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## PROCESS FOR TREATING PULP.

No Drawing.

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*To all whom it may concern:*

Be it known that we, WILLIAM D. GREGOR, WESLEY M. OSBORNE, and ALEX J. KEMZURA, citizens of the United States, residing at 5 Newton Falls, in the county of St. Lawrence, State of New York, and Newton Falls, in the county of St. Lawrence and State of New York, respectively, have invented certain new and useful Improvements in Processes for Treating Pulp, of which the following is a specification.

The present invention relates to processes 15 for treating pulps of various kinds used in the manufacture of paper, papier-mâché and like materials, to aid the bleaching quality thereof.

More particularly the invention relates to 20 processes for treating pulps prior to bleaching thereof which have been produced in any well known manner, such for example, as by the sulphite process, the soda process and the sulphate process, or other processes 25 which leave the pulp with an excess of acid or alkali, in a manner to neutralize the excess acid or alkali, and at the same time to set up reactions with the foreign coloring and other undesirable substances, such for 30 example, as the lignine contained therein. These reactions form soluble compounds, and loosen and free the foreign substances from the fiber so that they may to a large extent, be removed by washing rather than 35 depending upon bleaching to remove these impurities. The results attained have been marked in reducing the amount of bleaching chemicals necessary, in the time required to effect bleaching, and in the higher quality and greater strength of the fiber produced, 40 when the pulp is treated in accordance with the present invention before being subjected to any of the well known bleaching processes.

The special treatments hereinafter set 45 forth are based upon the facts that the various coloring matters contained therein are either soluble in certain dilute acids or alkalis, or are converted into water soluble 50 compounds by the reactions set up, or are freed so that they may be readily washed from the fiber when properly treated. It is undetermined and immaterial which of the actions referred to predominate, and prob- 55 ably all three are present to produce the

highly beneficial results which have been attained in practice. In addition to the actions above referred to, if an excess of acids are present in the pulp, advantage is taken of the neutralizing effect by utilizing an 60 alkali in the special treatment, while if an excess of alkalies are present, dilute acids are utilized.

Objects of the invention are to provide 65 processes for treating pulps in a manner to remove foreign substances and produce higher grade stock; to specially treat pulp prior to the bleaching thereof in a manner to reduce the amount of bleaching chemi- 70 cals used; to specially treat pulp prior to bleaching in a manner to produce higher grade and stronger bleached fibers than have been heretofore produced, and such other objects as may be attained by utilization of the various steps hereinafter set forth and 75 claimed.

In practice, after the stock is reduced to pulp in the digestors, it is passed into blow pits and the blow liquors are washed out in 80 well known manner. After the blow liquors have been washed out, it is common practice to pump the washed pulp from the blow pits to a stock or storage chest, and from the stock chest, the pulp is passed to the bleaching apparatus as needed. In the preferred 85 embodiments of the present invention, the special treatment is applied between the blow pit washing system and the bleaching system. A storage vat is preferably provided into which the washed pulp from the 90 blow pit is flowed, and from which the pump feeding the stock chest is supplied. After the cooking liquors are washed from the pulp, a dilute solution of acid or alkali in accordance with the alkali or acid nature of 95 the pulp, is slowly and continuously supplied to and mixed with the pulp either in the blow pit, or as it flows to the storage vat. Because of the greater concentration of pulp in the blow pit after washing, the 100 solution is preferably added at this point. In this manner the solution is more active for a short time, and becomes more dilute as the stock passes through the system. The various actions and reactions above 105 referred to, due to the addition of the solution, then proceed until the chemical action of the added solution is substantially exhausted, and the pulp is pumped from the storage vat to the stock chest. 110

In the treatment of sulphite pulps, a solution in the proportion of one pound of sodium carbonate to three gallons of water has been found to give excellent results, when applied to the pulp at the rate of eighteen gallons for each ton of air dry fiber. This solution is preferably heated to the boiling point before being mixed with the pulp. It is to be noted that this amount of heated solution added to the pulp in the amount given above will not heat the mass appreciably above normal temperatures. It has been found that above a certain strength of solution, no beneficial results are attained as the main actions and reactions are produced with a small percentage of alkali. Excellent results are also attained with sulphite and acid pulp by the use of potassium carbonate, caustic soda, caustic potash, and by various combinations of these alkalies, but sodium carbonate and potassium carbonate are preferably used. Although a proportion of six pounds of alkali dissolved in eighteen gallons of water, to each ton of air dry sulphite pulp has been given, it will be understood that these quantities may be varied within wide limits for different pulps, and the best proportions for each kind of pulp and each kind of alkali are most conveniently determined by trial, because of the wide variations in acidity, in impurities, and in quality of commercial alkalies.

A similar treatment is carried out using dilute acids at this stage, for alkaline pulps, such as are produced by the soda and sulphate processes. In this case dilute acids are applied to the pulp. Sulphurous acid with calcium as a base, such as the well known bisulphite cooking acid, or dilute solutions of acids formed from sulphur dioxide, trioxide, or the salts compounded therefrom, such as bisulphite of calcium, bisulphite of soda, and the sulphites of sodium and calcium, are effectively used.

An effective solution for the treatment of soda and sulphate pulps has been found to consist of three tenths of a pound of sodium carbonate for each gallon of water, treated with  $\text{SO}_2$  gas to a point where the solution still shows a slight alkaline reaction. It has also been found that beneficial results are attained by treating the stock directly with  $\text{SO}_2$  gas, but the solution is most effective and most convenient.

In the stock chest the reactions are completed. As the material passes through the system, properly treated material shows increasingly faint reactions, and the stock is

so diluted by water as to have no harmful effect on the strength of the fiber. As the pulp is drawn from the stock chest and passed to the bleaching apparatus, the alkali or acid together with the free and soluble coloring matter and foreign substances formed in the reactions are washed out, the pulp is thickened and screened, and then is ready to be bleached by any of the known processes. Any well known form of washing and thickening apparatus may be employed.

Actual mill tests on sulphite pulp have shown a saving of 23.2 per cent in bleach on spruce pulp, 31.9 per cent on hemlock, 14.8 per cent on poplar, and 17.4 per cent on hardwood pulps when treated in accordance with the present invention over the amount of bleach used in bleaching like pulps by the same method, but not treated in accordance with the present invention.

Having described preferred embodiments of the invention, what is desired to be secured by Letters Patent and claimed as new is:

1. In the process of preparing digested paper pulp for bleaching, the step which comprises treating the pulp at about normal temperatures with an agent capable of converting impurities contained in said pulp into water soluble compounds.

2. In the process of preparing sulphite pulp for bleaching, the step which comprises treating the pulp at about normal temperatures with an alkaline material to convert impurities contained in said pulp into water soluble compounds.

3. The process of preparing digested paper pulp for bleaching, which comprises treating the pulp at about normal temperatures with an agent capable of converting impurities contained in said pulp into water soluble compounds, and washing the thus treated pulp to remove the impurities therefrom.

4. The process of preparing sulphite pulp for bleaching which comprises treating the pulp at about normal temperatures, with a solution containing an alkaline material capable of converting impurities contained in said pulp into water soluble compounds, and washing the thus treated pulp to remove the impurities therefrom.

In testimony whereof, I affix my signature.  
W. D. GREGOR.

In testimony whereof, I affix my signature.  
W. M. OSBORNE.

In testimony whereof, I affix my signature.  
ALEX J. KEMZURA.