

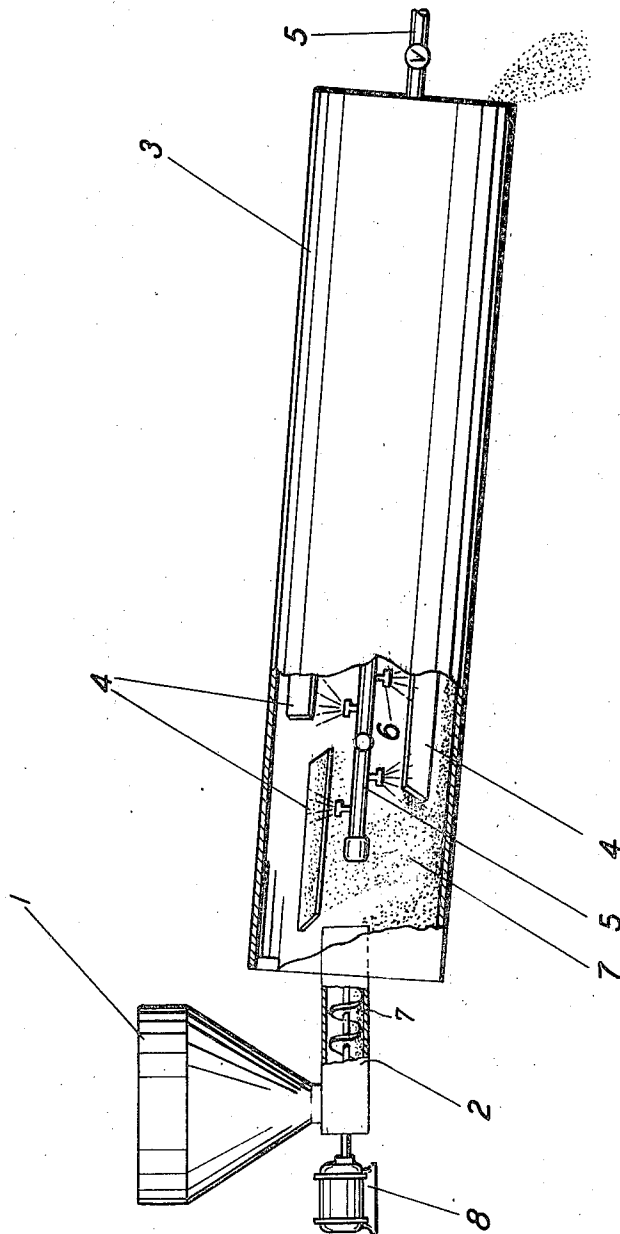
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BLEACHING WOOD PULP

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BLEACHING WOOD PULP

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3 Claims. (Cl. 8—104)

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This invention relates to bleaching wood pulps, and more particularly to bleaching high consistency wood pulps with peroxides.

Wood pulp, as produced by chemical digestion of wood chips or by grinding, is a slurry of wood fibers in water usually containing less than 15% by weight of wood fiber during the pulp refining operations and paper manufacturing process. Such low consistency pulps can be bleached and otherwise processed. However, it generally is advantageous to remove a large part of the water from the wood pulp before subjecting it to bleaching operations. In conventional high consistency bleaching operations, wood pulp of about 8 to 15% consistency is mixed with a bleaching chemical, for example, a peroxide solution. In such mixing operations, the pulp is a rather pasty mass and considerable time and power are required to obtain complete and uniform mixing of the bleaching chemical with the pulp. In such operations, care must be exercised to avoid localizing of bleaching and to obtain a uniform mixture of the pulp and the bleaching solution.

An object of the present invention is to provide a new and improved process for bleaching wood pulps. A further object is the application of a peroxide bleaching solution to a high consistency wood pulp so as to obtain uniform action of the bleaching solution on the wood pulp in a shorter time of operation than is possible in previously known methods. Further objects will be apparent from the following description of the invention.

The above-mentioned objects are accomplished in accordance with the present invention by forming a mist-like dispersion of an aqueous hydrogen peroxide solution in a gas, such as air, and bringing high consistency wood pulp of at least 30% consistency (i. e., containing not more than 70% by weight of water) into contact with said dispersion.

The appended drawing, which is an elevation partly in section, illustrates one form of apparatus that may be used to practice the invention. A conventional screw conveyor mechanism 2 powered by conventional motor and gear train 8, is adapted to feed granular material into a rotating hollow cylinder 3, which is rotated and supported by conventional means not shown. Hopper 1 is mounted to feed granular material 7 into the screw conveyor 2. Cylinder 3 is constructed and mounted like a conventional rotary dryer, its axis sloping downwardly from the feed end and having a plurality of conventional lugs or baffles 4 mounted on its interior walls, adapted to elevate and drop granular material therein during rotation. Valved pipe 5, supported by conventional means not shown, leads into the interior of cylinder 3 and is provided with a plurality of atomizing nozzles 6. Nozzles 6 are of

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a conventional type capable of forming a finely divided mist-like dispersion in air of liquid forced into pipe 5.

In a preferred method of practicing the invention, the process starts with freshly prepared wood pulp, for example, groundwood which has a relatively low consistency, e. g., 0.5 to 6% consistency. This low consistency pulp is dewatered to form high consistency pulp of at least 30% consistency which may be obtained as individual fibers or small agglomerates. A convenient method for preparing such high consistency pulps is to utilize a pulp press such as is commonly utilized for dewatering vegetable by-products, such as tomato pomace and the like. An example of such a pulp press is one which consists essentially of a vertical perforated cylinder within which rotates a hollow perforated element having the shape of a frustum of a cone and equipped with screw conveyor flights in the annular space between it and the inner wall of the vertical cylinder. The pulp is fed into the annular space and the inner member is rotated thus causing the screw conveyor flights to compress the pulp in the annular space as it passes downwardly therein, so that the water is squeezed out through the inner and outer perforations. Pulp passing out from the bottom of the annular space generally contains around 60% by weight of water and for the most part is in the form of some small agglomerates of fibers, e. g., 2 to 3 mm. in diameter, and some individual fibers. This form of high consistency wood pulp is essentially a solid material in divided form and can be handled mechanically like commonly known granular free-flowing materials, such as seeds or sawdust. For want of a better term, we designate this as "granular" wood pulp.

As an illustration of the invention, the above described granular pulp is treated in the apparatus shown in the drawing. The granular pulp is placed in hopper 1 whence it flows by gravity into screw conveyor 2, which is rotated to feed the granular pulp into the rotating cylinder 3. Aqueous peroxide bleaching solution is forced through pipe 5 and nozzles 6 to form a finely divided dispersion or mist of the solution in the air in cylinder 3. Cylinder 3 is rotated at the slow rate of speed commonly employed in rotary drier operations, so that the granular pulp is elevated by the lugs or baffles 4 to a point higher than the axis of the cylinder and thence dropped downward in a scattering manner. The granular pulp in cylinder 3 thus is repeatedly elevated and scattered down through the mist of peroxide solution. Due to the slope of the axis of cylinder 3, the pulp granules gradually travel to the lower, open, discharge end, where they fall out. During its passage through cylinder 3, the high consistency granular pulp absorbs peroxide

solution from the mist-like dispersion. The granular pulp very rapidly absorbs the peroxide solution from the mist so that the solution completely and uniformly impregnates each fiber and fiber agglomerate, thereby completely and uniformly impregnating the entire mass of granular pulp with the peroxide solution.

The concentration of peroxide in the bleaching solution may be varied over a wide range, depending upon the desired extent of bleaching and the desired consistency of the pulp emerging from the rotating cylinder. Generally, it is preferred to utilize a sufficiently high concentration of peroxide so that the discharged pulp will still have a high consistency, preferably not lower than about 20% consistency, e. g., 20 to 50% consistency. Other ingredients besides hydrogen peroxide and alkali metal peroxides commonly utilized in conventional peroxide bleaching solutions may be added in practicing this invention. It is generally preferable to utilize an alkaline peroxide solution, and for this purpose the conventional alkalining agents may be used, such as alkali metal hydroxides, carbonates, silicates, borates and the like. We prefer to use alkali metal silicates, either alone or in conjunction with other alkalies. Conventional methods for preparing peroxide bleaching solutions are suitable for practicing our invention. The invention is not restricted to utilizing aqueous solutions of inorganic peroxides, such as hydrogen peroxide and sodium peroxide, but if desired solutions of other peroxygen compounds may be used, such as solutions of inorganic or organic peracids and their salts, e. g., perborates, peracetates and the like.

The above preferred method of practicing the invention is given by way of example, and the invention is not necessarily restricted thereto. In its broader aspects, the invention comprises any method whereby wood pulp having a consistency of 30% or higher is brought into contact with a mist or similar finely divided dispersion of a peroxide solution. For example, the high consistency wood pulp may be spread in a thin layer, as on a conveyor; and thus brought into contact with the aforesaid dispersion or mist. For the best results and to obtain a complete and uniform distribution of the bleaching solution in the wood pulp, it is preferable that the latter be in a more or less finely divided state, such as the granular pulp described above. While such granular or finely divided pulp is most economically prepared by means of a pulp press or its equivalent, such pulp also may be prepared by other means, for example, by shredding high consistency pulp formed on a lapping machine; or the like. It is essential however that pulp contain not more than 70% by weight of water, as at lower consistencies the bleaching solution is not sufficiently rapidly absorbed from the mist to obtain a complete and uniform distribution of the bleaching chemical within the fiber clusters. If desired, the pulp may be completely dewatered, i. e., so that it contains little or no water, but there is no substantial advantage in dewatering the pulp to a consistency of more than about 50%. It is preferred therefore to utilize pulp which has been dewatered to a consistency of from 30 to about 50%.

It should be understood that statements herein and in the appended claims describing treat-

ing pulps of certain consistencies with the dispersion of bleaching solution refer to the initial consistency of the pulp, i. e., the consistency it has before it is brought into contact with the bleaching solution.

An advantage of the herein described invention is the ease and rapidity with which the pulp is completely and uniformly impregnated with the bleaching agent. A further advantage is the simplicity of control, resulting from the rapidity with which the high consistency pulp absorbs bleaching solution from the peroxide mist. A further advantage is that the pulp, after impregnation with the bleaching solution may still have a high consistency such as 20 to 30% (i. e., a water content of 70 to 80% by weight) and hence may be handled like a granular solid material.

We claim:

1. The process for bleaching wood pulp which comprises forming a mist-like dispersion of an alkaline aqueous peroxide solution in air in an enclosed space and passing through said space in contact with said dispersion a substantially granular, free-flowing, high consistency ground-wood pulp initially containing not less than about 50%, and not more than 70% by weight of water, said granular high consistency pulp being repeatedly elevated and scatteringly dropped during its passage through said space.

2. The process for bleaching wood pulp which comprises forming a mist-like dispersion of an aqueous peroxide bleaching solution in air in an enclosed space, forming a substantially granular, free-flowing high consistency wood pulp initially containing not less than about 50% and not more than 70% by weight of water, introducing said granular pulp into said space and therein mechanically acting on the pulp granules to scatter them through said mist-like dispersion and finally removing said granules from said space.

3. The process for bleaching wood pulp which comprises forming a mist-like dispersion of an aqueous peroxide bleaching solution in air in an enclosed space, forming a substantially granular free-flowing high consistency wood pulp initially containing not less than about 50% and not more than 70% by weight of water, introducing said granular pulp into said space and therein repeatedly elevating and scatteringly dropping said granular pulp through said mist-like dispersion until the pulp granules have absorbed sufficient of said solution to contain 70 to 80% by weight of water and then removing said granules from said space.

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Certificate of Correction

Patent No. 2,492,047

December 20, 1949

PAUL B. K'BURG ET AL.

It is hereby certified that errors appear in the above numbered patent requiring correction as follows:

In the grant, line 7, title of invention, for "BLEACHING WOOD PULPS" read *BLEACHING WOOD PULP*; column 4, list of references cited, add 2,465,738 *McEwen*.....*Mar. 29, 1949*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of February, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.