

UNITED STATES PATENT OFFICE.

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PROCESS FOR THE MANUFACTURE OF CELLULOSE FROM WOOD, WOOD-CHIPS, STRAW,
REED, AND LIKE MATERIALS.

1,058,898.

Specification of Letters Patent.

Patented Apr. 15, 1913.

No Drawing.

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To all whom it may concern:

Be it known that I, JOSEF EDUARD PFIEL, subject of the Emperor of Austria-Hungary, and a resident of 4 Czerningasse, Vienna, Austria-Hungary, have invented new and useful Improvements in Processes for the Manufacture of Cellulose from Wood, Wood-Chips, Straw, Reed, and the Like Materials, of which the following is a specification.

This invention relates to a process of manufacturing cellulose from fibrous material. In known processes of this kind it was only possible to use pieces of wood having a uniform degree of hardness and being freed of knots and bark as raw material. In all of these methods the lye, in which the material was boiled, acted upon the material until all or the largest part of the incrusting substances was dissolved therein. This necessitated the use of a large amount of lye and other chemicals and required considerable time. The particles near the surface of the layer, upon which the lye acted, usually were overboiled, that is, the fiber was destroyed or damaged, while particles near the center were not sufficiently changed to free the fiber from the incrusting substances. It was therefore necessary to maintain the lye in circulation through the material and to continue the boiling for a relatively long time.

An object of this invention is to obtain cellulose from fibrous material of various degrees of hardness and consistency, as for instance wood chips, straw, reed, etc., the material being in finely divided condition.

Another object of the invention is to swell up the incrusting substances surrounding the wood fiber by a short boiling process only and to dispense with the circulation of the lye through the mass, which was required in the known processes, the chemical action of the lye in the present process being maintained only until the incrusting substances are swelled up.

Another object of the invention is to remove all or part of the swelled up incrusting substances by a mechanical process, as for instance by washing in water.

Another object is to remove incrusting substances which will eventually adhere to the fiber after the washing by a degumming process.

Other objects of the invention may be recognized by reference to the following specification and the appended claims.

The new process therefore consists in its preferred form essentially of three steps, namely a swelling up of the incrusting substances, a mechanical opening of the fiber by a removal of the swelled up incrusting substances and finally if necessary, a degumming for the removal of the last traces of incrusting substances.

In the present process finely divided fibrous material spread out in a relatively thin layer of about 12 to 20 inches thickness is boiled in lye for a time only which is sufficient to swell the incrusting substances, so that the same loosen their hold on the fiber which they surround. The boiling temperature may rise to about 200 centigrades under a pressure of about 220 pounds per square inch. As a suitable boiling liquid, I prefer to use pure caustic soda-lye of low concentration, for instance 2 to 4%. The time for which the boiling is continued depends upon the material to be used and upon the lye, as well as upon the consistency to which the material is to be converted.

The incrusting substances partly separated from their fibers and having then a jelly-like structure are removed from the fibers by washing. For this purpose the material is subdivided and strong jets of water are passed therethrough, which carry the jelly-like substances along while the fiber is precipitated.

For the purpose of removing the last traces of incrusting substances the mass is degummed by adding thereto solutions of permanganate of potassium or other permanganates in suitable dilution. This has an oxidizing effect upon the residue of incrusting substances, which are converted thereby into granular condition, and which may be dissolved by adding sulfurous acid.

The boiling of the raw material in lye may take place in relatively small vessels of tubular shape, having a diameter of 12 to 20 inches and being several yards long. As only comparatively small quantities of raw material are subjected to lye at a time it is obvious that the action thereof will be uniform throughout the material. The tubular vessels may be heated by gas, for instance gas produced from chips, lye residue or by

steam or by both. If they are heated by steam care must be taken that the condensate of the steam should not lower the degree of concentration of the lye; it is therefore of advantage to have a lye of somewhat stronger concentration at the beginning of the process, or to introduce superheated steam to decrease condensation.

The heating temperature may be regulated to suit requirements. It is advisable to have a high temperature and pressure at the beginning for a short time, say for half an hour, and to continue the boiling at a moderate heat, for instance for an hour, so as to lower the pressure. The heat may be entirely shut off, when the charge is removed from the boiler.

It is also possible to remove the charge from the boiler after the first short heating operation, and to store it in tanks, which contain the lye. The partial separation of the incrusting substances may be continued in this way without any external heat.

The washing operation, following the boiling, may be performed by passing the material through hollanders, commonly used in the manufacture of paper and such like. In a device preferably used for this purpose strong jets of washing liquid are conveyed through the material which is disposed on sieves. The jets wash the incrusting substances and short fibers through the perforations, while the long and good fibers remain on the sieve and form a felt-like structure, so that by this means the product is sorted and purified.

In known methods of manufacture of cellulose the lye diffused partly into the fiber, so that it was necessary to bleach the same.

The bleaching medium had to react upon the fiber; in the present process, however, the fiber is obtained in white and lustrous condition and no bleaching is required. In former methods the bleaching was effected by oxidizing the material by means of potassium permanganate, while in this process the permanganate acts upon the incrusting substances only and the sulfurous acid dissolves the same.

I claim:

1. A process for making cellulose which consists of separating the incrusting substances from the fibers by boiling the fibrous material until the incrusting substances are converted into a jellylike mass, interrupting the boiling before the incrusting substances have gone into solution, removing this jellylike substance from the fibers by washing, and degumming the residue by the addition of a permanganate.

2. A process for making cellulose, which consists of boiling fibrous material under pressure in lye, until the incrusting substances are swelled up, interrupting the boiling before the incrusting substances have gone into solution, washing the swelled up incrusting portions from the fibers, degumming the residue by addition of a permanganate and precipitating the permanganate and the residuary incrusting substances dissolved therein by sulfurous acid.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEF EDUARD PFIEL.

Witnesses:

IGNAZ KNOCHELMACHER,
AUGUST FUGGER.