

[54] **EQUIPMENT FOR PRE-FILTERING
THE SOLVENT, PARTICULARLY IN
DRY-CLEANING MACHINES**

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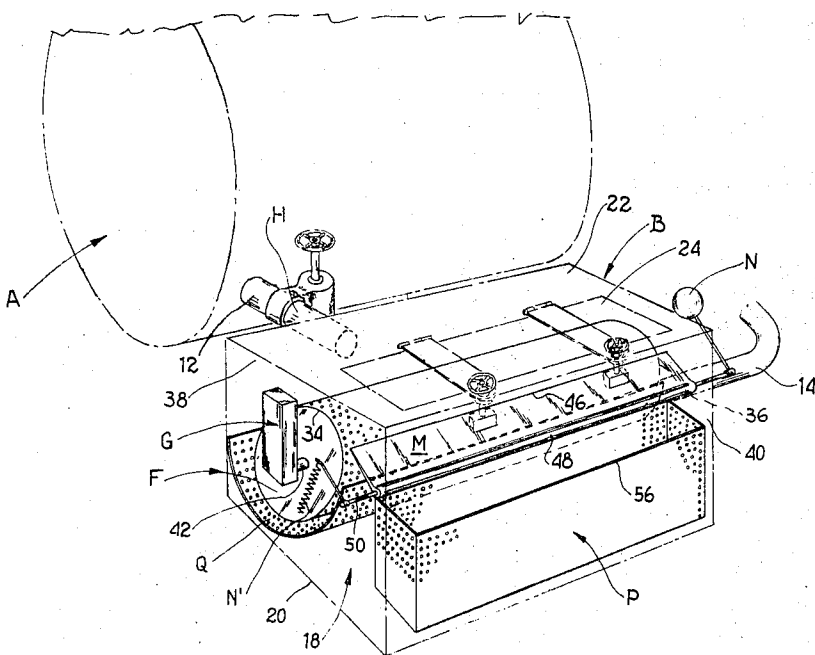
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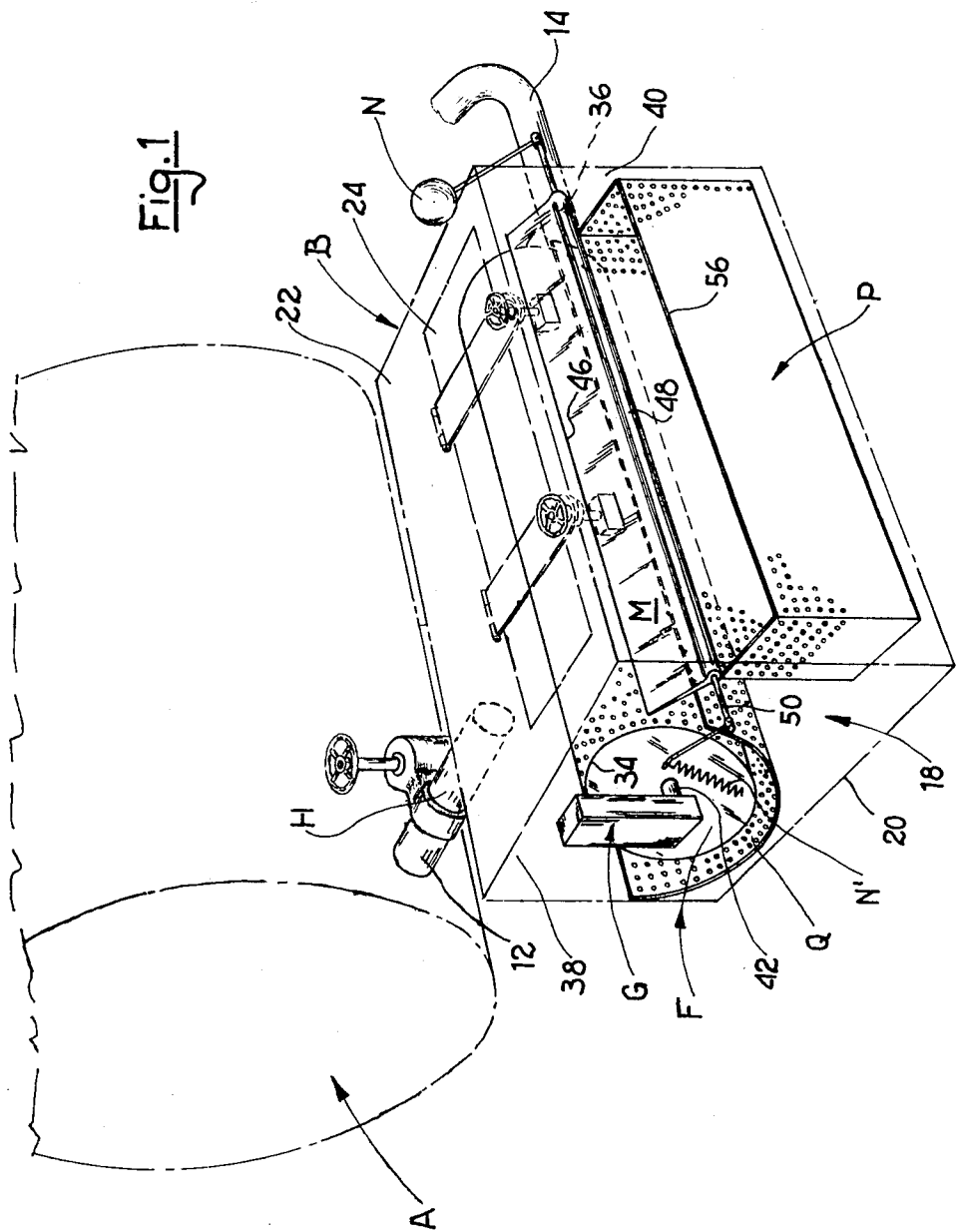
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[57] **ABSTRACT**

An equipment for pre-filtering the solvent in dry-cleaning machines or plants, said equipment comprising a chamber wherein drained dirty solvent is forced to pass across a filtering surface which is continuously cleaned by scraping means, relatively movable with respect to said filtering surface. Said filtering surface is in the form of an outer surface of a revolvingly fitted perforated drum; whereon a scraping blade is acting in order to remove any dirt therefrom and collect the same within a collecting box or the like.

6 Claims, 3 Drawing Figures





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EQUIPMENT FOR PRE-FILTERING THE SOLVENT, PARTICULARLY IN DRY-CLEANING MACHINES

BACKGROUND

This invention concerns an equipment for carrying-out pre-filtering operations of solvent, particularly in dry-cleaning machines or plants.

Machines wherein garments, fabrics, hosiery and the like are dry-cleaned, or at any rate machines wherein washing or finishing operations are performed by means of liquid solvents such as perchlorides, trichloroethylene and the like, are well known and comprise or at least cooperate with a suitable equipment wherein a solvent pre-filtering step is carried-out. Such pre-filtering step is substantially designed to clear the solvent discharged from a machine washing drum or chamber from all coarse impurities as removed from washed garments, fabrics and the like. Such coarse impurities may consist e.g. of buttons, pins, tufts of cotton or wool and other materials which may show a high mechanical strength as it happens when carpets, hosiery, fabrics and the like are processed.

When a pre-filtering equipment is not interposed between a washing chamber outlet and a solvent pump, said pump suction ports would be quickly clogged by said coarse impurities conveyed by the solvent. Furthermore, said solid impurities, as, e.g., buttons, pins and the like could get stuck between the impeller and the pump casing, thus jamming said impeller. In any case, the pump, and thus the dry-cleaning plant, should become unserviceable after a very short time.

Due to the above reason, suitable pre-filtering equipments have been interposed between said washing chamber outlet and said solvent pump in order to keep back the impurities as specified above.

However, previously known pre-filtering equipments show many drawbacks, that are due mainly to their design and operation.

SUMMARY

An object of this invention is to provide an equipment of the type referred to, wherein said drawbacks are obviated and comprising one or more features herein described.

Accordingly, this invention concerns an equipment particularly designed for pre-filtering a solvent which is circulated within machines or plants wherein garments, fabrics, hosiery, carpets and so on are dry-cleaned or otherwise dry-processed, said equipment comprising: at least one casing connected with an outlet duct from a chamber wherein a dry-cleaning or dry-processing drum is revolvingly fitted, as well as with a suction duct of a solvent pump; controlled movable means within said casing, through which said solvent is allowed to flow from said outlet to said suction duct in order to be pre-filtered thereon; cleaning means designed to cooperate with said pre-filtering means in order to maintain the same under their best cleaned condition to the purposes of said pre-filtering operation; and means to collect impurities and dirt removed from said solvent during said pre-filtering operation, preferably by said cleaning means.

According to an advantageous embodiment of this invention, said controlled movable pre-filtering means consist of at least one perforated drum, revolvingly

fitted preferably about its longitudinal axis within said casing and suitably controlled, said cleaning means being formed of at least one scraping blade or the like, designed to engage under a given pressure with the outer surface of said revolving drum; said collecting means consist of at least one perforated box or the like, fitted within said casing and having an opening directed toward the lower end of said cleaning means.

DRAWINGS

FIG. 1 is a diagrammatic perspective view of a dry-cleaning plant comprising a pre-filtering equipment according to this invention.

FIG. 2 is a diagrammatic cross-section of said pre-filtering equipment, and

FIG. 3 is a diagram of hydraulic connections between said equipment and a related plant circuit.

PREFERRED EMBODIMENT

Referring now to the drawings, a dry-cleaning or dry-processing chamber A, having therein a rotary drum C cooperates with a pre-filtering equipment B which is connected, through a pipe fitting 10, with an outlet duct 12 of said chamber A. Equipment B is also connected through a pipe fitting 14 with a suction duct 16 of a solvent pump D.

Said pre-filtering equipment consists of a metallic box-shaped casing 18 having a bottom wall 20, side walls and a top wall 22, said top wall having a cover 24 tightly secured by any suitable means onto a backward opening of said top wall, in order to sealingly close an admittance port to said casing 18.

Within a front part of said casing 18 and below the generatrix 26 of pipe fitting 10, a perforated drum F is fitted, said drum consisting of a metallic cylinder having a longitudinal axis 28 parallel to the longitudinal axis of casing 18 and to the axis 30 of said drum C within said chamber A. Said drum F comprises a cylindrical wall 32 wherein holes having a diameter suitably selected according to the particular solvent pre-filtering operation to be performed by the equipment are provided. Said cylindric wall 32 comprises circular side edges 34-36 lying against the inside surfaces of side walls, 38-40 of casing 18, being practically into contact therewith. The drum edge 34 might be closed by a circular solid wall, while the drum edge 36 is left open. Said drum F is secured to a shaft 42 extending centrally and longitudinally therethrough, having an axis coincident with said axis 28. One end of said shaft 42 sealingly projects out of said wall 38 and is keyed to a pinion or the like, in mesh with the driven gear of a geared motor G, which may be supported by the same wall 38 and is adapted to impart a rotary motion about said axis 28, e.g., in the direction of arrow X, to said drum F. The drive imparted by said geared motor G to drum F is in synchronism with automatic opening motions of an exhaust valve H, controlling an outlet duct 44 from said washing chamber A. As soon as said valve H is opened and establishes communication between said chamber A and equipment B, said drum F is started by said geared motor and caused to rotate in the direction of arrow X for the whole time during which said valve H is kept open, or otherwise for the time as required to perform a complete prefiltering operation.

Means to clean said drum F engage with the outer cylindric wall surface of the same, said means consisting of a blade or plate M the upper edge 46 of which is kept engaged with said outer cylindric wall surface, while the opposite lower edge 48 thereof is pivotally supported, e.g., by a pin 50 secured to said plate M and parallel to the shaft 42, in order to allow said plate M to be swung about said edge 48. Both the shaft 42 and pin 50 are pivotally fitted within suitable seats formed in the side walls 38, 40 of the casing 18 and provided with bearings if required.

As it can be readily noticed from the drawings, the outlet port of suction pipe fitting 14 is provided on said wall 40 at a level such that the lowest generatrix thereof be substantially coincident with the lowest generatrix of said cylindric wall 32, said discharge port from equipment B being thus located in the lower part of said revolving drum F.

Said plate or blade M is kept under the action of a counterweight N or a spring N' (both said components being shown for illustrative purposes only in FIG. 1) whereby said blade edge 46 is kept engaged with said wall 32 under a given adhesion or friction pressure, such pressure being adjustable by adjustment of the spring force or the counterweight load.

Behind the blade M (in the direction of the solvent stream into said pre-filter B) are fitted means to collect the impurities and dirt, as kept back on said perforated wall 32 when the solvent is flowing therethrough. Such collecting means may consist of perforated baskets or boxes P, that in this case are in the form of one perforated box only that extends across the whole length of casing 18, like said drum F.

Said collecting box P may comprise at least one handgrip 52 in order to withdraw the same from casing 18 through an opening 54, after removing said cover 24 therefrom.

The upper edge 56 of said collecting box P is tightly engaged onto related longitudinal supporting elements 58, whereby the inside of casing 18 is subdivided in two compartments by the perforated walls of box P, as well as by a semi-cylindric perforated wall Q which will be described in more detail below, namely into a compartment below said walls, wherein substantially no dirt is collected, and into an upper compartment, wherein all dirt and impurities are collected.

Said semi-cylindric perforated wall Q extends all around the lower half of said revolving drum F.

Said wall Q is not concentric with the wall 32 and when considering cross-sections of said pre-filter, free space is defined between said wall 32 and wall Q having an area gradually increasing from the beginning to the end of said wall Q respectively below said blade M, and into contact with the pre-filter front wall 11. Thus said free space as defined by said walls 32 and Q is in the form of a diffuser having an outlet in front of said wall 11, to a purpose which will be stated later on.

In the illustrated embodiment no partition baffle plate or other hydraulic partition means extends between said wall Q and box P. 13 is a drain pipe fitting having a valve which is opened only when the pre-filtering equipment is to be wholly emptied to perform general cleaning or servicing operations.

Referring now to FIG. 3, a delivery duct 15 of pump D is branched in two pipes 17 and 19. The branch pipe

17 is adapted to directly feed the solvent to said chamber A through a duct 21, while the branch pipe 19 is adapted to feed the solvent to a filter 25 through a duct 23, wherefrom said solvent (already pre-cleaned by said pre-filter B) is then fed to said chamber A in order to perform dry-cleaning or processing operations.

The suction duct 16 of pump D may be connected through a pipe 27 with a solvent tank 29, which is subdivided into three compartments 31, 33, 35 wherefrom the liquid therein contained may be withdrawn by said pump through opened related valve 37, 39, 41. Moreover, pre-filtered liquid can be fed to said compartments 31, 33 or 35 by said pump delivery duct 15, through a branch pipe 43.

Referring now to the operation of said pre-filter assembly B, once a dry-cleaning or dry-processing operation on fabrics, hosieries, carpets, garments, and so on is performed, said solvent outlet valve H is automatically opened, whereby all solvent in said chamber A flows by gravity through 10 into said pre-filtering assembly B, wherein it reaches, e.g., a level 43. As already stated, as soon as said valve H is opened, said drum F starts its rotational motion in direction X and said blade M is kept against the outer surface of wall 32, while the solvent is withdrawn through 16 and the pipe fitting 14 by the pump D, said solvent going through the holes of drum F and thus leaving any coarse impurity, such as cotton or wool tufts, comb fly, buttons and so on on the surface of perforated drum F. Such impurities are continuously scraped and removed from said surface 32 due to the action of blade M, and caused to fall into said box P.

Thus, as a result of the rotational motion of drum F and scraping action of blade M, the drum surface is kept always wholly cleaned and thus said pre-filtering wall 32 never can become clogged and stopped, as occurs in conventional stationary basket pre-filters.

The solvent S drained into the casing 18 is thus withdrawn by the pump D through said pipe fitting 14 and is thereby forced to flow into said rotary drum F leaving all coarse impurities back on the outside surface thereof. Said cleaned solvent then flows into said pipe fitting 14 by the pump D, that operates until a small solvent head only is left within the casing 18.

The cleaning plant centrifugation step, during which the drum C is driven at a high RPM by a motor, is then carried out under the best possible conditions since the whole amount of solvent is drained. Conversely, conventional pre-filters, once wholly clogged do not allow a draining of residual amount of solvent from dry-cleaning or processing chamber.

When the drum F is rotated, the removal of impurities and dirt sticking to wall 32 is improved by the shape of said free space, since the increase of its cross-section in the direction of drum rotation promotes a spreading out of said impurities, which therefore cannot be caught between the wall 32 and wall Q.

Then, during all pre-filtering steps the operating conditions of said equipment B are always such as to ensure a complete solvent draining through pipe fitting 10, said solvent being housed within the casing 18.

After a number of pre-filtering operations, e.g., after a continuous plant operation of 8-10 hours, said box P may be removed through the opening 54 and the impu-

urities collected therein may be dumped whereafter said empty box is replaced within the casing and the latter is sealed by said cover 24.

As previously stated, from time to time said pre-filtering equipment may be wholly emptied by opening the duct 13 in order to allow a draining of all solvent and an overall equipment cleaning operation; due to the above stated operating conditions, any danger that the pump operates under no-load conditions or the motor winding can burn off is wholly obviated.

Obviously said drum F may be made of a wire net instead of a perforated metal sheet and a plurality of drums may be series connected with each other, instead of a single drum; similarly, a plurality of pre-filters B associated with a dry-cleaning or dry-processing plant may be provided, instead of one pre-filter B only.

I claim:

1. A pre-filtering equipment for the solvents used in machines and plants having a chamber wherein garments, fabrics, hosieries, carpets and the like are dry-cleaned or dry-processed, comprising a casing connected to an outlet duct from said chamber, a revolving foraminous drum in said casing, a solvent suction pump having a suction duct connected to said casing, controlled valve means whereby said solvent is allowed to flow from said duct to said suction duct in order to be pre-filtered by said drum, cleaning means inclined against the direction of rotation of said drum cooperating with said drum to positively strip fibrous material from the surface of said drum, collecting means for the impurities and dirt removed from said solvent, and a stationary perforated wall fitted below the lower half of said revolving drum and radially spaced therefrom by a

distance which gradually increases in the direction of the drum rotation from the zone wherein said drum is acted upon by said cleaning means.

2. An equipment according to claim 1 wherein said cleaning means comprises a scraping blade having a free edge engaged against the outer surface of said revolving drum under a given pressure and said collecting means comprise a perforated box within said casing having an opening directed toward the bottom of said cleaning means.

3. An equipment according to claim 1, wherein said stationary perforated wall at the point wherein said distance thereof from said revolving drum is at its minimum value, is directly facing a related perforated wall of said collecting means.

4. An equipment according to claim 2, wherein said scraping blade is kept engaged against the outer surface of said revolving drum by adjustable pressure means in order to obtain a required engagement pressure of said scraping blade against said drum surface.

5. An equipment according to claim 2, wherein the edge of said scraping blade opposite to said scraping edge comprises means to allow a blade swinging motion about said edge, said means comprising a pin preferably parallel to the revolving drum axis fastened to said blade and means acting on said pin to pressure engage said scraping blade edge against said drum surface.

6. An equipment according to claim 1, wherein a geared motor is operatively connected to the shaft of said drum and means responsive to said controlled valve means for selectively operating said geared motor.

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