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METHOD OF DESIZING AND CLEANSING FABRICS.

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To all whom it may concern:

Be it known that I, JOSEPH P. MILLIKIN, residing at Hasbrouck Heights, county of Bergen, State of New Jersey, have invented an Improvement in Methods of Desizing and Cleansing Fabrics, of which the following is a specification.

The present invention is a process of cleansing and desizing cotton fabric as it comes from the loom preparatory to mercerizing, bleaching, and dyeing.

The object of the invention is primarily to dispense with the usual protracted steeping and boiling operations as well as the washings and other intermediate steps thereby necessitated, and in place thereof to employ a series of steps in the nature of one continuous operation consuming but a few minutes of time.

Another object is the substantial reduction of expense now incident to the finishing of cotton goods. To this end, the present invention dispenses with the usual boiling under steam pressure in kiers, and also with much of the usual manual labor, so a plant of any given capacity is enabled materially to increase its output.

The invention consists broadly in treating cotton fabric before mercerizing with a mineral acid to desize and cleanse the material.

It is well known that ordinarily grey cotton goods as they come from the loom contain natural resinous, waxy and fatty matters, sometimes an organic coloring matter, a small percentage of mineral matters, and also the size introduced during the process of manufacture, together with an accumulation of ordinary dirt. The size is usually a composition of starch and tallow or other saponified fat and frequently paraffin wax. All of these matters must be removed before the fabric can be mercerized and bleached to produce a uniform cloth.

It is the usual present practice, following the singeing operation, to saturate the goods with a dilute caustic, followed by boiling under steam pressure in dilute caustic and other chemicals, to decompose or dissolve the starchy and other foreign matters so they may be washed out. If the saturation takes the form of steeping, this step may require 24 hours. A single boiling will require from 8 to 12 hours more. If a second boiling be needed, it will consume additional time of from 8 to 12 hours. And it requires about 4 hours each time the material is put in and taken out of a kier. From the foregoing it appears that the time actually consumed, if the fabric is steeped and twice boiled, is from 46 to 54 hours.

Following the boiling step and removal from the kier, the usual process is first to wash the fabric; next sour or acidify with dilute mineral acid, usually sulphuric, to neutralize the caustic solution and to dissolve foreign matters not attacked by the caustic; then wash again, mangle and dry. These various steps prepare the fabric for the usual mercerizing treatment to be followed by bleaching; or, as is well known, the bleaching process may precede the mercerization.

By the present invention all the foregoing steps following the singeing operation and preparatory to mercerizing and bleaching are eliminated, and the fabric is conducted in one continuous uninterrupted run from the singer into the mercerizing bath (or the chlorine bath if it is to be first bleached); and the time of this run is approximately thirty minutes, instead of more than that number of hours consumed by the old process as above described.

According to the present invention, as the fabric comes from the singer to be cleansed and desized, it is first passed through a bath of mineral acid. It has been found that a hot hydrochloric acid solution, made to Twaddell at about 1 degree, is very effective for the purpose when the fabric is subjected to the action thereof for approximately one minute. If the solution is made somewhat stronger and the temperature thereof somewhat increased, the time of treatment may be shortened. More specifically, the ordinary grey cotton fabric may be very efficiently treated by subjecting it for one minute to the action of a solution made to Twaddell at 1 degree and raised to or near the boiling-point. In practice, the solution is preferably used at from 180° F. to the boiling-point; but, if raised to the boil, wasteful evaporation should be prevented by a suitable covering for the vat.

Either sulphuric or nitric acid may be used in place of hydrochloric; but the lat-

ter is preferred primarily for the reason that it forms a soluble salt with the natural lime of the cotton and is more easily removed. Whereas sulphuric acid forms a sulphate of lime, which is not easily removed and makes the fabric unduly harsh; while nitric acid is more dangerous to both the user and the fabric, and is also more expensive than hydrochloric.

Following the dilute acid bath, the fabric is next squeezed, washed with water, sprayed with a neutralizing agent such as a solution of caustic soda, preferably at or near the boil and made to Twaddell at approximately 1 degree, again squeezed, and sprayed to cool.

The fabric may then be run directly from the spray into the mercerizing bath. The last spray is preferably a cold dilute caustic, rather than plain water, in order that the caustic mercerizing solution may not be too greatly diluted; and, to the same end, the fabric is preferably squeezed at a point intermediate the last spray and the mercerizing bath.

In the usual practice, the fabric is soured a second time and washed after being mercerized and before bleaching. The souring step is dispensed with in the present invention, and the fabric given a wash at or near the boil for 10 to 15 minutes with any suitable textile soap to remove all chemicals and other non-desirable matters. A wash suitable for the purpose is made by five pounds of soap to one hundred thirty gallons of water. This soap wash may be followed by a wash with water to remove all traces of the soap prior to bleaching.

It is established that dilute mineral acids do not attack the cellulose of cotton; but if a fabric containing such acids be subjected to dry heat tendering at once takes place. In the practice of the present invention, all possibility of such tendering is eliminated as the usual drying step of the old process (just before mercerization) is not employed.

For the purpose of describing the invention and making the process thereof available to others skilled in the art, some particularity has been observed in giving strength of solutions, temperatures employed, periods of time for immersion and washing, etc.; but it is to be understood that the invention is not limited to these precise details as it is well known that all such factors are variable according to the grade of cloth under treatment. For example, it may be desirable, in treating the heavier grades of cloth, to employ a hydrochloric solution made to Twaddell at 2° and to lengthen the time of immersion therein to two minutes, and such cloth may require say thirty minutes in the hot soap bath. It is also to be understood that the various steps need not necessarily be taken in the precise order here set forth. These details may be varied within the terms of the appended claims without departing from the spirit of the invention.

Having thus described the invention, the following is claimed:

1. The method of cleansing and desizing fabric to condition it for finishing operations, which comprises a brief treatment with dilute mineral acid with a subsequent brief treatment with dilute alkali.

2. The method of cleansing and desizing cotton fabric which comprises subjecting the fabric to the brief action of a dilute hydrochloric acid solution at or near the boiling-point, next washing with water, and then treating with a caustic solution at or near the boiling point and made to Twaddell at approximately the same degree as said acid solution, substantially as described.

3. The method of cleansing and desizing cotton fabric which comprises subjecting the fabric to the action of a hot hydrochloric acid solution made to Twaddell at from 1 to 2 degrees, next washing with water, and then treating with a dilute caustic.

4. The herein described process of preparing grey cotton fabric for mercerizing and bleaching which includes subjecting the fabric to the action of a hydrochloric acid solution at or near the boiling-point and made to Twaddell at from 1 to 2 degrees, to decompose and dissolve starch and other non-desirable matters, treating the fabric with a dilute caustic solution to neutralize said acid, and washing to cleanse the fabric.

5. The method of cleansing and desizing cotton fabric preparatory to mercerizing and bleaching which includes subjecting the same to the action of a hot dilute hydrochloric acid solution to decompose or dissolve the starchy and other non-desirable matters, then washing to remove said matters and part of said acid. and treating the fabric with a dilute caustic to neutralize the remainder of said acid.

6. The herein described process of finishing grey cotton fabric preparatory to bleaching which consists in subjecting the fabric to the action of a hot dilute mineral acid solution, next neutralizing said acid, then subjecting to a mercerizing treatment, followed by a hot soap wash.

7. The method of finishing grey cotton fabric which includes subjecting the same to the action of a dilute mineral acid bath, neutralizing and removing said acid, subjecting the fabric to a mercerizing treatment, followed by a hot soap wash, and bleaching in any suitable manner.

8. The method of cleansing and desizing fabric to condition it for finishing operations, which comprises a brief treatment with hot dilute mineral acid, a brief washing treatment, and a subsequent brief treat-

ment with an alkali, whereby any prolonged individual treatment for cleansing is dispensed with and the progress of the cleansing treatment made substantially to keep pace with the progress of subsequent finishing treatments.

9. The herein described method of preparing grey cotton for bleaching or dyeing which consists in subjecting a continuously traveling fabric to the action of a hot dilute mineral acid solution, next to the action of a dilute alkali solution to neutralize said acid, then to a strong caustic solution to mercerize said fabric, followed by a hot soap wash, and intermediate washings with water.

10. The method of preparing grey cotton for finishing operations which comprises briefly subjecting a continuously traveling fabric thereof to the action of an acid solution and an alkaline solution with an intermediate washing treatment.

In testimony whereof, I have signed my name to this specification.

JOSEPH P. MILLIKIN.