UNITED STATES PATENT OFFICE.

STEPHEN M. ALLEN, OF NIAGARA FALLS, NEW YORK.

IMPROVEMENT IN THE METHOD OF REDUCING LONG-STAPLE FIBROUS MATERIALS.

Specification forming part of Letters Patent No. **27,878**, dated April 17, 1860.

To all whom it may concern:

Be it known that I, STEPHEN M. ALLEN, of Niagara Falls, in the county of Niagara and State of New York, have invented a new and useful method of reducing long-stapled fibrous materials to be used in the manufacture of threads, yarns, and cloths; and I hereby declare that the following is a full and exact specification of the same, wherein I have set forth the nature and principles of my said improvements, by which my invention may be distinguished from all others of a similar class, together with such parts as I claim and desire to have secured to me by Letters Patent.

My invention consists in a new and valuable improvement in the preparation of the fibers of flax, hemp, jute, china-grass, and other long-stapled fibers, which shall enable them to be spun and woven on the ordinary short-stapled machinery adapted to the spinning and weaving of cotton and wool, thereby producing a much softer and more beautiful yarn, thread, or cloth, at a cheaper rate than can be produced from the ordinary long-line fibers on or by machinery used in spinning and weaving the ordinary long-line fibers aforesaid.

In the preparation of long-line fibers for spinning and weaving by the old method great care has to be taken to keep the fiber straight and of the full length of the stalk on which it grew. That this involves great expense will be readily perceived from the well-known delicate and numerous operations and treatment to which such plants are submitted in order to derive from them the product in the condition most suitable for spinning and weaving. On the other hand, it is well known that the spinning and weaving machinery adapted for the ordinary short-stapled fiber—such as cotton and wool—is not only the best, but also the cheapest for the spinning and weaving of fibrous material; but such machinery has not heretofore been suited to the working of fibers that are longer than two inches, or thereabout, and therefore flax and other long fiber could not be spun thereon.

The object, therefore, of my invention is not only the reduction of expense and labor in the operations and treatment of the plants for the purpose of extracting the fibers therefrom in a condition best suited for spinning and weaving, but also to enable the fibers thus obtained to be worked on or by machinery adapted to cotton or wool, whereby a yarn, thread, or cloth of a superior quality may be produced from such products at less expense.

To enable others to make and use my invention, I shall now describe the manner in which the same—as applied to flax or hemp, for instance—is or may be carried into practice.

I may here briefly state that by treating the fibers according to the process hereinafter described it is not necessary to perform the operations of pulling, of thrashing the seed, and of freeing the stalk from the woody heart or boon and harl which incloses the latter with as much care as is customary under the old method; but, on the contrary, I am enabled to mow or cradle the flax or hemp straw with as much facility as hay or grain, thrash the same in like manner as these latter substances, and take the product, either retted or unretted, and whether tangled or straight, and submit it to the action of machinery, which will reduce the fibers in the manner hereinafter described to the lengths of short-stapled fiber, or such other uniform length as will admit of them being worked by short-stapled machinery.

The operation and function of the machinery referred to for reducing the long-staple fiber is such as to effect the reduction of said fiber by straining it in the direction of its length between two given points.

Long fibrous substances, like flax, &c., have heretofore been reduced by suitable instruments or machines which effect the said reduction by means of shears or knives, cutting the fibers or severing it in parts of suitable length in such a manner as to leave a blunt end at either or both of the extremities of the fibers thus reduced; but it has been found that the short fiber produced by cutting the long fiber into parts cannot be spun with advantage or economy, as the blunt ends of the former rendered their entwining or their forming the requisite union with each other practically impossible. Previous to my invention, therefore, no flax, hemp, or other long-staple vegatable fibrous material has been prepared or reduced in such a manner as that it could practically—*i. e.*, with economy or without impairing the strength of the fiber—be spun on the ordinary cotton or wool machinery for the purpose of forming yarn or cloth therefrom.

Having thus stated the nature and main object of my invention, I shall now proceed par-

ticularly to describe my invention and the general method or manner in which the same is or may be carried into effect.

I take long fibrous material, like flax, hemp, jute, &c., and reduce either or all to the required length by submitting them, at given distances, (corresponding to the length of the reduced fiber required,) to a tensile strain, whether combined or not with torsion or other strain, but sufficiently powerful to produce the separation of the fiber. The fiber is thus disintegrated or disunited and separated into pieces of uniform length, the ends of which pieces present the individual fibrils of which the fiber is composed in an open and stranded form, and have a great tendency to unite and entangle or interlace with each other, or with the end of any other fiber. I therefore produce a double reduction of the fiber—*i. e.*, not only in the direction of its length, but also in the direction of its thickness, or across the fiber at that point where it is again to unite into other fiber.

The process above described of separating or of dividing the length of the fiber should be followed by or combined with one producing the splitting or disintegrating of the fiber laterally, and thereby render the employment of the reduced fiber, in the spinning and weaving of both fine and coarse fabric, practicable. The short or reduced fiber is therefore subjected to a chemical process or to an electrical process, or one which combines the two, and by which the fibers are still more perfectly disintegrated and separated. This process or processes have for their object the extraction of the glutinous or gummy compound which cements the individual fibrils or filaments together, and constitute what is ordinarily known under the term of "fiber." One of these processes, and which is now employed with perfect success (and for which Letters Patent of the United States have been issued to me on the 20th day of March, 1860) consists in subjecting the reduced fiber obtained from flax, jute, hemp, or other long-stapled vegetable fiber to heated air charged with steam or the vapor of alcohol, spirits of turpentine, &c., up to its point of saturation. The action of this saturated air produces an effect upon the fiber which has never before been attained by any process heretofore attempted—viz., it softens and separates the elements that hold the fibrils together without destroying or injuring its natural structure, and opens the capillary tubes, so that the albumen, resinous and colorizing matters can be readily reached and removed by water. But I deem it a *sine qua non*, in order to produce a practically useful result, that the two operations of dividing the fiber in length, as described, and of disintegrating it in thickness should be combined.

I claim—

The method herein described of preparing long-stapled vegetable fibrous material, for the purpose of spinning therefrom both coarse and fine yarn or thread, by combining the described mechanical reduction of the said fiber with its chemical treatment, as set forth.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

STEPHEN M. ALLEN.

Witnesses:

A. POLLAK,

STUART GWYNN.