UNITED STATES PATENT OFFICE.

GEORGE E. MARSHALL, OF TURNER'S FALLS, MASSACHUSETTS.

IMPROVEMENT IN PROCESSES FOR PREPARING WOOD FOR MECHANICAL REDUCTION TO PAPER-PULP.

Specification forming part of Letters Patent No. **193,261**, dated July 17, 1877; application filed June 30, 1877.

To all whom it may concern:

Be it known that I, GEORGE E. MARSHALL, of Turner's Falls, in the county of Franklin and Commonwealth of Massachusetts, have invented a new and useful Process in the Preparation of Wood for Wood-Pulp in the Manufacture of Paper; and I hereby declare the following to be a full and clear description of the same:

This invention relates to that class of processes employed mechanically to remove the superfluous and deleterious qualities in spruce, poplar, and other woods preparatory to their being used in the manufacture of wood-pulp for making paper-stock.

It is well known that poplar, spruce, and other woods used in the manufacture of pulp for paper-stock should all be cut in the winter season, while the grain of the wood is comparatively free from sap, and before it begins to ascend in the spring. This involves the necessity of keeping a large supply of the wood on hand for several months, or during the whole of the remainder of the year, as it is unfit for use when full of sap or frozen.

In keeping the wood for use several months, it, of course, becomes seasoned, and comparatively dry and hard, the gum, resin, acetic, and pinic acids become hard and fixed in the grain of the wood, and more or less insoluble. To remove these substances, and to render the wood fresh and soft for the best working condition, many processes have been attempted, but none with entire success. The wood has been boiled with alkalies and without. It has also been subjected to great pressure with steam, and other treatments, somewhat varied from these, have been tried; but in all these processes the wood is discolored—in some more than others—causing an additional expense to bleach it, and some of them are very expensive in the consumption of fuel and of chemicals.

I purpose, by my invention, to accomplish the desired object at a reasonable expense, and without the difficulties encountered in these various processes by the use of water, under a high degree of pressure, but with a comparatively low degree of heat.

The wood, having been cut, split, and prepared in the usual manner for grinding, is placed in a close vessel or tank, made tight and strong enough to resist a pressure of from two hundred to two hundred and fifty pounds to the square inch, into which the wood is packed. At the bottom of this tank is an opening, through which the water, of a temperature under the boiling-point, is forced, by a hydraulic press, to such an extent as completely to saturate and thoroughly to permeate the wood, and to soften and drive out of the pores the gum, the resin, and the acids. This may be somewhat aided by the introduction of a small quantity of some alkaline substance to partially act on the acids, but not sufficient to color the wood.

To aid in this operation, and to allow the superfluous and deleterious matter thus disengaged from the wood to pass away, an opening is made in the top of the tank, provided with a valve, gaged to allow the water, at any regulated high pressure, to pass off, thus constantly washing away the impurities rendered soluble and free by the introduction of the heated slightly alkaline water. The wood is continued in this condition until it is cleansed, freshened, and softened fit for the grinding-machines.

What I claim, in preparing wood for the mechanical manufacture of pulp for paper-stock, is—

The process of removing the gum, acids, and other deleterious matter preparatory to grinding, by subjecting the wood to a high degree of pressure of water under the boiling-point, all substantially as described.

Witness my hand this 25th day of June, A. D. 1877.

GEO. E. MARSHALL.

Witnesses:

W. H. P. GILMORE,

W. D. RUSSELL.