

## UNITED STATES PATENT OFFICE.

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## PROCESS OF LIBERATING AND SEPARATING FIBERS.

SPECIFICATION forming part of Letters Patent No. 786,721, dated April 4, 1905.

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*To all whom it may concern:*

Be it known that I, HENRY SPENCER BLACKMORE, a citizen of the United States, residing at 206 South Ninth avenue, in the city of Mount Vernon, county of Westchester, and State of New York, have invented certain new and useful Improvements in Processes of Liberating and Separating Fibers; and I 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 object of my invention is to liberate and separate fibers from their naturally uniting or binding constituents with which they are found in nature—such as cutose, vasculose, &c.—in such a manner that the fibers are not injured and that the gummy or binding constituents are removed by simple and economical means.

My invention relates particularly to the separation of ramie fiber, but is not limited thereto, as many other fibers may be liberated and separated by my process, such as jute, New Zealand flax, &c.

It is well known that substances which bind fibers of ramie and similar vegetation consist largely of complex acid substitution products combined more or less with calcium, forming ordinarily-insoluble compounds, such as the calcium salts of oleocutic, stereocutic, pectic, and similar organic acids.

My invention therefore consists in transforming the insoluble binding ingredients of the fibers into soluble compounds without affecting or injuring the fiber and separating the individual fibers from each other by the increase in bulk of chemicals introduced between the fibers induced by decomposition or combination.

In carrying out my process I prefer to proceed as follows: I take the stalk, such as ramie, from which it is desired to separate the fiber and place the same in a receptacle containing a ten-per-cent. solution of alkali aluminate, such as sodium aluminate, preferably in a heated state, (about 200° Fahrenheit.) The receptacle is then closed, the stalks allowed to digest for about an hour, when the pressure is preferably reduced by exhaustion,

which withdraws from the stalks any occluded air within the pores. I prefer to treat the fibrous material in drums holding about two hundred and fifty gallons of ten-per-cent. solution of sodium aluminate and add thereto from time to time fresh portions of alkali aluminate to compensate for that taken up by the decomposition of the binding constituents of the fiber, so that the solution may be maintained at about a uniform density. I then subject the material to an increased pressure of steam of about sixty pounds, which further heats the solution and drives it into the material, thus thoroughly saturating it with the alkali aluminate. During the digestion under pressure with the alkali aluminate the binding calcium salts are decomposed, producing alkali oleocutate, steariocutate, pectate, &c., and calcium aluminate. The alkali salts are afterward dissolved out by thoroughly washing with hot water. The stalks containing the alkali aluminate are then removed from the chemical bath and exposed to the action of carbon dioxide under pressure of about three hundred pounds, which decomposes the alkali aluminate, liberating aluminium hydroxid or hydrated oxid within the pores between the fibers, which, together with the alkali bicarbonate produced, simultaneously increase in bulk and segregate the fibers from each other. The pressure is then reduced and the stalks thoroughly washed with water, the alkali salts being thereby removed, leaving the fibers practically free from each other, retaining a portion of the aluminium hydroxid, which is finally removed by treatment with dilute caustic alkali solution, such as a five-per-cent. solution of caustic soda, which combines with the aluminium hydroxid, regenerating alkali aluminate, which is employed for further operation, leaving the fibers clean, and which after drying and bleaching are in condition for mechanical treatment and manufacture into textile articles.

It can be seen by the foregoing description that my process consists in chemically transforming the binding substances of the fibers into soluble compounds without injuring the fiber and parting the individual fiber by the increase in bulk of chemicals within the pores



between the fibers, such as the decomposition of sodium aluminate by the action of carbonic acid, producing alkali bicarbonate by absorption of the carbon dioxide and the liberation of  
5 aluminium oxid, which immediately absorbs moisture, producing aluminium hydroxid, both compounds of which are considerably increased in bulk by the reaction.

It is obvious that other salts or compounds  
10 capable of increasing in bulk by chemical combination or transformation and which chemical compounds have the property of transforming the binding substances of the fibers into soluble substances without injuring  
15 the fiber *per se* may be employed without departing from the spirit of my invention, which consists, substantially, in liberation and separation of fibers from their binding constituents by the action of chemical compounds, the  
20 increase in bulk whereof when introduced into the pores between the fibers lifts and parts the same without injury to the fiber.

Having now described my invention, what I claim as new, and desire to secure by Letters  
25 Patent, is—

1. The process of liberating and separating fibers which consists in saturating the combined fibers with a chemical compound capable of transforming the binding constituents  
30 into soluble compounds and separating the fibers from each other by increasing the bulk of chemicals in the pores between the fibers by chemical action.

2. The process of liberating and separating  
35 fibers, which consists in saturating the material containing combined fibers with a compound capable of decomposing the binding substances of the fibers and increasing in bulk when exposed to reagents and exposing the  
40 material so saturated to the action of reagents producing products of increased bulk where- by the fibers are separated from each other by formation and expansion of chemical salts.

3. The process of liberating and separating fibers which consists in saturating the mate- 45 rial containing combined fibers with a solution of chemicals capable of decomposing the binding substances by digesting therein, removing the saturated material from the chemical bath and exposing it to the action of a gaseous  
50 compound capable of uniting with the chemical retained therein, producing a product of increased bulk and washing and removing the compounds thus formed therefrom, substantially as described. 55

4. The process of liberating and separating fibers which consists in saturating the combined fibers with an alkali aluminate, and exposing to the action of water and a gaseous  
60 reagent. 65

5. The process of liberating and separating fibers which consists in saturating the combined fibers with sodium aluminate, and exposing to the action of carbon dioxide and water.

6. In the process of liberating and separating 65 ing fiber, the step of separating them from each other, which consists in increasing the bulk of chemicals within the pores between the fibers by the absorption, combination, or  
70 reaction with substances supplied thereto after saturation therewith, substantially as described.

7. The process of liberating and separating fibers which consists in decomposing the binding constituents of the fibers by chemical ac- 75 tion and separating the fibers from each other by producing solid compounds of increased bulk within the pores between the fibers by transformation of chemical content.

In testimony whereof I affix my signature in 80 presence of two witnesses.

HENRY SPENCER BLACKMORE.

Witnesses:

WARREN C. STONE,  
H. N. JENKINS.