Sept. 20, 1971 C. R. HOWERIN ET AL 3,605,169

CLEANING MACHINE

Filed Feb. 24, 1969 2 Sheets-Sheet 1

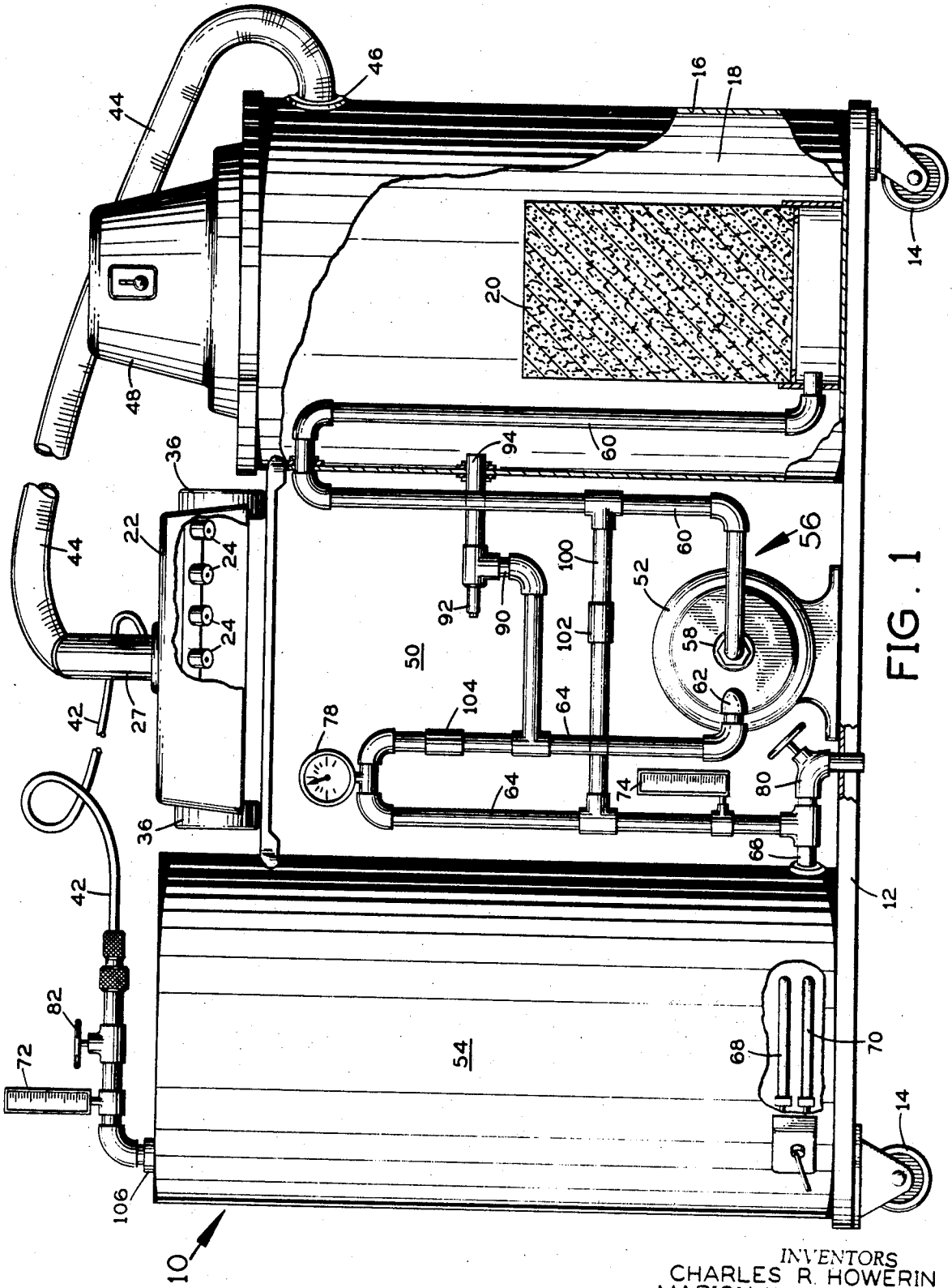

FIG. 1

INVENTORS
CHARLES R. HOWERIN
MARION W. HUMPHREYS

BY

John H. Oltman

Sept. 20, 1971 C. R. HOWERIN ET AL 3,605,169

CLEANING MACHINE

Filed Feb. 24, 1969 2 Sheets-Sheet 2

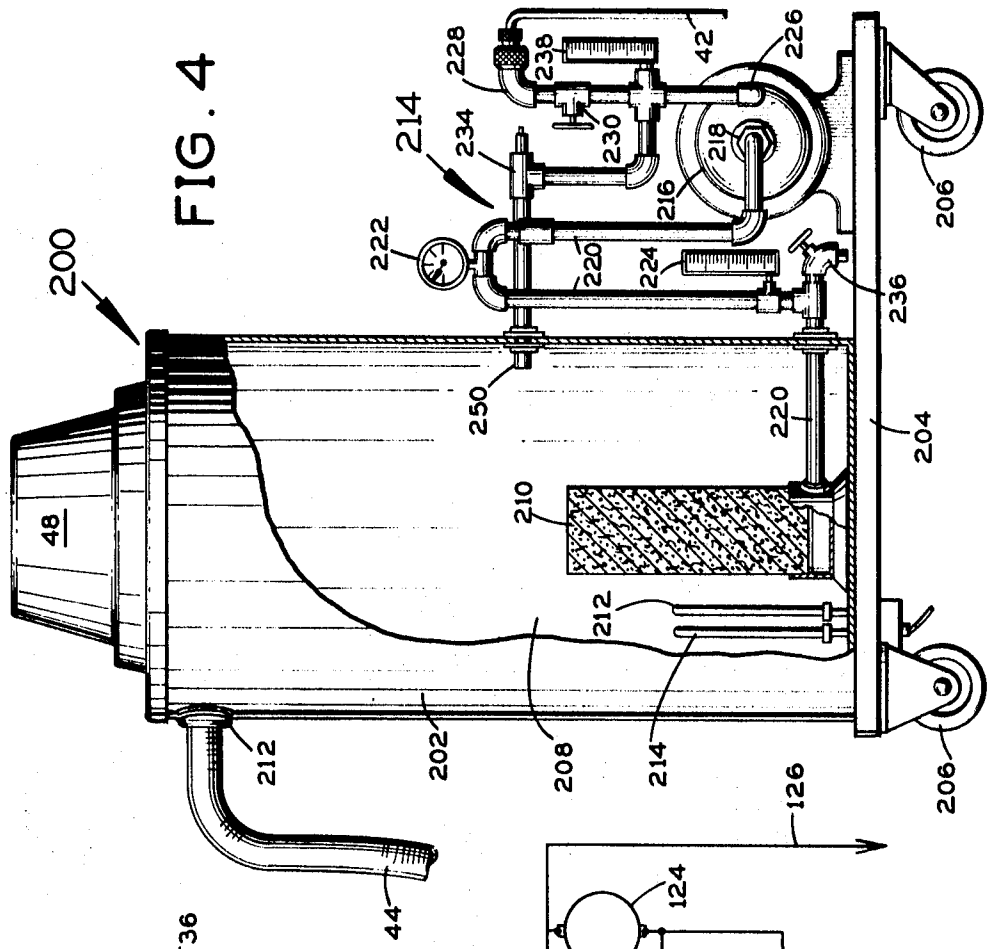

FIG. 4

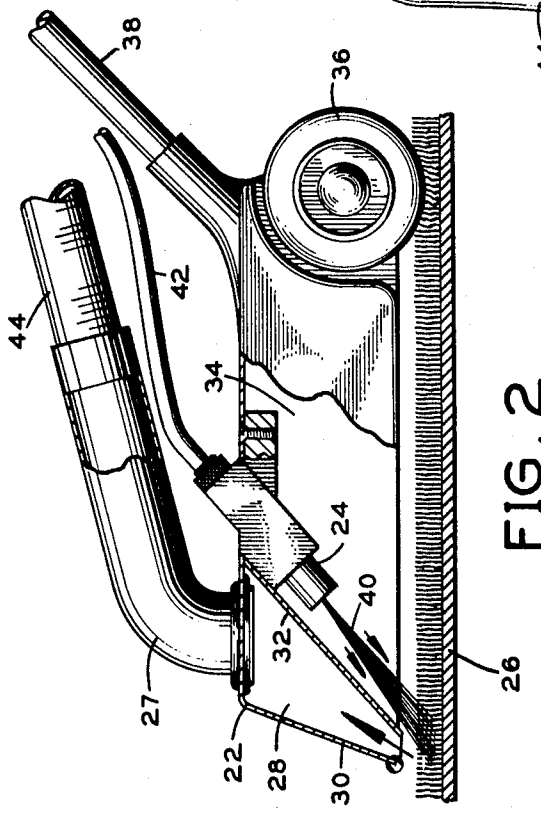

FIG. 2

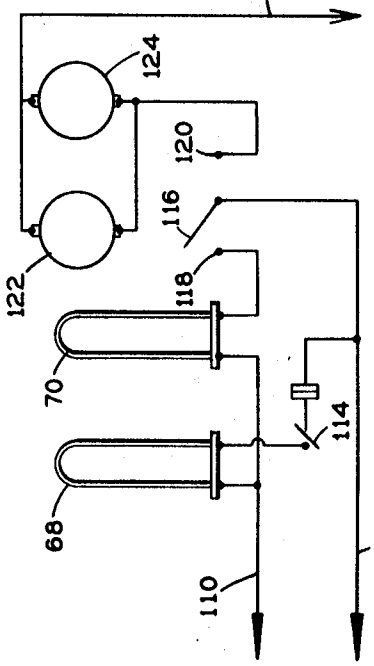

FIG. 3

INVENTORS
CHARLES R. HOWERIN
MARION W. HUMPHREYS
BY
John H. Altman

United States Patent Office 3,605,169 Patented Sept. 20, 1971

3,605,169

CLEANING MACHINE

Charles R. Howerin, 1631 NE. 57th St., Fort Lauderdale, Fla. 33308, and Marion W. Humphreys, Fort Lauderdale, Fla.; said Humphreys assignor to said Howerin

Filed Feb. 24, 1969, Ser. No. 801,432
Int. Cl. A47l 13/26
U.S. Cl. 15—321 3 Claims

ABSTRACT OF THE DISCLOSURE

A cleaning machine which is particularly useful for cleaning carpets. A preferred embodiment of the machine includes a head for directing a cleaning liquid such as water or an aqueous cleaning solution onto a carpet or the like and for withdrawing soil and excess liquid from the carpet and supplying it to a chamber which contains a filter. A blower may be utilized to suck the excess liquid and soil into the chamber or tank for containing liquid. The liquid is forced through the filter, for example by means of a pump, and the filter acts to remove contamnants from the liquid. The clean liquid flows from the exhaust side of the filter through a flow circuit back to the head where it is directed against the carpet, for example as a spray. A heater is provided to raise the temperature of the liquid so that it is very hot when sprayed, thereby improving its cleaning action. Thus, the machine involves a combination of recirculation, filtering and heating providing good cleaning and high efficiency.

BACKGROUND OF THE INVENTION

It is known to provide a type of cleaning machine which has a head through which hot water or steam is directed onto a carpet and also through which excess water or steam is withdrawn from the carpet; see for example U.S. Pats. 3,262,146 and 2,908,030. In the machine described in the former patent, a problem is encountered in that separate liquid and condensate tanks are employed in a manner which requires that the liquid supply tank be refilled relatively often. In the latter patent, recirculation of liquid is employed which reduces refilling requirements, but contamination of the liquid is a problem. The present invention proposes to employ recirculation of liquid, filtering of the liquid, and heating of the liquid to provide a highly efficient system in which neither contamination nor refilling are substantial problems. This system also employs heat to raise the temperature of the liquid, either before or after filtering, so that the liquid as directed against a carpet is very hot, thereby promoting good cleaning action. It is believed that no recirculating hot liquid system employing a filter in this manner has been proposed, although Pat. No. 2,574,731 discloses a recirculating air system which does not employ heat nor direct filtering of liquid in the main recirculation path.

SUMMARY OF THE INVENTION

One embodiment of the invention is a single tank cleaning machine having a filter mounted in the tank in a manner such that the tank can be filled with cleaning liquid such as water or a water solution to a level above the filter. A blower is used to reduce the pressure in the space above the liquid inside the tank. A pump is provided to pump liquid from the discharge side of the filter out of

the tank and through a flow circuit to a head from which the liquid is sprayed onto a carpet or the like. Excess liquid and soil is sucked from the carpet by the blower and returned through a flow circuit to the space in the tank above the stored liquid. Thus, liquid is constantly recirculated. A heater is provided either in this tank or in a separate tank which is part of the flow circuit leading to the cleaning head for heating the liquid to a temperature providing good cleaning action. Where the liquid is water, the temperature may be in the vicinity of 180–190° F., although the invention is not limited to this temperature range. Preferably, a portion of the liquid being pumped out of the main supply tank is tapped off from the discharge flow circuit and returned to the tank in a manner to cause the stored liquid in the tank to swirl so as to keep contaminants concentrated near the outside of the tank away from the filter, as will be described more fully hereinafter. This increases the useful filtering cycle of the filter so that it does not have to be rejuvenated or replaced as often.

The circulation of liquid from the discharge side of the filter through a cleaning head with excess liquid being returned to the intake side of the filter in a storage tank or chamber not only conserves cleaning fluid, but also assures good filtering action. The heating of the liquid can be accomplished in a simple manner with this system. Filtering prevents clogging or other deterioration of the machine and allows efficient recirculation as described above. The feedback to cause swirling in the storage tank or chamber helps to increase the length of the filtering cycle before rejuvenation or replacement is required. Rejuvenation may be accomplished by the use of a second tank having an air cushion therein for forcing liquid backwards through the filter, as will be described hereinafter.

Accordingly, it is an object of the present invention to provide an improved cleaning machine in which recirculation, filtering and heat are employed in combination.

Another object of the invention is to provide a cleaning machine which greatly reduces refilling requirements.

Another object of the invention is to provide a cleaning machine which effectively removes contamination from a recirculating liquid.

A further object of the invention is to provide a cleaning machine in which heating of a recirculating filtered liquid can be accomplished efficiently.

Another object of the invention is to provide a cleaning machine in which feedback or bypassing of liquid is employed to increase the effectiveness of a filter.

Another object of the invention is to provide a cleaning machine in which rejuvenation of a filter can be accomplished readily.

Among the other objects of the invention are to provide a carpet cleaning machine which is economical, efficient, rugged, and capable of being manufactured on a mass production basis.

Other objects of this invention will appear in the following description and appeanded claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

On the drawings:

FIG. 1 is an elevational view of a two-tank carpet cleaning machine in accordance with one embodiment of the invention;

FIG. 2 is an elevational view, partly in section, of a cleaning head utilized in the machine of FIG. 1;

FIG. 3 is a schematic diagram of a heating circuit for the machine of FIG. 1; and

FIG. 4 is an elevational view, partly broken away, of a carpet cleaning machine in accordance with another embodiment of the invention.

Before explaining the present invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and arrangements of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

As shown on the drawings:

A cleaning machine **10** for cleaning carpets or the like is shown in FIG. 1, and this cleaning machine is a two-tank embodiment of the invention. The machine **10** includes a support base **12** mounted on floor engaging wheels **14** which enable the machine to be rolled about as a carpet or other object is being cleaned. Mounted at the right hand end of the support base **12** as viewed in FIG. 1 is a tank **16** which forms a chamber **18** for containing cleaning liquid. The cleaning liquid may be water or a solution of water and a cleaning chemical or chemicals if desired. A filter **20** for liquids is retained in the chamber **18**, and this particular filter is a hollow, cylindrical tube having closed top and bottom ends. The filter is sufficiently porous to allow liquid to pass through it, but blocks the flow of contaminants such as dirt and other soil which may be removed from a carpet. The outside of the cylinder **20** is its intake side and the inside of the cylinder **20** is its discharge side. The filter is mounted relative to the chamber such that liquid can flow under pressure from the portion of the chamber on the intake side of the filter through the filter to the portion of the chamber on the inside or discharge side of the filter. A cloth filter or a filter of special material may be used if desired. The bottom end of the cloth or cloth-like portion of the tubular filter may be open to communicate with piping as shown.

It may be noted that the filter **20** need not be cylindrical. For example, it might be a flat disk type of filter retained transversely across the chamber **18** with its intake side facing up and its discharge side facing down. Such a filter might be dome-shaped with the convex side directed upwardly.

The machine **10** also includes a cleaning head **22** which is shown in both in FIG. 1 and also in FIG. 2. The cleaning head has nozzles **24** mounted in its providing a discharge flow path for directing liquid forcibly against a carpet or the like **26** as shown in FIG. 2. The head **22** also includes a tubular fixture **27** which communicates with a space **28** within the head to provide a return flow path for withdrawing excess liquid and soil from the carpet **26** under the influence of suction applied to the tube **27** as will be described. The head **22** has a shell **30** which is divided transversely by a slanting partition **32** so as to separate the space **28** from the space **34** in which the nozzle **24** are mounted. The head **22** is mounted on floor-engaging wheels **36**, and the head may be manipulated by means of a handle **38**.

In operation, the handle **38** may be pushed down to raise the head **22** off the carpet **26** slightly in the manner shown in FIG. 2 so that the head **22** may be pushed forward with the head raised. During this forward movement of the head, suction is applied but no spray of liquid is directed onto the carpet. At the end of the forward stroke of the head, the handle **38** is raised slightly to lower the head **22** onto the carpet, and then the head is pulled to the rear while the spray **40** is turned on by means of a control valve (not shown) provided in the conduit **42** connected to nozzles **24**. During this rearward stroke of the head, suction which has been applied to the tube **27** sucks excess liquid and soil from the carpet into the tube for return to the chamber **18**.

The tube **27** is connected to the portion of the chamber **18** on the intake side of the filter **40** by a flexible conduit **44**. This conduit **44** enters the tank **16** at a point **46** just above the normal liquid level provided in the tank **18**. In other words, the tank **18** should be filled with cleaning liquid to a point just below the intake point **46**. The conduit **44** constitutes a return liquid flow circuit for returning liquid and soil to the tank **16**. Means is provided either in this return flow circuit or in association with the intake portion of the chamber **18** to apply suction to the tube **27** and to cause liquid to flow from the tube **27** back to the tank. In the embodiment illustrated in FIG. 1, this flow producing means is a vacuum blower **48** which may be of the centrifugal type. The blower **48** communicates with the space above the inlet point **46**, and in operation produces reduced pressure or vacuum in the latter space so as to suck liquid and soil from the tube **27** into the intake portion of the tank **18**.

A discharge liquid flow circuit designated generally as **50** connects the portion of the chamber on the discharge side (the inside) of filter **20** with the nozzles **24**. In the embodiment illustrated in FIG. 1, this discharge flow circuit includes a pump **52**, a second tank **54**, a conduit **42** and suitable piping as shown generally at **56**. The pump **52** may have a self-contained electric motor or a separate motor as desired. The intake **58** of the pump **52** is connected by piping **60** to the discharge side of filter **20**, the pipe **60** entering through filter **20** at its lower end as shown in FIG. 1. The outlet **62** of pump **52** is connected by piping **64** to the tank **54** at an inlet **66** near the bottom of the tank. Two electrical heater elements **68** and **70** are mounted inside the tank **54** near its bottom end for heating the cleaning liquid in tank **54** to a temperature which is sufficiently high that when the liquid is sprayed from the nozzles **24** onto the carpet **26** as shown in FIG. 2 it will provide effective cleaning. Where the cleaning liquid is water, it may be heated by heating elements **68** and **70** to a temperature of about 180–190° F. The heating elements **68** and **70** are energized electrically by means of a circuit shown in FIG. 3 which will be described later. The liquid partially fills the tank **54** and is pumped by pump **52** through conduit **42** to the discharge nozzles **24** where it is sprayed onto the carpet **26**. Thermometers **72** and **74** are provided in the piping as is a pressure gauge **78**. Other gauges may be provided if needed. A valve **80** is provided at inlet **66** and may be opened for purposes of draining the tank **54**. A valve **82** is provided in conduit **42** for controlling the flow of liquid therein. As previously mentioned, an on-off control valve is provided on the handle **38** and is connected in conduit **42** for purposes of turning the spray **40** on and off as the head **22** is manipulated, this on-off valve being omitted from the drawings for lack of space.

In operation, liquid is pumped from the intake portion of tank **18** through the filter **20** where soil is removed to the discharge side of filter **20** and from there through piping **56**, tank **54** and conduit **42** to the nozzles **24**. Excess liquid and soil is sucked through tube **27** and conduit **44** to the inlet **46** where it enters the tank **16** and flows into the liquid stored in tank **16**. Thus, the liquid is constantly recirculated and only a relatively small portion of the liquid is left in the carpet. This means that the liquid level in the tank **16** drops relatively slowly so that it is not necessary to refill the tank **16** as often as would be the case if no recirculation were provided. Since soil is returned to the tank **16** along with the liquid, the apparatus might become clogged if it were not for the filtering action of the filter **20** which keeps the apparatus clean, and perhaps even more important, prevents soil from flowing through the discharge flow path **50** and back to the carpet **26**. The heat supplied by heating elements **68** and **70** heats the liquid sufficiently to assure good cleaning action.

It may be noted that it would be possible to provide a makeup water system for supplying makeup water to the tank **16** automatically to replace water left in the carpet. Such a makeup system is not illustrated in the drawings since it is not believed to be essential.

Tapped into the piping **64** is a feedback conduit **90** having a bypass valve **92** in it for controlling liquid flow therein. The piping **90** enters the tank **16** at an inlet **94** which is located just below the top of the normal liquid level in the tank **16**. The inlet **94** is preferably at an angle relative to the wall of the tank **16** such that it approaches a tangent relationship with the circumference of the tank. When the pressure in the piping **64** builds up sufficiently, the bypass valve **92** opens to allow liquid to be fed back through piping **90** and inlet **94** into the liquid in tank **16**. As the feedback liquid enters the water in the tank, it exerts force on the water causing it to swirl circularly about the circumference of the tank, and thus dirt present in the water in the tank tends to concentrate near the wall of the tank so that there is less tendency for large particles of dirt to collect on the filter **20**. This means that it takes longer for the filter to become clogged than if no feedback were provided.

Also tapped into the piping **64** is a backflush path **100** having a control valve **102** therein. The path **100** communicates with pipe **60**. The valve **102** may be opened and valve **104** closed when it is desired to backflush the filter **20**. There is a pipe **106** connected to valve **82**, and pipe **106** extends down into tank **54** a substantial distance. When liquid is pumped into tank **54**, an air cushion is created at the top of the inside of tank **54**. When valve **104** is closed and valve **102** is opened, the pressure of this air cushion causes liquid to be forced backwards through pipe **102** and piping **60** into the inside of filter **20** and backward through the filter **20** so as to flush contaminants out of the filter material. This rejuvenates the filter for further use. However, it may be noted that the filter **20** may be replaced rather than rejuvenated after a certain period of filtering, if desired.

A control circuit for energizing the heating elements **68** and **70** is shown in FIG. 3. Supply leads **110** and **112** are provided, and it may be seen that heating element **68** is connected across supply leads **110** and **112** through a thermostatic switch **114**. Thus, heating element **68** is controlled automatically to heat the liquid in the tank **54** to a desired temperature. The other heating element **70** serves as an auxiliary heater, and is controlled by means of a switch **116** connected to supply lead **112** and to heating element **70** which in turn is connected to supply lead **110**. When switch **116** is thrown to the left to make contact with fixed contact **118**, the energizing circuit for heating element **70** is closed. In this condition, both heating elements are operative, and the water in tank **54** will heat up rapidly. When the water reaches the proper temperature, switch **116** may be thrown to the right to make contact with fixed contact **120** which then energizes the pump motor **122** for pump **52** and the motor **124** for vacuum blower **48**. Motors **122** and **124** are connected in parallel with each other and to lead **126**.

FIG. 4 shows a cleaning machine **200** which is a single tank machine in accordance with another embodiment of the invention. The tank **202** is mounted on a support base **204** which in turn is mounted on floor-engaging wheels **206** to give the base **204** mobility. The tank **202** forms a chamber **208** in which a filter **210** is retained. The filter **210** is cylindrical and hollow and closed at both ends. Filter **210** is mounted in exactly the same manner as described in connection with the tank **16** of FIG. 1. The outside of filter **210** is its intake side and the inside of filter **210** is its discharge side.

Two heating elements **212** and **214** are mounted in the tank **202**, and these heating elements correspond exactly to heating elements **68** and **70** described in connection with FIGS. 1 and 3 except that they are mounted in the single tank **202** rather than in a separate tank **54**. The circuit for controlling the heating elements **212** and **214** may be the same as shown in FIG. 3. As previously pointed out, the filter **210** could be a circular disk type of filter extending transversely across the chamber **208** above the heating elements **212** and **214**. In this case, the water in tank **202** would be heated on the discharge side of filter **210**, whereas in the embodiment actually illustrated in FIG. 4 the water is heated intake side of filter **210**.

The tank **202** is normally filled with liquid to a level just below an inlet **212**. The inlet **212** is connected with the cleaning head **22** by a flexible conduit **44**, and it will be assumed for purposes of this description that the same head **22** is used with the machine of FIG. 4 as has been described previously in connection with the machine of FIG. 1. Similarly, a vacuum blower **48** of the contrifugal type is mounted on the top of tank **202**. It may be noted at this point that the top of tank **202** and also the top of tank **18** are removable to facilitate filling of the tanks. Thus, the blowers **48** are removable from the tanks. An advantage of this is that the blower and top can be placed on a separate tank when it is desired to circulate water to such a separate tank rather than to the main tank **18** or **202**.

It will be assumed that the same conduit **42** is provided for connection from the tank **202** to the nozzles **24** as has been described previously. However, in FIG. 4 the conduit **42** is connected through piping **214** and a pump **216** directly to the tank **202** rather than through a separate tank **54**. The inlet **218** of pump **216** is connected by piping **220** to the discharge side or inside of the filter **210**. A pressure gauge **222** and a thermometer **224** are provided in this piping. The outlet **226** of pump **216** is connected by piping **228** through a valve **230** with the conduit **42**. Piping **232** having a bypass valve **234** therein is connected from pipe **228** back to the tank **202** to provide a feedback path which is substantially the same as the feedback path **90** described in connection with FIG. 1. A valve **236** is provided for draining the tank **202**. A thermometer **238** is provided in piping **228**. Referring to FIG. 3, it may be considered that motor **124** drives the blower **48** and motor **122** drives the pump **216**.

In operation, pump **216** is actuated to pump liquid from the intake side of filter **210** through the filter to the discharge side thereof and out through piping **220**, pump **216**, piping **230** and conduit **42** to the discharge nozzles **24** of head **22**. The cleaning liquid is sprayed by the nozzles **24** onto the carpet **26**. Excess liquid is sucked into tube **27** and flows through conduit **44** to the space above the liquid inside tank **202** because of suction produced by the vacuum blower **48** in this space. Soil flows with this returning liquid. The soil and recycled liquid mix with the liquid in tank **202**, and the soil is filtered out by filter **210**. The recirculating liquid is heated by heating elements **212** and **214** to a temperature sufficient to assure good cleaning action.

When sufficient pressure builds up in piping **228**, part of the liquid pumped by pump **216** is fed back through piping **232** and valve **234** to tank **202**. This liquid enters at inlet **250** which is almost tangential with respect to the circumference of tank **202**, and the flow of liquid entering the tank at this angle causes the stored liquid in the tank to swirl so that heavied particles of dirt in the liquid tend to concentrate near the larger particles of dirt from clogging the filter **210** to prolong the filtering cycle. When the filter **210** does become clogged, it may be cleaned or replaced.

Thus, the invention provides a cleaning machine which provides efficient cleaning by means of a combination of recirculation, filtering and heating.

Having thus described our invention, we claim:

1. A machine for cleaning carpets or the like comprising support means, means affixed to said support means forming a chamber for containing cleaning liquid, a filter for liquids retained in said chamber and having an intake side and a discharge side, said filter being

mounted relative to said chamber to filter liquid passing from said intake side to said discharge side thereof in said chamber, a cleaning head having a discharge flow path for directing liquid forcibly onto a carpet or the like and a return flow path for withdrawing excess liquid and soil from a carpet or the like, a discharge liquid flow circuit communicating a portion of said chamber on the discharge side of said filter with said discharge flow path of said head, said discharge liquid flow circuit includng a tank separate from said chamber, a return liquid flow circuit communicating said return flow path of said head with a portion of said chamber on the intake side of said filter, heater means in said tank for heating cleaning liquid therein to an elevated temperature sufficiently high to assure that when said cleaning liquid is discharged from said head it is effective to clean a carpet or the like, pumping means in said discharge flow circuit for causing liquid to flow from the intake side of said filter through said filter and out from the discharge side thereof through said discharge flow circuit and said discharge flow path of said head onto a carpet or the like with sufficient force to facilitate cleaning, a back flush flow path path having a valve therein and connected across said pumping means in bypassing relation therewith for feeding the liquid from said tank back to said filter for backflushing, means associated with the portion of said chamber on the intake side of said filter for sucking excess liquid and soil from a carpet or the like into said return flow path of said head and for causing the same to flow through said return flow circuit into said chamber on the intake side of said filter for flow through said filter with said filter serving to remove contaminants from said liquid, said last-named means including blower means, means to operate said pumping means and means to operate said blower means.

2. A machine for cleaning carpets or the like, comprising support means, means affixed to said support means forming a chamber for containing a cleaning liquid, said chamber comprising a hollow tank rising vertically above said support means and having a mouth at the top thereof, and a generally horizontal lid removably mounted on said mouth at the top of said tank, a filter for liquids retained in said chamber and having an intake side and a discharge side, said filter being located adjacent the bottom of said chamber to filter liquid passing from said intake side to said discharge side thereof, said filter terminating substantially above the bottom of said chamber and being removable from said chamber for cleaning or exchange purposes by removing said lid from said chamber to provide access to said filter, said chamber having a free and unobstructed region therein below said lid and said mouth and above said filter to allow easy access to said filter, a cleaning head having a discharge flow path for directing liquid forcibly onto a carpet or the like and a return flow path for withdrawing excess liquid and soil from a carpet or the like, a discharge liquid flow circuit connecting a portion of said chamber on the discharge side of said filter with said discharge flow path of said head, a return liquid flow circuit connecting said return flow path of said head with said unobstructed region of said chamber below said lid, electrical heater means in the liquid path for heating the cleaning liquid to an elevated temperature sufficiently high to assure that when said cleaning liquid is discharged from said head it is effective to clean a carpet or the like, electrical control circuit means for controlling said heater means, said heater means including first and second heater elements, and said control circuit means including a first switch connected to operate said first heater element as needed to maintain a regulated temperature in said liquid and a second switch connected to turn said second heater element on and off separately, pumping means in said discharge flow circuit for causing liquid to flow from the intake side of said filter through said filter and out from the discharge side thereof through said discharge flow circuit and said discharge flow path of said head onto a carpet or the like with sufficient force to facilitate cleaning, centrifugal blower means mounted above and on top of the lid of said chamber above the mouth at the top of said tank, said centrifugal blower means communicating with said unobstructed region below said lid in said tank for blowing air from said tank so as to suck excess liquid and soil from a carpet or the like into said return flow path of said head and for causing the same to flow through said return flow circuit into said chamber at the region above said filter for subsequent flow through said filter with said filter serving to remove contaminants from said liquid, said centrifugal blower means and said lid being removable together from said chamber without detachment of any portion thereof from said blower means (1) to allow filling of said chamber, (2) to provide access to said filter, and (3) to allow said lid and blower means to be placed on said mouth without interference below said lid and removed easily and placed together on a separate tank when it is desired to recirculate dirty liquid to such separate tank rather than to said chamber.

3. A machine for cleaning carpets or the like, comprising support means, means affixed to said support means forming a chamber for containing a cleaning liquid, said chamber comprising a hollow tank rising vertically above said support means and having a mouth at the top thereof, and a generally horizontal lid removably mounted on said mouth at the top of said tank, a filter for liquids retained in said chamber and having an intake side and a discharge side, said filter being located adjacent the bottom of said chamber to filter liquid passing from said intake side to said discharge side thereof, said filter terminating substantially above the bottom of said chamber and being removable from said chamber for cleaning or exchange purposes by removing said lid from said chamber to provide access to said filter, said chamber having a free and unobstructed region therein below said lid and said mouth and above said filter to allow easy access to said filter, a cleaning head having a discharge flow path for directing liquid forcibly onto a carpet or the like and a return flow path for withdrawing excess liquid and soil from a carpet or the like, a discharge liquid flow circuit connecting a portion of said chamber on the discharge side of said filter with said discharge flow path of said head, a return liquid flow circuit connecting said return flow path of said head with said unobstructed region of said chamber below said lid, electrical heater means in the liquid path for heating the cleaning liquid to an elevated temperature sufficiently high to assure that when said cleaning liquid is discharged from said head it is effective to clean a carpet or the like, electrical control circuit means for controlling said heater means, pumping means in said discharge flow circuit for causing liquid to flow from the intake side of said filter through said filter and out from the discharge side thereof through said discharge flow circuit and said discharge flow path of said head onto a carpet or the like with sufficient force to facilitate cleaning, centrifugal blower means mounted above and on top of the lid of said chamber above the mouth at the top of said tank, said centrifugal blower means communicating with said unobstructed region below said lid in said tank for blowing air from said tank so as to suck excess liquid and soil from a carpet or the like into said return flow path of said head and for causing the same to flow through said return flow circuit into said chamber at the region above said filter for subsequent flow through said filter with said filter serving to remove contaminants from said liquid, said centrifugal blower means and said lid being removable together from said chamber without detachment of any portion thereof from said blower means (1) to allow filling of said chamber, (2) to provide access

to said filter, and (3) to allow said lid and blower means to be placed on said mouth without interference below said lid and removed easily and placed together on a separate tank when it is desired to recirculate dirty liquid to such separate tank rather than to said chamber, said discharge liquid flow circuit including a further tank separate from said chamber, said heater means being located in said latter separate tank, and said machine including a back flush flow path having a valve therein and connected across said pumping means in bypass relation therewith for feeding liquid from said latter tank back to said filter for back flushing.

References Cited

UNITED STATES PATENTS

2,292,435	8/1942	Crites	15—321
3,431,582	3/1969	Grave	15—321
2,909,800	10/1959	Grindle et al.	15—321

FOREIGN PATENTS

584,806	10/1959	Canada	15—321
1,111,899	5/1968	Great Britain	15—320

WALTER A. SCHEEL, Primary Examiner

C. K. MOORE, Assistant Examiner