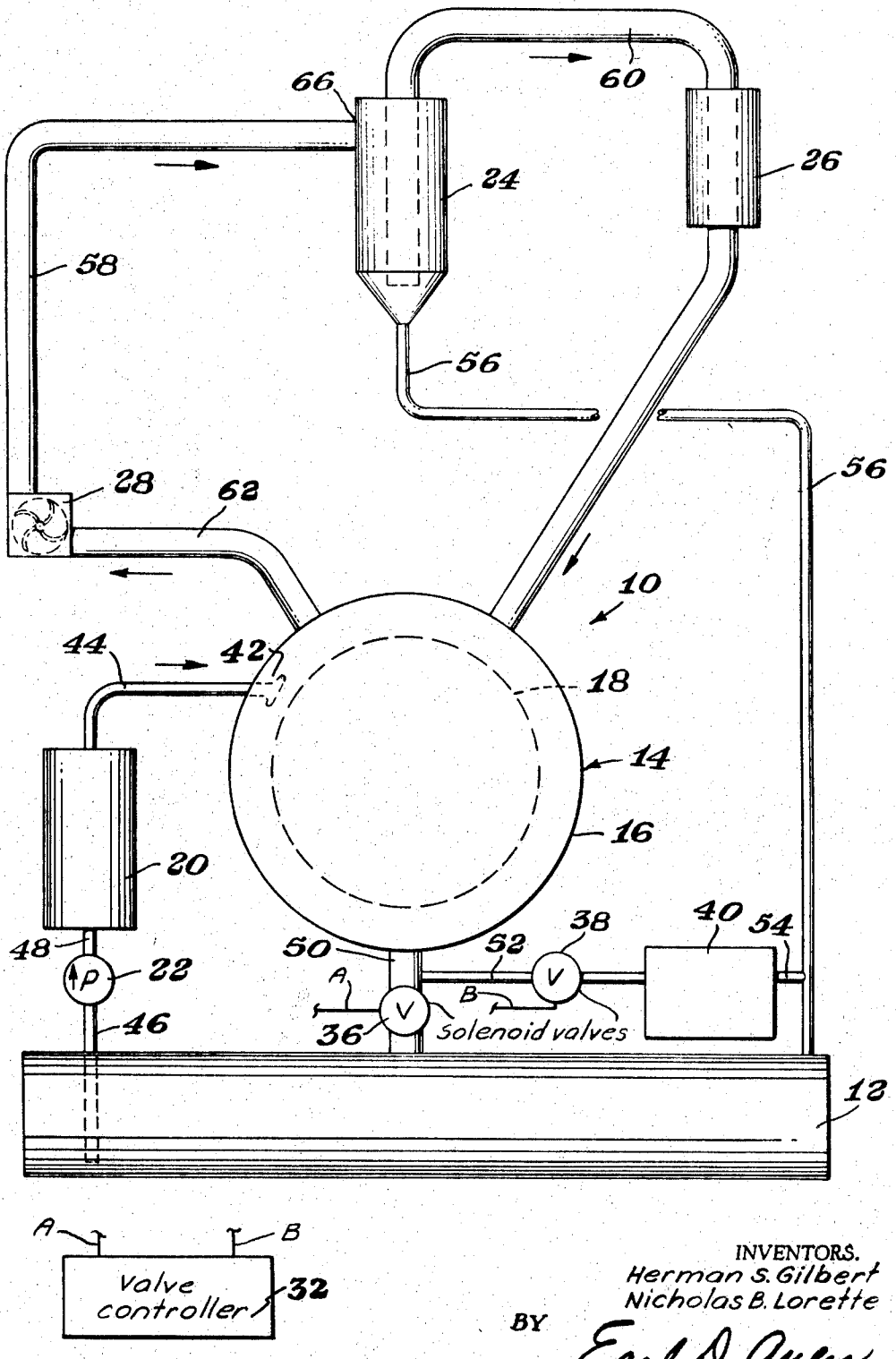
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DRY CLEANING METHOD

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DRY CLEANING METHOD

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This invention relates to an apparatus and method for cleaning fabrics by dry cleaning, and particularly to coin operated dry cleaning apparatus and a method of operating such apparatus.

In so-called dry cleaning operations clothes or other fabrics are usually cleaned by agitating them while passing a non-aqueous solvent through them which often contains a detergent or soap and then extracting the solvent to "dry" the cleaned fabric.

The removed soils are either suspended or dissolved in the solvent used in the cleaning operation. Suspended materials are removed from the solvent by filtering, while dissolved soils are removed either by adsorption on activated carbon, by using so-called sweetener powders to change the fatty acids to soaps or by distilling the solvent.

While distilling the solvent is a desirable way to separate non-volatile matter from the solvent, it is not really practical from an economic standpoint to distill all the solvent used between each cleaning operation.

In many types of coin operated dry cleaning equipment, for example, up to 55 gallons or even more of solvent is used during each cycle of operation. It is too expensive in a highly competitive business such as the dry cleaning business to distill all of the solvent which is used during each cycle of operation. As a substitute it is known to distill a small fraction of the solvent used during each cycle on an indiscriminant basis to remove the non-volatile materials from the distilled solvent and thereby slow the buildup of non-volatile materials in the solvent inventory in the cleaning apparatus.

However, even though a small fraction of the solvent is distilled (on a non-selective basis from the base tank) during each cycle of operation of the dry cleaning apparatus, the removal of non-volatile materials from the solvent still occurs at a less rapid rate than is desirable.

Accordingly, a principal object of this invention is to provide an improved, economical method and apparatus for removing non-volatile materials from the solvent in a dry cleaning system.

Another object of this invention is to provide an improved, simple to operate, economical apparatus and method for removing non-volatile materials from a predetermined portion of the solvent used in a dry cleaning operation.

In accordance with this invention there is provided means and a method for shunting into distilling apparatus at predetermined times a predetermined amount of the solvent which passes through the washing operation of the cleaning apparatus, and then returning the distilled solvent to a storage vessel. The solvent which is shunted into the distilling apparatus is that part of the solvent which contains the most dirt as a result of its contacting the fabric load in the cleaning apparatus.

The invention, as well as additional objects and advantages thereof, will best be understood when the following detailed description is read in connection with the accompanying drawing, in which:

The single figure shows, in simplified diagrammatical form, apparatus in accordance with this invention.

Referring to the drawing, there is shown dry cleaning apparatus, indicated generally by the numeral **10**, which comprises a base tank **12**, a wash wheel assembly **14** including an outer housing **16** and rotatable wash wheel **18**, a filter **20**, pump **22**, condenser **24**, heater **26**, blower **28**, solenoid controlled valves **36**, **38**, and distillation unit **40**.

The filter **20** is coupled to a spray nozzle **42** within the housing **16** of the wash wheel assembly **14** by a hollow tube **44**. The filter **20** is also coupled to the base tank **12** through hollow conduits **46**, **48** and the pump **22**.

A drain tube **50** having a valve **36** incorporated therein and which is coupled between the base tank **12** and the wash wheel assembly **14** provides the main means for draining solvent from within the housing **16** of the wash wheel assembly to the base tank **12**.

A drain tube **52** having a valve **38** incorporated therein is coupled from the drain tube **50** (between the valve **38** and the housing **16**) to the distillation unit **40**. The output line **54** from the distillation unit **40** is coupled to the line **56** which extends between the base tank **12** and the output of the condenser **24**.

A gas and vapor circulation and extraction system, which includes the condenser **24**, heater **26**, and interconnecting tubing **56**, **58**, **60**, **62**, is coupled to the interior of the housing **16**.

The tubing **62**, blower **28** and tubing **58** connect the wash wheel housing **16** to the input **66** of the condenser **24**. The tubing **60** extends from the condenser **24** through the heater **26** and back into the wash wheel housing **16**.

In operation, as filtered solvent is pumped by means of the pump **22** through the nozzle **42** and onto the load of fabric (not shown) which is being tumbled by the rotating wash wheel **18**, the solvent which has passed through or impinged on the fabric being cleaned usually returns from the housing **16** to the base tank **12** through the line **50** and valve **36**.

However, during the part of the wash cycle in which the solvent contains the most soil, usually during the first one to three minutes of the wash cycle, the valve **36** is closed, the valve **38** is opened, and a predetermined amount, around one gallon, for example, of solvent is flowed into the distillation unit **40**. The valve **38** is then closed and the valve **36** is opened, and the remaining solvent drains from the wash wheel directly into the base tank through the line **50** and open valve **36**.

Following the wash cycle, the wash wheel **18** is rotated at a rapid rate as is well known in the art to extract the solvent from the fabric load. Simultaneously, gas and vapors are drawn from the housing **16** by means of the blower **28** through the lines **62**, **58**. The vapors and gas from the line **58** are passed through the condenser **24**, the solvent liquefying into droplets and dropping through the tube **56** and thence into the base tank **12**.

The uncondensed gas and vapors leave the condenser **24** through the line **60**, passing through the heater **26** before returning to the wash wheel assembly **14**, as is well known in the dry cleaning art. As the heated air re-enters the wash wheel housing **16** additional solvent in the fabric is vaporized and withdrawn from the wash wheel assembly through the line **56** as described above.

Because the solvent which is passed into the distillation unit **40** contains a substantially larger amount of soil, especially non-volatile soils, than does the average similar amount of solvent which leaves the wash wheel assembly, the distillation of this relatively small amount of solvent during each wash cycle provides a substantial improvement in solvent reconditioning over what is achieved when a similar amount of solvent, indescriminantly selected, is distilled.

The valve controller timer **32**, coupled, as at A and B, to the solenoid valves **36**, **38** actuates the valves **36**, **38** to provide the flow of solvent to the distillation unit **40**

at the appropriate time during the wash cycle. The particular time at which the solvent is most heavily laden with soil varies with different types of cleaning apparatus, but usually occurs within ½ minute to 3 minutes after the washing cycle begins.

What is claimed is:

1. In a method of dry cleaning wherein liquid solvent is circulated from a base tank through soiled fabric and returned to said base tank, followed by mechanically removing solvent from said fabric and then heating any solvent remaining in said fabric to dry said fabric, the steps comprising withdrawing a predetermined amount of said circulated solvent which has contacted said fabric and which contains the heaviest load of soil suspended or dissolved therein and then distilling said predetermined amount of soiled solvent before returning it to said base tank.

2. A method in accordance with claim 1, wherein said predetermined amount of solvent is withdrawn between the first and third minute that said solvent is circulated through said fabric.

3. A method in accordance with claim 1, wherein said predetermined amount of circulated solvent is approximately one gallon.

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U.S. Cl. X.R.

8—139, 139.1; 134—11