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APPARATUS FOR PASSING CLEANER FLUID THROUGH FABRICS

Filed June 21, 1947

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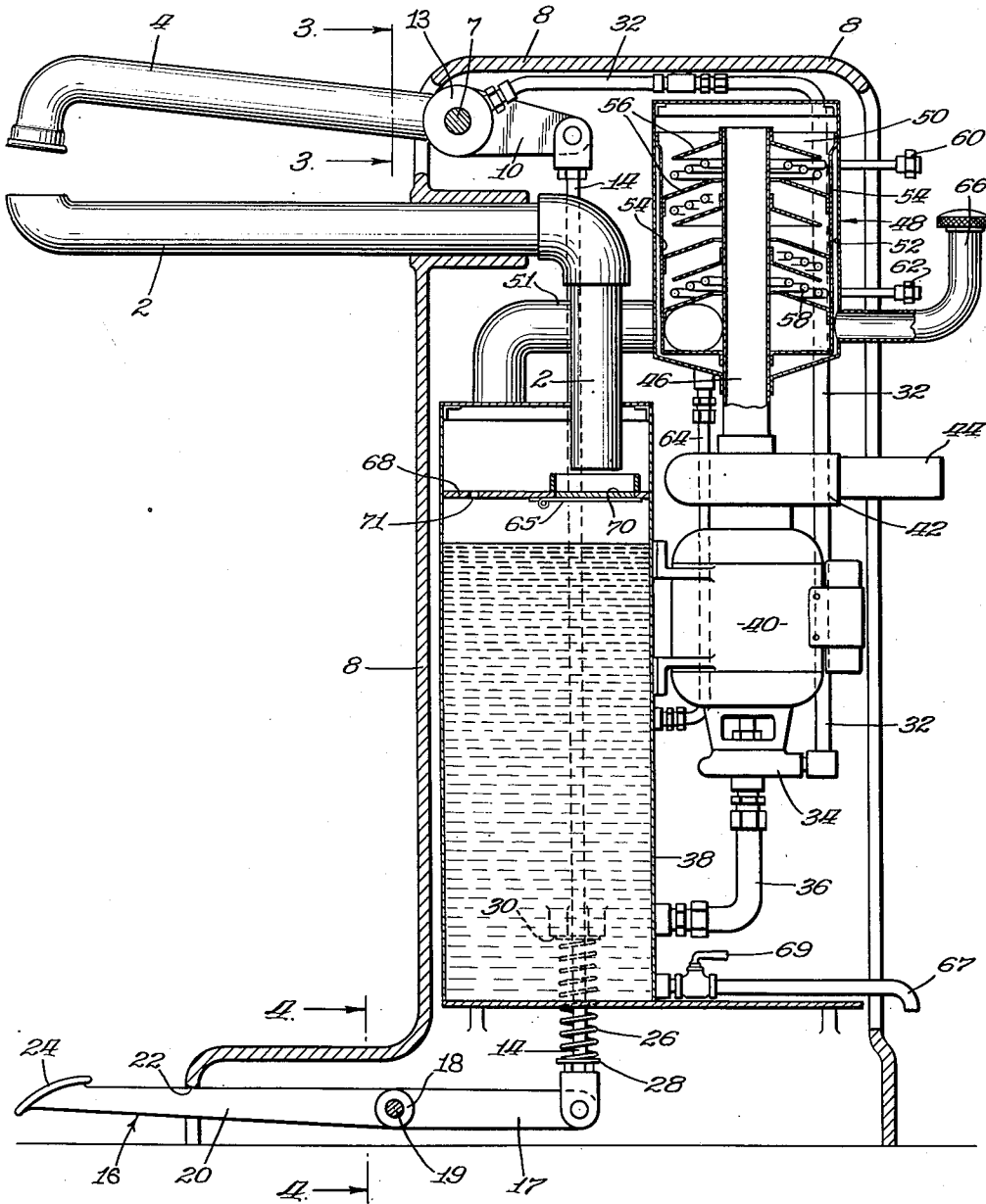


Fig. 1.

INVENTOR.
Robert H. Sedgwick
BY
Orin O. Garner *Atty.*

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R. K. SEDGWICK

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2 SHEETS—SHEET 2

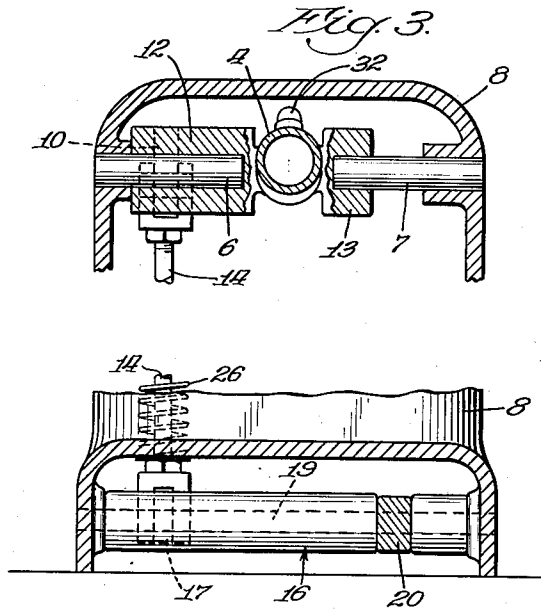
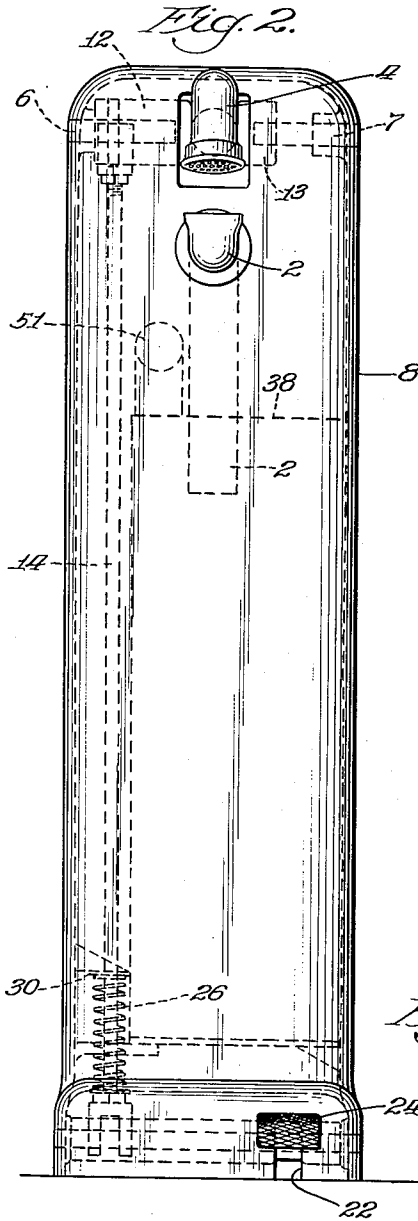
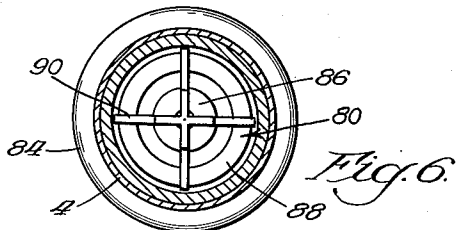
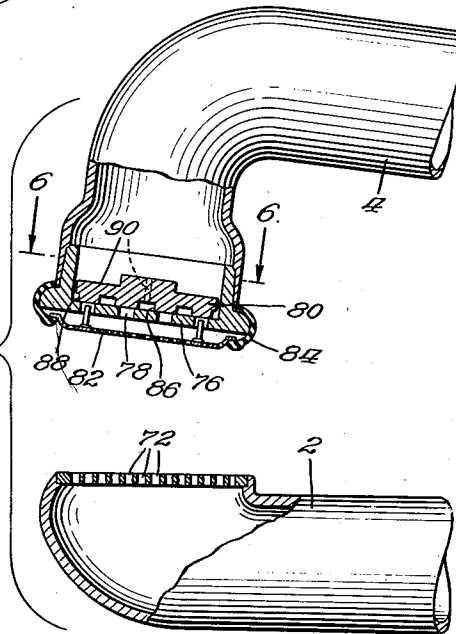


Fig. 4.



INVENTOR.
Robert K. Sedgwick
BY
Am. O. Garner
Atty.

UNITED STATES PATENT OFFICE

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APPARATUS FOR PASSING CLEANER FLUID
THROUGH FABRICSRobert K. Sedgwick, Chicago, Ill., assignor to
American Steel Foundries, Chicago, Ill., a cor-
poration of New Jersey

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16 Claims. (Cl. 68—18)

This invention relates to the dry cleaning of fabrics and more particularly to a novel means for cleaning fabrics by forcing cleaner fluid therethrough.

A general object of the invention is to effect turbulence in the cleaner fluid by forcing the same through the fabric thereby affording adequate agitation to accommodate penetration of the innermost threads of the fabric.

Another object of the invention is to provide a novel means for removing spots and stains from fabrics without hand scrubbing thereof.

Still another object of the invention is to reduce fumes and odors in the cleaning zone by substantially eliminating such fumes and odors at the point of contact between the fabric and the cleaner fluid.

A further object of the invention is to provide automatic reclamation of the cleaner fluid which in conventional hand spotting evaporates and is lost.

The foregoing and other objects and advantages of the invention will become apparent from a consideration of the following specification and the accompanying drawings, wherein:

Figure 1 is a side view of a preferred embodiment of a novel machine utilized in the practice of my invention, portions of the machine being broken away in vertical section to disclose the internal construction thereof;

Figure 2 is a front elevational view of the machine shown in Figure 1;

Figure 3 is a view taken on the line 3—3 of Figure 1 with portions of the machine broken away in vertical section to illustrate the hinged mounting for the pressure pipe of the machine;

Figure 4 is a sectional view taken on the line 4—4 of Figure 1;

Figure 5 is an enlarged fragmentary view, partly in vertical section, of the pressure and vacuum pipes showing the portions thereof adapted to engage the fabric to be cleaned; and
Figure 6 is a sectional view taken on the line 6—6 of Figure 5.

Describing the invention in detail and referring first to Figures 1 and 2, the novel mechanism shown therein comprises a suction pipe or line 2 and a pressure pipe or line 4 adapted to be pivotally actuated by a bell crank lever 10 connected to a hub 12 (Figure 3) supporting the pipe 4 from a pivot pin 6. The pipe 4, as best seen in Figure 3, is also provided with a hub 13 supported by a pivot pin 7, both of the pins 6 and 7 being supported by the frame or housing 8 of the machine. The lever 10 is pivotally con-

nected to a push rod 14, the lower end of which is connected to a bell crank lever 16 comprising a lever arm 17 pivoted to the rod 14 and a lever arm 20 extending outwardly through a slot 22 in the frame 8 for actuation by a foot pedal 24. The bell crank 16 also comprises a hub 18 integral with the arms 17 and 20 and pivotally mounted on a frame-supported pin 19. A spring 26 reacting against a seat 28 on the rod 14 and against a seat 30 on the frame 8 is adapted to yieldingly urge the pressure pipe 4 to its open position shown in the drawings.

The pressure pipe 4 is connected to a flexible tube or line 32 (Figure 1) which is connected to the discharge side of a pump 34, the suction side of which is connected by a pipe 36 to a tank or reservoir 38 containing any suitable dry cleaner fluid, such as, for example, cleaner's naphtha or carbon tetrachloride.

The pump 34 is driven by a motor 40 which also actuates a blower 42, the discharge pipe 44 of which is adapted to be connected to an associated stack (not shown). The suction side of the blower 42 is connected to a suction or outlet pipe 46 of a condenser, generally designated 48. The condenser includes an inner chamber 50 connected to an inlet pipe 51 communicating with the tank 38 above the level of the dry cleaner fluid therein. The condenser 48 also comprises an outer chamber 52 connected by radial ports 54 to the inner chamber 50 which contains baffle plates 56 and a coolant coil 58 having inlet and outlet connections 60 and 62 to afford circulation for a coolant, such as water, therethrough. Thus vaporized fluid flowing through the condenser 48 is swirled through the inner chamber 50 from the inlet pipe 51 which is connected tangentially thereto and the vaporized fluid is condensed and collected in the outer chamber 52 by centrifugal separation through the ports 54, as will be readily understood by those skilled in the art. The condensed fluid then passes through a return line 64 to the tank 38. The outer condenser chamber 52 is also connected to a filler pipe 66 through which fluid is admitted to the system, the tank being provided with a drain pipe 67 equipped with a conventional drain valve 69 to accommodate draining of the fluid from the system.

It may be noted that the suction pipe 2 and the condenser inlet pipe 51 communicate within the tank 38 above a partition 68 therein containing a downwardly opening trap door 70 yieldingly actuated to its closed position by a light torsion spring 65 adapted to accommodate open-

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ing of the trap door 70 in response to force exerted thereagainst by the cleaner fluid passing through the suction pipe 2, as hereinafter more fully described in connection with the operation of the machine. The partition 68 is also provided with one or more ports 71 to accommodate release of vapors formed within the tank 38.

Referring now to Figure 5, it will be seen that the suction pipe 2 is provided with a strainer 72 and the pressure pipe 4 is provided with an end wall 76 having ports 78 adapted to be opened and closed by a ring valve 80 and a perforated trip plate 82 mounted within an annular gasket 84 secured in any convenient manner to the end of the pressure pipe 4. Thus as the pressure pipe 4 is urged downward in response to actuation of the foot pedal 24, the gasket 84 engages the associated fabric (not shown) around the outer perimeter of the strainer 72 to afford a seal therearound, and the perforated trip plate opens the valve 82 to admit flow of the cleaner fluid through the ports 78, the fabric, and the strainer 72 into the suction pipe 2.

It may be noted, as best seen in Figure 6, that the ring valve 80 comprises a pair of spaced concentric inner and outer rings 8 and 88 connected by a pair of integrally formed bridges 90 adapted to secure the rings 86 and 88 in proper spaced relationship and also adapted to position the ring valve 80 within the pressure pipe 4.

The machine is started in operation by actuation of the motor 40 by means of an associated switch (not shown). The pump maintains pressure in the pressure pipe 4 which is closed by the valve 80, while the blower 42 draws a continuous stream of air through the suction pipe 2 and the condenser inlet pipe 51 through the condenser 48 and outwardly through the pipe 46 into the stack pipe 44. It may be noted that the air passing through the tank 38 between the pipes 2 and 51 spreads out above the partition 68 and thus there is no appreciable air turbulence over the fluid within the tank to cause substantial evaporation.

The fabric is cleaned by placing the same on the strainer and then actuating the foot pedal 24 to urge the pressure pipe downwardly, thereby actuating the valve 80 to its open position as the trip plate 82 engages the fabric. Under these conditions, the cleaner fluid in the pressure pipe 4 flows through the fabric dissolving all soluble foreign matter, dislodging solid material, and washing the residue down into the suction pipe. The washings are dropped into the tank 38 and accumulate on the trap door 70 or the partition 68.

It will be understood that as the fluid flows through the cloth, an extremely turbulent flow is produced by passage of the fluid through the fibers of the fabric thereby affording adequate agitation to accommodate penetration of the fluid to the innermost fibers. This action results in an extremely efficient removal of all soluble spots and stains in the fabric without the necessity of hand scrubbing, such as is commonly utilized in a cleaning operation of this type.

When the operator releases the foot pedal 24, the pressure pipe 4 is urged by the spring 26 to open position, whereupon the valve 80 is urged to its closed position, and flow of the cleaning fluid ceases. Air is immediately drawn through the fabric to dry it, whereupon the fabric is removed from the strainer 72 accelerating downward movement of the slug of cleaner fluid within the pipe 2 whereupon the fluid entering the

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tank 38 actuates the trap door 70 and plunges downwardly into the fluid at the bottom of the tank. The trap door immediately closes and air flow is re-established above the door drawing fumes within the tank 38 and in the region of the strainer 72 through the condenser. During and subsequent to a cleaning operation, such as above-described, all vapor laden air is drawn through the suction pipe 2 and the condenser 48 thereby ensuring substantial elimination of all fumes and odors in the region of the machine. The condensed fluid is thus reclaimed and drained through the line 64 to the tank.

It may be noted that the illustrated embodiment of the invention is in the form of an isolated machine, and the tank 38, as above described, is provided with a filler pipe 66 and a drain pipe 67 so that contaminated liquid may be drained and replaced periodically. However, it will be understood that in large installations wherein a plurality of the machines are utilized, the tank 38 may be piped to a central reclamation machine (not shown), and a conventional float valve mechanism may be used to maintain a constant amount of cleaning fluid in the tank 38.

As in conventional dry cleaning machines, an explosion proof motor 40 and back fire traps (not shown) on both the exhaust and filler pipes 44 and 66 are necessary to eliminate hazard in operation of the machine where inflammable fluid is utilized.

It is to be understood that I do not wish to be limited by the exact embodiment of the device shown which is merely by way of illustration and not limitation as various and other forms of the device will, of course, be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

I claim:

1. Dry cleaner apparatus comprising a tank adapted to contain dry cleaner fluid, a condenser comprising a vapor receiving chamber and another chamber communicating with and adapted to receive condensed vapor from said vapor chamber, a conduit adapted to convey condensed vapor from said other chamber to said tank, an inlet conduit connected to said vapor chamber and connected to said tank above the level of said fluid, a blower, an outlet conduit connected to said vapor chamber and to the suction side of said blower, a suction line connected to said tank above the level of said fluid and having an extremity communicating with the atmosphere, a fluid supply line having an extremity terminating adjacent the extremity of said suction line, and pump means for conveying fluid from said tank to said supply line, one of said lines being movable relative to the other for bringing said extremities into communication with each other through an associated fluid permeable fabric to be cleaned by passage of fluid therethrough, a partition in said tank spacing the upper level of said fluid from the connections of said inlet conduit and said suction line to said tank, and a downwardly opening trap door in said partition beneath the connection of said suction line to said tank, said trap door being adapted to be opened by fluid flowing from said suction line, and yielding means for holding said door in its closed position until opened by the force of said fluid flowing from said suction line.

2. Dry cleaner apparatus comprising a tank adapted to contain dry cleaner fluid, a condenser, an inlet conduit connected to said condenser and to said tank above the level of said fluid, a blow-

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er, an outlet line connected to said condenser and to the suction side of said blower, means for delivering condensed fluid from the condenser to the tank, a suction line connected to said tank above the level of said fluid and having an extremity communicating with the atmosphere; a fluid supply line having an extremity terminating adjacent the extremity of said suction line, and pump means for conveying fluid from said tank to said supply line, one of said lines being movable relative to the other for bringing said extremities into communication with each other through an associated fluid permeable fabric to be cleaned by passage of fluid therethrough.

3. A dry cleaning machine comprising a line connected to an associated source of dry cleaner fluid, a vacuum line connected to an associated source of vacuum, means for moving the lines to the closed position thereof whereat they are in communication and for moving the lines to the open position thereof whereat they are out of communication, valve means responsive to pressure in said first-mentioned line, for automatically closing the same, and means engageable with said valve means for operating the latter automatically upon movement of said lines to closed position.

4. A dry cleaning machine comprising a fluid supply line, a source of dry cleaner fluid connected thereto, a vacuum line, a blower having its suction side connected to said vacuum line, means for connecting and disconnecting said lines by movement of the same toward and away from each other respectively, and normally closed valve means carried by one end of the supply line and having a closing area actuated by the pressure in the supply line to close said valve means, and actuating means carried by a corresponding end of the vacuum line for opening said valve means to accommodate the flow of fluid through said lines when the lines are connected.

5. A dry cleaning machine comprising a blower, a reservoir connected to the suction side of said blower, a suction line connected to said reservoir, a supply of dry cleaner fluid in said reservoir beneath the level of its connections to said suction line and to said blower, a fluid supply line, means for forcing fluid from said reservoir into said supply line, and one-way valve means within the reservoir associated with the suction line for accommodating flow of fluid therefrom into the reservoir, said lines having their extremities opening toward each other and adapted to receive associated fluid permeable fabric therebetween, and means for moving said extremities into and out of communication.

6. A dry cleaning machine comprising a pair of pipes having their extremities opening toward each other to receive an associated fluid permeable fabric therebetween, means operatively connected to at least one of said pipes for connecting and disconnecting said extremities, a blower, a tank connected to the suction side of said blower and connected to one of said pipes, a source of dry cleaner fluid connected to the other pipe, valve means carried by said other pipe and adapted to close in response to fluid pressure in said other pipe thereby cutting off flow of fluid therethrough when said pipes are disconnected, and cooperating means on said one pipe and said valve means for opening the latter when said pipes are connected.

7. Apparatus, according to claim 2, wherein valve means are provided in said supply line for opening and closing the same against flow of said

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fluid therethrough, and said suction line is provided with means for automatically actuating said valve means to the open position thereof when said extremities are in communication with each other.

8. A dry cleaning machine comprising a conduit, means for forcing cleaner fluid therethrough, a readily separable connection in said conduit, means for opening and closing said connection to accommodate insertion and removal of associated fluid permeable material to be cleaned by fluid forced through said conduit, flow control means responsive to opening of said connection for automatically terminating flow of fluid thereto, and means responsive to closing of said connection for automatically rendering said flow control means ineffective.

9. Cleaner apparatus comprising a pair of pipes adapted to receive fluid permeable material therebetween, a source of cleaner fluid connected to one of the pipes, said one pipe comprising valve means including a port and a valve member having an area adapted to be acted upon by fluid pressure in said one pipe to urge said valve member to closed position with respect to said port, a flexible gasket carried by said one pipe and adapted to seat against said material, and means carried by said gasket and operatively connected to said member for urging the latter to open position when said pipes are urged together thereby flexing said gasket against said material.

10. Cleaner apparatus comprising a pair of conduits adapted to receive fluid permeable material to be cleaned therebetween, a source of cleaner fluid connected to one of the conduits, said one conduit comprising valve means responsive to fluid pressure in said one conduit for cutting off fluid therethrough, valve actuating means carried by said one conduit, and an abutment carried by the other conduit and engageable with said actuating means to operate the latter when said conduits are moved into communication with each other.

11. Cleaner apparatus comprising a reservoir containing cleaner fluid, a suction line connected to said reservoir and spaced from said fluid, a condenser having an inlet line connected to said reservoir and spaced from said fluid, said lines being in communication through said reservoir, a pressure line, pump means connected to the pressure line and to the fluid in said reservoir for forcing said fluid into said pressure line, gas blower means having a suction side connected to said condenser for drawing vaporized fluid therethrough from said inlet line, and means for returning condensed vapor from the condenser to the reservoir, said suction and pressure lines being relatively movable into and out of communication with each other to force said fluid through material to be cleaned between said suction and pressure lines.

12. Cleaner apparatus, according to claim 11, wherein valve means are provided between said suction line and said inlet line in said reservoir for accommodating flow of cleaner fluid from said suction line into said reservoir and for restricting flow of cleaner fluid from said inlet line to said suction line.

13. Cleaner apparatus comprising a pair of conduits adapted to receive therebetween fluid permeable material to be cleaned, a source of cleaner fluid connected to one of the conduits, said one conduit comprising valve means for cutting off flow of fluid therethrough, valve actuating means carried by said one conduit, and an

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abutment carried by the other conduit and engageable with said actuating means to operate the latter for opening said valve means when said conduits are moved into communication with each other.

14. Apparatus of the class described comprising a reservoir of cleaner fluid, a suction line connected to said reservoir above the level of the fluid therein, a condenser having an inlet line connected to said reservoir above the level of the fluid therein, a gas blower having its suction side connected to the condenser, a cleaner fluid supply line, means for moving said suction and supply lines together, to communicate through an associated fluid permeable fabric to be cleaned by flow of said fluid therethrough, and means for pumping said fluid through the supply line and thence into the suction line, the outlet side of said blower being connected to the atmosphere for discharging vapor thereto.

15. A dry cleaning machine comprising a pair of pipes having their extremities opening toward each other to receive an associated fluid permeable fabric therebetween, means operatively connected to at least one of said pipes for connecting and disconnecting said extremities thereof, a gas blower, a tank connected to the suction side of said blower and connected to one of said pipes, a source of dry cleaner fluid connected to the other pipe, normally closed valve means carried by said other pipe to cut off flow of fluid therethrough when said pipes are disconnected, and cooperating means on said one pipe and said valve means

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for opening the latter when said pipes are connected.

16. Dry cleaner apparatus comprising a tank adapted to contain dry cleaner fluid, a condenser, an inlet conduit connected to said condenser and to said tank above the level of said fluid, a blower, an outlet line connected to said condenser and to the suction side of said blower, a suction line connected to said tank above the level of said fluid and having an extremity communicating with the atmosphere, a fluid supply line having an extremity terminating adjacent the extremity of said suction line, and pump means for conveying fluid from said tank to said supply line, one of said lines being movable relative to the other for bringing said extremities into communication with each other through an associated fluid permeable fabric to be cleaned by passage of fluid therethrough.

ROBERT K. SEDGWICK.

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