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PILE FABRIC CLEANING METHOD AND MATERIAL

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This invention relates to methods of and materials for cleaning pile fabrics, particularly adapted to replace the usual shampooing and solvent or dry cleaning processes. This application is a continuation-in-part of application Ser. No. 209,632, filed on May 23, 1938.

In caring for pile fabric floor coverings, household cleaning suffices for a superficial cleaning but periodically a more thorough cleaning is required to remove dirt that adheres to the grease or oil film that accumulates on the fibre surfaces. For that purpose shampooing and dry cleaning have been employed, but these practices have many disadvantages. If the rug or carpet is shampooed on the floor, as is common, the major portion of the dirt is not removed but is merely displaced from the visible surface of the pile to the bases of the pile tufts, and the fatty soap residues which remain in the fabric induce rapid resoiling, bleeding of the dye, and cause the pile to crush or mat readily. If the floor covering is taken up, thoroughly shampooed and rinsed and then relaid, it may be cleaned satisfactorily, but usually there is considerable shrinkage and temporary loss of use results. Neither of these methods can effectively be used on fabrics having a hard twisted pile as the twist will be removed. To obviate shrinkage and to clean twisted pile, dry cleaning organic solvents have been used, but they are almost prohibitively expensive and large carpets cannot readily be handled in commercial dry cleaning equipment.

The object of the present invention is to provide a method of cleaning pile fabrics of all sorts, including hard twisted pile, on the floor, which will effectively remove dirt and leave no deleterious residues. Our further purpose is to provide a cleaning material for that use. The material consists of a moist powdery mixture of a volatile grease solvent and a pulverulent absorbent material which effectively absorbs the dirt particles liberated when the grease is dissolved by the solvent. Subsequent removal of the absorbent material, as by vacuum cleaning, removes the dirt with it and leaves the fabric clean and bright.

We have found that cleaning compounds of the sort heretofore suggested for cleaning fabrics that have no pile cannot be used effectively for our purpose of cleaning pile. Such prior compounds either do not penetrate the pile sufficiently to clean to the depth required or, if penetration is effected, the cleaning compounds

cannot thereafter readily be removed, but leave the pile with an objectionable dusty grayish appearance. In accordance with our invention, we provide an absorbent material of such character and state of subdivision that when mixed with a predetermined quantity of a certain type of solvent a moist powder material of high detergent properties is produced which can readily be brushed thoroughly into the pile for intimate contact with the soiled fibres at and below the soil level and which thereafter can easily be removed so that a thorough cleaning results without leaving unsightly or harmful residues.

The absorbent component of our novel cleaning material preferably consists of bentonite, but we may use other colloidal clays such as fuller's earth or other materials such as woodflour. We have discovered that the absorbent material of whatever sort must be within a limited range of fineness so that when mixed with a liquid solvent in the proportions noted below the moist powder thus formed can be made to penetrate the pile sufficiently, can be easily removed, and will clean thoroughly. A material that is too coarse cannot be made to penetrate the pile to and below the soil level and excessive coarseness also detracts from the cleaning efficacy of some absorbents. On the other hand, material that is too fine clings to the tuft surfaces and cannot readily be removed. When bentonite is used, as is preferable, it should not be coarser than approximately 100 mesh nor finer than 325 mesh or thereabouts, and we prefer approximately 200 mesh. Most types of fuller's earth, on the other hand, have less absorbent properties at 200 mesh than at 325 mesh, and accordingly we prefer the latter size for such absorbents, but 200 mesh bentonite is preferable because of the facility with which it can be removed. We have also successfully used woodflour coarser than 200 mesh in place of clays.

We have also found that only certain kinds of solvents in a limited range of proportions, relative to the quantity of absorbent material, may be used. The solvent must, of course, readily dissolve grease, and we prefer a volatile organic solvent which evaporates fairly rapidly so that the cleaning process can be completed within a reasonable time and yet evaporation must not be so rapid that the solvent is lost during application of the material to the carpet. It must not form a jelly with the absorbent material which is difficult to remove. In general, we prefer a hy-

drocarbon with a high flash point, good solvent power and moderate evaporation rate. Thus, we may use one or more petroleum naphthas such as V. M. & P. naphtha or Stoddard solvent, and of these we prefer the latter. Both are good grease solvents. Although the first is considerably more rapid in its evaporating rate than the latter, both are suitable. To eliminate any possibility of fire hazard, we may add to such petroleum naphthas a non-inflammable solvent such as carbon tetrachloride. However, we prefer not to use carbon tetrachloride alone in the absence of suitable provision for inhibiting evaporation during application because of its toxicity and excessively high rate of volatilization.

The proportion of solvent to absorbent is critical within limits. We have found that best results are obtained when the proportions are such that the material, when applied, is in the form of a moist powder. That is, it should be sufficiently moist to avoid dusting during application as would occur with a dry powder, and it should not be pasty because a paste cannot readily be brushed into the pile to the depth necessary for thorough cleaning as can a moist powder of the type provided by our invention. Generally speaking, we prefer about 5 or 6 gallons of solvent to 100 pounds of dry absorbent, and although this proportion may vary somewhat, less than 3 gallons of solvent is usually too dry and over 7 gallons tends toward pastiness. The moist powder consistency should obtain when the material is first deposited and the use of 5 or 6 gallons of solvent allows for the slight evaporation that usually occurs while the material is being applied. If hooded equipment is used to inhibit evaporation during application the amount of solvent may be reduced considerably and in instances to as low as one or two gallons per 100 pounds dry absorbent.

As a specific example of our preferred formula, we use 100 pounds of 200 mesh bentonite with 5.25 gallons of solvent composed of equal parts by weight of Stoddard solvent and carbon tetrachloride. The solvent is added to the dry powder with agitation in a suitable mixer until an even, moist-powder consistency is obtained. The moistness of the powder should be preserved until the material is to be used and if it is to be stored or shipped prior to use the containers should be sufficiently air tight to inhibit solvent evaporation.

In cleaning a pile fabric floor covering with our novel preparation the material is first spread in a thin layer over the pile surface. The pile is then brushed to distribute the composition and cause it to penetrate into the pile. Any excess remaining on the surface of the carpet may be immediately removed by a vacuum cleaner, although this is not essential. After allowing the solvent to evaporate, the fabric is thoroughly vacuum cleaned to remove the remaining compound. For this purpose the vacuum cleaner preferably should first be run against the pile to loosen the deposited material and then in the opposite direction to take out the remainder and smooth the pile surface. Usually it will be found that the compound readily yields to this treatment, and we attribute the ease with which our material may be removed to the fact, partly, that the evaporation of solvent after the material has been applied reduces it to a dry dusty powder which readily yields to vacuum cleaning. However, should any

objectionable trace of material remain after vacuum cleaning, it can readily be removed by lightly sprinkling or spraying the pile with water and, after allowing the moisture to sink into the pile, again running over it with a vacuum cleaner.

In practice we have found that a pile fabric which has been cleaned by the above described method using our novel material has a clean bright pile that contains no noticeable residue of cleaning material. There is no residual odor that is in any way objectionable. The process is extremely simple and can be used by the housewife as it presents no danger from inflammability or toxicity.

Whereas the kind, type and proportions of absorbent material and solvent may be varied somewhat without departing from the spirit of our invention, we prefer to employ materials substantially as set forth herein. Our invention is not, however, to be limited to such details except as indicated in the appended claims and in those claims when we speak of "absorption" or an "absorbing material" we refer generally to the taking up of the dirt, etc., by the powdery material regardless of whether, technically, absorption or surface adsorption occurs.

We claim:

1. The method of cleaning a pile fabric having soil deposited to a depth below the surface equal to only a portion of the pile height, which consists in enveloping said portion of the pile tufts with a mixture of absorbent and solvent while avoiding any substantial deposit of material below said depth by applying to the surface of the pile a thin layer of a mixture of finely divided colloidal clay powder of a size between approximately 100 and approximately 325 mesh and a volatile, water-immiscible grease solvent, which does not form a jelly with the clay, in proportions to moisten the powder without forming a paste, and brushing the mixture into the pile until most of it has disappeared from the surface thereof, thereafter allowing the solvent to evaporate and finally removing the dry absorbent and with it the dirt absorbed thereby.

2. The method of cleaning a pile fabric having soil deposited to a depth below the surface equal to only a portion of the pile height, which consists in enveloping said portion of the pile tufts with a mixture of absorbent and solvent while avoiding any substantial deposit of material below said depth by applying to the surface of the pile a thin layer of a mixture of finely divided colloidal clay powder of a size between approximately 100 and approximately 325 mesh and an amount of volatile, water-immiscible grease solvent, comprising a substantial proportion of petroleum naphtha sufficient to moisten the powder without forming a paste, and brushing the mixture into the pile until most of it has disappeared from the surface thereof, thereafter allowing the solvent to evaporate and finally removing the dry absorbent and with it the dirt absorbed thereby.

3. The method of cleaning a pile fabric which consists in enveloping the upper portions of pile yarn fibers with a mixture of absorbent and solvent while avoiding any substantial deposit of material deeper in the pile than said upper portions, by applying to the surface of the pile a thin layer of a mixture of finely divided powdery absorbent material of a size between approximately 100 and approximately 325 mesh and a volatile, water-immiscible grease solvent compris-

ing in substantial proportion a material chosen from the group consisting of V. M. P. naphtha, Stoddard solvent and carbon tetrachloride, the solvent being present in an amount to moisten the powder without forming a paste, and brushing the mixture into the pile until most of it has disappeared from the surface thereof, thereafter allowing the solvent to evaporate and finally removing the dry absorbent and with it the dirt absorbed thereby.

4. The method of cleaning a pile fabric having soil deposited to a depth below the surface equal to only a portion of the pile height, which consists in enveloping said portion of the pile tufts with a mixture of absorbent and solvent while avoiding any substantial deposit of material below said depth by applying to the surface of the pile a thin layer of a mixture of powdery colloidal clay divided into particles of between approximately 100 mesh and 325 mesh mixed with an organic volatile, water-immiscible grease solvent in the proportions of being approximately 3 and 7 gallons of solvent per 100 lbs. of dry clay, and brushing the mixture into the pile until most of it has disappeared from the surface thereof, thereafter allowing the solvent to evaporate and finally removing the dry absorbent and with it the dirt absorbed thereby.

5. A cleaning composition for removing from pile fabrics dirt deposited to a soil level depth below the surface of the pile equal to only a portion of the pile height, comprising an absorbent powder of an average particle size of between approximately 100 and approximately 325 mesh and a volatile water-immiscible grease solvent mixed with the powder in proportions of between 3 and 7 gallons of solvent per 100 pounds of dry powder to moisten the powder without forming a paste or a jelly, the solvent having a rate of evaporation so low that the composition has the property of remaining moist while being brushed into the pile and the property of being thereby worked into the pile down to, but not substantially below, said

soil level, the moist powder composition having, due to its small particle size, a large solvent-carrying surface compared to its volume and having the properties of dissolving grease which attaches dirt to the pile, of adsorbing grease on the particles of powder and of loosening the dirt from the pile, said grease solvent being of such volatility as to have the property of readily evaporating from below the pile surface after said adsorbing to leave a substantially dry powder in the pile substantially all above the soil level and capable of being readily removed by a vacuum cleaner.

6. A cleaning composition for removing from pile fabrics dirt deposited to a soil level depth below the surface of the pile equal to only a portion of the pile height, comprising an absorbent powder of an average particle size of approximately 200 mesh and a volatile water-immiscible grease solvent mixed with the powder in proportions of between 3 and 7 gallons of solvent per 100 pounds of dry powder to moisten the powder without forming a paste or a jelly, the solvent having a rate of evaporation so low that the composition has the property of remaining moist while being brushed into the pile and the property of being thereby worked into the pile down to, but not substantially below, said soil level, the moist powder composition having, due to its small particle size, a large solvent-carrying surface compared to its volume and having the properties of dissolving grease which attaches dirt to the pile, of adsorbing grease on the particles of powder and of loosening the dirt from the pile, said grease solvent being of such volatility as to have the property of readily evaporating from below the pile surface after said adsorbing to leave a substantially dry powder in the pile substantially all above the soil level and capable of being readily removed by a vacuum cleaner.

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