

UNITED STATES PATENT OFFICE

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DRY CLEANING PROCESS

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4 Claims. (Cl. 68—38)

My invention relates to a process of dry cleaning, and more particularly to a process of that character wherein clothing or other articles to be cleaned are subjected to a bath of non-aqueous liquid, such as gasoline, naphtha, carbon tetrachloride, tri-chlorethylene, ethylene dichloride or the like, commonly referred to as solvent or cleaners' solvent, capable of removing impurities from the clothing or other articles to be cleaned, hereinafter referred to as clothing, and in which the dirty solvent is clarified for reuse.

With some such processes, wherein only the solvent has been employed, loose dirt has been removed from the solvent by settling or centrifuging, and grease or fats by reaction with caustic soda or sulphuric acid, but with such processes some of the clarifying agent is usually taken up by the solvent and has a detrimental effect on the clothing to be cleaned with the reused solvent.

Detergents have been employed for aiding the solvents in removal of fatty acids, fats and other impurities, such as those held to the clothing by the fatty acid and fats, from the clothing, but these have usually been soaps containing excess fatty acids, and which, with those removed from the clothing, remain in solution in the solvent and cannot be removed by filtration, centrifuging or settling, and may soil garments subjected to the reused solvent.

Weak alkaline clarifiers have been employed, but unless properly proportioned to known quantities of fatty acids, fats and alkali transferred to the solvent from clothing in the washer and present in the detergent employed, an excess of the fatty acids and fats will remain in the solvent to streak or soil the clothing when the solvent is reused, and accumulate therein, so that the solvent must be treated with a strong alkali, such as caustic soda, and/or a strong acid, such as sulphuric acid, after a comparatively few reuses to recondition the solvent for further use.

I have discovered that by using an alkaline detergent formulated both qualitatively and quantitatively according to known acidic and alkaline content of the impurities removed from clothing with any of the solvents commonly employed for dry cleaning, and then treating the solvent with a clarifier capable of adsorbing the fatty acids and fats transferred to the solvent from the clothing and detergent, I am able to effect substantially complete removal of the acidic, fatty and other impurities and avoid loading of the solvent with components of either

the detergent or clarifier, and to reduce the quantity of clarifier that would otherwise be required in the proportion that fatty acids introduced into the solvent from the clothes are neutralized by alkalinity of the detergent.

Due to the fact that, although the quantity of fatty acid and alkaline content of the impurities removed from clothing may vary slightly in different localities, the soil content, including free dirt as well as fatty acid and fats, remains substantially constant, and the mass of impurities substantially uniform at 5% by weight to the weight of the clothing regardless of location, a detergent and a clarifier of substantially uniform compositions respectively may be supplied for dry cleaning according to my improved process, as presently more particularly described.

It is, therefore, the object of my invention to provide a balanced unit process of dry cleaning with non-aqueous solution including addition of an alkaline detergent to the solvent during the cleaning operation and purification of the solvent with an adsorbing agent, preferably supplied in dry form, with or without filtration of loose dirt as a separate step, the invention contemplating reversal of order of supply of detergent and clarifier to the solvent if so desired.

As my process may be employed with any of several well known bath or continuous types of dry cleaning apparatus, I have not illustrated its use with any particular form of apparatus.

The term alkaline detergent as here employed may be defined as any mixture of detergent value which disperses or dissolves in the particular dry cleaning solvent to be used, and which when shaken with twice its volume of distilled water gives a pH value to the water of greater than 7 and less than 12. The composition of the alkaline detergent should be such that all materials which would cause odor or streaks in the cleaned garments are removed by the action of the dry clarifier defined herein.

The term dry clarifier as here employed may be defined as any powder or mixture of a natural silicious base, known commercially as bleaching or adsorbing earth, including the potentially active earth of the Creede formation near Creede, Colorado, when crushed and roasted at approximately 500° F. until the total moisture content is approximately 10%, and to which there is added approximately 1.25% of an alkali, such as sodium carbonate.

One example of alkaline detergent for em-

ployment with my process may comprise a solution consisting of:—

- 76% liquid vehicle, preferably such as alcohol and/or other volatile solvents capable of dissolving a weak alkali having cleaning characteristics, 20% completely saponified material, such as corn oil saponified with caustic potash, 4% excess potassium carbonate, or other weak alkali.

- 10 An example of dry clarifier adapted for use with the detergent above stated may consist of:—

- A clay product such as obtained from the Creede formation in Colorado, activated by treatment with heat and, if necessary, alkali, to obtain a total moisture content of approximately 10% and a pH when shaken with distilled water of greater than 9 and less than 12.

- 20 Another example of alkaline detergent may consist of approximately:—

- 65 to 70% liquid vehicle, preferably such as alcohol and/or other volatile solvents capable of dissolving a weak alkali having cleaning characteristics, 20 to 24% completely saponified material, such as corn oil saponified with caustic potash, 10 to 12% excess potassium carbonate, or other weak alkali.

With the second example of alkaline detergent should be used a dry clarifier consisting of:—

- 30 A clay product such as obtained from the Creede formation in Colorado, activated by treatment with heat and, if necessary, alkali, to obtain a total moisture content of 6% and a pH when shaken with distilled water of greater than 7 and less than 10.

- With either of the above examples the alkali and fats in the detergent is completely balanced with the fatty acids and fats in the detergent plus those transferred to the solvent from the clothes so that a substantially balanced product results from the treatment to leave no appreciable amount of fatty acids and fats added with the detergent to be removed by the clarifier, and the adsorbent properties of the clarifier are balanced with alkalinity of the detergent and fatty acids and fats transferred from the clothing to effect substantially complete removal of these impurities, so that upon filtration, centrifuging or settling, the clarifying agent with its adsorbed impurities, and the spent detergent may be removed to clear the solvent for reuse.

- In dry cleaning clothing according to my processes a batch of 20 pounds of soiled garments is placed in a washing machine containing the ordinary quantity of solvent, such as gasoline, and the clothing agitated in the solvent for approximately ten minutes to remove loose dirt from the clothing, and the solvent then preferably removed, filtered and returned to the washer or replaced with a clean batch of solvent, the loose dirt being removed at this stage to avoid loading the detergent and clarifying agent with the loose soil. Any ordinary filter aid may be employed and centrifuging or settling substituted for filtration if desired.

- 4 to 6 ounces of either of the above stated examples of alkaline detergent solution is then added to the filtered cleaning solvent and the garments agitated in the bath for approximately thirty minutes.

- During this operation the soap and any volatile solvents in the detergent loosens the fatty acids and fats so that they may be removed from the clothing, and the alkaline component

neutralizes a portion of the fatty acids and fats.

4 to 6 ounces of either of the above stated examples of dry clarifier is then added to the mixture of cleaning solvent and detergent and the garments agitated in the solution of cleaning solvent, detergent and clarifier for from five to ten minutes.

During this operation any fatty acids and fats remaining in the solvent are adsorbed on the particles of clarifying agent, the clarifying agent acting as a coupling for transfer of the fats from the solvent to the excess alkali supplied by the detergent and which may be present in the clarifier as disclosed in Letters Patent No. 1,926,813, issued to me under date of September 12, 1933 the particles of clarifying agent with the impurities adsorbed thereon remaining in suspension in the solvent while the agitation continues.

The dirty solvent containing the clarifying agent and its adsorbed impurities, together with the spent detergent which is no longer soluble in the solvent, is then removed from the machine and the impurities and detergent removed from the solvent mechanically as by filtration, centrifuging or settling. The clean solvent may then be returned to the washer or stored for reuse.

The process as above stated may be varied by transfer of the clothing to another washer for treatment by a stronger detergent solution after preliminary cleaning with the solvent, and, when it is desired to leave a portion of the detergent in the clothing, the dry clarifier may be supplied ahead of the detergent for removal of impurities introduced by the clothing and left in the solvent by the detergent employed in a previous operation; the detergent, in such cases, being then added to remove stains which cannot be removed by solvent alone. The proportions and control of the cleaning material is, however, the same for either order of operation.

What I claim and desire to secure by Letters Patent is:

1. In the process of dry cleaning including application to the articles to be cleaned of a non-aqueous solvent and a detergent having alkalinity sufficient for substantially neutralizing the fats and the fatty acids in the detergent and those transferred to the solvent from the articles being cleaned, purifying the solvent with a clarifying agent having an alkaline content balanced with alkalinity of the detergent to effect substantially complete removal of fatty acids and fats in the solvent by adsorption thereof by the clarifier.

2. In the process of dry cleaning including application to the articles to be cleaned of a non-aqueous solvent and an alkaline detergent, purifying the solvent with an adsorbing clarifier having an alkaline content which, together with that of the detergent, balances the acidity imparted to the solvent from the cleaned articles and the fats present in the detergent, to neutralize such acidity and permit substantially complete removal of the fats and fatty acids from the solvent by adsorption by the clarifier.

3. In the process of dry cleaning including application to the articles to be cleaned of a non-aqueous solvent and an alkaline detergent composed of approximately 76% liquid vehicle, 20% completely saponified material and 4% weak alkali, and removal of the solvent and detergent from the articles to be cleaned, purifying the removed mixture with a clarifier having

an alkaline content balanced with that of the detergent to substantially neutralize fatty acid transferred to the solvent from the articles being cleaned and from the detergent.

tergent from the articles to be cleaned, purifying the removed mixture with a clarifier having a total moisture content of approximately 10% and a pH of approximately from nine to twelve, whereby combined alkalinity of the detergent and clarifier substantially balances combined acidity imparted to the solvent from the articles to be cleaned and from the detergent.

5 4. In the process of dry cleaning including application to the articles to be cleaned of a non-aqueous solvent and an alkaline detergent composed of approximately 76% liquid vehicle, 20% completely saponified material and 4%
10 weak alkali, and removal of the solvent and de-

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