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METHOD AND APPARATUS FOR PRODUCING CELLULOSE.

APPLICATION FILED JULY 10, 1906.

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METHOD AND APPARATUS FOR PRODUCING CELLULOSE.

No. 325,560.


To all whom it may concern:

Be it known that I, ALVAR MUNTZING, a subject of the King of Sweden, and resident of Vestr Trädgårdsgatan 11, Stockholm, Sweden, have invented a new and useful Improvement in Methods of and Apparatus for Producing Cellulose, of which the following is a specification, reference being had to the drawing accompanying and forming a part hereof.

This invention relates to improvements in methods of and apparatus for producing cellulose by digesting wood or the like.

In all methods hitherto employed for digesting cellulose by cooking or boiling the raw material, for instance wood cut to pieces, pieces have been filled in digesters of various constructions. Common to all these methods is that the cooking or boiling of the wood with the cooking lye used for fractioning the fibers of cellulose, by more or less dissolving or swelling out other matters adhering in the raw material to the fiber of the cellulose, is performed with the same dose, until the digestion is considered to be finished. In so doing the chemicals employed for preparing the boiling lye, such as caustic alkalies, caustic alkali salts in combination with sulfered potassium, soda or sulfuric acid sulfur ous salts, etc., in continued action upon the fibers of cellulose will act also upon the latter, so as to weaken and also more or less to dissolve it. Especially with high temperature and great pressure, it was not possible to prevent at least part of the fibers of cellulose from being weakened and other parts from being dissolved, this resulting in neither so large amount nor of so good a quality of pulp as possible. To this contributes, as far as wood is concerned, that parts thereof are looser and more easily digested than other parts simultaneously present in the boiler. On account thereof the supply of lye must be so large and the cooking continued for so long a time as to secure a sufficient dissolving and decomposing also of the hard-boiled wood or other raw material. It cannot then be avoided that the loose and easily boiled raw material contained in the boiler will be, so to say, too hard boiled, in consequence of which some of the fibers will be weakened or totally dissolved. Very often parts of the wood to be treated contains more water than other parts that are to be simultaneously boiled, and inasmuch as the wet wood is harder boiled than the dry one, the above mentioned disadvantages will for this reason be met with.

The boiling methods hitherto used have further the disadvantage that the boiling lye has the greatest strength and effectiveness when being filled in and at the beginning of the boiling. As a consequence, the actuating chemicals will attack with their greatest energy the fibers of wood first met with and on account the impossibility of a perfect distribution of the boiling lye among the fibers of wood taking place in one moment, some fibers of wood will be more strongly attacked than other and therefore be weakened and partly dissolved.

The object of the present invention is a method of and apparatus for producing cellulose by the process of boiling wood or the like, in which the said disadvantages are avoided.

The invention consists, briefly, in effecting a powerful circulation of the boiling lye, suitably in such a manner as to cause the lye to run off in a continuous stream from the digester and thus withdraw the disengaged fiber of cellulose. This boiling lye, that is led through sufficiently large tubes, is driven through any suitable strainers, for instance so-called filter presses such as are used in manufacturing sugar, china-clay etc., but especially adapted for the purpose in question. The fibers of cellulose will be caught in said strainers, while the escaping lye is forced by means of any suitable pumping arrangement into the other end or side of the boiler, thus in such a manner as to pass through the mass that is being digested.

In the accompanying drawing Figure 1 shows schematically an arrangement of the apparatus according to this invention when using a horizontal digester, and Fig. 2 a similar arrangement, when using an upright digester.

Referring to the drawing, A is the horizontal boiler, which by the rolling tires B rests in suitable wheels, and is adapted to be rotated by means of any suitable transmission device.

C is the lid of a man-hole for introducing the pulp-wood.

D is the lye conduit from the boiler, E is a strainer by means of which larger twigs and wood not decomposed are caught on a grate.

F is an apparatus, f. i. a filter press or the like, for separating the fiber or cellulose from the lye.
C is a pumping arrangement by which the lye issuing from F is brought back to the boiler either directly or through a heating apparatus H. When required, new boiling lye can be supplied through the tube K. During the boiling and circulation of the lye, the boiler is rotated with a suitable rapidity for causing the raw material of cellulose contained in the boiler to separate, by rubbing, the fiber of cellulose, according as it becomes ready.

The arrangement shown in Fig. 2 differs from that illustrated in Fig. 1 only therein that the lye escapes from the lower end of the boiler and is brought back to the upper end thereof. In this arrangement the boiler remains stationary during the circulation but, if desired, it may be provided with an arrangement for transmission of movement, so that the boiler may at times be rotated about a horizontal shaft J, in which case the lye conduits obviously ought to be disjoined and the boiler closed by cocks or taps.

The lye that remains in the fiber of cellulose detached in the apparatus theretofore employed (filter press or the like) should be washed away in any suitable manner and purified for recovering the chemicals used for the lye, when alkali in any form is used in the boiling operation. Instead of the quantity of lye thus removed during the boiling new lye of suitable strength should be successively added, whereby it will be possible to keep the boiling lye more uniform in strength during the whole time of boiling than is possible in usual boiling methods. By this invention it is not necessary at the commencement of boiling or after new charge of wood supply to have stronger lye than it ordinarily need to be in order to detach the fiber.

In case the fiber can be detached and sufficiently cleaned without the use of pressure the supply of new raw material can be successively performed during the progress of the boiling, in which case the boiler is kept stationary during the time the charging takes place. When steam pressure is required, two boilers may be used alternately, one being cleaned and charged while the other is working. When the boiling has proceeded so long that a new supply is required, the boiling lye is removed from the latter boiler to that one that is being charged.

By the present method the great advantage, which constitutes an essential object of the invention, is gained that the pulp-wood does not need to be cut to pieces, but blocks or ribs of wood can be placed in the boiler in any convenient lengths. The expenses for cutting the wood into pieces thereby saved, and the considerable loss of wood also spoiled in cutting is avoided, besides no fibers are shortened by cutting.

When using a horizontal boiler and undivided blocks or ribs of pulp wood placed horizontally in the boiler, the latter may be rotated so fast that the fiber of cellulose is rubbed away from the surfaces of the block or rib as soon as it is digested, which obviates the disadvantages of the old method as set forth in the first part of this specification.

Another advantage of the present method is that the fibers of cellulose need not be exposed to any pernicious influence by the chemicals. As soon as freed they are removed and withdrawn from the dissolving action of the chemicals that else would follow. The output will therefore, be larger, and the fiber stronger, than with the former methods. Hard and loose wood can be boiled simultaneously without inconvenience and without the fibers of the loose wood being spoiled. Wet wood or dry can be used each for itself or together without any inconvenience or loss of fibers. The strength of the lye can be kept approximately constant whereby loss and weakening of the fiber is avoided.

This invention may obviously be used for any kind of raw materials.

Instead of the combination of one apparatus of each kind, as shown in the drawing, obviously a plurality of such apparatus can be used. One or more of the apparatus, for instance the strainer may in some cases be dispensed with. Instead of using a separate heater for the lye, steam can be led directly into the boiler, or the boiler be heated in any other suitable manner.

Having now described my invention, I claim:

1. In a process of manufacturing cellulose by boiling wood or the like, the steps which consist in causing the lye to flow through the boiler, causing the detached fibers to escape from the boiler with the lye, catching the fibers outside the boiler, and causing the lye to run back to the boiler, substantially as and for the purpose set forth.

2. In a process of manufacturing cellulose by boiling wood or the like, the steps which consist in causing the lye to flow through the boiler, causing the fibers detached within the boiler to escape therefrom with the lye, catching the fibers outside the boiler, causing the lye to run back to the boiler, and adding fresh lye to the inflowing lye before used, substantially as and for the purpose set forth.

3. In a process of manufacturing cellulose by boiling wood or the like, the steps which consist in causing the lye to flow through the boiler, causing the fibers detached within the boiler to escape therefrom with the lye, catching the fibers outside the boiler by straining the lye freed from the fibers back into the boiler, substantially as and for the purpose set forth.

4. In a process of manufacturing cellulose by boiling wood or the like, the steps which
consist in placing the wood in the boiler in the shape of blocks, causing the lye to flow through the boiler, causing the fibers detached from the blocks within the boiler to escape therefrom with the outflowing lye, catching the fibers outside the boiler, and forcing the lye freed from the fibers back into the boiler, substantially as and for the purpose set forth.

5. In an apparatus for manufacturing cellulose by boiling wood or the like, the combination of a boiler, a conduit connected to the boiler in such a manner as to allow the lye flowing through the boiler to withdraw therefrom the fibers of cellulose detached during boiling, means for causing the lye to circulate through the boiler and conduit, and a filtering apparatus inserted in the conduit for retaining the fibers, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALVAR MÜNZING.

Witnesses:

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