UNITED STATES PATENT OFFICE.

EDMOND FRÉMY AND VICTOR URBAIN, OF PARIS, FRANCE, ASSIGNORS TO SOCIÉTÉ DE CRÉDIT Â L'INDUSTRIE, AU COMMERCE ET AUX TRAVAUX PUBLIES.

PROCESS OF TREATMENT OF TEXTILE VEGETABLE FIBERS.

SPECIFICATION forming part of Letters Patent No. 303,221, dated August 5, 1884.

Application filed May 17, 1884. (No specimens.) Patented in France February 10, 1883, No. 153,642, and in England February 12, 1883, No. 763.

To all whom it may concern:

Be it known that we, EDMOND FRÉMY and VICTOR URBAIN, both citizens of the French Republic, and residents of Paris, France, have invented a new and Improved Process of Treating Textile Vegetable Fibers, of which the following is a specification.

It has been found difficult to render many vegetable fibers—such as rhea or China grass—suitable for textile purposes on account of the cement which binds the fibers together and the colored pellicle which envelops them.

We have discovered that the substances which have to be removed in order to render the fibers useful for manufacturing purposes are pectose, cutose, and vasculose; and the present invention consists in a process for discharging these substances without injuring the fibers.

The character of the process about to be described has to be more or less varied according to the proportions in which the ingredients that are to be removed exist in the crude material, and according to the purpose to which the prepared fibers are to be applied. If they are to be used for purposes requiring strength and tenacity, as for cordage, it is better not to remove from the material the cutose and vasculose, but to remove only its pectose. If, on the other hand, the fibers are to be used for textile purposes, they should be thoroughly cleared of the cutose and vasculose as well as the pectose, so as to obtain them in a soft, silky condition fit for spinning and weaving very fine textures. Qualities of fiber intermediate between those applicable for cordage and those applicable for fine textures may be obtained by treatment to remove the pectose and cutose, but to leave the whole or part of the vasculose. Many of the materials—such as those of the China-grass kind, though they can be treated in their green or crude condition—are more easily and thoroughly dealt with after they have undergone a preliminary process of steaming, which furnishes the material in the form of long flexible ribbons. As different materials contain the substances to be removed in different proportions, it is necessary in the first place to ascertain by analysis what those proportions are, and to modify the treatment accordingly. The nature of the process may, however, be so far understood by several examples that the manufacturer, aided by proper analysis, could apply it with suitable modifications in other cases.

It has been found by analysis that certain of the materials ordinarily used (which are set out as examples, so as to illustrate the process to be employed) contain ingredients according to the following table:

	Flax.	Hemp.	Chinese rhea.	Algerian rhea.
Substances of cellulose and soluble character	83.5	83.5	86.5	76.5
Pectose	13.0	12.5	12.5	11.5
Cutose	3.0	2.5	0.8	0.3
Vasculose	0.5	1.5	0.2	11.7
	100.0	100.0	100.0	100.0

It will be observed that in some of these, as in flax, hemp, and Chinese rhea, the pectose predominates, the cutose and vasculose being in very small proportion. Again, in Algerian rhea having a pellicle almost exclusively composed of vasculose, the pectose and vasculose appear in considerable proportion, the cutose being in small quantity. In like manner, the proportions in other materials being first ascertained by analysis, the process applicable will be understood as follows:

To remove pectose when it predominates or when it is desired only to remove this substance without removing the cutose or vasculose, so as to leave the fibers in condition suitable for cordage or such like purposes, the material is boiled at ordinary pressure for three hours in a liquor containing a weight of dry carbonate of soda equivalent to two-thirds of the weight of pectose, this quantity of carbonate of soda being, according to the preceding table, about eight per cent. of the total weight of the material treated.

To remove cutose and pectose without removing vasculose, a similar operation is ap-

plied; but instead of carbonate of soda caustic soda is used in quantity amounting to one-third of the weight of pectose and cutose taken together. This quantity of caustic soda in the case of flax or hemp would be about five per cent., and in the case of rhea about four per cent., of the total weight of the dry material treated. When vasculose predominates, as in Algerian rhea, or when it is desired to have the fibers thoroughly cleared, the material is boiled for three hours, under a pressure of not less than sixty pounds per square inch, in a solution containing a weight of caustic soda equivalent to that of the vasculose to be removed, amounting, according to the table, to about twelve per cent. of the total weight of Algerian rhea treated. This treatment for vasculose serves also to remove the pectose and the cutose, so that no other bath is required for their removal. The complete purification of the fibers may be tested by subjecting a sample to the action of bihydrated sulphuric acid, in which it should dissolve without any residue. Fibers prepared in this manner, but with excess of alkali, are suitable for paper-pulp.

When it is desired to apply the process to materials other than those mentioned in the preceding table, a careful preliminary analysis must be made in order that the reagents may be applied in suitable proportions. As a guide to the analyst, it should be noted that hydrochloric acid, boiling, dissolves pectate of lime, setting free pectic acid, which may be neutralized by an alkali, and it also transforms pectose into pectine, which can be precipitated by alcohol. Cellulose is dissolved by ammoniauret of copper, and boiling hydrochloric acid renders paracellulose soluble in ammoniauret of copper. Bihydrated sulphuric acid dissolves cellulose substances. A boiling solution of potassa dissolves cutose, and under pressure it dissolves vasculose. Dilute nitric acid renders vasculose soluble in alkaline solutions.

Having thus described the nature of our said invention and in what manner it is to be performed, we would have it understood that no general claim is here intended to be made for the treatment of vegetable fibrous materials with alkalies or their compounds, as this is frequently done without regard to the particular substances that have to be acted on, or to the particular proportions in which the reagents should be applied; but so far as we know there has been hitherto no successful manufacture of the materials above referred to by treating fibrous bodies according to a regulated process, such as is hereinbefore described. According to that process the character of the raw fibrous bodies operated upon is first ascertained by analysis, and the chemical agents are applied in a regulated manner, which is varied just as analysis may indicate variation to be necessary, having regard to the purposes for which the prepared fibrous materials are to be used, so that in all cases the required character of prepared material may with certainty be obtained from the raw substances acted upon.

We therefore claim—

The herein-described method of treating textile vegetable fibers, which consists in first analyzing the particular fiber to be treated, in order to ascertain the proportion of pectose, cutose, and vasculose contained therein, and then boiling the fiber in an alkaline solution, in which the quantity of alkali is proportioned, as set forth, to the amount of the pectose, cutose, or vasculose to be removed as ascertained by the analysis.

In witness whereof we have hereunto signed our names in the presence of two subscribing witnesses.

EDMOND FRÉMY.
VICTOR URBAIN.

Witnesses:
ROBT. M. HOOPER,
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