

UNITED STATES PATENT OFFICE.

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TREATMENT OF PAPER PULP.

No Drawing.

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This invention relates to the treatment of paper pulp stock.

In the preparation of paper pulp one of the principal objects is the complete separation of the fibres to form what is known as a free flowing pulp, so that in the subsequent forming operations the felted paper may attain a maximum strength and uniformity. In the manufacture of sulphite and other chemically prepared pulps from wood, the liquor in which the chips are cooked, acts to remove the lignin and resin and other bonds for the fibers and thus leaves the fibres themselves free for the subsequent felting. In the manufacture of ground wood or mechanical pulp the grindstone acts to tear the fibres apart. Generally speaking the separation of the fibres in the chemical processes is more complete than in the mechanical so that paper made from the former is stronger than that made from the latter.

The chemical processes are, however, much more expensive than the mechanical so that in the cheaper papers, such as newspaper, mechanical pulp must largely predominate with a small addition of chemical pulp for strength. Improvements in grinding methods and machinery are making possible a better separation of the fibres and the production of improved ground wood papers, but the chemical pulps are still superior, largely because of the more complete separation of the fibres. Paper made from chemical pulps are superior to ground wood papers for the further reason that in the former the lignin and resin have been removed while they remain in the latter, slowly oxidizing and resulting in a yellow brittle paper.

I have discovered that the addition, in the beater, of a small percentage of a sodium peroxide solution to any paper pulp—enough to make the pulp react alkaline to litmus—results in a more complete separation of the fibres and the formation of a stronger, tougher, cleaner, more uniform paper. Although this result is obtained when any pulp is treated, I realize the most marked improvement in the treatment of pulp consisting largely or wholly of ground wood either new or reclaimed.

In practicing the present invention I first make up an aqueous solution of sodium peroxide the concentration of which may range from $\frac{1}{4}\%$ to 25%. This solution is then

added to the pulp in the beater or the solution introduced first and the pulp added to it. Sufficient sodium peroxide is used to turn the contents of the beater alkaline to litmus. When working with new stock, I have found that this alkaline reaction is obtained by adding from 0.1 pounds to 0.25 pounds of sodium peroxide to 100 pounds of pulp, all figured on dry basis. When working with an average pulp in the form of reclaimed waste paper, I have found that from 1.25 pounds to 2 pounds of sodium peroxide per 100 pounds pulp should be added. When working with a reclaimed pulp made from a rosin-sized paper with free alum present even more sodium peroxide must be used. In each case the sodium peroxide is added until the stock reacts alkaline to litmus. I have also found that better results are obtained if the temperature of the stock in the beater is from 120° to 130° F. Temperatures substantially above 130° F. are injurious to the fibres. After the beater is loaded with the pulp and the sodium peroxide solution, the contents are agitated to complete the separation of the fibres. This can usually be accomplished in from ten to twelve minutes.

The resultant stock when discharged from the beater is perfectly free flowing and need not be passed through a Jordan engine. It is in fact much freer than it could be made by a Jordan. It is well-known that ordinary paper stock after standing for even a short while becomes unfit to form properly on the machine, whereas, stock treated in accordance with the present invention can stand for months without becoming soggy and makes excellent paper at any time. The treated stock is also clean and of light color.

Paper made from pulp treated in accordance with the present invention is considerably stronger than paper made from the same pulp untreated. In some instances I have found an increase of as much as 100% in the Mullen bursting test and in the tear or breaking test in favor of paper made from the treated pulp. Such paper is also more uniform than paper made from untreated pulp, not only in thickness but in strength. It is also whiter when first made and, what is more important, remains white indefinitely and does not grow brittle and weak with age even though largely or

wholly made from ground wood. In short, paper made from ground wood pulp treated in accordance with the present invention not only possesses many of the virtues of papers made from sulphite and other chemical pulps, but possesses these properties in a marked degree.

I claim:

1. The method of treating paper pulp to separate the fibres which comprises adding a solution of sodium peroxide to the pulp until the whole reacts alkaline to litmus under conditions permitting the sodium peroxide to act freely and without retardation, and then agitating to complete the separation of the fibres while maintaining the mixture at a temperature somewhat above usual atmospheric temperatures but insufficiently high to injure the fibres.
2. The method of treating paper pulp which comprises adding a solution of sodium peroxide to the pulp until the whole reacts alkaline to litmus, agitating the whole, and heating to a temperature not higher than about 130° F.
3. The method of treating paper pulp which comprises adding a solution of sodium peroxide to the pulp until the whole reacts alkaline to litmus and agitating the whole for about ten minutes to complete the separation of the fibres.
4. The method of treating paper pulp which comprises adding a solution of sodium peroxide to the pulp until the whole reacts alkaline to litmus and agitating the whole to complete the separation of the fibres, while maintaining it at a temperature approximately from 120° to 130° F.
5. The method of treating paper pulp which comprises adding a solution of sodium peroxide to the pulp in proportions of from 0.1 pounds to 2.00 pounds of sodium perox-

ide to 100 pounds of pulp, dry weights, agitating for about ten minutes to complete the separation of the fibres, and heating to a temperature not higher than about 130° F.

6. The method of making paper which comprises forming a pulp, adding a solution of sodium peroxide until the pulp reacts alkaline to litmus, agitating the pulp to separate the fibres, heating to a temperature not higher than about 130° F. and forming the paper into webs or sheets.

7. The method of treating pulp in paper form which comprises adding a solution of sodium peroxide to the pulp until it reacts alkaline to litmus and agitating the mixture about ten minutes to separate the fibres.

8. Paper made from a pulp treated with sodium peroxide until the pulp reacts alkaline to litmus, agitated about ten minutes to separate the fibres and heated to a temperature not higher than about 130° F.

9. The method of treating ground wood pulp which comprises adding sodium peroxide to the pulp until it reacts alkaline to litmus, and agitating the treated pulp about ten minutes to complete the separation of the fibres.

10. The method of treating ground wood pulp which comprises adding sodium peroxide to the pulp so that it reacts alkaline to litmus, agitating the treated pulp to complete the separation of the fibres and heating to a temperature not higher than about 130° F.

11. Paper made from ground wood pulp treated with sodium peroxide until the pulp reacts alkaline to litmus, agitated about ten minutes to complete the separation of the fibres while heated to a temperature not higher than about 130° F.

In testimony whereof I affix my signature.

CLARENCE R. ROBINSON.