Patented Jan. 2, 1940 2,185,695

UNITED STATES PATENT OFFICE

2,185,695

FIREPROOFING CELLULOSIC FIBROUS MATERIALS

Ralph R. Oliver, Lockport, N. Y., assignor to Lockport Cotton Batting Co., Lockport, N. Y., a corporation of New York

No Drawing. Application May 1, 1935, Serial No. 19,169

2 Claims. (Cl. 91—68)

This invention relates to the fireproofing or flashproofing of cellulosic fibrous materials such as cotton, and is particularly intended for the fireproofing or flashproofing of cotton preparatory to the manufacture of cotton batting.

It is obvious that, in the absence of some fireproofing or flashproofing treatment before it is carded or garnetted and assembled in superimposed laminae to form the relatively thick fluffy structure known as cotton batting, cotton in the form of cotton batting is peculiarly liable to ignition and rapid combustion when exposed to any suitable igniting means.

A general object of the present invention, therefore, is so to treat cotton preparatory to the manufacture of cotton batting that while it will still retain those desirable characteristics which make cotton batting useful for the purposes for which it is intended, such as the manufacture of comfortables, etc., the liability of the cotton batting to flash-like ignition and combustion will be substantially eliminated.

A particular object of the invention is so to effect the fireproofing treatment of the cotton or other cellulosic fibrous material preparatory to its employment in the manufacture of cotton batting or other product that this treatment may be carried out as a substantially continuous process.

Other objects and important features of the invention will appear from the following description of a preferred method of effecting the flashproofing or fireproofing treatment of cotton or other cellulosic fibrous material.

In effecting the flashproofing or fireproofing of cotton by my improved process, I take the cotton, which may be in the form of raw cotton, cotton linters, or delinters, and first effect a caustic alkali digestion or saponification thereof, after which it is subjected to the action of a suitable oxidizing agent for the purpose of bleaching. Suitable agents for this purpose are calcium hypochlorite, sodium hypochlorite, hydrogen peroxide, or sodium peroxide.

After the desired bleaching has been effected, the cotton is thoroughly washed with water. The water is then drained off and the cotton treated in any suitable manner as, for example, by centrifugal drying, pressing, or otherwise to reduce the moisture content until the moisture content is less than forty per cent calculated on the bone dry weight.

The object of this preliminary treatment is to rid the cotton of undesirable compounds and so to open the fibre canal that in the second step of the process capillary action will cause the penetration of this canal by the firepoofing or flashproofing solution.

The fireproofing of the cotton fibre is based upon my discovery that when sodium tetraborate solution having a hydrogen ion concentration of 8.0 is reduced to a hydrogen ion concentration of 7.0 to 7.4 by the addition of boric acid and crystallization permitted, the crystals so formed are triclinic, and that when such a solution is allowed to re-crystallize within the canal of the cotton fibre the fibre is rendered fireproof and flashproof without rupturing the fibre wall or in any other way effecting any substantial change in the physical structure of the fibre.

This fireproofing solution may be applied to the cotton either cold or at any temperature up to and including 212° F., and the impregnation of the cotton with the solution may be effected either in open vats as, for example, by slushing the cotton through the solution contained in such an open vat, or it may be effected in any suitable manner under reduced atmospheric pressure approaching vacuum.

After the desired impregnation has been effected, either at atmospheric pressure or under reduced pressure, the cotton thus treated is then pressed or subjected to any other suitable means for extracting the excess liquid therefrom to such an extent that from 10 to 20 per cent of the fireproofing solution remains within the canal of the fibre and around the fibre wall. The cotton is then dried by any of the well known cotton drying methods.

An illustrative specific procedure in accordance with the present invention is as follows:

A 10 per cent solution of sodium tetraborate in water is first made and the hydrogen ion concentration of the solution determined, which will usually be between 8.0 and 9.0 pH, depending upon the alkalinity of the water used. Boric acid is then added until the hydrogen ion concentration stands between 7.0 and 7.4 pH, the raising of the acid radical thus effected results in the formation of the sodium-metaborate compound.

The cotton to be fireproofed or flashproofed is now placed in this solution and kept therein until it has become thoroughly saturated. It is then taken out of the solution and pressed or otherwise treated to effect the extraction of moisture until its moisture content is from 10 to 15 per cent greater than it was before it was placed in the solution. The treated cotton is then passed through a dryer and dried to the desired degree.

Cotton thus treated is substantially fire or flash proof. Moreover, the fireproofing or flashproof-

ing of cotton in this manner does not discolor the cotton which, as above suggested, is preferably bleached before the treatment, nor does it cause any discoloration as the cotton becomes aged. Moreover, the chemicals used in the treatment are non-toxic.

As above pointed out, the treatment does not materially change the physical characteristics of the cotton, which can be carded and garnetted and handled in the usual manner to make cotton batting having the normal characteristics of a good cotton batting.

What I claim as new is:

1. The process of treating loose cotton fibers to render them substantially flash-proof or fireproof without materially changing their desirable physical characteristics, which consists in first adding to substantially a 10% solution of sodium tetraborate in water boric acid until the hydrogen ion concentration stands between 7.0 and 7.4 pH, immersing the cotton fibers to be fireproofed in said solution and keeping them therein until they become thoroughly saturated, withdrawing said fibers from said solution and effecting the extraction of the solution until the fireproofing solution content is from 10 to 15% greater than it was before the fibers were placed in the solution and then drying the cotton fibers.

2. Cotton having its fibre canals substantially filled with triclinic crystals of sodium metaborate which have been crystallized in situ from a 10 per cent aqueous solution of sodium tetraborate having its alkalinity reduced to between 7.0 and 7.4 pH by admixture therewith of boric acid, the crystalline content of the cotton representing the crystallization from an addition to the natural moisture content of the cotton of from 10 to 15 per cent of the aforementioned solution and said impregnated cotton showing no discoloration with aging.

RALPH R. OLIVER.