UNITED STATES PATENT OFFICE.

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PROCESS OF MANUFACTURE OF CHEMICAL OR SULFITE WOOD-PULP.

No. 833,750. Specification of Letters Patent. Patented Oct. 23, 1906.

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To all whom it may concern:

Be it known that I, ROBERT ROE, Jr., a citizen of the United States, residing at Niagara, in the county of Marinette and State of Wisconsin, have invented certain new and useful Improvements in Processes of Manufacture of Chemical or Sulfite Wood-Pulp, of which the following is a specification.

My invention relates to the process of artificially drying wood-chips used in the manufacture of wood-pulp by the chemical or sulfite process; and it consists of the novel combination of the several process steps hereinafter described, and specifically set forth in the claims.

In the manufacture of chemical or sulfite pulp from wood the wood is used in the form of chips. These chips are cut from logs (or occasionally from slabs and sawmill waste) usually by means of a heavy circular revolving disk, upon the face of which are set several knives bolted in position and at such an angle that when a log or piece of wood is pushed against the revolving disk a chip about three-quarters of an inch in length is cut off by each knife in passing, which chip is so cut off not diametrically of the log or piece of wood, but in a direction diagonal to the diameter. This action of the revolving knives is similar in its results to the action of a hatchet. These chips have heretofore not been dried artificially, nor is it necessary that they should be dried; but I have found that much better results are obtained by the artificial drying of the chips, as I will presently explain, before they are introduced into the digesting apparatus and there subjected to chemical action.

In the cutting of wood-chips, as above described, a considerable portion of the product of the operation is waste, consisting of knots, dirt, and other refuse matter. The good chips have sometimes been separated from this waste or refuse by throwing the whole into a tank of water, with the result that the good chips float and the knots and other undesired matter sink. Some of the good chips, however, may be or become water-logged, and these will sink also. Such chips have usually been thrown away with the waste; but as they amount sometimes to as much as five per cent. of the entire product it is now thought desirable to recover the good chips so lost. This is accomplished by drying in a suitable apparatus the whole of such waste product, whereupon it is all thrown into the tank of water a second time, with the result that the good chips, which before were water-logged, and consequently sank, now float and are taken out, while the knots and other heavy undesirable substances again sink and become waste. This floating or drying and floating operation, however, is wholly for the purpose of separating out the chips, which are proper for the pulp manufacture, and in every instance the chips, which go into the digesting apparatus for chemical treatment, are those which are more or less wet.

The chips are usually stored in bins and taken when required in suitable quantities to the digesting apparatus, in which they are subjected to the action of an acid or chemicals. This acid is usually the bisulfite of lime and magnesia, which, as is well known in the art, is made by burning sulfur and passing the gas through a milk of lime, (and magnesia mixed,) five hundred pounds of lime to five thousand gallons of water being a common proportion. When the liquor has cleared and is found to be of sufficient strength, it is stored in tanks and is drawn off as required. The operation in the digester is commonly called "cooking" and consists in submerging in the digester a proper quantity of chips in a proper quantity of this acid and boiling under seventy-five to eighty pounds pressure with the aid of steam.

I have found by experiment that much better results are obtained in the manufacture of sulfite pulp when the chips are first artificially dried and that wet wood made into chips which are artificially dried produces a better quality of pulp than do chips which are made from dry seasoned wood. A larger quantity of chips can be got into the digester (on account of their being less bulky) than of either wet chips or chips from seasoned wood. The acid penetrates much more readily the artificially dried chips than the others named, and therefore the cooking is more uniform. There is an actual increased yield of fiber from a given quantity of wood, because by the use of ordinary chips, as above described, the cooking is necessarily prolonged to the point where the interior portions of the chips are cooked sufficiently, and in doing this the surfaces of the chips are subjected to overcooking, because the cooking commences at and near the surface before the acid has penetrated to the

center, and consequently some of the fibers are dissolved and destroyed by excessive acid action, (thus causing loss,) and in another portion the fibers are reduced in length and strength, (thus causing a poor quality of pulp.) By my process the time of cooking is materially shortened, so enabling a larger output per diem. The moisture in the chips is completely extracted, while in seasoned wood under the processes heretofore used twenty-five per cent. to thirty per cent. of the moisture is retained. There are no disadvantages in the use of my said process; but in every respect there are great advantages.

I do not wish to be confined to any particular method of drying the chips. Any artificial method will yield valuable results and embody the principle of my invention. I may employ cool air or gases in large volumes to carry away the moisture of the chips or warm air or gases in lesser volumes for the same purpose, or the moisture may be extracted by centrifugally-acting devices or machines or in any other known manner.

It may be desirable in some cases to dry the chips only partially by artificial means, as hereinbefore specified, but just before introducing them into the digester for chemical treatment to slightly moisten them by sprinkling or otherwise with water or even with some of the acid with which they are to be cooked or digested; but such preliminary or partial artificial drying of the chips I claim as within the scope of my invention.

I claim as a novel and useful invention and desire to secure by Letters Patent—

1. In the manufacture of chemical or sulfite wood-pulp, the use of artificially-dried wood-chips.

2. In the manufacture of chemical or sulfite wood-pulp, the improved process herein described, consisting of the cutting of chips from wet wood, then artificially drying said chips, and then cooking said chips in a digester by means of acid and under steam-pressure.

3. In the manufacture of chemical or sulfite wood-pulp, the improved process herein described of the cutting of chips from unseasoned wood, then artificially drying said chips, and then cooking said chips in a digester by means of acid and under steam-pressure.

4. In the manufacture of chemical or sulfite wood-pulp, the process of cutting chips, then extracting the moisture of said chips, and then cooking said chips in a digester by means of acid under steam-pressure.

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

ROBERT ROE, Jr.

Witnesses:

Chas. A. Sommers,

Albert W. Tohms.