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PROCESS FOR CLEANING PILE AND OTHER
FABRICS

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This invention relates to improvements in the cleaning of pile and other fabrics including carpets and rugs, and has for an important object to provide a method for thoroughly cleaning any grade of carpeting or other textile napped floor material in situ, that is on the floor of the home or office, without appreciable detriment to texture or color of the fiber.

The accomplished objects of the invention are speedy and thorough washing and cleaning of pile fabrics on the floor of the home or office and tacked or untacked without shrinkage, without fading, without mechanical or chemical injury to pile or base, and without wetting the floor, nor an interposed carpet pad.

Heretofore, it has been common practice to clean carpets, rugs and similar textile materials in either of two well known ways. One way involves the removal of the carpet or rug from the floor and then washing the same in suitable apparatus, drying, and again sizing the back of the carpet or rug. This operation is expensive, necessitates the removal of the carpet or rug from the floor, is injurious to the material in many instances, and is objectionable from other standpoints.

The other method of cleaning carpets and rugs involves the use of a motor driven brush with a liquid detergent on the rug or carpet while it is in position on the floor. Shrinkage of the material takes place in many instances and results in distortion and tearing if the material is fastened in place, to say nothing of the wear on the nap of the material by the brush.

A very important advantage in my process is that there is no shrinkage of the moistened material. In brush scrubbing of carpeting shrinkage is considerable. Operating, for example, on a nine by twelve Wilton rug, the shrinkage in length is from two and one-half to three inches and the shrinkage in width is from one and one-half to two inches. Where the rug is fitted to the room shrinkage spoils the fit. If the rug is fitted and tacked to the floor and if an attempt were made to wash it by the old methods, tearing would occur and the carpeting no longer fits the room.

The success of my method seems primarily to depend on application by spraying, and the use of a water solution of a neutral detergent compound, and the employment only of vacuum for the removal of that solution with its contained dirt or foreign matter. By my method all of the detrimental effects of wet-brushing are avoided, soaking of the base of the carpet is avoided and

air is sucked through the base threads of the carpeting from the floor side upwardly along the nap towards the outer terminals of said nap to obtain thorough drying. There is no violent brush-grinding of the nap, nor any folding, rolling, tumbling or other handling of the covering such as is necessary in the old schemes.

The common and frequent use today of the new patented types of twisted yarns adds to the difficulty of cleaning without detriment. I have found that my process will wash the cheapest carpets with no appreciable detriment, and a special feature of the invention is that the carpets can be washed in situ, that is, on the floor, and can be properly dried on the floor. This is a very important feature. Heretofore, it was always necessary to take the carpeting off of the floor, send it to the cleaners, clean it, return it and then relay it.

Of course it is well known to all carpet cleaners and probably to most housewives that home vacuum devices do not clean carpets, but only suck up the surface particles of dust or loose dirt, without removing the dulling and discoloring foreign incrustation on the fibers. Incidentally, with certain types of home vacuum machines which have brushes combined with vacuum, much of the small amount of wool of some rugs is found in the bag of the vacuum cleaner. Brushes are detrimental to all carpeting.

In a study of carpet wools, carpet fillers other than wool, and carpet cleaning, over a period of twelve years and by various washing tests on various carpets, I have proved by scientifically conducted tests, including careful microscopic examinations, color tests, etc., that brush scrubbing of a wet carpet is very detrimental and that the soaking of the entire carpet with water does not thoroughly remove the dirt, and leaves the carpet streaked and spotted after the operation.

My method consists in heating water to about 140 to 170° F. and then highly atomizing the same (by adding hot air at the nozzle) and applying the atomized water in a fine spray, preferably avoiding deep penetration into the base. I next spray the carpet with a warm water solution of a neutral detergent compound, the spray preferably being of round form (as distinguished from flat) and the detergent solution being highly atomized before application and being applied in the same manner as the water. I next use a vacuum apparatus to remove the solution and its contained dirt, and if, as does occur in some cases, the rug has been badly spotted by use, a second application of the detergent is made

around these spots and vacuum is again used. All treatments with detergent should be made before the acetic acid is applied, as hereinafter described.

5 After the vacuum removal of the detergent solution and dirt contained therein, I then apply a highly atomized spray solution of acetic acid, or equivalent, the object of which is to thoroughly free the fiber and base of any remaining
10 detergent, the action being to effect a thorough loosening of the soapy film, and to assist in drying. The drying action of the acetic acid is an important feature, because by varying the amount or proportion of acetic acid, a greater or
15 lesser degree of drying can be accomplished. This enables me to wash carpets on the floor of the home. Of course, the use of vacuum and acetic acid results in the removal of any water which may have entered the base material of the carpet, but the liquids are ordinarily so controlled, by
20 spray application that penetration into or through the base material does not occur. Generally there is no need for penetration nor is it advisable that the liquids penetrate the base.

25 I next use the vacuum to finally remove all liquid and to effect thorough drying of the material, and to remove any residual detergent. If desired the carpet may be repeatedly gone over with a vacuum apparatus. In drying carpeting
30 on the floor, the amount of acetic acid is generally increased to hasten drying, as well as to thoroughly neutralize the previously applied detergent chemical.

The neutral character of the detergent or
35 cleaning fluid is important, and specifically the use of this material as part of the process is claimed, although the invention as a process is broader than the specific composition of the detergent used. The detergent material per se is
40 covered in another application copending herewith.

In the preparation of the cleaning or detergent compound I use natural raw bentonite, in powdered form of about 300 mesh. I add to and mix
45 with about 20 pounds dry weight or about 50 pounds wet weight of the bentonite about 5 gallons of heated water, preferably distilled water. This mixture is then heated in a closed vessel to about 190° F. and at this temperature there is
50 introduced into the closed receptacle about 55 cc. of 56 percent water solution of acetic acid, which has a temperature of about 150° F when introduced. About five minutes after the introduction of the acetic acid the receptacle is opened.

55 After the bentonite-acetic acid product is cooled and filtered and after it cools to a temperature of about 85° F., and preferably not less than 70°, six and one-half pounds of trisodium phosphate is added. A whipper or stirrer is then
60 used and the substance is stirred for about four and one-half hours. During this stirring period I add one-half pound portions of soda ash every half hour, the total amount added being about four pounds. At the end a very thick
65 heavy mass is formed and it is transferred to a storage compartment and quart portions of distilled water are added, the total quantity added being about 20 gallons, making about 38 gallons of the material in all. Under steam the mass of
70 non-alkaline bentonite forms a jelly and the volume is increased as much as ten times. Other substances can be used, such as whiting or chalk.

Into a separate open tank is now put about 50
75 pounds of commercial olive oil foots. The foots have gone through a salting process in which

after each salting the upper part of the tank in which it is contained is thoroughly cleaned with a fine screen, preferably 75 mesh. To the salted olive oil is then added a solution of about one and
5 one-half pounds of dry lye in about one gallon of water, the water being added a little at a time. The addition of the lye to the oil is made at a temperature of about 400° F. Thereafter about two pounds of common salt is added over a period
10 of four hours. The tank should be only about one-half full at any time. The object of the salt is to extract as much of the free alkali as possible. The batch is now allowed to slowly cool (while being agitated) to a temperature of about 80° F. which ordinarily takes about
15 hours, and at this temperature of 80° about 100 pounds of distilled water is added, about one gallon at a time. The final result is a neutral soap stock which is about 94 to 97.5 pure.

After salting the soap is added to the bentonite-
20 acetic acid solution and the whole is whipped for about 6 hours very slowly. Slow whipping is very important. The whipper arm makes only about 15 to 20 turns per minute. After about 6 hours whipping, the product is dumped into a
25 larger storage tank and for each part by weight of the compound there is added two parts by weight of water. It is preferable to underwater, than to overwater. More uniformity can be obtained by underwatering and the process can be
30 more accurately controlled. After complete chilling the material is finally filtered, preferably in a pulp filter, and is then bottled in air tight containers. Before it is used one gallon is diluted
35 to five gallons of distilled water, and the water is preferably hot and is added just before using.

Any preferred type of steamer can be used for heating the soft water and the water is heated to a temperature of approximately 160° to 170°
40 before it is atomized, and is applied as a spray in the first step of the process. A compression tank is used for the water and the air is supplied by a small apparatus delivering air at a pressure of 100 to 110 pounds at the nozzle of the spray gun. A very fine spray is obtained, and should be obtained, and the spray contains about 70 to 75
45 percent of air.

This spray is so applied that most of it lies on the surface or upper part of the pile. Most of the dirt or sticky substance is on the surface of the
50 pile and not on the base of the fabric. Usually the detergent material is applied about three minutes after the application of water and air spray, and this liquid is also applied by air spraying through the same atomizing nozzle which is
55 used for the application of the water.

In less than about 2½ minutes from the time of the application of the detergent solution, penetration over the entire pile of the fabric begins and extends to a depth of ½ to ¾ of an inch.
60 In some instances it may extend to the base and in fact I have found that by this method the upper side of the base is cleaned and has the appearance of new carpet. After application of the solution the vacuum of course is used which
65 lifts the water and solution mixture from the carpets. As before stated if there are some spots made by oil, tar, etc., which have not been removed by the first treatment with the detergent, more detergent is applied to these spots. The detergent solution does not leave rings nor does it
70 itself spot the carpet in any manner. It is highly important that all "spotting", that is, removal of spots of oil and tar, be accomplished before the final operation which I consider to be not only
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neutralizing and drying, but antiseptic in character. If the spray antiseptic or neutralizing spray is applied to the spots left on the carpet it will be difficult if not impossible to remove the spots thereafter. For this reason no "spotting" should be attempted after the antiseptic or drying spray is applied.

The antiseptic or neutralizer is composed of about 65 percent of wood vinegar (acetic acid) about 2 percent of oxalic acid and about 5 percent of alum. This solution also acts as a cutting agent and cutting agents of other kinds may be applied. As before stated the vacuum is applied over the whole carpet following application of the cutting agent, and warm dry air may be applied to hasten final drying.

The vacuum operation may in some instances be repeated to assist in drying and the carpet should be thoroughly dried. I have found that with this process and the final application of warm air, the carpet is quickly dried.

In my process, all applications of liquid or chemical are applied by spraying which spraying is so controlled as only to thoroughly moisten the pile. By spraying, the liquid is not only not driven through the base of the carpet, but it is very uniformly applied. By my method a stair carpet can be successfully washed while on the floor while the usual pads remain beneath. And the same is true for rugs in homes where a pad is interposed between the rug and the floor. Even "needle-point" upholstered chairs can be cleaned by this method without removing the upholstery. And this is accomplished in part by careful control of the spray at reduced pressure, or by spreading or more finely atomizing.

The soft water, which can be obtained by the use of zeolite, is heated to about 160° F., and is delivered at the nozzle at about 100° F. It hits the carpet at about 85° F. The air from the compressor tank may or may not be heated but preferably is heated.

The soap compound is applied so as to hit the carpet at about 80° F. and the acetic acid should be at about a temperature of 70° preferably 60° when it hits the carpet. It may be said that the temperature range for application of the water and soap is from 60 to 85°, and the application temperature for the acetic acid may range between 60 and 70°.

I have found operating with soap prepared without bentonite, and experimenting with a nine by twelve rug, that the drying time is 45 minutes longer than when bentonite is used and that under those conditions twice as much liquid is required. While I believe that my invention is not entirely limited to the use of a detergent having an absorbent incorporated therein, I consider such incorporation important.

Whatever compound is used it is preferred that it be washed out by water or by suitable chemical, and in my process the removal of moisture is accomplished by vacuum. The use of acetic acid or its equivalent is advisable to get the best results. That is, the use of acetic acid or some equivalent chemical, so acting on the soap as to change its condition to make it more easily removable with its contained dirt is of great advantage.

An important point is to so operate as to substantially prevent wetting of the base of the carpet, but so that substantially the entire length of the pile is moistened (not soaked). I distinguish between wetting or soaking and moistening. By the wetting I mean so saturating the

carpeting that there is decided volume of overflow onto and sometimes into the base material. By moistening I mean an operation in which the liquid material is spread uniformly but somewhat lightly and so as not to be driven into or through the base material. It will be understood that most of the loose dirt is at or on the top surface of the base of the carpet. It is the pile which is caked with the foreign substances generally of gummy coal tar nature mixed with fine particles of sand or gravel dust, and sand and coarser foreign materials which has sifted through the pile to the top surface of the base is removed by vacuum. It is therefore unnecessary and undesirable to wet the base of the carpet.

In so far as I am aware this method is the only brushless method of washing for really cleaning carpets. The process is completely harmless and I avoid a straight suction vacuum process with a motor driven brush. These motor driven brushes of vacuum machines have submitted modern type of floor covering to a great deal of unnatural wear. Probably twice as much wear as from the ordinary foot pounding which occurs under normal conditions of use. The process is harmless, but speedy. The light application of proper liquids uniformly without saturation, and the use only of vacuum to remove moisture and the other gritty material from the pile and base is important.

I claim as my invention:

1. A brushless process for cleaning pile fabrics which consists in applying a mist-like spray of water and air to the fabric pile in quantities insufficient to penetrate to the base of the fabric to any appreciable extent and to provide a substantially continuous film of water over the surface of the fabric, then applying a liquid detergent as a mist-like spray to the fabric pile and in such quantity as not to materially wet the base of the fabric, and then removing the detergent and loosened dirt by suction.

2. A brushless process for cleaning pile fabrics which consists in applying a mist-like spray of water and air to the fabric pile in quantities insufficient to penetrate to the base of the fabric to any appreciable extent, then applying a liquid non-neutral detergent as a mist-like spray to the fabric pile and in such quantity as not to materially wet the base of the fabric, then removing the detergent and loosened dirt by suction, then applying a liquid spray capable of neutralizing any of said detergent remaining in the fabric, and then applying suction to remove the applied substance and dry the fabric.

3. A brushless process for cleaning pile fabrics which consists in applying a mist-like spray of water and air to the fabric pile in quantities insufficient to penetrate to the base of the fabric to any appreciable extent, then applying a liquid alkaline detergent as a mist-like spray to the fabric pile and in such quantity as not to materially wet the base of the fabric, then removing the detergent and loosened dirt by suction, then applying to the fabric a liquid spray having an acid reaction, and then applying suction to remove the applied substance and dry the fabric.

4. A brushless process for cleaning pile fabrics which consists in applying a mist-like spray of water and air to the fabric pile in quantities insufficient to penetrate to the base of the fabric to any appreciable extent and at a temperature of from substantially 70° to 90° F. when it reaches the fabric, then applying a liquid detergent con-

5 taining a soap base as a mist-like spray to the fabric pile in such quantity as not to materially wet the base of the fabric and at a temperature of about 80° when it reaches the fabric, and then removing the detergent and loosened dirt by suction.

10 5. A brushless process for cleaning pile fabrics which consists in applying a mist-like spray of water and air to the fabric pile in quantities insufficient to penetrate to the base of the fabric to any appreciable extent and at a temperature of from substantially 70° to 90° F. when it reaches the fabric, then applying a liquid detergent containing a soap base as a mist-like spray to the fabric pile in such quantity as not to materially wet the base of the fabric and at a temperature of about 80° when it reaches the fabric, then removing the detergent and loosened dirt by suction, then applying a liquid spray capable of neutralizing any detergent remaining in the fabric, and then applying suction to remove the applied substance and dry the fabric.

25 6. A brushless process for cleaning pile fabrics which consists in applying a mist-like spray of water and air to the fabric pile in quantities insufficient to penetrate to the base of the fabric to any appreciable extent, then applying a detergent containing a soap base and bentonite as a mist-like spray to the fabric pile, then applying a liquid spray of a substance which reacts with the detergent to decrease its filming action, and then applying suction to remove the applied substance and dry the fabric.

30 7. A brushless process for cleaning pile fabrics which consists in applying a mist-like spray of

water and air to the fabric pile in quantities insufficient to penetrate to the base of the fabric to any appreciable extent, then applying a detergent containing a soap base and bentonite as a mist-like spray to the fabric pile, then applying a liquid spray containing acetic acid which reacts with the detergent to decrease its filming action, and then applying suction to remove the applied substance and dry the fabric.

10 8. A brushless process for cleaning pile fabrics which consists in applying a spray of warm soft water to the fabric in quantities insufficient to penetrate to the base of the fabric to any appreciable extent, then spraying with a solution of a detergent containing a soap base in which bentonite and acetic acid are incorporated, then spraying on a substance which contains acetic acid and which reacts with the detergent to decrease its filming action, and then applying suction to remove the applied substance and dry the fabric.

15 9. A brushless process for cleaning pile fabrics which consists in applying an alkaline liquid detergent as a mist-like spray to the fabric pile and in such quantity as not to materially wet the base of the fabric and to provide a substantially continuous liquid film over the surface of the fabric and at a temperature of about 80° F. when it reaches the fabric, then removing the detergent and loosened dirt by suction, then applying a liquid spray having an acid reaction and capable of neutralizing any detergent remaining in the fabric, and then applying suction to remove the applied substance and dry the fabric.

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