UNITED STATES PATENT OFFICE.

ANTONIO MEUCCI, OF CLIFTON, ASSIGNOR TO WM. E. RIDER, OF NEW YORK, N. Y.

IMPROVED PROCESS FOR REMOVING MINERAL, GUMMY, AND RESINOUS SUBSTANCES FROM VEGETABLE FIBER.

Specification forming part of Letters Patent No. 47,068, dated March 28, 1865.

To all whom it may concern:

Be it known that I, ANTONIO MEUCCI, of Clifton, in the county of Richmond and State of New York, have invented certain new and useful Improvements in the Process of Removing the Mineral, Gummy, and Resinous Substances from Vegetable Material, (for which Letters Patent, No. 44,735, were granted to me the 18th day of October, 1864;) and I declare that the following is a full, clear, and exact description of my said improvements.

My present improvement consists in treating the vegetable materials, first, while in a dry state, with the gases produced by the action of nitro-muriatic acid upon iron and carbonate of lime, or their equivalents; second, while in a wet state, with the same gases; and, third, with a caustic alkali, these three operations constituting one compound process.

My improvement consists, further, in treating the vegetable material subjected to the first two of the above-recited operations with a mixture of caustic alkali and oil, the effect of which is to give elasticity to the fiber produced.

In order to practice this process, I make use of a vat to contain the vegetable material, and a gas-generator to generate the gas. The vat may be a cylindrical vessel fitted with a perforated cover, and with a perforated diaphragm at a short distance above its bottom to hold the vegetable material. The vat should also be provided with a cover which fits it tightly, and which may be substituted for the perforated cover. This vat should either be made of some material which is not affected materially by the gases or should be coated with such a material. In the latter case it may be coated with shellac in the form of varnish. The gas-generator may be made of glass. It should be fitted, at a short distance above its bottom, with an iron grating to support the carbonate of lime. It should also be fitted with a funnel-pipe, the end of which terminates in the vicinity of the grating for the purpose of introducing the acid, and with a pipe connecting its upper part with the vat beneath the perforated diaphragm thereof, so as to conduct the gases from the generator to the under side of the diaphragm of the vat. If wood be the vegetable material to be treated, I saw it crosswise to the grain into pieces about three inches thick, and then split it in the direction of the grain into pieces of about the size of match-splints. The split wood, which, if not already dry, should be dried by stoving it, is placed in the vat upon the perforated diaphragm and is covered with the perforated cover. The gas-generator is charged with oyster-shells or other form of carbonate of lime, and sufficient water is introduced to cover them. The acid is then poured little by little into the funnel-pipe, and the mixture of gases produced by the action of the acid upon the oyster-shells and the iron of the grating passes through the connecting-pipe to the under side of the mass of dry split wood and rises among it. This operation or dry-gasing of the material is continued until the gas begins to escape at the perforations of the cover of the vat. Then water at the temperature of the atmosphere is poured into the vat until the wood is covered. The tight cover is then applied to the vat, and the introduction of the gases from the generator is continued, so that the wood is subjected, while wet, to the action of the gases, and this wet-gasing is continued until the wood becomes yellow throughout its entire substance, the result being better the longer the wood is subjected to this second operation. The wood is then withdrawn from the vat and is drained of the liquid, after which it is steamed until it becomes tender, this operation being conveniently effected by placing it in a covered vat and admitting steam from a steam-boiler. After it is steamed it is wet with the caustic alkali, or with the compound of the caustic alkali and oil, and is crushed in an ordinary putty-mill until it is reduced to a fibrous mass, the wetting with alkali being continued during the crushing.

The fibrous material produced by the above operations should be well washed with water, to free it, as much as possible, from the alkali. If it is required to be white, it should be bleached with chlorine in the following manner: The fiber is steeped and stirred in a solution of muriatic acid in water in the proportion of from two to five parts of acid to one hundred of water. A solution of chloride of lime in the proportion of from one to five pounds of chloride to one hundred pounds of water, in water, is

gradually added, the stirring being continued during this operation. The fibrous material, when sufficiently bleached by these operations, is drained, washed in water, drained of water, pressed, and dried for use; or, if required, it may be used in the wet state.

The nitro-muriatic acid employed by me with success in practicing the above process is a mixture of four parts, by weight, of commercial nitric acid of 24° of Baumé's hydrometer with one part, by weight, of commercial muriatic acid of 20° of Baumé's hydrometer.

The caustic alkali used by me with success is a solution of caustic soda in water of from 2° to 5° of Baumé's hydrometer, and when oil is used the alkaline solution is mixed with three per cent. of a non-drying oil, such as cotton-seed oil or olive-oil. This mixture should be used in a warm state—say at a temperature of not less than 150° of Fahrenheit. The water in which the material is washed and the bleaching solutions should also be used warm, the temperature being not less than 150°.

The kinds of wood which I prefer to employ, when the fiber produced is to be used for the manufacture of paper, are white pine and spruce, the branches being preferred, as they contain less resin and are more readily split.

Having thus described the best mode with which I am acquainted of practicing my improvement, what I claim as my invention, and desire to secure by Letters Patent, is—

1. The improved process of treating a vegetable material by treating it, first, in a dry state, with the gaseous substances produced by the action of nitro-muriatic acid upon carbonate of lime and iron, or their equivalents; second, in a wet state, with the same substances; and, third, with a caustic alkali, substantially as set forth.

2. The process of treating the vegetable material which has been subjected to the first two operations above recited with a mixture of caustic alkali and oil, substantially as above set forth.

In witness whereof I have hereunto set my hand this 11th day of February, A. D. 1865.

ANTONIO MEUCCI.

Witnesses:
E. S. RENWICK,
W. L. BENNEM.