May 31, 1949. C. S. ARNOLD 2,471,667

METHOD FOR DRY CLEANING

Filed Aug. 21, 1945 2 Sheets-Sheet 1

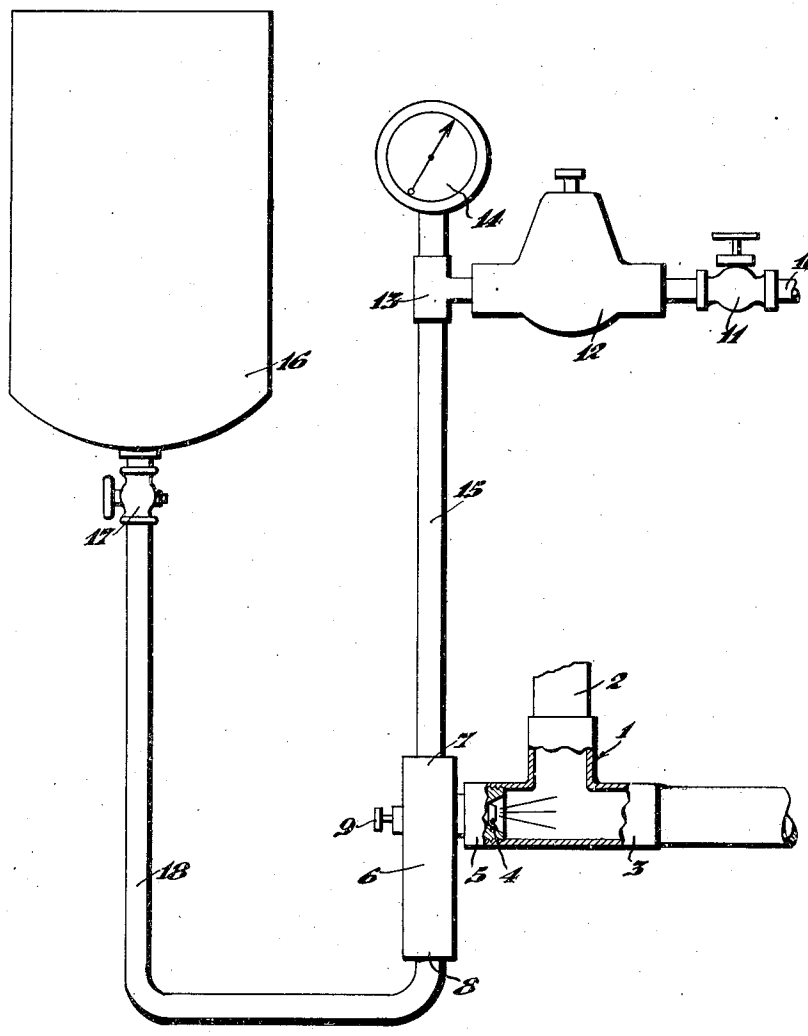


Fig. 1

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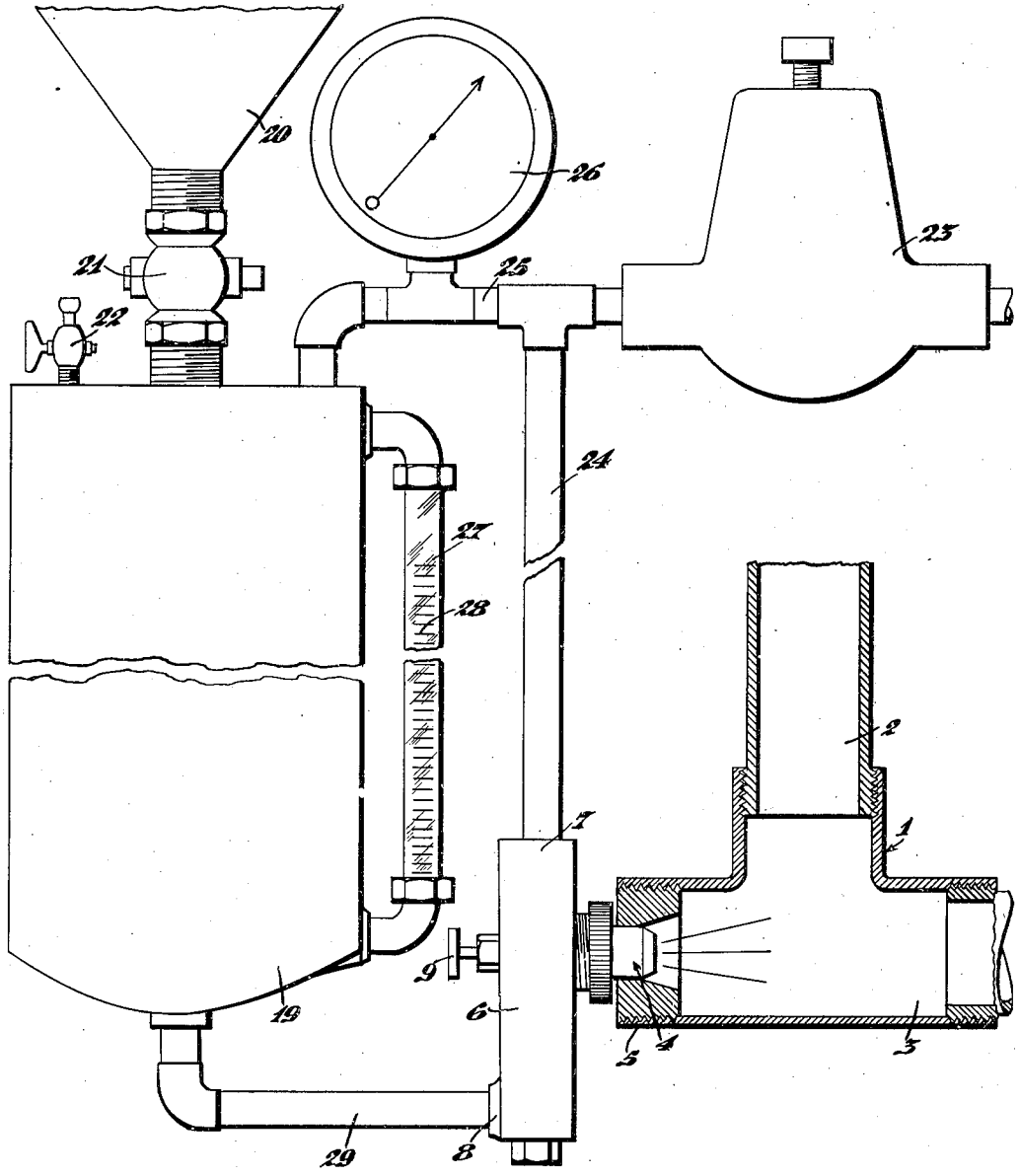


Fig. 2

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METHOD FOR DRY CLEANING

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1 Claim. (Cl. 259—4)

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This invention relates to the art of dry cleaning in which an organic solvent is employed for removing oil soluble soil from fabrics and in which water is introduced into the solvent for the purpose simultaneously of removing water soluble soil.

The invention is directed particularly to improved method for charging the solvent with water. In the moisture process of dry cleaning, for instance, as disclosed in the Reddish United States Patent No. 1,911,289, it is desirable that the water be distributed throughout the solvent in a finely divided condition; otherwise fabrics may be affected adversely by shrinking or becoming water spotted. The optimum condition of dispersion of water in the solvent is represented by a solution substantially optically clear; under such circumstances the water may be said to be absorbed by the solvent. Inasmuch as water and the dry cleaning solvent are not miscible with one another, an absorbefacient or dispersing agent usually is employed which renders the solvent receptive to the water, but even with the use of absorbefacients the exercise of some care is still required to avoid damage to the fabrics which might occur should they be exposed to solvents containing substantial quantities of moisture in an undistributed condition.

In the commercial practice of the moisture process of dry cleaning an apparatus known as a humidifier conventionally is used, which comprises a tank containing an absorbent packing into which the water quota to be added to the solvent is introduced. Dry cleaning solvent is passed around and through this packing whereby the moisture is transferred from the packing to the solvent progressively and uniformly. The humidifier serves its purpose excellently—its only disadvantage is its cost which, from the point of view of the smaller dry cleaning establishments, sometimes seems appreciable.

Briefly, in accordance with this invention, water is atomized and projected into a moving stream of solvent. Atomization of the water is produced by means of compressed air which is conveniently accessible in all dry cleaning plants where it is used for many other purposes. During atomization the volume of water to be introduced mechanically is subdivided into tiny droplets, the fineness or size of which may be governed by the construction of the atomizer nozzle and by the air pressure.

It has been proposed heretofore to utilize saturated steam as the means of charging water into solvent but the results have not been satisfactory

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for several reasons, the most important of which are the heating effect upon the solvent which is caused through the introduction of hot steam thereto, and the inability of the operator to measure or otherwise control the quantity of water added to the solvent in this manner. In accordance with the present invention compressed air conveys, subdivides and mechanically distributes the water in the solvent in a finely divided condition but has no other, or adverse, effect on the solvent, and its use creates no heating problem. At the same time, the control over the quantity of water introduced is maintained easily by measuring a given quantity of water into a container feeding to the atomizer and by continuing atomization until all the water of the measured amount is fed into the solvent.

The water, in measured amount to be charged into the solvent, may be caused to be delivered to the atomizer either by suction, by gravity feed, or by forced feed. A typical arrangement for gravity feed is shown in Figure 1 of the drawings. In this circuit dry cleaning solvent is caused to flow through a fitting indicated generally at 1, which may be in the form of a T or elbow, the solvent being introduced through one of the legs 2 and being discharged through another of the legs 3 preferably, but not necessarily, at right angles thereto. The atomizer which is indicated generally at 4 is fastened to the third leg 5 of the fitting, preferably in axial alignment with the solvent discharge from the fitting. The construction of the atomizer may be conventional; therefore, it is not described here in detail. By way of example, however, a conventional atomizer head 6 is disclosed having an air inlet 7, a liquid inlet 8 and an adjustment knob 9 which, at the interior, controls a needle valve for regulating the quantity of liquid discharged by the atomizer.

In the circuit shown in Figure 1 compressed air is delivered through a pipe 10 to a control valve 11 and then to a pressure reducing valve 12 which is connected to a T 13 having a pressure gauge 14 at its one end and an air delivery pipe 15 at its other end which, in turn, is connected with the air inlet to the atomizer head. Water to be introduced into the solvent is placed in a container 16 from which it passes, through a shut-off valve 17, to a delivery pipe 18 which is connected to the liquid inlet 8 of the atomizer head.

In the operation of this circuit dry cleaning solvent is caused to flow through the fitting 1 in a continuous stream; water is placed in container 16; the air valve 11 and the shut-off valve 17 are

opened, and the water, atomized at the nozzle 4, is projected into the stream of solvent.

The T type of fitting at the point where the spray of water contacts the solvent stream has several advantages. In the first place the solvent is required to pass through a turn or bend and at this point considerable turbulence in the solvent is created which causes a more uniform exposure of solvent to the water particles. At the same time this type of fitting enables the nozzle to be arranged in substantial axial alignment with the solvent discharge for concurrent flow of the water and the solvent, as distinguished from transverse or countercurrent flow, to promote uniform water distribution.

In the force feed type of system shown in Figure 2, a fitting and atomizer connection are employed as shown in Figure 1 and these parts therefore bear the same numerals as in Figure 1.

However, in this circuit water is poured into a container 19 through a funnel 20 which is connected with the container through a stop cock 21 while vent valve 22 is open. Compressed air is supplied to a pressure reducing valve 23, and the air from the valve is divided, part being led through a pipe 24 to the air inlet 7 of the nozzle head while part passes through a second branch 25 to the receptacle 19. The second branch carries a pressure gauge 26.

For convenience in measuring the additions of water to the solvent through the atomizer the receptacle 19 carries a sight glass 27 which may have graduations 28 thereon denoting ounces or cubic centimeters of water. Water is delivered from the receptacle through a pipe 29 to the liquid inlet 8 of the atomizer head. To place this apparatus in operation stop cock 21 and the vent valve 22 are opened and the receptacle 19 may be filled with water through the funnel 20 after which both of the valves 22 and 23 are closed. Compressed air passes through the pipe 24 to the atomizer nozzle 4. At the same time the water in the receptacle is subjected to air pressure through the line 25 and water therefore is forced through the discharge line 29 to the atomizer where it is subdivided. This circuit enables a large quantity of water to be introduced rapidly

into a moving stream of solvent and is particularly suitable for use in conjunction with dry cleaning systems of large capacity.

In the operation of the moisture introducing apparatus with the conventional dry cleaning system it is preferable to install the atomizer at a point between the washer and the filter, whereby the filter is enabled to assist in the distribution of moisture in the solvent, or to prevent the passage of any large globules of undistributed water to the dry cleaning machine where damage might be caused to the fabrics therein.

It has also been found desirable that there be a straight section of pipe, preferably at least two feet long, following the point at which moisture is introduced into the solvent by the atomizer. This allows the moisture to be distributed or absorbed by the solvent before it is impinged upon any surface which might cause coagulation or agglomeration of moisture particles. Thus, in the preferred practice the outlet pipe connected with the outlet 3 of the atomizer fitting preferably is two feet or more in length before there is a turn or bend or connection with other equipment.

Having described my invention, I claim:

A method of dispersing moisture in a dry cleaning solvent which comprises establishing turbulence at a local area in a confined moving stream of solvent, and projecting atomized particles of water, by means of an air blast directed into the moving stream of solvent at said local area of turbulence and in the direction of flow of said stream.

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