United States Patent

Peterson et al.

[15] **3,649,331**

[45] **Mar. 14, 1972**

[54] METHOD OF TREATING CELLULOSE SPONGES AND RESULTING PRODUCTS

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[73] Assignee: **General Mills, Inc.**

[22] Filed: **May 10, 1968**

[21] Appl. No.: **728,166**

[52] **U.S. Cl.** .....**117/37 R,** 106/122, 117/98, 117/118, 117/144, 117/DIG. 9, 260/218, 264/321

[51] **Int. Cl.**.....**C08b 9/00,** C08b 29/38

[58] **Field of Search**.....260/218; 106/122; 117/98, 144; 264/321

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[57] **ABSTRACT**

A portion of at least one of the surfaces of a dry, compressed, regenerated cellulose sponge is treated with a liquid cellulose degrading substance to render the said treated portion incapable of expanding to its normal volume.

9 Claims, 6 Drawing Figures

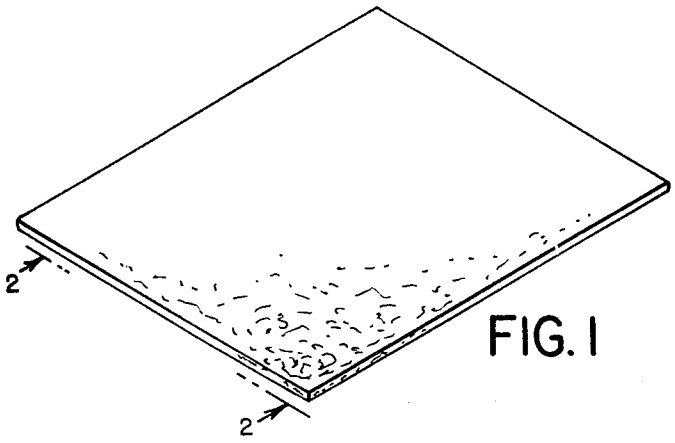


FIG. 1

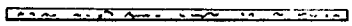


FIG. 2

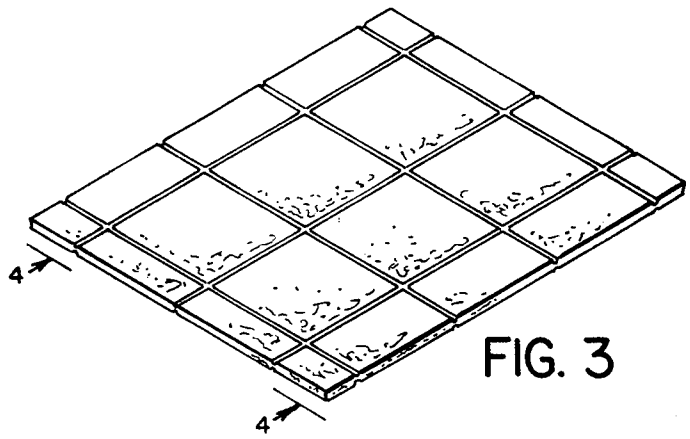


FIG. 3



FIG. 4

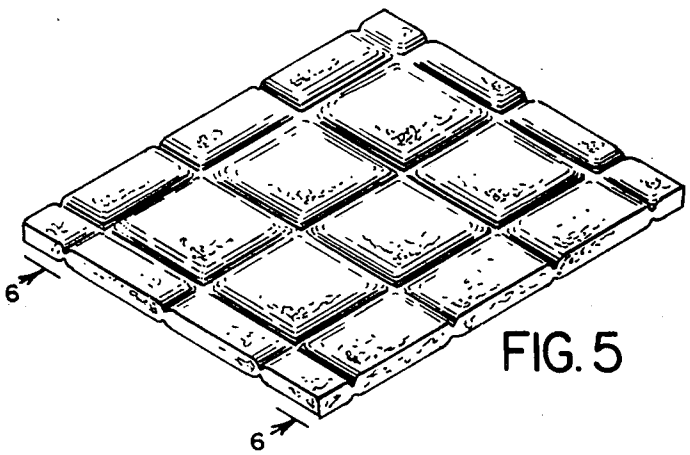


FIG. 5



FIG. 6

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METHOD OF TREATING CELLULOSE SPONGES AND RESULTING PRODUCTS

The present invention relates to a method for treating cellulose sponges and to the resulting products. More particularly, it relates to such a method wherein a compressed dry cellulose sponge is treated with an agent capable of at least partially degrading the portion of the sponge treated and thus rendering the same incapable of expanding to its normal volume.

Regenerated cellulose sponges have found wide use principally as cleaning aids. Processes of preparing such sponges are well known and form no part of the present invention. Various procedures have been developed to modify the properties of the sponges and thus improve their appearance and/or usefulness. In this respect, dyes have been added, the sponges have been impregnated with detergents and the like and fibrous materials have been incorporated into the sponge.

We have now discovered a new process for adding special effects to regenerated cellulose sponges. In our process, a portion of at least one of the surfaces of a dry regenerated cellulose sponge compressed to less than about 90 percent of its original volume is treated with a liquid cellulose degrading substance which at least partially degrades the portion of the surface of sponge so treated rendering the same incapable of expanding to its normal volume. By "degrading" is meant that the cellulosic structure is altered by physically changing the form thereof such as by dissolving same and/or by chemically attacking the cellulose molecules themselves. In any event, the treated portions are rendered incapable of expanding to their normal volume.

FIG. 1 is a perspective view of a dry, compressed regenerated cellulose sponge.

FIG. 2 is an end view of the sponge of FIG. 1 as viewed along line 2—2.

FIG. 3 is a perspective view of the dry, compressed regenerated cellulose sponge of FIG. 1 treated in accordance with the present invention.

FIG. 4 is an end view of the sponge of FIG. 3 as viewed along line 4—4.

FIG. 5 is a perspective view of the treated sponge of FIG. 3 expanded to its normal volume.

FIG. 6 is an end view of the sponge of FIG. 5 as viewed along line 6—6.

A variety of liquid cellulose degrading substances can be used in the treatment of the regenerated cellulose sponges. A preferred substance is an aqueous solution of $ZnCl_2$, such solution containing from about 40 to 90 percent by weight $ZnCl_2$. Solutions containing more than 50 percent by weight $ZnCl_2$ are especially preferred since such solutions degrade the sponge to the desired degree in a relatively short period of time without causing appreciable swelling of the compressed sponge. Other aqueous solutions of acids, bases and inorganic salts are also effective to varying degrees. Aqueous solutions containing about 50 to 75 percent by weight NaOH give good results (at the higher concentrations the solution should be heated since NaOH has a solubility of 347 g. per 100 ml. H_2O at 100° C.—approximately 76 percent by weight). Concentrated aqueous solutions of sulfuric and phosphoric acids are also useful. However, the same tend to cause the treated areas to be darker and more brittle than when $ZnCl_2$ and NaOH solutions are used. In general, however, any liquid substance which degrades the cellulose sponge to the desired degree can be used.

Various known thickening agents can be added to the liquid treating substances to increase the viscosity thereof. The increased viscosity can allow greater control over the penetration of the treating substance into the sponge. Representative thickening agents are sodium carboxy methyl cellulose, depolymerized guar gum, and the like.

Dyes can also be added to the treating solutions to give the treated areas a color different than the starting sponge. In this respect, the starting sponge may also be dyed or pigmented to further enhance the decorative nature of the articles prepared in accordance with out invention. Representative dyes are

Diphenyl Fast Yellow C5GL Conc., Direct Blue 2B Conc., Calcomine Orange EGL and the like.

The treating can be carried out in various ways. Thus the treating solution can be brought into contact with the compressed sponge using a simple mechanical pen. Or the area to be treated can be left exposed while the area of the sponge not to be treated can be covered and then the treating solution can be sprayed onto the surface of the sponge. It is apparent that any procedure yielding a reasonably definitive demarcation line between treated and untreated areas can be employed. It is also clear that the process of our invention can be carried out on production lines. Thus the dry, compressed regenerated cellulose sponge can be continuously supplied to the treating area where the treating agent is applied to same in predetermined areas.

The treating substance wets the area to be treated and the treatment is usually completed within a short period of time, the treatment period depending somewhat on the particular liquid cellulose degrading substance and the strength thereof. In this regard, aqueous solutions of $ZnCl_2$ and NaOH containing at least about 50 percent by weight of such agents give the desired results in less than about 5 minutes and often in less than about 1 minute.

The sponges treated in accordance with our invention can be sold in the compressed state and then expanded by the ultimate consumer such as by immersing the same in water. Alternatively, they can first be expanded, dried, and then sold.

The following example illustrates a preferred embodiment of the invention without being limiting.

EXAMPLE

A light yellow sheet of dry, compressed regenerated cellulose sponge (compressed from a thickness of three-sixteenth to one-sixteenth in.) was treated with a 75 percent by weight aqueous solution of $ZnCl_2$. The $ZnCl_2$ solution was applied using a mechanical pen. Lines were drawn on the two large flat surfaces of the compressed sponge to yield approximately 13/16-inch squares. The squares on each side of the sponge coincided with each other. The embossing or degradation of the sponge was essentially complete within about 30 seconds after the treated areas were wetted by the solution. When the entire sponge was immersed in water and thus expanded, an article having pillowlike squares was obtained. The treated areas or lines expanded very little whereas the untreated major areas expanded to their normal volume. FIGS. 1 through 6 illustrate the preparation of the article according to this example.

It is evident that a wide variety of new and unique articles can be prepared in accordance with the present invention. Other geometric patterns can be used including circles, triangles and the like. And only one side of the sponge need be treated. Additionally, letters can be formed to spell out any desired word or the like. Such letters can be formed by the treated areas or by the untreated areas. In the former, the letters would be essentially sunken whereas in the latter, the letters would be in the expanded part of the sponge and thus raised. The effect can be small or large depending somewhat on the original amount of compression of the sponge (preferably the compression is sufficient to reduce the volume from about 50 to 75 percent), the particular liquid cellulose degrading substance and the relative strength thereof and the amount of the surface area treated. Of course, less than 100 percent of the surface will be treated. The sponges can have increased utility as cleaning aids by having predetermined changes in surface regularity due to the expanded and treated areas. Various decorative and ornamental articles can be prepared by the process of our invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A method for modifying a cellulose sponge which comprises treating a portion of at least one of the surfaces of a dry regenerated cellulose sponge compressed to less than about

90 percent of its original volume with a liquid cellulose degrading substance which at least partially degrades the portion of the surface of the cellulose sponge so treated rendering the same incapable of expanding to its normal volume.

2. The method of claim 1 wherein the liquid cellulose degrading substance is applied in a geometric pattern.

3. The method of claim 2 wherein the liquid cellulose degrading substance is applied to more than one side of the sponge.

4. The method of claim 1 wherein the sponge is compressed so that the original volume thereof is reduced from about 50 to 75 percent.

5. The method of claim 1 wherein the liquid cellulose degrading substance is an aqueous solution containing about 40 to 90 percent by weight of $ZnCl_2$.

6. The process of claim 1 wherein the cellulose sponge is compressed to about 33 percent of its original volume, the liquid cellulose degrading substance is an aqueous solution containing about 75 percent by weight $ZnCl_2$ and the said substance is applied in a manner dividing at least one of the surfaces of the sponge into squares.

7. The process of claim 1 wherein the treated sponge is expanded.

8. The article prepared by the process of claim 7.

9. The article prepared by the process of claim 7.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,649,331 Dated March 14, 1972

Inventor(s) Lowell E. Peterson and Lyle F. Elmquist

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col 4, line 11, "claim 7" should read -- claim 1 --.

Signed and sealed this 22nd day of August 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents