

March 7, 1939.

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2,150,031

METHOD OF DRY CLEANING

Filed March 1, 1937

*Fig. 2.*

STAGE I

(a) Dehydrate Solvent

STAGE II

(b) Charge Fabrics to Washer

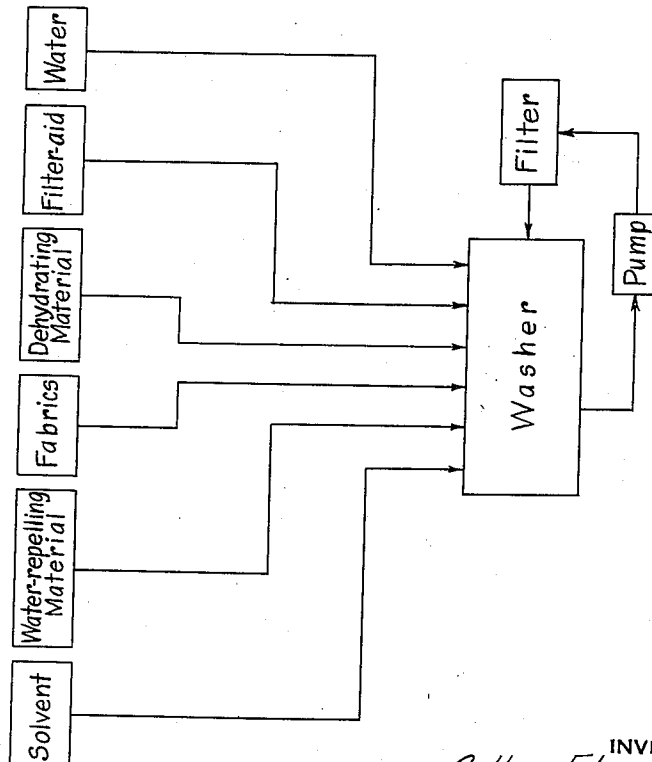
(c) Remove Greasy Soil from Fabrics

STAGE III

(d) Incorporate Water with Solvent

(e) Remove Water Soluble Soil from Fabrics

*Fig. 1.*



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## UNITED STATES PATENT OFFICE

2,150,031

## METHOD OF DRY CLEANING

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Application March 1, 1937, Serial No. 128,462

6 Claims. (Cl. 8-142)

My invention relates to a method of dry cleaning, that is, a process of cleaning garments, fabrics, textiles, and the like, by means of solvents such as light hydrocarbons, including gasoline and naphtha, and chlorinated hydrocarbons such as carbon tetrachloride or trichlorethylene and like organic solvents.

This application is a continuation in part of my copending application, Serial No. 35,832, filed August 12, 1935, now Patent 2,072,332, dated March 2, 1937.

In my Patent 1,990,691, dated February 12, 1935, I disclosed a process of dry cleaning which enabled both greasy soils and water soluble soils to be removed without the dangers and disadvantages attending the humidifying of a dry cleaning solution. In the process of my patent, I am able to accomplish the results by first rendering the fabrics water repellent and then subsequently humidifying the dry cleaning solution.

In practical operation, a dry cleaning bath is used for successive batches of clothes. After the dry cleaning solvent has been once humidified, I have found that colloidal water is dispersed throughout the solution. This water is of such small quantity that it is not objectionable in causing clothes to shrink. I have found, however, that the presence of water has a deleterious effect when greasy soils are removed. If it is attempted to remove greasy soils in the presence of water, upon the clothes being immersed in the cleaning bath, the dirt is first released from the clothes and then is redispersed because of the presence of water and redeposited upon the clothes. This results in making the clothes look hazy and dull. In order to get perfect dry cleaning, therefore, it is essential that the greasy soils be removed from the clothes and the dry cleaning solution clarified or filtered of the greasy dirt by filtration or the like, before it is attempted to remove the water soluble soils by humidifying the dry cleaning solution.

One object of my invention is to provide an improved method of dry cleaning in which the greasy soils and water soluble soils are removed in stages.

Another object of my invention is to provide a process of dry cleaning in which both greasy soils and water soluble soils are removed from the fabrics without the danger of redeposition of soil upon the clothes.

Another object of my invention is to provide a process of dry cleaning in which a dry cleaning bath is alternately humidified and rendered sub-

stantially anhydrous, and the same bath continuously used for cleaning successive batches of fabrics.

Other and further objects of my invention will appear from the following description.

In the accompanying drawing, which forms part of the instant specification and is to be read in conjunction therewith:

Fig. 1 is a schematic view showing the arrangement of the washer, pump and filter through which cyclic flow of the solvent occurs.

Fig. 2 is a chart showing the stages of my process in outline.

In general, my invention contemplates the dehydrating of the dry cleaning bath by means of a dehydrating agent after the water soluble soil has been removed by humidifying the dry cleaning bath in order that the same bath may be used for cleaning a subsequent batch of fabrics of greasy soil in the absence of water or moisture.

More particularly, I employ as a dehydrating agent a natural, hydrous silicate of alumina, known generally as "bentonite" which has the property of absorbing from ten to twenty-five times its weight of water.

Bentonite may be represented by the formula,



In the above formula,  $x$  may represent any number from 1 to 15, depending upon the dryness of the sample. The amount of chemically combined water, however, does not ordinarily exceed  $2\text{H}_2\text{O}$ . Bentonite, however, has very little chemical affinity for water. It is no more hygroscopic than any inert, powdered, argillaceous material. Bentonite, however, does not have a great physical avidity for water in liquid form. In the formula given above, the alumina may be replaced to a considerable extent by iron, lime or magnesia and, to a very limited extent, by alkali.

More particularly, I may employ as a dry cleaning solvent any of the well known agents such as naphtha, gasoline, carbon tetrachloride, trichlorethylene, and the like. The system is first filled with dry cleaning fluid. The pump is started and dry cleaning fluid is circulated from the washer to the pump, through the filter and back to the washer. Filter aid, which may be fuller's earth, diatomaceous earth, or the like, is introduced into the circulating ring of the fluid. It is understood that the filter aid may be introduced at any suitable point into the ring. A convenient place for its introduction is into the washer. The filter aid is caught upon the leaves of the filter, pre-coats the filter and precludes

its becoming clogged readily. The amount of finely divided bentonite is then introduced, together with some additional filter aid. Bentonite may be used alone, if desired. Instead of bentonite, I may employ other dehydrating agents, such as calcium chloride and the like, either alone or with bentonite. However, when the dry cleaning fluid contains considerable moisture, the bentonite alone, in absorbing water from the dry cleaning fluid, may tend to clog the filter. The addition of bentonite along with a diatomaceous earth which is highly porous will assure that resistance to flow will not build up unduly. The circulation is continued to permit any water which might be present to be taken out of the dry cleaning fluid by the bentonite which is caught upon the leaves of the filter.

In my Patent 2,072,332, I disclose the dehydration of a dry cleaning bath in which bath is dissolved a material capable of rendering the fabrics water repellant. In the instant case, the use of this addition agent is not contemplated and the process relates to a continuous use of a single bath which is charged with moisture for the cleaning of successive batches of clothes. Moisture may be disseminated through a dry cleaning bath either by a chemical dispersing agent, such as an absorbefacient or the like, or by means of mechanical dispersing devices such as viscolizers, homogenizers, or the like. Usually the moisture dispersed in less than the moisture tolerance of the fabric, that is not more than can be absorbed by the fabric without injury to the same, it being contemplated that the moisture charged will be removed from the bath by the fabrics being cleaned. I have found, however, in practice, that the fabrics do not completely absorb the moisture from the bath. The amount of moisture remaining in the bath is an unknown quantity so that, when the bath is again recharged with moisture for the cleaning of a succeeding batch of fabrics, it frequently happens that the quantity of moisture is too great, resulting in injury to the fabrics. In other words, I have observed that there is a "building up" of moisture, due to the fact that increasingly greater quantities will remain when the bath is repeatedly charged with moisture, until such quantity is present that injury is occasioned.

In order to obviate the danger of charging a bath with excessive moisture, I propose to dehydrate the bath before any moisture is charged and before the fabrics are introduced into the dry cleaning bath. In this manner, I am enabled always to control the moisture which is added without the necessity of determining the quantity of water remaining in the bath before adding additional moisture. Furthermore, by

substantially dehydrating a bath before charging a fresh bath of clothes, the danger of redepositing the soil upon clothes, due to the presence of water and thus obtaining dull or hazy work, is greatly lessened.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and sub-combinations. This is contemplated by and is within the scope of my claims. It is further obvious that various changes may be made in details within the scope of my claims without departing from the spirit of my invention. It is, therefore, to be understood that my invention is not to be limited to the specific details shown and described.

Having thus described my invention, what I claim is:

1. In a process of dry cleaning in which a dry cleaning bath is successively humidified prior to successive cleaning operations on successive batches of fabrics, the steps of dehydrating the solvent prior to each moisture charging step.

2. In a process of dry cleaning in which a dry cleaning bath is successively humidified prior to successive cleaning operations on successive batches of fabrics, the steps of dehydrating the solvent prior to each moisture charging step by contacting the bath with bentonite.

3. In a process of dry cleaning in which a dry cleaning bath is successively humidified prior to successive cleaning operations on successive batches of fabrics, the steps of dehydrating the solvent prior to each moisture charging step by contacting the bath with bentonite and a filter aid.

4. In a process of dry cleaning in which a dry cleaning bath is successively humidified prior to successive cleaning operations on successive batches of fabrics, the steps of dehydrating the solvent prior to each moisture charging step by contacting the bath with calcium chloride and bentonite.

5. In a process of dry cleaning in which a dry cleaning bath is successively humidified prior to successive cleaning operations on successive batches of fabrics, the steps of dehydrating the solvent prior to each moisture charging step by contacting the bath with calcium chloride and a filter aid.

6. In a process of dry cleaning in which a dry cleaning bath is successively humidified prior to successive cleaning operations on successive batches of fabrics, the steps of dehydrating the solvent prior to each moisture charging step by contacting the bath with diatomaceous earth and a dehydrating agent.

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