Patented May 6, 1930 1,757,757

UNITED STATES PATENT OFFICE

GEORGE L. SCHWARTZ, OF WILMINGTON, DELAWARE, ASSIGNOR TO E. I. DU PONT DE NEMOURS & COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF DELAWARE

PROCESS OF PRODUCING POROUS PAPER

No Drawing. Application filed June 6, 1928. Serial No. 283,446.

This invention relates to a process of producing a cellulose fibre mat suitable on account of its high degree of porosity and other desirable properties for paper towels or other absorption purposes.

There is disclosed in U. S. Patent, Serial No. 1,038,086, to A. L. Clapp, the treatment of paper with caustic of mercerizing strength (usually around 18%) and at a normal temperature.

In my copending application, Serial No. 232,192, filed November 11, 1927, I have disclosed a process of gelatinizing cellulose fibres by treating them in the form of a paper mat with caustic soda at a low temperature and in a definite concentration range. In this treatment the fibres become gelatinized and swell, and, after removing the reagent, the fibres return approximately to their normal volume. As a result, the paper is puffed and becomes highly porous.

An object of my present invention is a process of making absorbent paper from cotton fibres. A further object of my present invention is a process of making absorbent paper from such fibres as linters and hull fibres that have been given a certain preliminary treatment such as cooking in dilute caustic soda. A still further object of my invention is the process of making absorbent paper from paper containing a mixture of reactive fibres, such, for example, as cooked cotton linters, with non-reactive or slightly reactive fibres, such, for example, as uncooked cotton linters, kraft, jute, etc. Other objects will appear as the description proceeds.

I have now found that a good quality of porous absorbent paper may be obtained by treating the paper made from certain grades of fibres with caustic under conditions outside of the range disclosed in my copending application aforesaid. According to my present invention paper made from cotton fibre may be treated with practically any concentration of caustic from 8% up, at a temperature from around 0° up to 104°, and a product obtained which is sufficiently porous and absorbent for most commercial purposes. Under these conditions, the fibres are not gelatinized but become permanently curled so that the mat decreases in density to a marked extent.

Particular features of my invention reside in the use of paper containing cooked cotton fibres, or cooked cotton fibres mixed with other less reactive fibres, and treating the fibres above the gelatinizing temperature. I have found that when a mixture of cooked bleached linters and uncooked linters, kraft, or jute are used, the non-reactive or less reactive fibres hold the mass together and the reactive fibres furnish the intense puffing which is so desirable.

The following steps are given as specific embodiments of my improved process, but it is to be understood that these are illustrative only and are not to be taken as limitations of my invention.

I. Short cotton fibres, for example, linters or hull fibres, are treated with or without pressure with caustic soda at about 1–10% concentration.

II. A paper mat is made either from the cooked cotton fibres alone, or from these fibres mixed with another grade of fibres, preferably wood or hemp, which are less reactive with caustic soda under the conditions of treatment in step III, following.

III. This paper mat is treated with caustic soda of mercerizing strength, which is ordinarily about 18% and is necessarily above a minimum of about 8%. The strength as stated applies to the solution in actual contact with the fibres. The temperature of this treatment is preferably low, especially where high porosity of product is desired, but the temperature should be kept above the point at which the fibres are gelatinized to a noticeable degree by caustic of the concentration used. The minimum temperature of the caustic treatment, therefore, is not fixed, but varies with the fibres used and with the concentration of the caustic. This is a point which is readily determined for any given fibre and reagent. At higher temperatures, that is, at temperatures from 60 to 104° C., the curling effect on the fibres and the puffing effect on the paper are less marked than at lower temperatures. In the present case, it therefore follows that for given fibres and

concentration of caustic, the lower operative temperature limit is the upper temperature limit at which the fibres are gelatinized, and the upper operative temperature limit is the lower temperature limit at which the fibres undergo degradation in the presence of oxygen. Depending on the grade of fibres and the concentration of the caustic, this degradation effect becomes noticeable in the presence of a small proportion of oxygen at temperatures around 100° C.

IV. The paper is washed to free it from the reagent.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that I do not limit myself to the specific embodiments thereof except as defined in the appended claims.

I claim:

1. A process for producing a porous felted cellulose fibre product which comprises treating a cellulose fibre mat made from cooked cotton fabrics with aqueous caustic solution, at a temperature above the gelatinizing point of the fibres and less than 104° C.

2. A process for producing a porous felted cellulose fibre product which comprises treating a cellulose fibre mat made from cooked cotton fibres mixed with a grade of fibre less reactive with caustic under the conditions of mercerizing, and treating the fibres at a temperature just above the gelatinizing point of the reactive fibres and less than 104° C.

3. A process of making a porous felted cellulose fibre product which comprises forming a paper mat from cooked cotton fibres, treating the paper mat with caustic of mercerizing strength at a temperature just above the gelatinizing point, and washing the paper free from the agent.

4. A process of making a porous felted cellulose fibre product which comprises treating a paper mat made from cooked cotton fibres, with caustic of a strength of approximately 8% to 18%, and at a temperature above 0° C. but less than 104° C., and washing the paper free from the caustic.

5. A process of making a porous felted cellulose fibre product which comprises treating a paper mat made from cooked cotton fibres, with caustic of a strength of approximately 8% to 18%, and at a temperature above 0° C. but less than 60° C., and washing the paper free from the caustic.

In testimony whereof, I affix my signature.

GEORGE L. SCHWARTZ.

Claims amended
8-20

6

CERTIFICATE OF CORRECTION.

Patent No. 1,757,757. Granted May 6, 1930, to

GEORGE L. SCHWARTZ.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 25, claim 1, for the word "fabrics" read "fibers"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 24th day of June, A. D. 1930.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.