Patented Aug. 7, 1928. 1,679,441

UNITED STATES PATENT OFFICE.

DINSHAW RATTONJI NANJI, OF BIRCHFIELDS, BIRMINGHAM, ENGLAND.

PROCESS OF MANUFACTURING PULP FOR PAPER PRODUCTION.

No Drawing. Application filed November 5, 1926, Serial No. 146,575, and in Great Britain August 17, 1926.

This invention relates to a new or improved process for the treatment of plant, woody and other cellulosic materials for the production of pulp in paper manufacture and for other purposes.

Hitherto the pulp has been obtained from the woody or like tissue, mainly by either one of two processes, viz:—that known as the sulphite process and that making use of caustic alkali. The pulp obtained by the first process is not pure chemically and though it may be cheaply produced, technical difficulties are encountered, the treatment is lengthly, the time ranging from 6 to 20 hours, and serious corrosion of the plant occurs owing to sulphurous fumes. In the second process making use of caustic soda, it has not been found possible hitherto to delignify the tissue satisfactorily with a solution of alkali of lower concentration than 6–8%. The use of an alkali liquor of such a concentration considerably increases the expense of the process and even so the time of treatment cannot be allowed to fall below from 4 to 6 hours. Up to the present efforts to use high temperatures accompanied by use of concentrated solutions have resulted in very considerable wastage due to alkaline hydrolysis of the cellulose to soluble products thus giving a lower yield and a product difficult to bleach. According to the present invention, the woody or like raw material is treated for a short period, viz: from half to one hour with alkaline solution of concentration up to 4% and the mixture heated either under high pressures, approximating to 10 atmospheres, or at temperatures corresponding to these pressures. By this improved process making use of relatively low concentration and working at high temperatures for a short time, it is possible to delignify the raw material in a very effective manner.

Under these conditions, it is possible to delignify all the cellulosic materials without any serious loss of the cellulose which moreover is obtained in a readily bleachable condition.

The invention also includes the treatment of raw materials containing pectin and sugars, in which case the cellulosic material is first acted upon with a pectin solvent, such as a dilute solution of a neutral salt of one of the alkali metals or of ammonia; after this preliminary treatment the material is submitted to the action of the caustic solution of low concentration and at high pressure. The preliminary depectinizing treatment avoids possibility of staining or colouring the substances on addition of the alkali.

Following the delignification the pulp is bleached and dried according to the ordinary methods of paper production.

The alkali used also may be recovered by concentration electrolytically or in any other convenient manner.

If desired, instead of treating the woody or like raw material with the improved process, I may treat impure celluloses obtained by other methods such for example as sulphite pulp, soda pulp or the like, to obtain a product pure enough for preparing cellulose derivatives.

As an example of the improved process as applied to bagasse from sugar cane, the fibres are first disintegrated into lengths of from ½″ to 1″. This is done by the crushing rollers employed in the sugar expression process. 1000 lbs. of this mass is then triturated with 300 gallons preferably of a nearly boiling solution of 4% caustic alkali. When the whole of the soda solution is well mixed with the mass, this is then transferred to a suitable digester and heated say by steam under pressure, or by superheated steam until the temperature of the mixture reaches 185° C. It is maintained at this temperature for approximately one hour and the digested mass is then pressed out in a suitable press to remove the caustic lye, washed with hot water, and bleached in any suitable manner.

Where considerable quantities of pectin and sugars are present in the raw material, it is preferable to employ as a depectinizing agent, a 0.5% solution of ammonium sulphate or other neutral salt of ammonium or of an alkali metal in quantities sufficient to immerse the material under treatment.

I claim:—

1. A process of manufacturing pulp by treatment of suitable cellulosic materials with an alkali solution of concentration up to 4% and the mixture heated to a temperature corresponding to a vapour pressure of from 7 to 10 atmospheres and preferably as near 10 atmospheres as possible for a period of from one half to one hour.

2. A process of manufacturing pulp by the treatment of bagasse from sugar cane, whereby the fibres of the raw material hav-

ing been disintegrated to suitable length, one thousand pounds of the mass is triturated with three hundred gallons of a nearly boiling solution of 4% caustic alkali, and when the mixing is completed the whole mass is transferred to a suitable digester and heated either by steam under pressure, or by superheated steam until the temperature reaches 185° C., this temperature being maintained for approximately one hour when the digested mass is pressed out, washed and suitably bleached.

3. A process of manufacturing pulp from cellulosic material, in which the raw cellulosic materials containing pectin and sugars are submitted to a preliminary treatment with a pectin solvent such as a dilute solution of a neutral salt of one of the alkali metals or of ammonium, and subsequently to treatment with an alkali solution of concentration up to 4% and the mixture heated to a temperature corresponding to a vapour pressure of from 7 to 10 atmospheres and preferably as near 10 atmospheres as possible for a period of from one half to one hour.

In testimony whereof I affix my signature.

DINSHAW RATTONJI NANJI.