

UNITED STATES PATENT OFFICE

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DETERGENT

No Drawing.

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My invention relates to detergents of the class employed in laundries, and in general has these objects:

(1) To provide simple means for overcoming the hygroscopic characteristics of certain detergents, so that such detergents can readily be stored and shipped without caking, and also can readily be measured out and used in finely divided form.

(2) To provide a simple method for combining a hygroscopic detergent with a cake-preventing detergent.

(3) To provide novel, inexpensive and efficient detergent compositions suitable for laundry use.

In commercial laundries it has long been recognized that soap alone is not adequate for the speedy cleansing of goods and for the proper whitening of linens and the like, since ordinary soap is slow to loosen the dirt, although the soap is highly effective for lubricating and carrying off the detached dirt and the like. Consequently, sodium carbonate (known in the trade as soda ash or washing soda) is commonly employed along with the soap, but this tends to weaken the clothes and to turn white goods gray. To offset the excess of alkalinity of the sodium carbonate or the like, it is advisable to employ another detergent ingredient also, and preferably one which will also soften the water and whiten linens or the like.

While numerous materials may be employed for this water-softening and whitening, the cost makes many such materials prohibitive, while others have been barred from such use because their highly hygroscopic nature makes it impractical to ship and handle them in finely divided form. For example, a silicate of the general character of a sodium metasilicate, would be highly desirable as a combined water softener, whitener and antidote to excessive alkalinity, in view of its low cost. However, the commercial sodium metasilicate (which is available on the market with a content of about 27 percent sodium oxide, 26 percent silica and 47 percent water) is so hygroscopic that exposure to the air

quickly causes it to cake by having the particles knit together. If finely ground and shipped or stored in barrels, it soon cakes or knits into a solid mass of such hardness as to require an axe to chip it out, and the resulting chunks soften slowly when moistened. Consequently, the commercial sodium metasilicate when it reaches the laundries cannot readily be measured out in the desired quantity (as needed in proportion to the soap and the soda ash or other alkali), cannot be spread in dry powdered form on the so-called wheel of a commercial washing machine, and cannot be easily and quickly employed in household washing machines.

This is true of the numerous metasilicates of soda, for each of which the formula is Na_2SiO_3 followed by the number of molecules of water by which the particular metasilicate is distinguished. Thus, the commercial tetrahydrated sodium metasilicate has the formula Na_2SiO_3 plus $4\text{H}_2\text{O}$, while the pentahydrated and hexahydrated forms respectively have five and six molecules of water in place of the four in the tetrahydrated form.

In one of its important objects, my invention provides a simple and inexpensive method for treating sodium metasilicate or the like so as to render it non-caking, thereby enabling it to be stored, shipped and measured out in finely divided form. Furthermore, my invention effects this treatment by employing another ingredient which is itself a detergent, namely soap, and provides a novel product in which the cake-preventing soap is so intimately combined with the metasilicate that the resulting action on the clothes is more speedy and effective than when the same ingredients are separately introduced into the washing solution.

Furthermore, my invention provides finely divided forms of detergent compositions in which suitably proportioned quantities of a suitable metasilicate, a soap and an alkali are all combined in a powder which dissolve almost instantly and which can be

stored indefinitely under ordinary atmospheric conditions without caking.

To make such a metasilicate non-caking, I intimately work it up with at least sufficient soap for sealing the exterior pores of the particles of metasilicate and coating these particles with a film of soap. This I can readily do by initially grinding the metasilicate to a larger grained powder than that desired for the final product, then mixing it with the soap and regrinding the mixture. The resulting composition is a powder, dry to the touch, and which remains so dry under ordinary storage and shipping conditions that it can readily be sprinkled or otherwise distributed, as a powder. When used in a washing machine, it dissolves almost instantly and acts with unusual speed both for whitening linens and for removing the dirt. I have not as yet ascertained the cause of this greater rapidity of action, but it may be this: that the impregnating of each particle of the metasilicate in a film of soap causes each dissolved particle to be (at least partially) housed by a film of dissolved soap, which film is then disposed in such intimate association with the dissolved metasilicate that is instantly acts as a carrier for the dirt detached by the action of the metasilicate.

When an additional ingredient, such as soda ash or other alkali, is also desired in the same composition, I intermix this with the metasilicate either before or after adding the soap, and in practice may grind the metasilicate and soda ash together initially, and then regrind them after adding the soap. However, I preferably reduce the needed amount of soap by first soap-coating the metasilicate and then mixing these coated particles with the soda ash or other ingredient or ingredients. In practice, I preferably employ a neutral soap, and the proportion of this to the metasilicate will obviously vary somewhat with the nature of the soap and with the water content of the metasilicate.

Illustrative of such a non-caking detergent composition with three ingredients, I have secured good results by using these proportions: 30 pounds sodium metasilicate, 10 pounds neutral soap, and 60 pounds soda ash. Since the soap in this formula represents only a tenth of the total weight, and since the other two ingredients are both much cheaper per pound than soap, the cost of such a three-ingredient detergent composition per pound may be less than one third of the soap in it. Likewise, the cost per pound of the metasilicate adequately sealed against caking by soap can easily be less than half that of the soap. Consequently, I can readily provide highly effective washing compounds at a low cost,

in addition to facilitating their shipping, storing and handling.

However, while I have described two novel products both including metasilicate of soda as one ingredient, and one of which includes sodium carbonate also, I do not wish to be limited to these particular ingredients, since the pore-sealing and film-coating action of the soap would obviously be the same with other hygroscopic detergents (such as potassium metasilicate), and since one or more other ingredients could readily be substituted for the sodium carbonate.

Neither do I wish to be limited to the pre-grinding of the hygroscopic detergent before treating it with the soap, since my novel product can also be produced by a single grinding of the soap intermixed with lumps of the hygroscopic detergent, either with or without the admixture of one or more other ingredients.

So also, I do not wish to be limited to the above mentioned proportions, since the ratio of the soap to the hygroscopic ingredient will obviously vary with the particular constituency of each, and the required minimum quantity of the soap would also be greater if this is applied to one or more other ingredients conjointly with its application to the hygroscopic ingredient, since part of the soap would then impregnate and adhere to these other ingredients.

Nor do I wish to be limited to the providing of my novel products in powdered forms, or to a grinding procedure. For example, if sodium metasilicate intended for laundry uses is to be stored or shipped in lumps, these lumps may be surface-treated by working them up with soap, thereby preventing them from knitting together and hence permitting the separate lumps to be withdrawn from the barrels or other containers later on.

Furthermore, I am using the term "sodium metasilicate" in the appended claims in the broad sense in which this includes both the anhydrous form (Na_2SiO_3) and the numerous hydrates which have specific chemical designations according to the number of molecules of water associated with the Na_2SiO_3 . All of these are hygroscopic so that they cannot readily be shipped or stored commercially in powdered form unless pre-filmed with soap after the manner here disclosed.

So also, it is to be understood that my invention has no reference to the ordinary sodium silicate or so-called "water-glass", which is frequently used as a filler or adulterant to add weight to soaps or soap powders. This common sodium silicate (which has a much higher content of silica in proportion to the sodium) dissolves only slowly and to a jelly-like or colloidal solution which

will not mix freely with the suds and which cannot readily be rinsed out of the goods afterwards, whereas both sodium metasilicate and the mixtures of it to which my invention relates dissolve readily into solutions which freely intermingle with the suds, which produce a whitening effect not attained by the sodium silicate, and which are readily rinsed out of the goods. In other words, my invention enables laundrymen to profit by the high detergent qualities of the sodium metasilicate which heretofore could not be employed commercially because of its caking.

I claim as my invention:

1. The method of preventing the caking of a comminuted sodium metasilicate which consists in intimately intermingling this with approximately one third its own weight of soap.

2. The non-caking powder comprising granulated sodium metasilicate with about one-third of its weight of soap.

3. A non-caking detergent powder readily soluble in water, comprising granulated sodium metasilicate with about one-third its weight of neutral soap and twice its weight of soda ash.

Signed at Chicago, Illinois, October 18th, 1927.

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