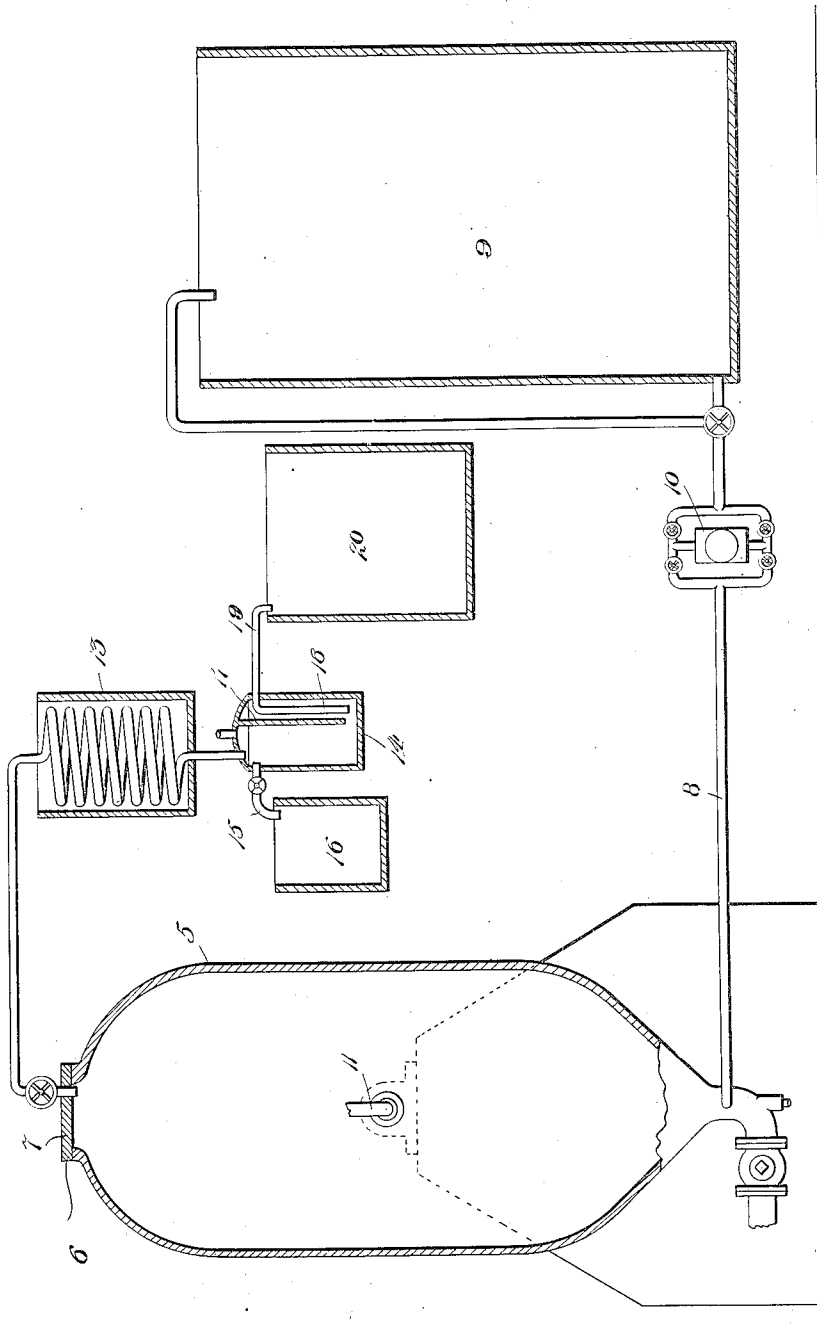


O. KRESS & S. D. WELLS.
MANUFACTURE OF WOOD PULP.
APPLICATION FILED DEC. 10, 1915.

1,266,957.

Patented May 21, 1918.



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Sidney D. Wells

UNITED STATES PATENT OFFICE.

OTTO KRESS AND SIDNEY D. WELLS, OF MADISON, WISCONSIN.

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Specification of Letters Patent.

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(DEDICATED TO THE PUBLIC.)

To all whom it may concern:

Be it known that we, OTTO KRESS and SIDNEY D. WELLS, citizens of the United States of America, and employees of the Department of Agriculture of the said United States, both residing at Madison, in the county of Dane, State of Wisconsin, (whose post-office address is Madison, Wisconsin,) have invented new and useful Improvements in the Manufacture of Wood-Pulp.

This application is made under the act of March 3, 1883, chapter 143 (22 Stat., 625), and the invention herein described and claimed may be used by the Government of the United States or any of its officers or employees in the prosecution of work for the Government, or any person in the United States, without payment to us of any royalty thereon.

Our invention relates to the manufacture of pulp for paper making and similar uses by any alkaline process such as the soda, sulfate, or kraft and the recovery of the rosin and turpentine and other volatile oils when using resinous woods.

The object of the invention is to bring about a more uniform digestion of the wood through preliminary penetration into the interior of the chips of cooking liquor under pressure and at lower temperature than ordinarily used in cooking by using a cooking liquor of such concentration that on withdrawal of excess cooking liquor the chips only hold the requisite amount of cooking chemical when the steam for cooking is introduced. We thereby secure a larger yield of more uniform pulp, lighter in color, easier to bleach, with less steam consumption and in a shorter time than is otherwise possible. When resinous woods are used, a large portion of the rosin can be recovered as such and in such form that it can be readily prepared for use in sizing paper, the manufacture of soap, etc. The turpentine and other volatile oils can be distilled over in larger quantities at lower temperatures and pressures and, therefore, are less contaminated with products of decomposition.

Still other objects of the invention will appear in the following specification, in which the preferred form of our invention is disclosed.

The drawing shows a diagrammatic view illustrating the apparatus which we prefer to use in carrying out the invention.

In the practice of the invention, the process is preferably carried out in the following manner:

The wood is chipped or shredded by any of the means practised in the art, and charged into a digester, 5, preferably a tumbling digester. While the chipped wood is introduced into the digester, 5, through an opening 6, which is normally closed by a plate, 7, an alkaline cooking liquor is introduced into the digester, 5, through a pipe, 8, and from a cooking liquor storage tank, 9, the alkaline cooking liquor being forced from the storage tank, 9, to the digester, 5, by means of a pump, 10, this pump, 10, being of a reversible variety, so that the alkaline cooking liquor may be pumped back from the digester, 5, into the storage tank, 9. When the chipped wood and the alkaline cooking liquor have been introduced into the digester, 5, the digester is closed, and the chipped wood in the digester is impregnated with the alkaline cooking liquor, and, if necessary, the pressure in the digester, 5, is raised and is maintained either by pumping in additional alkaline cooking liquor from the storage tank, 9, or by forcing air, steam, or other agents into the digester, 5. It has been found in practice that with longleaf pine, 100 pounds pressure from fifteen to twenty minutes at a temperature of substantially 185 degrees F. is sufficient to completely impregnate heart and sapwood chips five-eighths of an inch long with the grain. At the end of this period, the excess liquor is pumped back from the digester, 5, through the pipe 8, by means of the pump, 10, to the storage tank, 9, and on cooling, free rosin and rosin soap will separate from the alkaline cooking liquor in the storage tank, 9, and this free rosin and rosin soap, in the form of a thick scum, may be skimmed off of the alkaline cooking liquor in the storage tank, 9, from time to time, it being possible to make use of this free rosin and rosin soap in the sizing of paper, soap making, and other well known purposes.

While the excess alkaline cooking liquor has been removed in this manner from the digester, 5, the wood chips impregnated with the alkaline cooking liquor still remain in the digester, 5, and when live steam is introduced into the digester, 5, through a pipe, 11, rosin is saponified by the alkaline cooking liquor to rosin soap, and this rosin soap foams in the digester, 5, and, as there is no

excess of cooking liquor in the said digester, the rosin soap will prime over through a relief line, 12, to a condenser, 13, and into a separator, 14. The rosin soap recovered in this way is only very slightly alkaline, and with the addition of a small amount of acid can be used in the sizing of paper pulp as commonly practised.

At the same time that the rosin soap is priming over, turpentine and other volatile oils are distilled from the chipped wood, and at lower temperatures and pressures than are ordinarily used when reclaiming such oils. Inasmuch as there is no excess cooking liquor in the digester, 5, these oils distil over more readily and quickly than in ordinary pulping practice, and they are, therefore, distilled at lower temperatures and pressures, as stated.

This gives purer turpentine, and larger yields than is possible under other methods, for in other methods there is considerable contamination caused by products produced by the action of the cooking liquor on wood at more elevated temperatures and pressures, also by the cracking of compounds at high boiling points, such as rosin.

The turpentine and rosin soap which have passed through the relief line, 12, to the condenser, 13, flow from the condenser, 13, to the separator, 14, in which the oils rise to the surface and pass through a pipe, 15, to a turpentine reservoir, 16, there being a baffle plate, 17, on the separator, 14, under which the water and rosin size flow to the bottom, 18, of a pipe, 19, which serves to convey them to a rosin soap reservoir, 20.

While the rosin, turpentine, and other volatile oils are being recovered in the manner described, the pressure and temperature within the digester are increasing to the points desired for reducing the chipped wood to pulp, and after the rosin, turpentine, and other volatile oils have been recovered, the cooking process is continued by the usual method.

In carrying out our process, the time necessary for complete digestion of the wood chips to pulp is materially reduced, while at the same time a much more uniform and

easier bleaching pulp, of lighter color and increased strength, is obtained, with larger yields, and with a reduction of steam consumption during the cooking process and in the recovery of the by-products referred to above.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. A process of pulping wood consisting of impregnating wood with an alkaline cooking liquor under pressure at a temperature of substantially 185 degrees F. and before cooking, the reduction of the pressure, the withdrawal of excess cooking liquor and the cooking of the impregnated wood.

2. A process of pulping wood consisting of impregnating wood with an alkaline cooking liquor at a temperature of substantially 185 degrees F. and before cooking, the withdrawal of excess cooking liquor and the cooking of the impregnated wood.

3. A process of pulping wood consisting of impregnating wood with an alkaline cooking liquor under pressure at a temperature of substantially 185 degrees F. and before cooking, the reduction of the pressure, the withdrawal of excess cooking liquor, and the cooking of the impregnated wood by contact with steam.

4. A process consisting of impregnating wood with an alkaline cooking liquor under pressure and at a temperature of substantially 185 degrees F. and before cooking, the reduction of the pressure, the withdrawal of excess alkaline cooking liquor, cooling and then skimming of rosin soap therefrom, cooking the wood by contact with steam, and the collection of foaming rosin soap and distilled turpentine, and other volatile oils through digestion of the wood as described.

In testimony whereof, we affix our signatures in the presence of two subscribing witnesses.

OTTO KRESS.
SIDNEY D. WELLS.

Witnesses:

JOHN J. LAING,
CLINTON K. TETFO.