

S. M. ALLEN.
TREATMENT OF FIBROUS PLANTS.

No. 27,507.

Patented Mar. 20, 1860.

Plate 1.



Fibre of
Natural Wool

Plate 2.



Fibre of
Natural
Cotton

Plate 3.



Fibre of
Natural
Silk

Plate 4.



Fibre of
Natural
Flax

Plate 5.



Fibre of
Natural
Hemp

Plate 6.



Fibre of
Flax partly
Eliminated

Plate 7.



Fibril of
Flax
Prepared

Plate 8.



Sec. thro' stem
of flax.



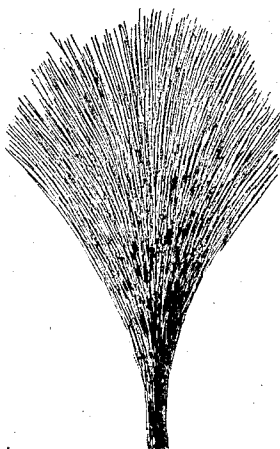
Sec. thro'
stem
of
Flax

Plate 9.



Elevation
of
Fibril A

Plate 10.



Filament
of Flax
Eliminated

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TREATMENT OF FIBROUS PLANTS.

Specification of Letters Patent No. 27,507, dated March 20, 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 certain new and useful Mode of Treating Fibrous Plants, the object of which is to produce a new and better fibrous material than any hitherto produced, to be used as a substitute for and mixed with silk, cotton, wool, and linen, and that the following description, taken in connection with the accompanying drawings, hereinafter referred to, forms 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.

The present invention relates to the treatment of fibrous vegetables like flax, hemp, jute, Manila-grass, sugar cane, etc., so as to change and improve their staple and thus render them valuable as the basis of textile fabrics and so that they can be used as substitutes for or mixed with silk, cotton, and wool, etc., in the manufacture of yarns and cloths.

Before proceeding further, it may be well to state that my improvements are not applicable to cotton, between which and those plants of which I treat, there is no true analogy, as cotton is a seed-covering and can only be cleansed, not have its staple altered, whereas the mechanical structure of the above named plants, can be in a degree affected by different modes of treatment. But all processes heretofore employed have been more or less destructive of the best qualities of the fibrous basis sought to be obtained, and these qualities may be enumerated as follows: It is important to obtain such a shape of fibril and such a surface thereon, as to best adapt it to mix with silk, wool or cotton or to work pure into a strong thread or yarn and so that it can be worked on the ordinary machinery now used in producing silk, woolen or cotton or linen goods. It should be of the nature and condition to receive and permanently retain unchanged the dyes used in producing colored goods. Its condition should be such, that the bleaching can be performed by chlorin instead of by air, or natural bleaching, as now practiced. It should retain the softness of touch, which give value

to fine animal wools, and lastly it should have the glossy appearance of silk.

To produce a fiber which should possess all the above-named qualities is the object aimed at and secured by my invention, and one which has never before been attained; and in order to clearly point out the distinctive features and advantages of my new mode of treatment and wherein it is in direct opposition to those that have heretofore been employed, it may be observed that in most of the fibrous plants herein above spoken of are found albumen, resin, oil, &c., which color and cement the fibrils and filaments to the central woody stalk. All the old processes while attempting to remove these matters have changed or destroyed the true natural structure of the fibrous plant. Thus the old "setting" and analogous processes have been fermenting ones which in the end cause the decomposition, decay or destruction of the texture of the organic substances of the fiber. The later and patented processes of treating with caustic alkalis or acids, produce as bad an effect though of a different kind. All of them lessen the strength and diminish the softness and glossy appearance of the ultimate fibril.

The essential feature of my new mode of treatment, consists in subjecting the material acted upon to heated air charged with water up to its point of saturation. The action of this saturated air produces an effect upon the fiber which has never before been secured by any process heretofore attempted, viz; it softens and separates the elements that hold the fibers together, without destroying or injuring its natural structure, and opens the capillary tubes, so that the albumen, resinous and coloring matters can be readily reached and removed by water. All processes heretofore used instead of doing this, fix the albumen and coloring matter with the more insoluble matters such as gum-resin, &c., and prevent the very object aimed at, viz., opening the fiber so that the coloring matter, albumen, &c., can be removed by water or otherwise.

It will be seen that there is a great difference between heated vapor, and air, at the same temperature, when charged with water up to its point of saturation, as air thus charged is much more penetrative and has its solvent power increased to a wonderful extent, and the finest fibers thus treated become filled with water as may be observed

with the aid of a powerful microscope. Exposure to watery vapor will produce no such effect, as the vapor will condense on the surface of the fibrous materials, and may be observed there in minute globules. After this "air-bath" the fibers are exposed to boiled water cooled down to about 140° to 160°, and kept at that heat a proper length of time (in any suitable vessel) say for about three hours, when a large percentage of the cementing matters, especially the albumen and green coloring matter is dissolved. This solution is then displaced and driven out of the fibrous materials by pure water of about 140° to 150° in any proper manner.

In order to show the distinctive features between the structure of the several fibrous vegetables that I treat and that of cotton and the peculiar effect of my process, I have illustrated fibers of the same, highly magnified in Sheet 1 of the accompanying plates of drawings of which Plate 1 is a fiber of natural wool highly magnified. Plate 2 is a fiber of cotton. Plate 3 one of silk. Plate 4 one of natural flax. Plate 5 one of hemp. Plate 6 one of flax with the fibrils partly separated or spread out. Plate 7 one of flax partially prepared by my process. Plate 8 a cross section through a stem of flax in its natural state. Plate 9 a cross section of the fibril, showing its shape and how surrounded with a set of cords in a spiral direction. Plate 10 a fibril of flax as prepared by my process and Plate 11 a filament of flax spread out. By inspection of these plates, it will be seen, that the fiber produced by my new mode and shown in Plate 10 combines in itself the good qualities of the insect, animal, and vegetable materials.

I will next proceed to describe more in detail my new mode of treating flax, it being premised that a similar treatment is pursued when operating on any of the materials herein before named, varying slightly of course in temperature and the size and form of the apparatus used according to the use to which the result is to be applied.

I take the flax plant which should be pulled or mown before it be too ripe, and sun dry it, or dry it by means of air deprived of its normal moisture by heat and then cooled in a manner that will be described in a subsequent application for separate Letters Patent, and place it in a vessel A, Fig. 1, Plate 2, in which vessel B is a "man-hole" for the insertion of the fibrous materials and C a "man hole" for the removal of the same, D a perforated bottom and E a heating coil. Air charged with water as before stated is then forced through the vessel A and out at the valve I, depositing its moisture in and penetrating the fibrous materials, as follows: A', Fig. 2, Plate 2 is a chamber containing water to the level *b b*.

B' is a steam-heating coil, C' an air-coil. E' is a cistern containing water to the line *f f*. D' is a hollow piston, with a valve at H' opening inward, operated by a lever I'. F' is an air-pipe rising above the level of the water line *f f* and provided with a valve at G' opening inward. The air entering at valve H' in elevating the piston is forced in the down stroke through the pipe F' and through perforations in the coil D', thence upward through the water heated by the steam coil B' and out at the cock J' into the vessel A containing the fibrous materials upon which, the moisture with which the air is charged, is deposited. The air after having thus deposited its moisture, passes out at the cock G. After the fibrous materials have been thus treated with the "air-bath" the "cementing matters" are brought into such a molecular condition as to be soluble in water, which should be made pure by boiling and cooled to 140° or 150° and then passed through the fibrous materials, which may be done by letting it enter the cock G, Fig. 7, Plate 2, from a reservoir and pass out at the cock H until the solution is removed. The resultant fiber may then be passed through breaking and separating or spreading machines in the usual or any desired mode and then is ready to be used in coarse fabrics but for fine fabrics it undergoes further operations which will form the subjects of subsequent applications for separate Letters Patent.

It will be evident that there are other modes and a variety of apparatus other than those described by which the fibrous materials can be subjected to the action of the "air-bath" and that the air can be saturated by different means from those described and I shall not therefore in my claim restrict myself to the use of any particular apparatus for producing the desired results. It will be also evident that in lieu of charging air with water, that it may be saturated with various spirits, such as alcohol, spirits of turpentine, &c., before acting upon the fibrous materials.

Having thus described my improved and new process, I shall state my claim as follows:

What I claim as my invention and desire to have secured to me by Letters Patent is—

My new mode of treating fibrous materials, such as flax, hemp, jute, Manila-grass, sugar-cane, &c., the same consisting in subjecting them to the action of air charged or saturated with moisture or vapor, substantially as set forth.

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Witnesses:

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