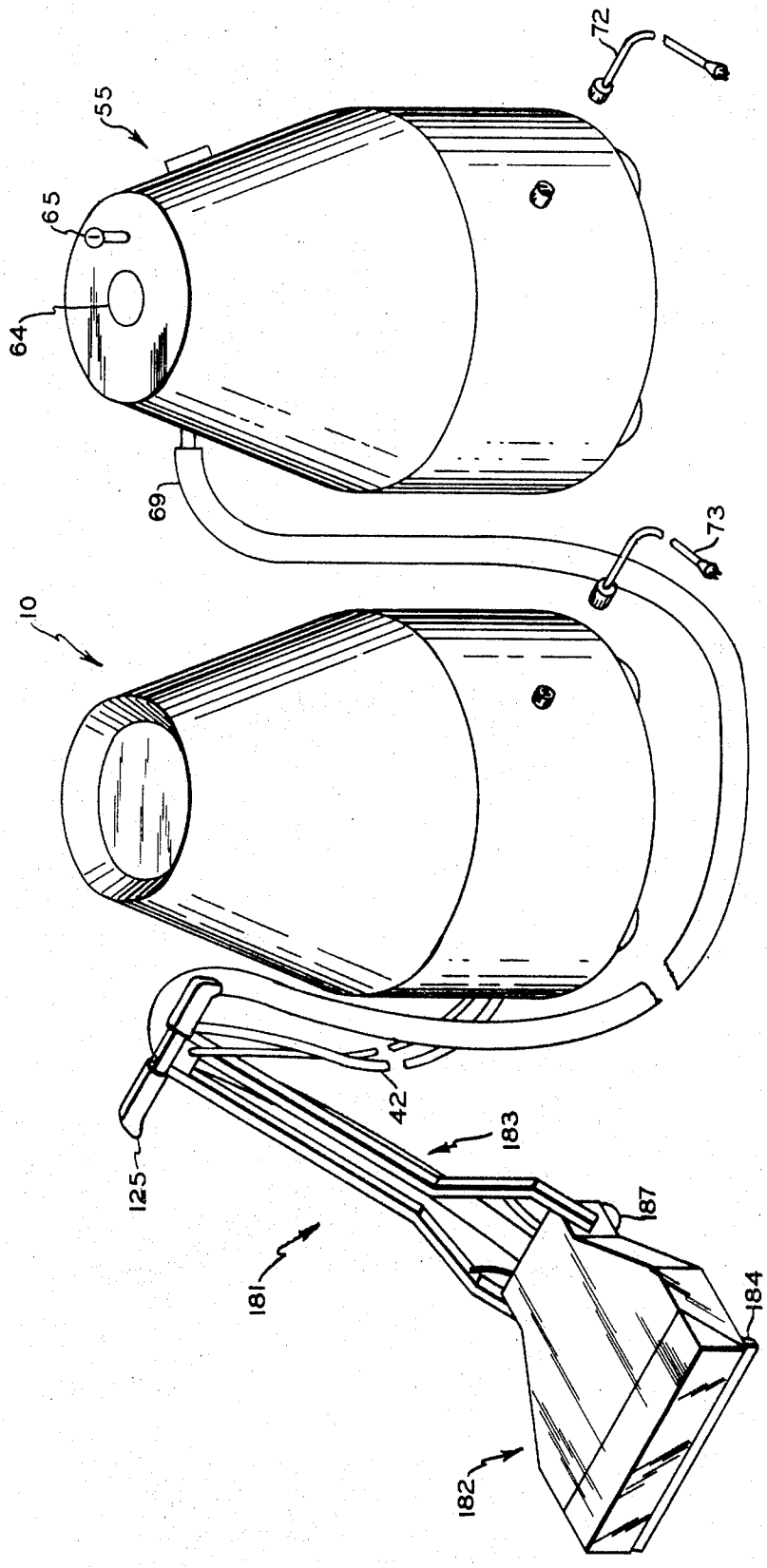


FIG. 5

VACUUM PICK-UP SYSTEM

The present invention relates to carpet and upholstery cleaning apparatus, and more particularly to such apparatus for supplying a cleaning fluid to a cleaning head for application to a carpet and providing vacuum pick-up means to withdraw from the carpet the cleaning fluid and entrained dirt.

In the cleaning of carpet and upholstery, it has been found effective to discharge a jet of pressurized cleaning solution into the pile, nap, or weave of the fabric to be cleaned, and to thereafter apply suction to the fabric to withdraw the used cleaning solution from the fabric together with the dirt loosened and entrained in the cleaning solution.

Cleaning apparatus of the type referred to above may comprise, for example, a liquid tank and vacuum tank each mounted on separate base structures housing a drive motor and its associated components. A motor drives a suction blower, the intake side of which is coupled to the interior of the vacuum tank while the discharge side of the vacuum blower discharges to the atmosphere either directly or through a muffler. A liquid pump also driven by a motor is connected to draw liquid from the liquid tank and feed the liquid under pressure to heating means which is then discharged through a hose and control valve to a spray or cleaning head adapted to discharge the heated liquid onto the material being cleaned. For a more thorough discussion, reference is made to patent application Ser. No. 25,521, filed Apr. 3, 1970, now U.S. Pat. No. 3,663,984, and assigned to the same assignee as this application.

Other cleaning devices particularly devoted to commercial cleaning fields have been provided which include fluid distribution means and a vacuum means for picking up fluid and loosened material from surfaces after the surface has been scrubbed by brushes or the like. Still other devices have been provided which include means for high pressure fluid distribution and vacuum pick-up means for receiving the fluid delivered to the surface to be cleaned. The picked-up fluid may or may not be returned for recirculation. These devices operate on the principle that the high pressure fluid delivery serves as the cleaning and scrubbing element thereby eliminating the use of brushes or other scrubbing devices.

Whether one is concerned with two-tank cleaning apparatus as described above or any other apparatus having similar power requirements, in every case the power consuming characteristic of the apparatus has in the past been effectively limited to relatively low levels. This power limitation is due to the fact that the National Electric Code requires that all residential and industrial conventional convenience outlets be wired and fused for only 15 amperes.

In the past this limitation in available electrical power from any convenience outlet has severely limited the design, capability, and efficiency of such devices because their electrical power consumption must be limited to relatively low values, even if separate electrical devices are provided for connection to separate outlets as taught in the aforementioned patent application Ser. No. 25,521. For a description of a method of and apparatus for combining electrical power from two separately fused circuits and supplying same to carpet cleaning apparatus of the type here concerned, wherein current in excess of that available from one convenience outlet may be supplied to the vacuum drive motor for example, while still supplying sufficient current to the other power consuming devices, reference is made to patent application Ser. No. 154,889, filed June 21, 1971, now U.S. Pat. No. 3,697,771 and assigned to the same assignee as this patent application.

It is an object of the invention to provide improved two-tank cleaning apparatus.

Another object of the invention is to provide an improved two-tank cleaning apparatus designed to deliver a heated cleaning solution under pressure to a surface to be cleaned and to recover the solution through the use of a vacuum system.

A further object of the invention is the provision of improved two-tank cleaning apparatus comprising a reservoir system and vacuum system wherein the vacuum system includes a float actuated switching unit for disconnecting the vacuum drive motor and controlling a dump pump motor for emptying the vacuum tank.

A still further object of the invention is the provision in two-tank cleaning apparatus of an improved vacuum pick-up system.

A further object of the invention is the provision in two-tank cleaning apparatus of an improved vacuum pick-up system including a vacuum tank and having a dump pump for automatically emptying used cleaning fluid from the vacuum tank without danger of damage to the dump pump and also preventing overfilling wherein the dump pump and the vacuum drive motors are controlled by a float actuated switching unit in the vacuum tank.

The novel features that are considered characteristic of the invention are set forth in the appended claims; the invention itself, however, both as to its organization and method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment, when read in conjunction with the accompanying drawings, in which:

FIG. **1** is a diagrammatic view of a reservoir system in accordance with the invention;

FIG. **2** is a diagrammatic view of the vacuum pick-up system;

FIG. **3** is a fragmentary view, partly in section showing details of the float actuated switching unit in the vacuum tank.

FIG. **4** is a schematic diagram of the electrical circuit including reed switches in a float actuated switching unit in the vacuum tank for controlling the vacuum drive motor and dump pump motor.

FIG. **5** is a perspective view of a remote cleaning head for cleaning carpets together with a reservoir and vacuum pick-up system.

FIG. **6** is a side view of an alternate embodiment of the float actuated switching unit comprising a cylindrical tube and float.

Directing attention now to the drawings, in FIG. **1** is shown the reservoir system designated generally by the numeral **10.** The reservoir system may be supported by an acoustically insulated base housing as shown for example in FIG. **4,** the reservoir or solution tank **12** being removably attached as by hooks or the like to the upper surface of the housing and the balance of the reservoir system more fully described hereinafter being contained in conventional manner within the base housing.

At the base of the reservoir tank may be provided two connections preferably of the conventional "quick disconnect" type so that the reservoir tank can be sim-

ply, quickly, and without loss of fluid, removed from the base housing while still containing a liquid or cleaning solution. Disposed within and supported by the base housing is an electric drive motor **15** coupled, for example, in conventional driving relationship via pulleys to a solution or liquid pump **16.** While the electric drive motor must meet certain power requirements, the liquid pump employed may if protected as described hereinafter be of a simple and inexpensive type without any protective means or apparatus to protect the pump against damage in the event the pump inlet is not continuously supplied with fluid. Since several well-known types are suitable for the purpose, the details thereof are not illustrated or described herein.

The inlet or low-pressure side of the liquid pump **16** may be connected by a conventional pipe or liquid supply line **19,** a pressure or flow sensitive switch **25** more fully disclosed hereinafter, and a flexible hose **26** to the quick disconnect connection **13** as shown.

As will become more evident hereinafter the inlet and outlet sides of the liquid pump need not be coupled through conventional by-pass means including pipes and a pressure regulator for maintaining a predetermined pressure at the outlet of the liquid pump and/or providing continuous fluid flow through the pump. The liquid pump may be of a conventional type as noted above and typically should at least be capable of providing an outlet pressure of about 100 psi at flow rates of about 2 gallons per minute or more. The outlet of the liquid pump **16** communicates through pipe **31** and a one-way check valve **32** with the lower end of a conventional electric type heater means **33** for at least maintaining the temperature of cleaning fluid at a suitable temperature to provide at the outlet of the heater, a temperature of, for example, about 160° F. The cleaning fluid is most conveniently initially provided in the tank **12** by mixing suitably hot water with concentrated detergents and the like. A suitable heater may be, for example, a "Chromalex," Model No. B, manufactured by the Edwin L. Wiegand Company which includes adjustable thermostat means **33***a* to control the temperature to which the liquid is heated by the heater.

The outlet side of the heater **33** communicates through one port of a T-connection via pipe **34,** flexible hose **30,** a pressure regulator **35,** and connection **14** with the interior of the reservoir tank **12.** Through the other port of the T-connection, the outlet of the heater also communicates via pipe **36,** filter **37,** adjustable flow pressure valve **38,** pressure gauge **39** and a quick disconnect connection **44** with an insulated and flexible high temperature fluid predetermined **42,** the remote end of which hose communicates with a suitable cleaning head more fully described hereinafter and in said application Ser. No. 25,521. Heated fluid may flow from the heater **33** in one of two directions, the first of which is through pressure regulator **35** and back into the reservoir tank and the second of which is via pipe **36,** adjustable flow pressure valve **38** and flexible hose **42** to the cleaning head. Pressure regulator **35** is adjusted to open and permit heated fluid to pass therethrough when the pressure in line **34** is greater than a predetermined amount such as, for example, 75 psi. Adjustable flow pressure valve **38** is a normally open, solenoid actuated type flow valve having an on-off switch **46** connected in series therewith and a pilot light **47.** Both the switch **46** and pilot light **47** are preferably mounted on the base housing. The pilot light **47** is of course lit when switch **46** is closed thereby indicating that valve **38** is in its actuated position.

When the control valve in the cleaning head is in its normally closed position, thereby preventing the discharge of cleaning fluid (or flexible hose **42** is disconnected thereby closing line **36** at connection **44**), cleaning fluid in the reservoir tank will be continuously supplied to the heater **33,** heated, and then circulated back into the reservoir tank **12.** The adjustable flow pressure valve **38,** pressure gauge **39,** and one-half of connection **44** may be mounted in the base housing. The quick disconnect connection **44** is, of course, connected such that the high temperature fluid line **36** is closed when the flexible hose **42** to the cleaning head is disconnected.

When the high temperature fluid line **36** is coupled to the cleaning head via hose **42** and the control valve at the cleaning head is opened, the heated fluid which previously was flowing back into the reservoir tank via pressure regulator **35** now flows through the high temperature flexible hose **42** and is discharged at the cleaning head because the pressure on the heater outlet side of pressure regulator **35** drops below the critical pressure at which it is set and, accordingly, pressure regulator **35** closes. Upon closure of regulator **35,** the heated fluid is directed to the cleaning head. When the control valve on the remote cleaning head is closed or hose **42** is disconnected, the pressure on the heater side of pressure regulator **35** increases thereby causing pressure regulator **35** to exceed its critical pressure and, hence, open and permit heated cleaning fluid to again be circulated back to the reservoir tank. As will now be obvious, there is a continuous flow of fluid from the reservoir tank to the heater and thence back to the reservoir tank except when fluid is permitted to be discharged at the cleaning head. This permits the solution in the tank to be at least continuously maintained at an initial predetermined temperature thereby allowing maximum cleaning capability to be effected by the cleaning solution.

The foregoing arrangement also results in continuous pressurized flow of fluid through the pump **16** irrespective of whether cleaning fluid is being used or not. Accordingly, during any time that motor **15** is actuated no damage can result to the motor driven pump or the system so long as sufficient cleaning fluid is contained in tank **12** to permit continuous circulation via pipes **26** and **30.**

Pressure switch **25** is connected in series with electric motor **15** via conductors **48.** Flow sensitive switch **25** may be any conventional type such as, for example, a McDonnell No. FS1 flow switch manufactured by McDonnell and Miller, Inc., of Chicago, Ill., which is comprised of an electrical switch portion controlled by a flow sensitive portion through which the monitored fluid flows. The point of actuation of the switch is variable whereby the switch can be set to be actuated from a minimum to a maximum flow velocity.

As shown in FIG. **1,** the electrical switch portion of switch **25** is connected in series with the input line. Thus, when normal flow in hose **26** is interrupted, as when tank **12** is empty or flow via hose **30** or line **36** is blocked, this condition is detected by switch **25** and the flow of current to motor **15,** heater **33,** and flow control valve **38** is interrupted. In short, the reservoir system is shut down, thereby preventing damage to heater **33** and/or damage to pump **16** that may other-

wise result from their continued use without a continuous supply of fluid.

Directing attention now to FIG. 2 there is shown the vacuum tank pick-up system generally designated by the number 55 comprising a vacuum tank 56 that may be removably supported as by hooks on a second base housing (not shown), a second drive motor 58, and a suction blower 59. The drive motor 58 may be drivingly connected as by a pulley-belt system to the suction blower 59. The suction blower may be of the positive displacement type. The specific type of suction blower employed is not material to the invention, and since several well-known types are suitable for the purpose, the details thereof are not illustrated or described herein. The outlet or high pressure side of the suction blower 59 communicates through a pipe 61 with one end of a silencer 62 which may be a muffler of the type used to muffle the exhaust noise of internal combustion engines and the like. The silencer 62 is preferably supported within the base housing as by support brackets or the like.

A suction type flexible hose 60 is connected to the inlet or low pressure side of the suction blower 59 and extends upwardly through a hole in the base housing. The upper end of the flexible hose 60 is removably fitted onto the lower end of a suction tube 63 incorporated axially in the vacuum tank 56. The flexible hose 60 preferably is of the annularly corrugated, axially resiliently extensible type to permit it to be easily connected and disconnected from the axial tube 63 of the vacuum tank 56.

A suitable base housing may be of sheet metal, cylindrical, mounted on casters, and of a size to receive the components as described hereinbefore.

The vacuum tank is of the same size and generally of the same structure as the reservoir tank. Each may comprise a conventional domed bottom, sealed into the lower end of a conical wall having a radially inwardly extending shoulder. While the upper end of the reservoir tank is open, that of the vacuum tank is closed, and has a suction relief valve 64 mounted thereon. The suction relief valve 64 is so adjusted that when the pressure within the vacuum tank drops below a pre-set minimum of the relief valve, the latter will open to permit atmospheric air to bleed in and thus limit the vacuum in the tank to the desired level. A conventional vacuum gauge 65 is mounted on the vacuum tank to indicate the degree of vacuum therein.

Provided adjacent the top of the vacuum tank is a suction inlet 68 for communicating the vacuum hose 69 with the interior of the vacuum tank. The remote end of the vacuum hose 69 is coupled to the cleaning head as and for the purposes more fully described hereinafter. A drain valve 40 is also provided at a low point in the vacuum tank for draining soiled cleaning solution therefrom. A conventional electrically driven dump pump 66 is coupled to the interior of the vacuum tank via hose 67 and a "quick disconnect" connection 70. A garden hose or the like may be connected to the outlet of the dump pump and is of such length as to reach a drain.

Disposed within the vacuum tank 56 is a float actuated switching unit 71 comprising a sealed, upright tube 72 sealably attached to the bottom of the vacuum tank 56, a float 73 slidably carried on the tube 72, and switching means removably carried inside tube 72. The switching means as best shown in FIG. 3 may comprise a first upper magnetically actuatable reed switch 74 and a second lower magnetically actuatable reed switch 75 attached to a supporting member 76 maintained in tube 72 by plate 77, two conductors for each switch being brought out through the bottom of the vacuum tank and connected as and for the purpose set forth below.

Irrespective of whether a square or circular tube is used the actuated portions of the reed switches are preferably ferromagnetic and disposed close to the tube wall. For the case of a square float, it need only be provided with a single magnet 78 effective to actuate each reed switch when moved to a position in close proximity thereto. In conventional manner, the magnet actuates each switch to its actuated position. Thus, if the reed switches 74 and 75 are normally closed when the fluid level reaches a sufficiently high level, as may be determined by the location of switch 74, float 73 will reach switch 74 and actuate it, which action, in accordance with the invention, is utilized to prevent further fluid from being introduced into the vacuum tank as it is necessary to make sure that liquid does not enter pipe 63. On the other hand, when the level of liquid in the vacuum tank approaches switch 75, float 73 will reach this switch and actuate it. In accordance with the invention, this action is advantageously utilized to control a motor driven dump pump for automatically pumping soiled cleaning fluid out of the vacuum tank and via a suitable hose, to any convenient drain.

If desired, a switch or the like (not shown) may be connected in series with motor 66 to prevent its actuation in the event a drain is not available and/or it is not desired to continuously empty the vacuum tank. Operation under these circumstances will in due course cause actuation of switch 74 which may, for example shut the system down. Thus, even if tank 12 is refilled, operation is prevented until tank 56 is emptied.

Where a circular tube 72*a* as shown in FIG. 6 is used, and care is exercised to locate the reed switches close to the tube wall, which of course must be composed of a non-magnetic material, a circular float 73*a* may be used with two oppositely disposed magnets 78*a* and 78*b*. If desired, for example, the tube may be formed of a suitable non-magnetic material such as, for example, non-magnetic stainless steel and made integral with a threaded base portion 97 adapted to be sealably threaded in conventional manner into the base of the vacuum tank. The float is advantageously formed of a plastic that will float with the magnet or magnets imbedded therein adjacent the inner periphery of the float.

The upper switch 74 is preferably located such that it will be actuated when the fluid level reaches a level several inches below the top of tube 63, and switch 75 is located such that it will be actuated when the fluid level is within one or two inches of the bottom of the vacuum tank.

Directing attention now to FIG. 3, there is illustrated in schematic form, connection of the switches to prevent overfilling of the vacuum tank and provide automatic emptying during use such that the fluid level in the vacuum tank is always maintained at a level near the bottom of the tank.

For the embodiment shown in FIG. 4, switch 74 may be a conventional normally closed reed switch one contact of which is connected via conductor 81 and through coil 82 of relay 83 to main power conductor 84

and one contact is connected to the other main power conductor **85.** The normally closed switch **86** of relay **83** is connected in series with conductor **84** such that, as shown, power is removed from vacuum motor **58** and dump pump motor **66** whenever reed switch **74** is actuated to its open position by float **73.** Start switch **87** is connected across switch **86** to momentarily energize coil **82** and thereby close switch **86** on start-up.

Normally closed reed switch **75** is connected across the main power conductors **84** and **85** through coil **91** of relay **92** and conductors **93, 94,** and **95.** The dump pump motor is connected across the main power conductors **84** and **85** through normally closed switch **96** of relay **92.** As will now be apparent, when the fluid level in the vacuum tank causes the float to be disposed above switch **75,** current will be supplied to the dump pump motor and effect emptying of the vacuum tank. However, when the level of fluid approaches the bottom of the vacuum tank, reed switch **75** will be actuated to its open position by float **73,** thereby shutting off the dump pump by disconnecting its motor from the source of current.

While an illustrative arrangement has been shown by way of example, for controlling the vacuum drive motor **58** and dump pump motor **66,** it is to be understood that the invention is not to be so limited and that other arrangements and connections operative to control the aforementioned motors as and for the purposes disclosed may be used as may be desired by those skilled in the art. For example, switches **74** and **75** may be coupled to actuate appropriate relays in the power control system disclosed in said application Ser. No. 154,889.

Referring now to FIG. **5,** a suitable cleaning head is indicated generally by the numeral **181** and includes a floor tool head assembly **182** and a handle assembly **183.** The floor tool head assembly includes a pick-up nozzle unit **184** to which is secured a roller **187.** When the roller **187** is in contact with the surface of the carpet or the like being cleaned, the nozzle unit **184** is in contact with the surface being cleaned.

The nozzle unit **184** is generally hollow having converging front and rear walls and side walls defining a suction chamber having an elongated narrow suction opening. In the working position shown in FIG. **5,** the nozzle opening of the nozzle unit is maintained in contact with an upper surface of a carpet being cleaned. Cleaning fluid dispensing means (not shown) may be disposed intermediate nozzle unit **184** and roller **187.** Such cleaning fluid dispensing means may conventionally include a plurality of adjustable jet outlet nozzles each providing a fan shaped spray and uniformly spaced from one another on a common axis. The nozzles are preferably canted slightly such that the edges of the fan shaped spray from the nozzles overlap but do not interfere one with another. This is effective in preventing what is commonly referred to as streak lines in a carpet.

The operation of the illustrative form of the invention is as follows:

With the reservoir tank and vacuum tank pick-up systems assembled and the cleaning head operatively connected, the drive motors are connected to a source of electric current. A supply of cleaning solution such as, for example, heated water with suitable cleaning and/or solvent material in solution therein, is poured into the open top of the reservoir tank **12,** the amount and type of solution used being determined by the nature of the cleaning job to be performed. With the drain valve **40** of the vacuum tank **56** closed, and the suction relief valve **64** and the pressure regulator valve **35** set to the desired setting, the separate drive motors **15** and **58** and the heating element of the heating means **33** are energized. With the reservoir system drive motor **15** and the heater **33** operating, the liquid in the reservoir tank is almost continuously being heated and the suction blower **59** immediately reduces the pressure within the vacuum pick-up tank **56** which causes a partial vacuum in the suction hose **69.** The size of the suction nozzle is preferably such as to limit the flow of atmospheric air therethrough to a rate below the capacity of the suction blower **59,** so that were it not for the vacuum relief valve **64,** the vacuum in the hose **69** would be greater than desirable. Accordingly, a suitable setting of the vacuum relief valve **64** is such as to maintain the vacuum in the tank **56** at a suitable level below ambient atmospheric pressure. With the system thus operating and after a few moments have been allowed to permit the heating of the liquid in the heater **33,** the control valve at the cleaning head may be opened to permit the discharge of cleaning fluid via appropriate nozzles onto the surface to be cleaned. For a further discussion of an appropriate cleaning head reference is made to said application Ser. No. 25,521.

The suction nozzle of the cleaning head is drawn in successive strokes across the material to be cleaned while at the same time operating the control valve as required to direct fan-shaped streams of heated cleaning fluid from jet outlet nozzles in the cleaning fluid dispensing means onto the material being cleaned. The dirt from the material being cleaned together with the cleaning solution used, and atmospheric air drawn through such material, are all sucked into the cleaning fluid pick-up chamber of the nozzle, pass thence through the vacuum hose **69** and are discharged in the vacuum tank **56** through the suction inlet tube **68.**

The soiled cleaning fluid is discharged through the vacuum inlet tube **68** into the vacuum tank **56** in conventional manner to prevent the flow of said cleaning fluid through the suction blower. In the event the dump pump system is not used or is not operative the collected cleaning fluid may be withdrawn from the vacuum tank **56** by opening the drain valve **71.**

Where convenient or possible, the outlet of the dump pump is preferably connected to a suitable drain via a hose, the action of the float in the vacuum tank being effective to control the operation of the dump pump motor to maintain the level of soiled cleaning solution at its normal low level adjacent the bottom of the vacuum tank and to disconnect the vacuum drive motor when the vacuum tank is full.

All during the time that the system is being used, cleaning fluid is continuously being supplied to pump **16** and either returned to tank **12** or supplied to the remote cleaning head. Thus the pump is not exposed to any danger of failure resulting from a lack of input fluid at any time so long as some fluid is present in tank **12.** When the fluid in tank **12** is exhausted, this condition is immediately detected by switch **25** which is effective to immediately shut down the reservoir system thereby preventing any possible damage to the pump **16** or heater **33** in the event it is not protected by a thermal cut-out switch. This permits the use of inexpensive and/or unprotected pumps in addition to permitting the

elimination and consequent cost of thermal protective means for the heater, thereby achieving not only more efficient operation but a reduction in component and assembly cost.

For rugs of average or small pile height and/or lightly soiled rugs, switch **46,** which may be conveniently mounted on the base housing, is actuated to its closed position, thereby providing actuation of valve **38** and pilot light **47.** When valve **38** is in its normally open or unactuated position, cleaning fluid may flow therethrough at the maximum rate, thereby providing the high flow condition.

When switch **46** is closed, valve **38** is actuated, and cleaning fluid may flow through valve **38** at one-half the rate when it is unactuated, thereby providing the low flow condition.

The provision of a low flow and a high flow rate is particularly advantageous when the remote cleaning head is of the small hand held type useful for cleaning carpets on stairs, in corners, and furniture and the like.

While a preferred embodiment of the invention has been illustrated and described, it will be understood, however, that various changes and modifications may be made in the details thereof without departing from the scope of the invention as set forth in the appended claims.

Having thus described the invention, what is claimed as new and desired to protect as Letters Patent is:

1. In a two tank cleaning apparatus for cleaning carpets and the like in situ comprising a cleaning solution reservoir tank system, a vacuum tank pick-up system, and a remote cleaning head; said reservoir tank system comprising a reservoir tank for supplying cleaning fluid under pressure to said cleaning head; said vacuum tank pick-up system including a vacuum tank adapted for connection to a flexible hose for coupling the interior of said vacuum tank to said remote cleaning head, an air suction-blower having an inlet and an outlet, said inlet being coupled to said vacuum tank for evacuating air therefrom, and a first electric drive motor for actuating said suction-blower, the improvement comprising:

a. a liquid pump having an inlet coupled to said vacuum tank for pumping fluid out of said vacuum tank;

b. a second electric drive motor for actuating said liquid pump; and

c. float actuated switching means including a hollow tube disposed in said vacuum tank, said tube extending from at least about the bottom to at least about the top of said vacuum tank, said switching means comprising first switch means disposed in said tube adjacent the top of said vacuum tank, second switch means disposed in said tube adjacent the bottom of said vacuum tank, and float means freely slidable on said tube and including means for actuating said first and second switch means when said float means is disposed at about the level of respectively said first and second switch means;

d. first circuit means actuated by said first switch means operable to control the operation of at least said first motor; and

e. second circuit means actuated by said second switch means operable to control the operation of said second motor.

2. The combination as defined in claim **1** wherein said vacuum tank has an opening in its bottom wall and said hollow tube is imperforate, closed at its end adjacent the top of said vacuum tank and sealably carried by the bottom wall of said vacuum tank at said opening therein.

3. The combination as defined in claim **1** wherein said means for actuating said first and second switch means comprises magnet means and said first and second switch means are magnetically actuatable by said magnet means.

4. The combination as defined in claim **3** wherein said hollow tube is rectangular and said magnet means is imbedded in said float means adjacent the inner periphery thereof.

5. The combination as defined in claim **4** wherein said magnet means is a single magnet.

6. The combination as defined in claim **3** wherein said hollow tube is cylindrical and said magnet means comprises first and second magnets imbedded in said float means opposite one another adjacent the inner periphery thereof.

7. In a two tank cleaning apparatus for cleaning carpets and the like in situ comprising a cleaning solution reservoir tank system, a vacuum tank pick-up system, and a remote cleaning head; said reservoir tank system comprising a reservoir tank for supplying cleaning fluid under pressure to said cleaning head; said vacuum tank pick-up system including a vacuum tank adapted for connection to a flexible hose for coupling the interior of said vacuum tank to said remote cleaning head, an air suction-blower having an inlet and an outlet, said inlet being coupled to said vacuum tank for evacuating air therefrom, and a first electric drive motor for actuating said suction-blower, the improvement comprising:

a. a liquid pump having an inlet coupled to said vacuum tank for pumping fluid out of said vacuum tank;

b. a second electric drive motor for actuating said liquid pump; and

c. float actuated switching means including a hollow tube disposed in said vacuum tank, said tube extending from at least about the bottom to at least about the top of said vacuum tank, said switching means comprising first switch means disposed in said tube adjacent the top of said vacuum tank, second switch means disposed in said tube adjacent the bottom of said vacuum tank, and float means freely slidable on said tube and including magnet means for actuating said first and second switch means when said float means is disposed at about the level of respectively said first and second switch means;

d. first circuit means for connection to a source of electric power;

e. second circuit means actuated by said first switch means for connecting and disconnecting at least said first motor from said first circuit means; and

f. third circuit means actuated by said second switch means for connecting said second motor to said first circuit means when said float means is disposed above said second switch means and disconnecting said second motor from said first circuit means when said float means is disposed at about the bottom of said vacuum tank.

8. The combination as defined in claim **7** wherein said second circuit means includes a first relay comprising a first actuating relay coil and a first relay switch ac-

tuated by said first relay coil, said first relay coil being connected in series with said first switch means and said first relay switch being connected in series with said first motor; and said third circuit means includes a second relay comprising a second actuating relay coil and a second relay switch actuated by said second relay coil, said second relay coil being connected in series with said second switch means and said second relay switch being connected in series with said second motor.

9. The combination as defined in claim **8** wherein said first relay switch is connected in series with said first and second motors whereby actuation of first magnetically actuated switch by said float means is effective to disconnect said first and second motors from said source of power.

10. The combination as defined in claim **8** wherein said vacuum tank has an opening in its bottom wall and said hollow tube is imperforate, closed at its end adjacent the top of said vacuum tank and sealably carried by the bottom wall of said vacuum tank at said opening therein, said means for actuating said first and second switch means comprises magnetic means, and said first and second switch means are magnetically actuable by said magnet means.

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