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INJECTOR FOR DRY CLEANING APPARATUS

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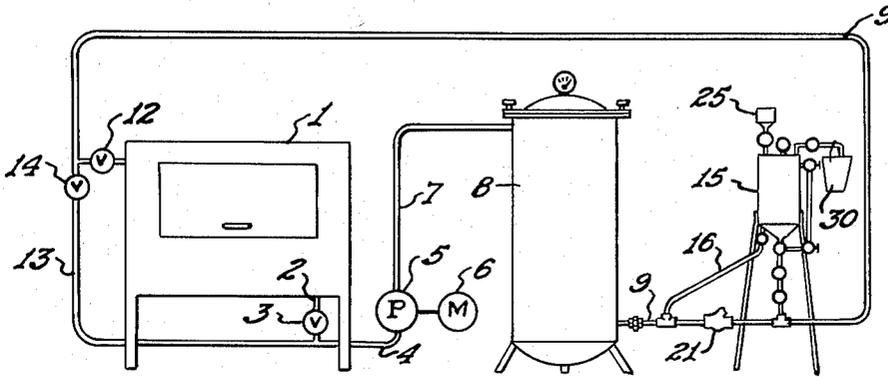


FIG. 1.

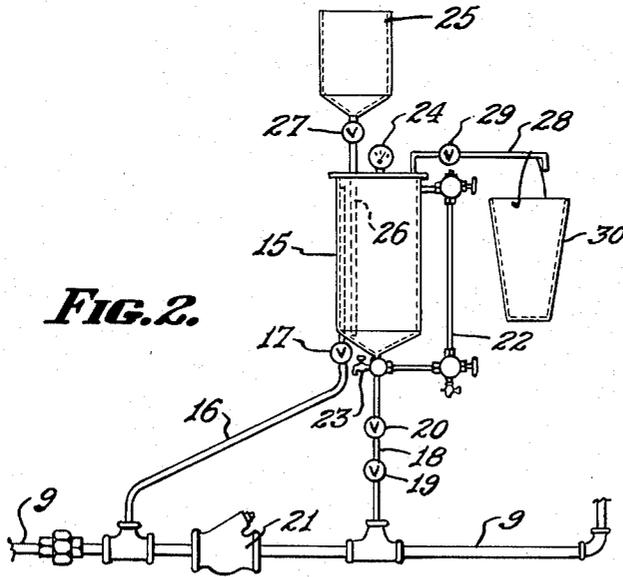


FIG. 2.

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INJECTOR FOR DRY CLEANING APPARATUS

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Application June 14, 1951, Serial No. 231,456

4 Claims. (Cl. 137—110)

This invention relates to a dry clearing apparatus and is a continuation-in-part of my application Serial No. 81,994, filed March 17, 1949 and entitled Dry Cleaning Apparatus and Method of Dry Cleaning, now abandoned. More particularly the invention has to do with an apparatus useful in connection with a dry cleaning system for the injection of a rapidly dispersing emulsion into the system. The specific injection apparatus according to my invention can be used for the injection of emulsions regardless of whether they are of high or low viscosity, as well as for the injection of pulverized and screened solids.

My invention has to do also with an apparatus combined with my novel injector, whereby the results on the garments being cleaned are much superior and much more uniform than it has heretofore been possible to obtain.

Further, my invention makes possible a novel way of utilizing dry cleaning solvents and dry cleaning soaps in order to achieve a better quality of dry cleaning.

In order that the invention may be more clearly understood, I shall first briefly describe present day dry cleaning systems. At the present time it is customary that the garments or fabrics which are to be dry cleaned are placed in a washer or agitator cylinder which contains approximately 25 gallons of dry cleaning solution to each 20 pounds of fabrics being cleaned. The dry cleaning solution may be a petroleum solvent, trichloroethylene, perchlorethylene, carbon tetrachloride, or the like. As soon as the garments or fabrics are placed in the cylinder agitation is begun, and as soon as the fabrics become saturated with the solvent, one of a number of so-called dry cleaning soaps is added directly to the cylinder of the washer. The washer cylinder oscillates back and forth—in other words it rotates somewhat in one direction and reverses and rotates in the other direction. Normally the instructions are that the dry cleaning soap is to be added during the cycle when the washer cylinder is rotating from the top of the cylinder toward the operator. The reason for this is that it is undesirable to permit the dry cleaning soap to directly contact the garments or fabrics being cleaned. The dry cleaning soaps mentioned above are sometimes known as dispersing agents or dry cleaning detergents. Normally the amount of soap added is from 0.1 ounce to 5.0 ounces per pound of fabrics being cleaned. The specific amount of soap added depends upon the type of soap being used and the type of fabrics being cleaned. Sometimes moisture is added at the same time as the dry cleaning soap.

The above described step is one of the evils of current dry cleaning processes. The insertion of the dry cleaning soap at the correct point in the cycle of oscillation of the cylinder of the washer is of the highest importance. If the dry cleaning soaps contact the fabrics directly and in improper concentrations they will cause the fabrics to clean poorly or unevenly and may cause damage to the colors, or to the fibers of the material being cleaned. Washer operators are often extremely careless in this matter and this accounts for the fact that the quality of

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dry cleaning in any one establishment will not be consistently good, even though a standard procedure is being followed.

After the so-called dry cleaning soap has been added, the fabrics are agitated in the solution of dry cleaning soap and solvent for from five to thirty minutes. After the soap run has been completed and while the washer is still continuously being agitated, the dirty solvent is withdrawn from the washer by means of a pump and forced through a filter. The filtered solvent returns to the washer and is diluted with the dirty solvent. This procedure is carried on for from five to thirty minutes, or until the appearance of the dry cleaning fluid in a sight glass in the pipe line between the washer and the filter shows the solvent to be reasonably clean.

Herein lies another evil of present day dry cleaning methods. The agitation of the fabrics in the first soap bath for from five to thirty minutes without the use of a filter, means that the fabrics are being agitated in the presence of the soil which has been broken loose from the fabrics by the soap and solvent. Since the dry cleaning soap may not, and often does not, stand up under this prolonged bath, and since static electricity builds up in the fabrics, such a prolonged agitation permits redeposition of soil on the fabrics. Here again may be found an explanation of the fact that in any given shop operating under a standard procedure, the quality of dry cleaning will vary from good, through indifferent to bad.

With the foregoing considerations in mind it is an object of my present invention to provide an apparatus for dry cleaning which will not agitate the garments being processed in the presence of unfiltered solvent, so that there is no possibility for the soap to break down or for the building up of static electricity charges which would cause redeposition of soiled particles on the fabrics.

It is another object of my invention to provide an injector apparatus for the introduction of dry cleaning soap, moisture, and/or other desired materials whereby such materials are introduced gradually and whereby they are introduced into the solvent flow line, or solvent circuit, ahead of the washer rather than directly into the washer. Thereby the contact between concentrated dry cleaning soap and fabrics being cleaned is obviated since the added material is thoroughly dispersed in the solvent before it enters the washer.

These and other objects of my invention which will be pointed out in more detail hereinafter, or which will be apparent to one skilled in the art upon reading these specifications, I accomplish by that certain construction and arrangement of parts of which I shall now describe an exemplary embodiment:

Reference is made to the drawings forming a part hereof and in which:

Figure 1 is a schematic diagram of a dry cleaning apparatus, and

Figure 2 is a detailed elevational view of an injector according to my invention.

Referring first to Figure 1 for a general description of the apparatus, a washer of conventional design is indicated at 1. Dry cleaning fluid from the washer 1 passes through a pipe 2, provided with a valve 3, through a pipe 4, to the pump 5, which circulates the fluid through the system. The pump 5 is driven through a suitable prime mover 6. From the pump 5 the fluid passes through a pipe 7 to the filter 8 which may be of usual construction and design. From the filter 8 the dry cleaning fluid passes through a pipe indicated generally at 9, back to the washer 1. At the entrance of the washer 1 there is provided a valve 12 and a bypass line 13 is provided around the washer connecting back into the pipe 4. A valve 14 is provided in the line 13 so that when the valves 12 and 3

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are closed and the valve 14 is open the washer 1 is bypassed. When the valve 14 is closed and the valves 12 and 3 are open the circuit passes through the washer.

Referring now in more detail to Figure 2, I have shown an injector comprising a tank 15. The tank 15 is provided with a connection 16, between the top of the tank and the line 9. The line 16 is provided with a valve 17. A connection 18 is made between the bottom of the tank 15 and the line 9. The connection 18 is provided with a valve 19 and a flow rate valve 20. Between the connections 16 and 18 there is in the line 9, an adjustable pressure check valve which preferably is capable of adjustments from 1 to 20 pounds. By virtue of the valve 21, when the valves 17, 19 and 20 are open a small portion of the dry cleaning fluid is bypassed through the pipe 16, through the tank 15, through the pipe 18 and back into the pipe 9. When the valves 17, 19 and 20 are closed, all the dry cleaning fluid passes straight through the line 9 against the pressure of the valve 21.

In this particular instance I have shown the connection 16 as passing up through the tank and having its terminus inside the tank adjacent the top. The tank 15 may be provided with the usual sight glass 22 and a drain cock 23 may be provided for the tank 15. The tank may also be provided with a suitable pressure gauge as at 24.

In order to charge the emulsion which is to be injected into the injector tank 15, I have provided a filling vessel 25 connected to the tank 15 by a line 26 having a valve 27 therein, and extending to a point adjacent the bottom of the tank 15. I have also provided an overflow line 28 having a valve 29 therein and any suitable receptacle for overflow may be provided as at 30.

Assuming the system to have been in operation and assuming that it is desired to charge a certain amount of emulsion into the system, the valves 17, 19, 20, 27 and 29 being closed, the emulsion to be added to the tank 15 is deposited in the filling vessel 25. If now the valves 27 and 29 are opened the emulsion in the vessel 25 will flow by gravity to the bottom of the tank 15 displacing from the top thereof an equal volume of the fluid then in the tank 15, which passes out through the overflow line 28. By virtue of this arrangement, none of the rapidly dispersing emulsion is lost through the overflow. As soon as all the emulsion which had been deposited has been charged into the tank 15, the valves 27 and 29 are again closed.

In order to inject the emulsion in the tank 15 into the dry cleaning circuit the valves 17, 19 and 20 are opened, the valve 20 being used to control the rate of flow of the emulsion in the tank 15, into the line 9.

The injector as just described can be used to inject viscous or non-viscous emulsions, liquids or solid materials in screened or comminuted form. Since the rate of flow from the injector tank into the solvent flow line can be controlled by means of the valve 20, the injection can be caused to flow very rapidly, or it may be caused to take place at a very slow rate over a considerable period of time.

It is known, in current dry cleaning practice, to subject fabrics to be cleaned to the action of a dry cleaning solvent containing a small percentage of a dry cleaning soap having as a major constituent a sulphonated mineral oil or sulphonated mahogany oil. The sulphonated bodies make the solvent water absorptive to some extent.

It is also known to subject fabrics to be cleaned to a dry cleaning soap containing a wetting agent which makes the soap solvent absorptive to a certain extent, and also lowers the surface tension and interfacial tension of any water which may be added, enabling the water to penetrate more effectively the fabrics being cleaned. This latter type of soap is at the same time an emulsifying agent which will form a water-in-solvent emulsion which breaks or disperses rapidly into dry cleaning solvent.

In connection with the use of my apparatus, I prefer the concurrent use of soaps of the types outlined above.

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Thus I intentionally lower the surface and interfacial tension of the dry cleaning solvent and of the water, and am thereby able to achieve a superior cleaning result with less residual water in the fabrics. For this reason there is less water carried in the fabrics to the extracting and drying machines, so that tendencies toward breaking down the sizing of the fabrics, and wrinkling, as well as shrinkage are reduced.

The preferred procedure using the apparatus according to my invention as described herein is as follows:

The solvent in the system is charged with about one per cent of the first type of soap mentioned above which includes as a major constituent, sulphonated mineral oil, or sulphonated mahogany oil. The fabrics to be cleaned are weighed and placed in the washer which preferably will contain solvent in the proportion of 25 gallons of charged solvent to each 20 pounds of fabrics being cleaned. Agitation of the washer is then begun. The pump is started so as to cause filter operation. A previously prepared rapidly dispersing emulsion of water, solvent and the second type of soap mentioned above is then injected from the injector. This emulsion may contain, for example, 1 part of said dry cleaning soap, 8 parts solvent and 9 parts water. Approximately one ounce of this water-in-oil emulsion is added to the injector per pound of fabrics being cleaned.

It should be noted that the injection of the emulsion can be carried on at any desired rate depending on the setting of the flow rate valve 20. The speed of injection should be determined on the basis of the time required for the garments to absorb moisture from the soap emulsion. However, the filter and washer operation will continue long enough for the water soluble and solvent soluble soils to be completely removed from the fabrics. The time required for this entire operation is usually about thirty minutes.

By the procedure outlined above, and by means of the apparatus described, the soap action on the garments and the absorption of moisture and moisture solubles by the garments is slowly and evenly accomplished, since the dispersed water bearing emulsion is spread by the injector over a wide volume of the dry cleaning fluid. Thus the added emulsion is brought into contact with the fabrics evenly and makes possible the addition of water dispersing emulsion while the filter is in continuous operation. In this manner the soil is being continuously carried away to the filter while the solvent, soap and water are breaking the soil free from the garments. Meanwhile the charge of approximately 1% of the first type of soap containing the sulphonated oil in the solvent assists in the dispersion process, and also adds a finish, "hand" or "feel," to the fabrics being cleaned. Furthermore, the continuous presence of the first mentioned type of soap in the system prevents the building up of static electricity in the solvent or the fabrics.

As briefly pointed out above, the injector described herein may be used in the system outlined above for the addition of pulverized or screened solids, such as filter powders, activated carbon, or the like, for the filter. If it is desired to add material for the filter the valves 12 and 3 are closed and the valve 14 is opened. The solid material to be charged is then placed in the filling vessel 25 and transferred to the tank 15, from whence it is injected into the line 9 as described above. The dry cleaning fluid carrying the pulverized or screened solids now bypasses the washer and goes directly to the filter. These solids are added gradually and slowly to the filter screens and build a more uniform and solid powder cake on the screens. In this manner wastage is minimized.

It will be understood from the foregoing description that the general apparatus for dry cleaning and specifically the washer, pump and filter, form no part of my present invention. My present invention relates particularly to the injector apparatus as shown in Figure 2. It will be understood that numerous modifications may be made with-

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out departing from the spirit of my invention, and I do not intend to limit myself except as set forth in the claims which follows.

Having now fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. An injector apparatus for injecting material into a fluid flowing through a flow line, comprising a tank, a connection between said flow line and the top of said tank including a valve, a connection between the bottom of said tank and said flow line, downstream from said first connection, and including a valve, an adjustable check valve in said flow line between said connections, whereby said connections and tank are filled with said fluid, means for adding material to be injected to the fluid in said tank at the bottom of said tank, and means for permitting fluid in said tank to be displaced from the top of said tank by said addition.

2. An injector apparatus for injecting material into a fluid flowing through a flow line, comprising a tank, a connection between said flow line and the top of said tank including a valve, a connection between the bottom of said tank and said flow line, downstream from said first connection, and including a valve, an adjustable check valve in said flow line between said connections, whereby said connections and tank are filled with said fluid, a filling vessel having a valved connection with the bottom of said tank, and an overflow line having a valved connection with the top of said tank whereby a quantity of material to be injected may be placed in said fluid in said vessel adjacent the bottom, and transferred into said tank by opening both of said valved connections, the displaced fluid in said tank being forced out through said overflow at the top by the addition of said material.

3. An injector apparatus for injecting material into a fluid flowing through a flow line comprising a tank, a pipe entering said tank at the bottom and extending to adjacent the top thereof on the inside, a connection between said flow line and said pipe including a valve, a connection between said tank and said flow line downstream from said first connection, and including a valve, an adjustable

check valve in said flow line between said connections, whereby said connections, pipe and tank are filled with said fluid, means for adding material to be injected to the fluid in said tank at the bottom of said tank and means for permitting fluid in said tank to be displaced from the top of said tank by said addition.

4. An injector apparatus for injecting material into a fluid flowing through a flow line comprising a tank, a pipe entering said tank at the bottom and extending to adjacent the top thereof on the inside, a connection between said flow line and said pipe including a valve, a connection between said tank and said flow line, downstream from said first connection, and including a valve, an adjustable check valve in said flow line between said connections, whereby said connections, pipe and tank are filled with said fluid, a filling vessel having a valved connection with the bottom of said tank, and an overflow line having a valved connection with the top of said tank, whereby a quantity of material to be injected may be placed in said fluid in said vessel adjacent the bottom, and transferred into said tank by opening both of said valved connections, the displaced fluid in said tank being forced out through said overflow at the top by the addition of said material.

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