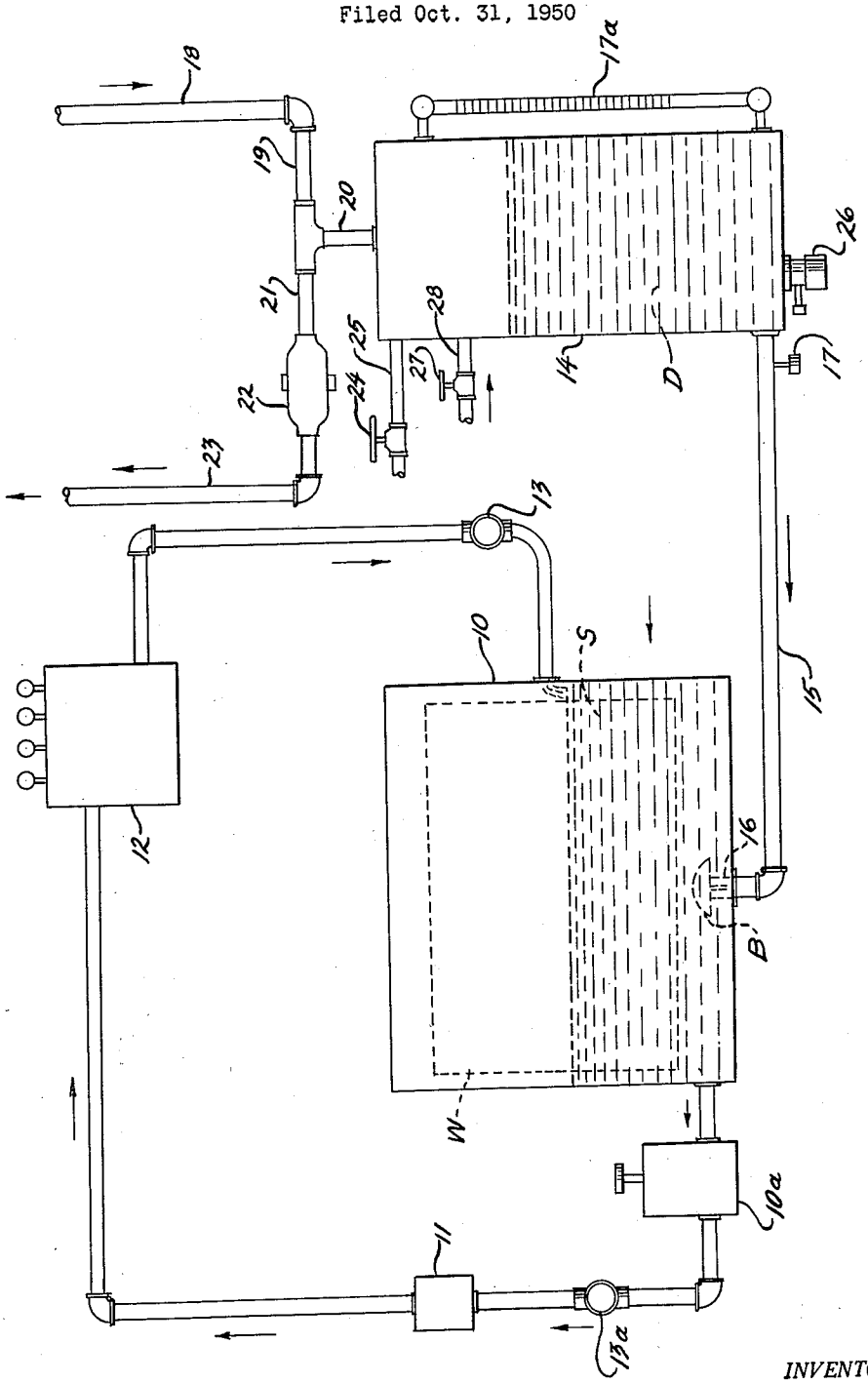
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DRY CLEANING METHOD AND APPARATUS

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DRY CLEANING METHOD AND APPARATUS

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This invention relates to dry cleaning, and more particularly to a process and means for dry cleaning with a solvent which has been charged with a detergent and an emulsifier and to which moisture will be introduced.

One object of this invention is to provide an improved apparatus for dispersing finely-divided water particles into a dry cleaning solvent containing an emulsifier and a detergent.

Another object of this invention is to provide an improved process for removing successively from garments oil soluble soil and water soluble soil in one continuous operation.

A further object of this invention is to provide an improved dry cleaning method for removing both oil-soluble soil and water-soluble soil without redeposition of soil upon the garments, thereby restoring the garments to their original brightness.

A further object of this invention is to provide a novel dry cleaning method which will not only thoroughly clean the garments, but will be beneficial to the fabrics cleaned, by virtue of supplying thereto finely dispersed moisture which will "soften" the fibers of said fabric and restore them to their original character.

A further object is to provide an apparatus of the above nature which will be simple in construction, inexpensive to manufacture, easy to install and manipulate, and very efficient and durable in use.

With these and other objects in view, there has been illustrated on the accompanying drawing one form in which the invention may conveniently be embodied in practice.

In the drawing, the single figure represents a block diagram showing schematically the improved dry cleaning system.

Referring now to the drawing, in which like reference numerals denote corresponding parts throughout the several views, the numeral 10 indicates a dry cleaning washer into which the garments to be cleaned are deposited. The washer may be of any one of the constructions well known in the art, and is provided with the usual rotating washer wheel W for flushing the cleaning solvents and other materials through the garments.

Means are provided for circulating the cleaning solvents through the washer, comprising, in series, a lint and button trap 10*a*, communicating with the bottom of the washer 10; a pump 11 for forcing the cleaning solvents through the circulatory system in the direction of the arrows; a filter unit 12 for removing soil and moisture from the

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solvents as will be hereinafter more fully explained; sight glasses 13 and 13*a* being provided for permitting visual inspection of the solvents leaving and re-entering the washer.

The solvent S contained in the washer 10 and circulated through the above-described circulatory system may be any one of the conventional cleaning solvents of the type exemplified by a volatile hydro-carbon or chlorinated hydrocarbon, the more commonly used of which are gasoline, "stoddard" solvents, carbon tetrachloride, trichlorethylene and perchlorethylene.

In accordance with this invention, at a certain stage in the cleaning process finely divided distilled water will be injected into the solvent S. Because water does not admix readily with the solvent S, it is necessary to previously add to said solvent a detergent and an emulsifier coupler, or absorbefacient, such as is commonly known in the art, in order to render said solvent capable of absorbing substantial amounts of moisture in a state sufficiently fine and dispersed as not to be injurious to the fabrics to be treated and without dissolving the sizing of the garment fibers. The detergent used may be either a "true" soap or a synthetic detergent.

In order to inject distilled water D into the solvent provision is made of a tank 14 communicating at its lower end with a non-rusting pipe 15, such as copper or brass, the other end of said pipe being connected to an atomizer 16 located in the lower end of the washer 10.

Within the washer 10 and above the atomizer 16 is a dome-shaped baffle member B which serves to prevent the water from coming into direct contact with the garments in the washer wheel W. The atomizer 16 is provided with a shut-off valve 17 for controlling the injection of distilled water into the detergent-charged solvent in the washer 10. The tank 14 is equipped with a graduated sight glass 17*a* for indicating the level of distilled water in said tank by means of which the amount of water injected into the washer may be determined at all times.

The tank 14 may be the usual condenser associated with the steam plant necessary in a dry cleaning and pressing establishment. Distilled water flows into the tank 14 through the pipes 18, 19, and 20. In the event that the tank 14 becomes full, there is provided a return path for the water to the steam plant boiler, or other return system, not shown, consisting of a pipe 21, a steam trap 22, and a pipe 23. The pressure of the steam from the pipe 18 causes the distilled water D to be injected in a finely atomized con-

dition into the washer 10. If desired, an auxiliary or substitute source of pressure may be supplied by means of an air compressor connected through a control valve 24 and a pipe 25 to the top of the tank 14.

The tank 14 is further provided with a blow-out valve 26 for either lowering the level of the water in the tank or for cleaning it out. A service water connection may also be connected to the tank 14 through a shut-off valve 27 and a pipe 28 for providing a make-up supply of tap water in case of an insufficient supply of distilled water.

Operation

In using the improved dry cleaning system herein disclosed, the garments will first be cleaned in the usual way by the detergent-charged solvents to remove the oil soluble soil. The detergent may previously be introduced into the solvent either directly into the washer or into the solvent supply tank, not shown. The solvent will be continuously cleaned by the filter 12, which removes the soil picked up by the solvent, as in the usual dry cleaning process. The valve 17 will then be turned on and the water from the tank 14, under pressure, will be atomized and injected into the bottom of the washer 10 below the solvent level thereof. The baffle B will spread the atomized water and thus prevent it from coming into direct contact with the garments, thereby avoiding any possibility of water staining or shrinking of the garment fabrics.

It has been found that best results are obtained when a sufficient amount of water is injected to turn the solvent from its normal clear color to a cloudy-milk-like color which is not optically clear. This fogging of the solvent is indicative of very finely dispersed moisture throughout the solvent. Upon the subsequent flushing of the moisture-containing solvent through the garments being cleaned, the remaining water-soluble soil, such as sugar, perspiration, food, and protein spots will be loosened and suspended in the water particles, after which the water and water soluble soil will be removed by the filter 12.

One advantage of this invention is that while most of the water in the cleaning solvent is carried away with the removed soil, part of the dispersed moisture will be absorbed by the fibers of the fabrics being cleaned in such a manner as to have a rejuvenating effect upon the garment.

Another advantage is that oil-soluble soil and water-soluble soil will be removed successively in a continuous process without danger of having the soil being redeposited in the garments.

Another advantage resides in the use of distilled water in preference to ordinary mineral-containing tap water, thus enhancing the detergent action in the removal of water-soluble soil and avoiding rusting or corroding of the apparatus and cleaning equipment.

While there has been disclosed in this specification one form in which the invention may be embodied, it is to be understood that this form is shown for the purpose of illustration only and that the invention is not to be limited to the specific disclosure, but may be modified and embodied in various other forms without departing from its spirit. In short, the invention includes

all the modifications and embodiments coming within the scope of the following claims.

Having thus fully described the invention, what is claimed as new, and for which it is desired to secure Letters Patent, is:

1. The process of dry cleaning fabrics which comprises agitating a batch of fabrics in a solution of a dry cleaning solvent and a detergent emulsifier to remove from said fabrics the dry cleaning solvent-soluble soil, and while continuing the agitation of said solution in contact with said fabrics subsequently injecting under pressure atomized finely-dispersed water particles into said solution below the surface level thereof in such a quantity as to produce a cloudy emulsion with the water particles suspended therein, continuing the agitation of said fabrics in the water-charged emulsion to remove the water soluble soil from said fabrics, removing said emulsion and solvent-soluble and water-soluble soil from said fabrics, and finally filtering the soil and water particles from said emulsion.

2. The process as defined in claim 1, in which said fabrics are thereafter rinsed in said water free filtered solution to prevent shrinkage of said fabrics.

3. In a dry cleaning apparatus, a circulatory system including a washer tank within which is a rotatable perforated tumbler barrel adapted to contain a batch of fabrics and a dry cleaning solvent charged with a detergent, means for rotating said tumbler barrel in said tank to remove the solvent-soluble soil from the fabrics therein, a first conduit, means to supply water under pressure to said first conduit, an atomizer within the washer tank and located below the surface level of said solvent and connected to the other end of said first conduit for injecting finely-dispersed water particles into said solvent after the solvent-soluble soil has been removed from said fabrics, to produce a cloudy emulsion and suspension of water in said solvent, whereby the subsequent continued rotation of said barrel and the batch of fabrics therein will remove the water-soluble soil from said fabrics, a pump, a second conduit leading from said tank to said pump, a third conduit connected to said pump and leading back to said tank, and a filter in said third conduit to remove all the soil and suspended water from said solvent before it is returned to said tank.

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