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PROCESS OF TREATING GROUND-WOOD PULP

No Drawing. Application filed March 11, 1927. Serial No. 174,720.

This invention relates to the treatment of ground-wood or mechanical pulp to convert it into a softer pulp from which paper possessing materially higher tearing resistance than that made from ground-wood pulp not so treated may be manufactured.

Paper made from the usual ground-wood pulp is characterized by its brittleness and low tear resistance, both of these ineluctable characteristics being traceable to the short average fiber length and high proportion of pentosan, lignin, beta and gamma celluloses, and other non-alpha cellulose constituent of such pulp.

I have found that if ground-wood pulp is treated under the proper conditions for a sufficient period of time with a strong alkaline solution, e. g., a caustic soda solution, the softness and tear resistance of such pulp is materially increased.

The applicability of the process of the present invention may best be appreciated by reference to a particular example of procedure, such, as the following. Ground-wood pulp derived from spruce, for example, may be treated with agitation as, say, a 10% suspension, in a solution of caustic soda of about 4% to 10% concentration, at temperatures preferably below 70° C. The pulp, which initially has a pentosan content of about 10% to 14%, is treated until such content has been reduced to 5% to 7%, such treatment requiring about one hour. The pulp is then washed free of treating solution, the washed pulp yield amounting to from 70% to 85% of the original pulp, depending upon the particular conditions maintained in the treatment and the type of ground-wood used as a raw material. Pulp thus treated is much softer and possesses materially higher tear resistance than untreated ground-wood pulp, as a result of the solution and removal of a considerable percentage of non-alpha cellulose constituent therefrom. The treated pulp has characteristics similar to Esparto pulp, and is particularly suitable for use as in the manufacture of magazine and book papers, where a relatively inexpensive pulp possessing bulk and fairly good tear resistance is desired. The color of the treated pulp may be improved by pretreating the ground-wood pulp with a relatively dilute solution of a lignin-reactive reagent, such, for example, as a chlorine, bleach, or bisulphite solution. This may also be accomplished by using bleach or like chemical simultaneously with the caustic soda solution. The alkali-treated fiber may be improved in color by a bleaching treatment preferably under conditions to preserve the fiber characteristics previously attained. This may be accomplished by bleaching the fiber in a bleach liquor maintained distinctly alkaline throughout the bleaching operation as disclosed and claimed in application for patent Serial No. 716,153, filed May 27, 1924 by Milton O. Schur and myself.

The conditions of alkaline treatment and the chemicals employed therein may be varied. Thus, a solution of sodium sulphide, or of sodium sulphide and caustic soda such as used in the kraft process of digestion may be employed as the treating solution. In any case, however, it is essential that the alkaline solution be sufficiently strong or concentrated to effect the removal of sufficient non-alpha cellulose constituent, including pentosans, lignin, and less-resistant celluloses, from the pulp to soften it materially and increase its tear resistance, but the concentration must not reach or exceed the concentration at which mercerization or injury to the paper-making characteristics of the pulp occurs. The limit of concentration which may be employed varies with the temperature of treatment. The lower the temperature, the lower the caustic soda concentration which must be maintained to avoid mercerization and injury of the pulp. Inasmuch as sodium sulphide does not effect a substantial mercerization of the pulp, it may be used at higher concentration, either alone or together with the caustic soda, but where sodium sulphide is employed, bleach or similar oxidizing chemical cannot be employed simultaneously therewith.

I am aware of the fact that waste or printed paper stocks are sometimes de-inked in alkaline liquors, the stock being beaten or otherwise disintegrated in such liquors at elevated temperature while saponification of the ink

vehicle and freeing of the pigment takes place. My process involves the use of an unused ground-wood pulp as a raw material, the pulp being digested in alkaline liquors under the conditions hereinbefore given, so that the alkali is consumed only in reacting upon non-alpha cellulose constituents originally associated with the wood.

Having thus described the nature of this invention, it is evident that it is susceptible of various changes and modifications without departing from its spirit or scope as defined by the appended claims.

What I claim is:

1. A process which comprises grinding wood into a papermaking pulp, and then digesting the unused ground-wood pulp in a strong solution of alkaline compounds to effect a removal only of non-alpha cellulose constituents originally associated with the wood.

2. A process which comprises grinding wood into a papermaking pulp, and then digesting the unused ground-wood pulp in a strong solution of alkaline sodium compounds to effect a removal only of non-alpha cellulose constituents originally associated with the wood.

3. A step which comprises digesting unused ground-wood pulp in a solution of caustic soda of 4% to 10% concentration at a temperature below 70° C. to effect a removal only of non-alpha cellulose constituents originally associated with the wood.

4. A process which comprises preheating unused ground-wood pulp with a lignin-reactive agent, and then digesting the pretreated pulp in a strong solution of alkaline compounds to effect a removal only of non-alpha cellulose constituents originally associated with the wood.

5. A step which comprises digesting unused ground-wood pulp in a strong solution of alkaline compounds containing a lignin-reactive agent to effect a removal only of non-alpha cellulose constituents originally associated with the wood.

6. A process which comprises digesting unused ground-wood pulp in a solution of caustic soda of 4% to 10% concentration at a temperature below 70° C., and then washing the digested pulp free of alkaline solution.

7. A process which comprises digesting unused ground-wood pulp in a strong solution of caustic soda under non-mercerizing conditions to effect a removal only of non-alpha cellulose constituents originally associated with the wood.

8. A process which comprises digesting unused ground-wood pulp in a strong solution of alkaline compounds to effect a removal only of non-alpha cellulose constituents originally associated with the wood, and then bleaching such pulp in a bleach liquor maintained distinctly alkaline throughout the bleaching operation.

9. A process which comprises digesting unused ground-wood pulp in a strong solution of alkaline compounds to effect a removal only of non-alpha cellulose constituents originally associated with the wood, and then bleaching such pulp.

10. A process which comprises treating unused ground-wood pulp with a lignin-reactive reagent, digesting such treated pulp in a strong solution of alkaline compounds to effect a removal only of non-alpha cellulose constituents originally associated with the wood, and then bleaching the alkaline digested pulp in a bleach liquor maintained distinctly alkaline throughout the bleaching operation.

11. A process which comprises digesting unused ground-wood pulp at about room temperature and at atmospheric pressure in a strong solution of caustic soda but without mercerizing such pulp to effect a removal only of non-alpha cellulose constituents originally associated with the wood.

12. A process which comprises digesting raw ground-wood pulp at about room temperature in a solution of caustic soda and sodium sulphide to effect a removal of non-alpha-cellulose constituents originally associated with the wood.

In testimony whereof I have affixed my signature.

GEORGE A. RICHTER.