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MANUFACTURE OF PAPER PULP

Aimwell Gordon MacIntyre, Decatur, Ill., assignor to A. E. Staley Manufacturing Company, Decatur, Ill., a corporation of Delaware

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The invention relates to the manufacture of wood pulp and more particularly to improvements in the cooking of pulp whereby a softer, stronger and purer fiber is obtained.

In the manufacture of paper pulp the wood is first chipped and then placed in a digester. In either the alkaline or the acid process the cooking liquor is then added and the pulp cooked either by the introduction of live steam into the digester or by indirect heating. The cooking operation removes the resins, pitch and lignins from the fibers. Prolonged cooking or drastic treatment at high temperatures and pressures breaks down the cell structure of the fibers and weakens the resulting product. At the same time, it is desirable to remove all or substantially all of the resins, lignins and other impurities from the pulp so that at the present time in actual practice a compromise is usually effected and as much of the impurities is removed as can be without seriously injuring the fiber structures.

I have found that the cooking of pulp can be carried on to much better advantage if a colloid is added to the chipped wood and cooking liquor in the digester. The colloid apparently disperses the pitch and lignins in the wood so that the cooking liquor atacks the impurities more effectively and dissolves them more readily. As a result a purer pulp is obtained.

An important feature of the invention is the ability to remove the lignins and resins from the wood with a milder cooking operation, that is the period of time may be reduced or lower temperatures and pressures may be employed. As a result, there is less breaking down of the cell walls of the cellulose and a stronger product is obtained. As the mechanical procedure of cooking varies greatly both as to time of treatment and temperatures and pressures, I am unable to give any specific examples of results obtained when a colloid is added to the cooking liquor compared to results obtained according to the present practice, but it is recognized by everyone skilled in the art that a drastic and prolonged cooking operation destroys or partially destroys the cell walls of the cellulose resulting in an inferior product and by the use of my invention either the time of treatment can be reduced or lower temperatures and pressures can be used and injury to the cellular structure eliminated.

As stated, the invention may be aplied both to the cooking of pulp by the alkaline process or by the acid process. In preparing pulp according to the sulphate, soda or kraft process, the caustic liquor is first prepared and allowed to settle. The colloid is then added to the caustic liquor. Introducing the colloid into the caustic liquor facilitates settling of the sludge and gives a clear decanting liquor. Any suitable colloid may be employed for the purpose. As examples thereof starch or converted starch may be used. The decanted caustic liquor is then used to prepare the cooking liquor in the usual manner. The pulp and cooking liquor are introduced into the digester, and a cold water solution of a colloid added thereto prior to cooking. The quantity of colloid added may vary within wide limits but in actual practice I have found that 25 pounds to a 6 or 8 ton digester is suitable. Even when smaller quantities of the colloid are employed, the same results are obtained to a less degree substantially proportionate to the amount of colloid added.

In the acid process the chipped wood is placed in the digester in the usual manner and the sulphite cooking liquor added. The colloid is placed in the digester in the form of a cold water solution. The use of a cold water solution prevents coagulation of the starch or other colloid added when steam is introduced and thus insures the colloid being dispersed throughout the cooking mass and serving its function.

In either the alkaline or acid process the cooking operation is then carried out in the usual manner except that milder cooking practice may be employed resulting in less breaking down of the cell walls of the cellulose. A further advantage of the process is that in cooking woods of high resinous content by the alkaline process the presence of the colloid reduces or minimizes the formation of foam in the diffusing and washing operation immediately after digestion.

Recent investigations have disclosed the fact that the fibrous structure of wood consists of a wall having a plurality of small diaphragms therein. These diaphragms are provided with openings through which the cooking liquor must penetrate to reach the interior of the fiber and remove the resins and lignins therein. In ordinary practice it is difficult to penetrate the interior of the fibers although the lignins, resins and other impurities located between the fibers can be readily removed. When greater pressures are employed in an attempt to force the cooking liquor into the fibers the diaphragm is forced against its seat in such manner that the openings therethrough are closed and it is necessary to employ pressures that will break the walls of the cell structure to penetrate the fibers and re-

move the impurities therefrom. As stated above, this results in a pulp that is weak and is not particularly suitable for paper manufacture. I believe that the addition of the colloid to the cooking liquor assists the cooking liquor in seeping through the openings in the diaphragm and removing the resins and lignins from the interior of the cell without breaking the cell wall.

The colloids mentioned above are by way of example only and other colloids may be employed. So-called gums formed from starch are particularly adapted for use in practicing the process.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description and it will be apparent that various changes may be made in the steps and their order of accomplishment of the process described without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the process hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. The step in the digestion of wood for the manufacture of wood pulp which comprises cooking wood in the presence of a dispersing colloid other than that contained in wood.

2. The step in the manufacture of wood pulp which comprises cooking wood in the presence of a gum consisting of converted starch.

3. The step in the digestion of wood for the manufacture of wood pulp which comprises introducing a dispersing colloid other than that contained in wood into the digester prior to cooking.

4. In the digestion of wood for the manufacture of wood pulp by the alkaline process the steps comprising adding a colloid other than that contained in wood to the caustic liquor, permitting it to settle, decanting the liquor, preparing cooking liquor therefrom, introducing the cooking liquor and wood into a digester, adding a dispersing colloid thereto and cooking.

5. In the digestion of wood for the manufacture of wood pulp by the acid process the steps comprising placing the wood to form the pulp in a digester, adding sulphite liquor thereto, adding a cold water solution of a colloid other than that contained in wood, and cooking.

6. In the digestion of wood for the manufacture of wood pulp by the alkaline process, the steps comprising placing the wood to form the pulp in a digester, adding cooking liquor thereto, adding a dispersing colloid other than that contained in wood thereto, and cooking.

7. The step in the manufacture of wood pulp which comprises introducing a gum consisting of converted starch in the digester prior to cooking.

8. In the manufacture of wood pulp by the alkaline process the steps comprising adding a gum consisting of converted starch to the caustic liquor, permitting it to settle, decanting the liquor, preparing cooking liquor therefrom, introducing the cooking liquor and wood into a digester, adding a gum consisting of converted starch thereto, and cooking.

9. In the manufacture of wood pulp by the acid process, the steps comprising placing the wood to form the pulp in a digester, adding sulphite liquor thereto, adding a cold water solution of a gum consisting of converted starch, and cooking.

10. In the manufacture of wood pulp by the alkaline process, the steps comprising placing the wood to form the pulp in a digester, adding cooking liquor thereto, adding a gum consisting of converted starch thereto, and cooking.

A. GORDON MACINTYRE.