

UNITED STATES PATENT OFFICE

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METHOD FOR THE PRODUCTION OF PULP

No Drawing.

Application filed June 22, 1928. Serial No. 287,651.

This invention relates to the production of pulp suitable for any of the many uses for which pulp of the usual type is adapted, and has especial reference to the production of
5 pulp from many of what have been considered the wastes of agriculture containing a low lignin content and relatively high amounts of pentosans.

Among the vegetable growths in this class
10 may be included cornstalks, bagasse, rice, and wheat straw, together with corn cobs, oat hulls, rice hulls, cottonseed hulls, etc., etc.

There have been many methods devised for the pulping of these low lignin content and
15 high pentosan content materials; but as will be seen in the disclosure hereinafter, the method of this application is new, and involves great economy and features which permit of the production of specialty pulps and paper
20 at a great saving of time, labor and expense.

As is well known, the basic structure of the materials referred to hereinbefore is cellulose associated with other materials which can be separated from the cellulose in various ways,
25 some of which involve deterioration of the cellulose, and others of which involve drastic treatment. The latter treatment frequently deteriorates the cellulose as well as the structure thereof from a physical standpoint.

30 In the process of this application the treatment accorded the material is not drastic, the final product is obtained in a very satisfactory condition for many uses, and the cost of production is low, thereby permitting competition with other pulps produced at a low
35 cost, but lacking many of the desirable properties possessed by the cellulose obtained by this process.

In working some of the materials referred
40 to above, such as cornstalks, bagasse, etc., it is necessary to shred them to make them workable, and it has been found practical and desirable to co-ordinate a washing process with the said shredding process, so that dirt and
45 foreign matter collected in the field may be removed at the same time.

The shredded and washed material is then fed into a digester, ten times its weight in
50 water is added, the digester is closed and heat and pressure of approximately ten pounds is

applied. The digester used is constructed so that the water therein may be drawn out at the lower portion thereof, passed through a heater, and then sprayed into the top of the digester where it is sucked through the mass and again passed out of the digester at the
55 bottom thereof.

This process is followed for a period of approximately thirty minutes, in which time any water soluble materials present are extracted and the fibre is opened and made more susceptible to the subsequent treatments.

As is well known the plant growths referred to herein as used in this process contain two types of pentosans, one of which types acts as reserve food material for the plant, the other type going to make up the structure of the plant, one of its functions being the binding together of the fibres.
65 When these binding pentosans are treated in a manner to convert them into soluble chemical products, their removal is not only easy, but frees the fibres, which may then be readily acted upon by certain chemicals to make the pulping operation easy of accomplishment.
70

This process of treating the pentosans may be termed hydrolysis and it has been found efficient and economical in the use of same in connection with this process to employ
75 a weak solution of sulphuric acid, for instance, one percent.

When the aforesaid hydrolysis operation is completed and pressure has been used, the pressure is released, the acid solution is drained off, and the residual mass is washed
80 to remove the acid.

The material is then in a condition to continue with the process disclosed in the copending patent application of Jackson and Darling, Serial No. 280,646 filed May 25th,
85 1928.

I do not desire to limit myself strictly to the use of pressure in either the water soluble material extraction step, nor the hydrolysis step of this method, as satisfactory results may be obtained without employing pressure, but the time of treatment is reduced, and under some conditions better results are attained when pressure is used.
90 95 100

Neither do I desire to be limited strictly to the use of sulphuric acid in the step of rendering soluble and removing the binding pentosans without damage to the fibre.

- 5 Other chemicals of a more costly nature could be used to equal advantage, but at greater expense, and, therefore, the sulphuric acid is preferable.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:—

1. The method of producing cellulosic pulp from vegetable growths of low lignin content and relatively higher pentosan content comprising the following steps; shredding and cleansing the material; digesting same in approximately ten times its weight of water and under heat and pressure; drawing off the water, heating same and passing it through the material again; treating the material with a weak sulphuric acid solution; and removing the acid from the mass.

2. The method of producing cellulosic pulp from vegetable growths of low lignin content and relatively higher pentosan content comprising the following steps; shredding and cleansing the material; digesting same in water, under heat, and under a pressure of approximately ten pounds; drawing off the water, heating same and passing it through the material again; treating the material with a weak sulphuric acid solution; and removing the acid from the mass.

3. The method of producing cellulosic pulp from vegetable growths of low lignin content and relatively higher pentosan content comprising the following steps; shredding and cleansing the material; digesting same in approximately ten times its weight of water and under heat; drawing off the water, heating same and passing it through the material again; treating the material with a weak sulphuric acid solution; and removing the acid from the mass.

4. The process of preparing cellulosic pulp from vegetable growths of low lignin and relatively high pentosan content which comprises shredding and comminuting the same, removing water-soluble constituents therefrom by digestion with hot water, and then hydrolyzing the pentosans therein contained.

5. In the treatment of cellulosic raw materials of the nature of cereal straws such as cornstalks and the like, the steps of removing from said materials the water-soluble constituents thereof by means of pressure-digestion with hot water, and then solubilizing the pentosans therein contained.

6. The process as defined in claim 4, wherein the hydrolysis is carried out by treatment with a weak acid solution comprising sulphuric acid.

7. The process as defined in claim 4, wherein the hydrolysis is effected by means of an

acid solution containing substantially 1% of sulphuric acid.

8. The process of producing cellulosic pulp from cornstalks which comprises shredding and comminuting said cornstalks, treating the same under heat and pressure with water, treating said water-treated cornstalks with a 1% solution of sulphuric acid, removing said sulphuric acid, and thereupon treating the cornstalks with water to remove the materials solubilized by the said treatment with the sulphuric acid.

In testimony whereof I have hereunto affixed my signature.

ELTON R. DARLING.