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PRODUCTION OF PURE CELLULOSE

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This invention relates to improvements in the production of pure cellulose. In this field, for example also in the manufacture of semi-cellulose, it is already known to saturate straw and similar grasses with soda lye and to decompose them in rotary boilers with the simultaneous supply of steam.

In operating with rotary boilers, for example in the production of semi-cellulose from straw and similar grasses, it has also been proposed to displace the air from the fibrous material saturated with a minimum of alkali solution, as well as from the boiler itself, by means of steam, and to apply then fresh steam.

It is likewise not novel in the art to boil straw and other grasses, using a rotary boiler, in the presence of excess alkali solution, with superheated steam.

It is an object of this invention to combine the detail measures referred to above so as to establish a one-turn procedure. A further object of my invention resides in simply saturating the straw and like grasses with soda lye without contacting it with excess lye, there being, however, at the bottom of a boiler (ball or tumbler boiler) receiving the straw a small quantity of treatment liquor which collects there.

More particularly, the invention consists in a combined process for producing pure cellulose by the decomposition of straw or similar grasses by soda lye in a rotary boiler, wherein the fibrous material is simply saturated with the decomposing liquid, the air being driven out by steam, and wherein the charge is finally steamed with dry superheated steam without increasing the content in moisture. At the same time, the air is not only driven out of the fibrous material, but also of the boiler, in order to avoid damaging the cellulose by oxidation.

Contrary to the process above first mentioned as known, by which immediately after the commencement of working, owing to the supply of steam, the proportion of decomposing liquid to fibrous material is varied by the condensed steam, according to the process of the invention, the charge is worked with a constant content in moisture and, thus, also with substantially uniform constitution of the decomposing agent itself, by the use of dry steam.

As compared with the last mentioned of said known proeesses, the process according to this invention differs in that the treatment is carried out whilst avoiding an excess of liquid, that is, the process is performed not by boiling but simply by steaming the material so that injurious effects on the cellulose by an excess of alkali are avoided. The proeess according to the invention will now be explained more fully with reference to an example:

20 kilograms of chaff cut from corn straw are placed in a tumbler boiler of 200 litres capacity. To this are added about 60 litres of water or waste lye with the addition of 2 kilograms of caustic soda or a corresponding concentration of weak waste lyes, and with the simultaneous addition of 100 grams of sulphite or hydrosulphite as a reducing agent. The boiler is closed and rotated for about ¼ hour. When the decomposing liquid has thoroughly saturated the material, dry superheated steam is supplied. The boiler valves are then closed and after a number of rotations the exhaust valve is opened and fresh steam is blown through for 5–10 minutes for the complete removal of the air. This treatment is repeated two or three times.

Steaming then takes place with dry superheated steam at about 5 atm. and for about 1½ hours. The temperatures here amount to about 140–175° C. After 1½ hours, blowing out takes place and the material which is now almost completely decomposed, is washed.

After the washing, the drained material freed from the washing liquid is again placed in the boiler and is subjected with a lye which contains about 1½ kilograms caustic soda to 10 litres of water and 100 grams of sulphite as above stated, to a second steaming with dry superheated steam. After about 1½ hours, the steam is blown out, 20 litres of fresh water are added and thus the major part of the caustic soda attaching to the material is carried away. The waste liquor recovered after draining off can, as above mentioned, be added to fresh chaff.

The material is then washed until it is free from alkali. The like decomposing stages following each other according to the example can with advantage be also carried out in a single working process if the treatment takes place with a corresponding increase of the concentration of the soda lye (30 litres of water, 2½ kilograms of caustic soda) and an increase of the duration of the treatment (2 to 2½ hours).

The decomposition even of the stalk knots and the like is then complete. The sifting waste amounts, in the case of double stage process, to about 2 to 3½, but with the single stage process, on the contrary, it is only 0.1 to 0.5% of the initial material. Hydroxycellulose cannot be seen; the yield amounts to about 50 to 55%.

It is to be understood that the detail steps of the novel process can be varied without departing from the spirit of the invention.

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