

UNITED STATES PATENT OFFICE.

ADNA T. DENISON AND HELEN L. PALMER, OF PORTLAND, MAINE.

METHOD OF MAKING PULP FROM VEGETABLE SUBSTANCES.

SPECIFICATION forming part of Letters Patent No. 496,400, dated May 2, 1893.

Application filed October 16, 1890. Renewed December 22, 1891. Again renewed July 5, 1892, and again renewed March 29, 1893. Serial No. 468,214. (No specimens.)

To all whom it may concern:

Be it known that we, ADNA T. DENISON and HELEN L. PALMER, citizens of the United States, residing at Portland, in the county of Cumberland and State of Maine, have invented an Improved Method of Making Pulp from Vegetable Substances, of which the following is a specification.

Our invention relates to improvements in the art or method of reducing vegetable substances by chemical treatment, and obtaining therefrom cellulose or pulp, which may be subsequently utilized in the manufacture of paper or for other useful purposes.

The object of our invention is to furnish an improvement in methods heretofore in use whereby the operation shall be more quickly and cheaply performed and an improved product be obtained.

The raw material which we believe to be best adapted for treatment according to our improved method is wood, preferably such as spruce, pine, hemlock, poplar, &c., although other fibers, such as straw, may be used. The stock, before being treated, is preferably cut up, as in former methods, into small lengths or pieces, and is then submitted in a suitable vessel to the action of a chemical solution. For this purpose the vessel ordinarily known as a digester, either upright or rotary, may be employed. In the digester the material to be treated is covered with a solution which may be described as an alkaline solution of a nitrate consisting of a caustic alkali, preferably carbonated ash and lime, or caustic soda, nitric acid, and water. The preferred proportion of these ingredients is in a solution having a strength of 7° Baumé, one fluid ounce of acid to one hundred and fifty fluid ounces of the alkaline solution. This solution, it will be observed, is much lower in density than the caustic alkaline solution heretofore ordinarily employed. The acid may be used in greater or less proportion than above stated, but according to our experience the proportion of one hundred and fifty to one

will give the best result with the wood stock. The chips and solution having been placed in the digester, are submitted to steam pressure and heat until the reduction of the material to cellulose is completed. The pressure and temperature employed may vary considerably in practice, but the higher they are the more rapid will be the disintegration. With a pressure of one hundred and ninety to two hundred pounds and corresponding temperature, we have reduced spruce chips to pure cellulose in one hour; but the same operation might be performed, although not so rapidly, with lower pressure and temperature. Straw may be successfully treated in a solution of lower density, say 2° Baumé, and with a smaller proportion of acid, say one to three hundred, and it may be thoroughly reduced in four hours' time under sixty-five pounds pressure, but more rapidly under a higher pressure and temperature. After the pulp has been thoroughly digested and reduced, it may be washed and bleached in any well known manner. We prefer the chloride of lime process now commonly employed, in which we find the pulp produced by our improved method bleaches very readily, and with a relatively small amount of chloride of lime. We are of course aware of the so called soda and bi-sulphite processes now commonly in use, and make no claim to them.

We claim—

The process of producing pulp for paper and other purposes from vegetable substances, which consists in subjecting the same to the action of an alkaline solution of a nitrate under heat and pressure substantially as set forth.

In testimony whereof we have hereunto subscribed our names this 3d day of October, A. D. 1890.

ADNA T. DENISON.
HELEN L. PALMER.

Witnesses:

JOSHUA S. PALMER,
WILLIAM J. KNOWLTON.