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PRODUCTION OF PULP.

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This invention relates to improvements in the production of pulp from wood.

According to the present invention we subject the wood to a two-step or two-stage treatment for the production of pulp therefrom. The first step or stage of the treatment is carried out with an acid cooking liquor containing free sulphurous acid but the liquor is used in insufficient amount to completely cook the wood. The cooking liquor is then separated from the partly cooked wood and the second step or stage of the process is carried out with the addition of a further amount of cooking liquor.

In the ordinary acid sulphite process, the cooking liquor is usually made of calcium or magnesium bisulphite with varying amounts of sulphur dioxide or sulphurous acid; and a sufficient amount of the cooking liquor is used for the completion of the pulp making operation. With such a strongly acid cooking liquor and with the amount of liquor used and the duration of the cook, the wood is profoundly modified during the cooking operation, and a considerable part of the wood fibres is broken down and goes into the so-called waste sulphite liquor. The fibres of the pulp produced, moreover, are injured by the strongly acid liquor.

According to the present invention certain of the advantages of the acid sulphite process are retained while the objectionable features of the process are largely overcome or avoided. We subject the wood chips to a preliminary cook with an acid sulphite cooking liquor but with such a limited amount of free sulphurous acid that the wood is not completely cooked or the wood fibres injured to any objectionable degree. This operation nevertheless is controlled as to free the fibres from a considerable portion of the non-fibrous constituents which go into the cooking liquor and are separated from the partly cooked chips in the residual liquor first produced. This first stage of the process however results in dissolving from the fibers a considerable portion of the non-fibrous constituents and performs a substantial part of the cooking required to pulp the chips. The process in which a preliminary digesting step is merely an extraction of the wood chips is not a part of the invention claimed in this application but forms the subject matter of a separate application which has now matured into Patent No. 1,581,671, dated April 20, 1926.

The first cooking liquor may be an aqueous solution of sulphur dioxide or it may be a solution of sodium bisulphite with sulphur dioxide, or it may be calcium or magnesium bisulphite with uncombined sulphur dioxide but the amount of sulphur dioxide (both free and combined) is not sufficient to completely cook the wood. The first cooking liquor, for example, may contain less than 3% of sulphur dioxide therein and may be used in sufficient amount to cover the chips completely in the digester and the chips may be cooked for from 1 to 5 hrs. at a pressure up to about 140 lbs. For example, spruce wood or other wood may be treated in this way.

Such a preliminary cooking operation will only partly cook the wood but will remove a considerable amount of the non-fibrous constituents without objectionable injury to the fibres.

When the preliminary partial cook is completed, the liquor is drawn off and may be treated for the recovery of products therefrom, for example, it may be neutralized completely or to the desired extent, and then fermented by the addition of yeast and yeast food for the production of alcohol which may then be recovered by distillation.

After the first liquor is drawn off, a second cooking liquor is added which may be an alkaline cooking liquor. The second stage of the cooking operation can be more easily carried out inasmuch as the wood has been freed from a large part of its non-fibrous constituents by the preliminary partial cook.

The second cooking operation can be carried out to particular advantage with a cooking liquor consisting essentially of normal sodium sulphite as more fully described in our German Patent No. 375,035. Such a cooking liquor does not injure the fibrous constituents of the wood but is effective in removing or completing the removal of non-fibrous constituents. The amount of the cooking liquor will be much less than would be necessary for the complete cooking of the wood; and the time required for completing the cooking operation will also be materially decreased. The chips may, for

example, be subjected to the second cooking operation with an amount of cooking liquor sufficient to cover the partly cooked chips, using a cooking liquor containing, for example, 10% of normal sodium sulphite, and cooking the chips at a saturated steam pressure (and corresponding temperature) corresponding to saturated steam at 60 to 180 lbs, per square inch. The time required for completing the operation will depend in part upon the extent to which the preliminary cook was carried and in part upon the strength of the second cooking liquor and the temperature and pressure used; but it can readily be determined by a simple test when the pulp-making operation has been completed.

The two-stage cooking process claimed in this application falls within the scope of our broad invention claimed in our prior copending application Serial No. 481,146, filed June 28, 1921.

We claim:

1. The method of producing pulp from wood which comprises subjecting the wood to a preliminary partial digestion with an acid cooking liquor containing sulphurous acid and completing the cooking operation with a cooking liquor containing essentially normal alkali metal sulphite.

2. The method of producing pulp from wood which comprises subjecting the wood to a preliminary partial digestion with an acid cooking liquor containing bisulphite and completing the cooking operation with a cooking liquor containing essentially normal alkali metal sulphite.

3. The method of producing pulp from wood which comprises subjecting the wood to a preliminary partial digestion with an acid cooking liquor containing less than 3% sulphurous acid and completing the cooking operation with a cooking liquor containing essentially normal alkali sulphite.

4. The method of producing pulp from wood which comprises subjecting the wood to a preliminary partial digestion with an acid sulfite cooking liquor in insufficient amount to completely cook the wood and subsequently subjecting the partially cooked wood to a further cooking operation with a non-acid cooking liquor containing sodium sulfite as a primary constituent.

5. The method of producing pulp from wood which comprises subjecting the wood to a preliminary partial digestion with an acid sulfite cooking liquor containing sodium bisulfite in insufficient amount to completely cook the wood and subsequently subjecting the partially cooked wood to a further cooking operation with a non-acid cooking liquor containing sodium sulfite as a primary constituent.

6. The method of producing pulp from wood which comprises subjecting the wood to a preliminary partial digestion with an acid sulfite cooking liquor containing sodium bi-sulfite and completing the cooking operation with a cooking liquor containing essentially normal sodium sulfite.

7. The method of producing pulp from wood which comprises subjecting the wood to a preliminary partial digestion with an acid cooking liquor containing a bisulfite, removing the residual liquor from the resulting fibrous material and thereafter completing the cooking operation with a cooking liquor containing essentially normal alkali metal sulfite.

8. The method of producing pulp from wood which comprises subjecting the wood to a preliminary digestion with an acid cooking liquor containing bisulfite and completing the cooking operation with a cooking liquor containing essentially normal sodium sulfite.

9. The process according to claim 8, in which substantially all of the bisulfite supplied to the cooking liquor is sodium bisulfite.

10. The process according to claim 8, in which substantially all of the alkaline material supplied to the cooking liquor utilized for completing the cooking operation is normal sodium sulfite.

In testimony whereof we affix our signatures.

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