

UNITED STATES PATENT OFFICE.

FERNAND GROS AND PAUL BOURCART, OF REMIREMONT, FRANCE.

PROCESS OF MERCERIZING.

SPECIFICATION forming part of Letters Patent No. 677,450, dated July 2, 1901.

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To all whom it may concern:

Be it known that we, FERNAND GROS and PAUL BOURCART, spinners, of Remiremont, Vosges, France, have invented certain new and useful Improvements in a New Method of Treating Cotton to Give it the Glossy Appearance of Silk; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to a new method of treating cotton to give it the glossy appearance of silk; and the object of it is to enable yarn or the unspun fibrous spinning material to be successfully "mercerized."

It may be well before proceeding with the description of our invention to explain that "mercerizing" is a term now generally used to designate the series of operations having for their object to impart to cotton a silk-like gloss or sheen.

An important factor in the mercerization of cotton is that the material under treatment must be stretched quite taut or subjected to considerable tension in order to counteract the shrinkage that would otherwise take place.

It has been found in practice that the gloss given to cotton by mercerization becomes more silky in proportion as the chemical solution employed is more concentrated, and as the ensuing shrinkage is also more considerable in proportion the counteracting tension to which the fiber or material must be subjected has to be increased accordingly. Hence although excellent results have been obtained by treating already-woven fabrics and finished or spun thread by this said process the same cannot be said of the unspun fibrous spinning material or yarn in the form of sliver, for example, owing to the fact that the latter, having practically no twist, has not the strength necessary to enable it to withstand the tension to which it would have to be submitted in being treated in a sufficiently-concentrated bath to produce the fine silky appearance desired. Besides, the innumerable free or stray ends of such cotton fiber which project laterally from the exterior surface thereof and form what is called the "down" escape the tension altogether, and consequently fail to acquire the gloss. In fact,

they contract and form a sort of sheath around the material, which, being dull and woolly in appearance, would greatly modify even such gloss as might have been imparted to a single fiber properly finished, (mercerized.)

The process which accomplishes the object of the present invention consists in mercerizing the cotton at one of the stages in the preparation of the cotton fiber or construction of the thread preparatory to the actual spinning operation in order to obtain mercerized cotton spinning material which may subsequently be finished as ordinary spinning material, according to the stage at which the preparation was arrested and the mercerization begun, or, on the other hand, it may be restored to any of its more primitive states or even converted into cotton-wool. For example, supposing the preparation of the spinning material is arrested on the completion of the "drawing" operation, then after the mercerization the sliver may be subjected to "slubbing" either once or twice, "roving," "spinning," and "doubling" to produce a thread of any thickness or size desired.

What characterizes cotton when in the condition known in spinning as "prepared" cotton—say in slivers as produced by carding or combing machines or in slubs or rovings produced by drawing-frames—is that the fibers are assembled together with little or no twisting, so that each fiber is apt to vary its position relatively to that of the others by a sliding or slipping motion. In this state the prepared cotton will break asunder at the slightest pull. The individual fibers, too, are comparatively short, and to subject them to the silkening process in this condition it would be necessary to stretch each of them singly, as it were, and for very small lengths and that without breaking the continuity of the strand or sliver, and it does not seem practicable to attain this result except, perhaps, by very special and exceedingly-complicated machinery, which is undesirable for obvious reasons. Now to remedy this defect we propose to bring the cotton temporarily into a certain transitory condition by two operations, which at this stage of the spinning process would at first sight appear to be quite uncalled for, and it would be so were it not for the specific object which they enable us to accomplish.

We proceed as follows: The cotton in the form of either a carding, drawing, slubbing, or roving sliver, whichever the stage at which it is taken in hand, is twisted as much as is necessary to impart to the "cord" thus produced as much strength as it requires to be capable of withstanding the tension, which shrinking tendency, owing to its immersion into the concentrated baths, renders imperative. As will be remembered, concentrated baths alone give the material the desired degree of silky gloss or sheen. In this preparatory twisting process the conditions of elasticity and the other qualities which cotton yarn is generally required to combine may be disregarded, and it is for this reason that we have selected the above term "cord" to designate the special and transitory state in which the cotton is at the time, being in the state of more or less incomplete yarn, whereas the cotton, while not possessing simply the properties of the prepared material or sliver, yet has acquired and only needs a part of those of yarn or thread. The cord thus produced is then mercerized by any well-known process, whereupon it is washed, acidulated, rinsed, and lastly dried. Also either before or after drying it may be bleached or dyed. After having thus submitted the cotton cord to all the necessary operations we bring the fiber into a condition in which it shall be capable of undergoing the whole or part of the spinning processes. To this end we now untwist it to any extent that may be desirable—in fact, entirely, if required. The mercerized cotton, which may have also been previously bleached or dyed, is now restored to the condition of prepared cotton, in which the fibers are parallel and held together by more or less slight twisting, so that it can undergo the subsequent spinning operations required to convert it into yarn or thread of any given thickness, or by simply loosening ("deviling") the cotton it might be restored to the condition of cotton-wool and subjected to all stages of the spinning process from beginning to end.

It will be understood that cotton yarn or

thread thus obtained possesses a fine silky gloss for two reasons—viz., first, because in the condition of cord the assemblage of cotton fiber offers as much resistance as is necessary to enable it to withstand the stretching strain it undergoes in the concentrated baths, which alone, as above stated, are capable of producing the desired high degree of sheen, and, second, because the down, which exists around the cord and which escapes the stretching and also, therefore, the mercerizing reaction, is during the subsequent spinning operations closely mixed with the fiber that has acquired the silky appearance.

In reality, then, our invention mainly consists in temporarily interrupting the spinning operations, be it at the stage of treatment in the spindle-frame or in the carding, combing, drawing, slubbing, or roving machine, and at this stage we convert the prepared cotton by twisting it as much as may be necessary into cords of sufficient strength to permit them to bear the required tension during the mercerizing, and after this treatment we obliterate the whole or part of the twisted effect thus produced by restoring the material either to its initial state of cotton-wool or to a state approaching that in which it was when the spinning process was interrupted.

We claim—

The process for imparting to cotton the glossy appearance of silk, characterized by first twisting the unspun material when in the state of a sliver into a "cord" of just sufficient strength to withstand mercerization, then stretching such cord taut, then submitting it to the mercerization process, after which the cord is untwisted or restored to the state in which it was prior to such treatment.

In witness whereof we have hereunto set our hands in presence of two witnesses.

FERNAND GROS.
PAUL BOURCART.

Witnesses:

EMILE BERT, Sr.,
EDWARD P. MACLEAN.