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## CLEANING COMPOSITION

Chester G. Gilbert, Washington, D. C., assignor to Research Corporation, New York, N. Y., a corporation of New York

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This invention relates to detergent aids known in the trade as "cleaning powders" and to methods of preparing the same.

An object of the present invention is the provision of a cleaning powder of new and superior merit for general purpose use but more specifically adapted for cleaning fine surfaces such as those of window glass, modern bathroom equipment, and the enameled and lacquered appurtenances to the modern kitchen. In this connection it is significant that in the face of enormous advance in the development of surface finishes, the past twenty years have seen practically no advance in the means for their cleaning and preservation.

Cleaning or scouring powders consist typically in two essentials, one in the form of solubles comprising detergents such as soap, sodium carbonate and borax or reactive chemicals; the other in the form of inert solids usually in the form of grit to contribute a scouring action.

To fulfill its scouring requirement the grit, usually constituting seventy to ninety-five percent of the total, must possess a resistive strength or hardness comparable to that of the surface to be cleaned or at least of the coating to be removed, softer bodies tending to break down and slime rather than scour. In meeting this along with other requirements the range of materials used narrows down essentially to volcanic ash or pumice, crushed silica, crushed feldspar, and diatomaceous earth. Whether used in its natural condition, as in the case of volcanic ash and diatomaceous earth, or crushed to the required fineness, as in the case of quartz or feldspar, the grit in all instances is more or less sharply angular; and in consequence its functioning as a scouring agent is in the nature of a scraping or scratching action. In an effort to minimize the damaging effect of scraping or scratching action, the practice has been to reduce the grit to a fineness such that scratching is as imperceptible as possible. For use on metal it is necessary to go to extreme fineness, and in this connection diatomaceous earth, a form of silica characterized by the microscopic fineness of its particle size, commonly has been used as the scouring agent. In cleaners compounded with special regard to use on surfaces such as window glass, an air floated grit of minus 250 to 300 mesh, depending somewhat on the character of the material, has been used. For use in the kitchen the typical cleaner has a grit of minus 150 mesh.

These measures, however, serve merely to minimize effects rather than to remedy the cause. If a buffing wheel rotated at 150 R. P. M. and bearing on a plate glass or porcelain enamel surface at a pressure of 10 pounds per square inch, is fed with crushed quartz, volcanic ash, or crushed feldspar of the fineness regularly used, it will presently be noted that in the case of the plate glass surface the circle under the buffing wheel takes on a foggy aspect when examined in reflected light at a low angle, and in the case of the porcelain enamel surface the finish is distinctly dulled. From a series of such tests I have found that the average time required to develop these effects distinctly is 15 to 20 minutes for crushed silica and crushed volcanic ash, and 30 to 40 minutes for crushed feldspar.

If now some of the same quartz or volcanic ash be dispersed in a gas, such as air, and carried in dispersed form into and through a zone maintained at a temperature at or above the melting temperature of the material, thus causing the individual particles to melt and again solidify while suspended in the gas, it will be noted on examination under the microscope that the resulting particles instead of being sharply angular are smoothly spherical. If now the tests, as previously described, are repeated using the spherulitized equivalent of the original materials, it will be noted that no fogging or dulling of the surface develops. Also, if one of the plate glass specimens used in the earlier test be mounted with the buffing wheel covering half of the fogged circle, and the experiment carried forward as before but using the spherulitized analogue, it will be noted in the course of an hour, if the earlier abrasion has not been carried beyond the point of mere fogging, that the fogging will disappear and the original plate glass lustre will be restored.

Comparative tests serve to indicate that the gain in smoothness is not at the expense of any appreciable loss in efficiency. The function of the grit is to promote the solvent action of the detergents or chemicals and this the spherular bodies do to equal, if not better, advantage, precisely as the rounded corrugations of the scrubbing board more than fulfill the function once crudely served by a rough stone surface.

As has been indicated above, the gist of the invention consists in the spherulitization of the finely divided, hard, inert mineral fillers commonly employed in cleaning powders and kindred cleaning compositions. In effecting this spherulitization I suspend the finely divided particles of the selected filler (be it glass, volcanic ash, quartz or other conventional "abrasive" component of a cleaning composition) in a gaseous medium, e. g.,

air, whereby a dispersion of the particles is produced, and pass the suspension through a zone of heating at or above the fusing temperature of the particular mineral, the suspended particles thereafter being caused to solidify while still suspended in the medium. In this fashion the tiny individual particles of mineral filler fuse, globularize, and solidify as individual spherical particles without any material agglomeration: Accordingly, the individual particles are made dense and truly spherical, and possess a diameter which is smaller than the effective cross-sectional dimensions of the angular particles prior to spherulitization.

In at least one important connection spherulitizing gives rise to marked advantages as an adjunct to cleaning as well as to smoothness. The so-called mechanics' soaps, like cleaning powders, consist in soap loaded with a scouring agent, commonly volcanic ash. In this connection spherular bodies possess a freedom of movement in and out of the pore recesses of the skin to far better advantage than the crude angular grit heretofore used. The great objection to mechanics' soap, too, is that its use irritates and roughens the skin adding to the difficulty of keeping it clean: use of spherulitized filler in a mechanics' soap obviates this disadvantage. Again, it should be noted that a cleaning composition in which the filler material is in spherulitized form is less harmful if accidentally gotten into the eyes than is a similar composition containing filler material in the form of angular grit.

I have found that a further advantage of spherulitized filler material in a cleaning composition resides in the fact that such composition is much more readily rinsed from a surface than is a similar composition but containing filler material in the form of angular grit: in the case of the latter composition there is a tendency to "drag", due to the physical properties of its angular filler material, whereas in the case of a composition containing spherulitized filler there is no tendency to drag on, or cling to, the surface cleansed therewith when removing the composition by simple rinsing.

The following specific composition is given as being an illustrative embodiment of the present invention:

| | Percent |
|---|---|
| Spherulitized volcanic ash, fine air floated | 63 |
| Spherulitized volcanic ash, 150 mesh | 30 |
| Soap | 7 |

In this composition the amount of the detergent component may vary from 7 to 10%, and the amount of the 150 mesh-size filler material may vary between 20 to 30%, with the more finely subdivided filler material making up the remainder. Instead of volcanic ash (spherulitized) I may use spherulitized glass, quartz or any other spherulitizable mineral matter provided only that the same has a minimum degree of objectionable solubility. The detergent component may be any alkali metal salt of a soap-forming fatty acid, or a mixture of such salts; e. g., any common household soap. Instead of household soap in the above composition I may use a corresponding amount of a sodium alkyl sulphate derived from a fatty alcohol: See Chemical & Metallurgical Engineering, 40, 249. An advantage arising from the employment of this type of detergent is that it is unaffected by the alkali earths (e. g., $CaCO_3$, $MgCO_3$, etc.) which not infrequently are present in water and which constitute the so-called "hardness" in water, tending to impair the detergent properties of an ordinary soap.

I claim:

1. A cleaning composition consisting essentially of a water-soluble detergent component and a hard inert finely divided mineral filler component, characterized in that the said hard mineral filler component consists of spherulitized particles of inert mineral filler, the said spherulitized particles being producible by passing a suspension, in a gaseous medium, of the mineral, in finely subdivided form, through a zone of heating at the fusing temperature of the mineral.

2. A cleaning composition as defined in claim 1, in which the hard inert finely divided mineral filler component is glass.

3. A cleaning composition as defined in claim 1, in which the hard inert finely divided mineral filler component is volcanic ash.

4. A cleaning composition as defined in claim 1, being a powder having the following formula:

| | Per cent |
|---|---|
| Spherulitized filler material, fine air-floated | 73–60 |
| Spherulitized filler material, 150 mesh | 20–30 |
| Water-soluble saponaceous detergent | 7–10 |

5. A cleaning composition as defined in claim 1, being a powder having the following formula:

| | Per cent |
|---|---|
| Spherulitized volcanic ash, fine air-floated | 73–60 |
| Spherulitized volcanic ash, 150 mesh | 20–30 |
| Soap | 7–10 |

6. A cleaning composition as defined in claim 1, being a powder having the following formula:

| | Per cent |
|---|---|
| Spherulitized volcanic ash, fine air floated | 63 |
| Spherulitized volcanic ash, 150 mesh | 30 |
| Soap | 7 |

7. A cleaning composition as defined in claim 1, being a powder having the following formula:

| | Per cent |
|---|---|
| Spherulitized volcanic ash, fine air-floated | 63 |
| Spherulitized volcanic ash, 150 mesh | 30 |
| An alkali metal salt of an alkyl sulphate derived from a fatty alcohol | 7 |

CHESTER G. GILBERT.