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BLEACHING OF PULP.

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This invention relates to an improved method of bleaching wood pulp, produced from wood by chemical processes.

The bleaching of chemical wood pulp is commonly effected with a solution of bleaching powder or calcium hypochlorite, but this method of bleaching, as commonly practised, not only requires a considerable amount of the bleaching agent, but generally employs an elevated temperature to bring about effective bleaching. In order to bleach the pulp satisfactorily in this way, the action of the bleaching agents upon the fibre may be sufficiently severe to injure the fibres, with production of oxidation products, e. g., oxycellulose, or with more or less profound modification of part of the cellulose of the fibres, e. g., with resulting increase in beta and gamma cellulose, etc.

The present invention relates to an improved method of bleaching wood pulp which can be carried out without objectionable injury to the fibres, and with an important economy in the amount of bleaching agents required, as well as with other advantages such as those hereinafter referred to.

We have found that the bleaching of certain kinds of chemical pulp can advantageously be effected by subjecting the pulp to a preliminary acid treatment, and then subjecting the acid treated pulp, preferably after washing, to a bleaching treatment with a bleaching agent.

The new process is of more or less general application but is of particular value for the treatment of pulp produced by alkaline cooking processes, that is, chemical pulp making processes in which the cooking liquor is alkaline in character, e. g., the ordinary soda process so-called, or the ordinary sulphate process so-called. It is also of particular value in the bleaching of pulp produced with a cooking liquor containing essentially normal sodium sulphite as the cooking reagent, or containing a mixture of caustic soda and sodium sulphite in varying proportions, but with an amount of caustic soda such that the fibres of the pulp are not injured to any considerable degree during the cooking operation.

The following more detailed description will further illustrate the invention as applied to the bleaching of pulp made by cooking jack-pine with a cooking liquor containing a preponderating amount of caustic soda together with a lesser amount of normal sodium sulphite equal to about one-fourth of the caustic soda in sodium content, the cooking operation being carried out at a steam pressure of 105–115 lbs. and a corresponding temperature for a period of 4 to 6 hours, at said pressure, and the cooking liquor containing 50–55 grams per liter of caustic soda and 25–20 grams per liter of normal sodium sulphite.

The pulp was first treated with a dilute solution of hydrochloric acid containing about .5 to 1.0 per cent of hydrochloric acid, and using 10 pounds of the acid per hundred pounds of pulp (figured on an air dried basis). The pulp was intimately mixed with the dilute acid solution and heated for about 15 minutes to a temperature not exceeding 200 degrees F., after which it was washed to remove the greater part of the acid solution and any constituents dissolved therein.

The acid treated pulp was then bleached with a bleaching powder solution containing 20 lbs. of bleaching powder per hundred pounds of pulp (air dried basis), the bleaching powder being added in the form of a solution of usual strength used in the art of bleaching wood pulp, the solution being sufficient to maintain an alkaline reaction throughout the bleaching operation. The preliminary acid treatment of the pulp enabled the amount of bleaching agent to be reduced, and also enabled the bleaching operation to be carried out in a less time and at a lower temperature. The pulp was nevertheless bleached to a good white strong pulp.

In a similar way, we have bleached pulp from jack-pine (after freeing it from residual liquors and subjecting it to the usual washing operation) by a preliminary acid treatment with a dilute solution of sulphuric acid with heating for a few minutes, then removing the greater part of the solution and washing, then bleaching with calcium hypochlorite or bleaching powder, and with the resulting production of a good strong white pulp.

The invention is also applicable to other pulp, and particularly to pulps which may be difficult to bleach with bleaching powder alone.

While we do not wish to limit ourselves by any theoretical explanation of the action

which takes place in the two-stage bleaching process of the invention, nevertheless the improved results obtained suggest that the preliminary acid treatment removes from the fibres certain compounds of an alkaline character, or of an acid soluble character, which would otherwise remain present and perhaps interfere with or retard the action of the hypochlorite, so that, after the removal of these compounds, the alkaline hypochlorite solution can more effectively do its work.

In the following claims by the term "an alkaline hypochlorite solution" we mean that this bleaching stage is carried out with a bleach liquor which remains alkaline until the bleaching operation has been concluded.

We claim:

1. The method of bleaching chemical wood pulp, resulting from the cooking of the wood with a cooking liquor containing sodium compounds, which comprises subjecting the pulp first to a preliminary treatment with dilute acid and subsequently to treatment with an alkaline hypochlorite solution.

2. The method of bleaching chemical wood pulp, resulting from the cooking of the wood with a cooking liquor containing sodium compound, which comprises subjecting the pulp first to a preliminary treatment with dilute mineral acid with heating of the pulp during such treatment and subsequently to treatment with an alkaline hypochlorite solution.

3. The method of bleaching wood pulp which comprises subjecting the pulp first to a preliminary treatment with dilute hydrochloric acid and subsequently to treatment with an alkaline hypochlorite solution.

4. The method of bleaching wood pulp which comprises subjecting the pulp first to a preliminary treatment with about ½% to 1% hydrochloric acid in the proportion of one part of acid to ten parts of the pulp figured as air dried pulp and subsequently to treatment with a hypochlorite solution.

5. The method of bleaching chemical pulp, resulting from the cooking of wood with alkaline cooking liquors, which comprises subjecting the pulp to a preliminary treatment with a dilute acid solution, separating the solution from the pulp, and subsequently treating the pulp with an alkaline hypochlorite solution.

6. The method of bleaching chemical pulp, resulting from the cooking of wood with alkaline cooking liquors, which comprises subjecting the pulp to a preliminary treatment with a dilute mineral acid solution, separating the solution from the pulp, and subsequently treating the pulp with an alkaline hypochlorite solution.

7. The method of bleaching chemical pulp, resulting from the cooking of wood with alkaline cooking liquors, which comprises subjecting the pulp to a preliminary treatment with a dilute hydrochloric acid solution, separating the solution from the pulp, and subsequently treating the pulp with an alkaline hypochlorite solution.

8. The method of bleaching chemical pulp resulting from the cooking of wood with alkaline cooking liquors, which comprises subjecting the pulp to a preliminary treatment with a ½% to 1% hydrochloric acid solution in the proportion of one part acid to ten parts of pulp figured as air dried pulp, separating the solution from the pulp, and subsequently treating the pulp with a hydrochlorite solution.

9. The method of bleaching coniferous wood pulp, resulting from the cooking of coniferous woods with a cooking liquor containing a sulfite of soda, which comprises subjecting the pulp first to a preliminary treatment with dilute acid and subsequently to treatment with a hypochlorite solution.

10. The method of bleaching coniferous wood pulp, resulting from the cooking of coniferous woods with a cooking liquor containing a sulfite of soda which comprises subjecting the pulp first to a preliminary treatment with dilute mineral acid with heating of the pulp during such treatment, and subsequently to treatment with a hypochlorite solution.

11. The method of bleaching coniferous wood pulp which comprises subjecting the pulp first to a preliminary treatment with dilute hydrochloric acid and substantially to treatment with an alkaline hydrochlorite solution.

12. The method of bleaching chemical pulp, resulting from the cooking of pine wood with alkaline cooking liquors, which comprises subjecting the pulp to a preliminary treatment with a dilute acid solution, separating the solution from the pulp, and subsequently treating the pulp with a hypochlorite solution.

13. The method of bleaching chemical pulp, resulting from the cooking of pine wood with alkaline cooking liquors, which comprises subjecting the pulp to a preliminary treatment with a dilute mineral acid solution, separating the solution from the pulp, and subsequently treating the pulp with a hypochlorite solution.

14. The method of bleaching chemical pulp, resulting from the cooking of pine wood with alkaline cooking liquors, which comprises subjecting the pulp to a preliminary treatment with a dilute hydrochloric acid solution, separating the solution from the pulp, and subsequently treating the pulp with a hypochlorite solution.

15. The method of bleaching chemical pulp, resulting from the cooking of pine wood with alkaline cooking liquors, which comprises subjecting the pulp to a preliminary treatment with ½% to 1% hydrocloric acid solution, separating the solution from the

pulp, and subsequently treating the pulp with a hypochlorite solution.

16. The method of bleaching chemical pulp resulting from the cooking of pine wood with alkaline cooking liquors, which comprises subjecting the pulp to a preliminary treatment with a ½% to 1% hydrochloric acid solution in the proportion of one part acid to ten parts of pulp figured as air dried pulp, separating the solution from the pulp, and subsequently treating the pulp with a hypochlorite solution.

17. The method of bleaching chemical pulp which is difficult to bleach by the use of bleaching powder alone, which pulp results from the cooking of wood with chemical cooking liquors containing sodium compounds, which comprises subjecting the pulp to a preliminary treatment with a dilute mineral acid solution, separating the solution from the pulp, and subsequently treating the pulp with an alkaline calcium hypochlorite solution.

18. The method of bleaching chemical pulp resulting from the cooking of wood with a cooking liquor containing a sulfite of sodium, which comprises subjecting the pulp to a preliminary treatment with a dilute mineral acid solution, separating the solution from the pulp, and subsequently treating the pulp with a hypochlorite solution.

19. The improvement in the bleaching of chemical pulp with an alkaline hypochlorite solution, which comprises subjecting the pulp to the action of a hot dilute mineral acid prior to the bleaching operation.

In testimony whereof we affix our signatures.

LINN BRADLEY.
EDWARD P. McKEEFE.

CERTIFICATE OF CORRECTION.

Patent No. 1,705,897. **Granted March 19, 1929, to**

LINN BRADLEY ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 77, claim 8, for the syllable "hydro-" read "hypo-", line 99, claim 11, for the word "hydrochlorite" read "hypochlorite", and line 129, claim 15, for the word "hydrocloric" read "hydrochloric"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 30th day of April, A. D. 1929.

M. J. Moore,
Acting Commissioner of Patents.

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