UNITED STATES PATENT OFFICE.

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PROCESS OF TREATING PAPER-PULP.

1,300,357. Specification of Letters Patent. Patented Apr. 15, 1919.

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To all whom it may concern:

Be it known that I, JUDSON A. DE CEW, a subject of the King of Great Britain, and resident of the city of Montreal, in the Province of Quebec and Dominion of Canada, have invented certain new and useful Improvements in Processes of Treating Paper-Pulp, of which the following is a full, clear, and exact description.

This invention relates to a method of treating paper stock for the purpose of improving the quality of the paper made therefrom, and also for facilitating the sizing and coloring of the paper, and the general working conditions of the paper stock on the paper making machine.

The paper stock may be treated either in the beating engine or prior to its employment therein, and my process consists essentially in the treatment of the paper making fibers with a solution of sodium aluminate prior to the sizing and coloring of the paper stock. The result obtained is the deposition of the alumina within the cellulose or paper fibers by the absorption of sodium aluminate, and also the deposition on the surface of the fibers of colloidal alumina by the principle of adsorption.

It is well known to those familiar with cellulose chemistry that cellulose will absorb approximately 2% of its weight of caustic alkali. If the cellulose is treated with aluminate of soda, the surface of the fibers will be impregnated with alumina, which will be removed from the soda by dialysis during the impregnating process, and any colloidal alumina separated by the ionization of the solution when diluted in the beating engine will adhere to the surface of the fibers by adsorption.

The treatment of the paper stock, therefore, with sodium aluminate results in a slightly alkaline reaction within the fibers, the removal of any acidity that may be present therein, and the impregnation of the fiber surface by alumina in the colloidal state. Not only is a special character given to the fibers by this treatment, but any soluble impurities associated with the fibers will be thrown out of solution by this treatment, or will be rendered insoluble. The result is that the fibers and the solution of water in which the fibers are suspended are both prepared for the subsequent chemical and physical reactions which take place in the sizing and dyeing process, and thus proper efficiency and uniform results can be obtained in this further treatment. The amount of material used in the treatment will be approximately from ¼% to ½% of the paper stock treated, the proportions depending upon the character of the fiber and the amount of impurities associated with them.

In carrying out my invention, I prefer to add approximately from two to five pounds of sodium aluminate to one thousand pounds of paper stock in a beating engine prior to its sizing treatment. The material is then thoroughly mixed by the beater. It will be obvious, however, that the sodium aluminate may be mixed with the paper stock in a mixing chest or in any other suitable way prior to putting it in the beater.

When paper fibers treated in this way come in contact with solutions of rosin size containing free rosin in the colloidal state, this colloidal rosin will be deposited upon them in association with the alumina already adsorbed, and thus a combination of these materials is obtained which effects most efficient sizing results. This coating, along with the rosin precipitated with alum, also gives the fibers a more water repellent character than that obtained solely from the precipitation of the rosin soap by means of alum.

In the dyeing process, the paper stock which has had this preliminary treatment will adsorb more of the dye than that which is untreated. Consequently, the cost of dyeing will be greatly reduced. In coloring with ultramarine, the retention of this material is increased and the subsequent destructive action of the alum solution is decreased, so that the coloring is obtained with less material than paper stock which has not been treated by this process.

There are also mechanical advantages resulting from this treatment due to the fact that any stickiness of the fibers is greatly reduced by the coating of alumina deposited on them, and consequently it is possible to make paper with less sticking on the wires and presses.

Having thus described my invention, what I claim is:—

1. A process which consists in treating paper making fibers with a solution of aluminate of soda and allowing the same to

be taken up and react with the fibers, before said fibers are treated with rosin sizing solutions.

2. A process which consists in treating paper making fibers with a solution of aluminate of soda and allowing the same to be taken up and react with the fibers, prior to the dyeing and sizing of the stock in the paper making process.

3. A process included in sizing paper which consists in treating paper making fibers with a solution of less than 1% of sodium aluminate and allowing the same to be taken up and react with the fibers, and then treating with rosin size solutions containing free rosin.

4. A process which consists in treating paper making fibers with a solution of aluminate of soda, and allowing the same to be taken up and react with the fibers, then neutralizing any free or excess alkali and then adding a solution of rosin soap containing free rosin which is eventually coagulated by means of sulfate of alumina.

5. A process of mordanting paper making fibers so that they will more readily absorb certain classes of dyes and also colloidal solutions of rosin in rosin soap which consists in treating the paper making fibers with a weak solution of sodium aluminate alone until the fibers themselves have become slightly alkaline from the absorption of this aluminate of soda.

6. A process of increasing the affinity of cellulose fibrous material for solutions of rosin soap containing free rosin which consists in obtaining a chemical reaction between the cellulose and sodium aluminate before the soap is added to the stock.

7. A process of sizing which comprises treating paper stock in a beating engine with sodium aluminate and separately with rosin soap solution containing free rosin acids in the colloidal state.

8. A process of sizing paper stock, which comprises treating the same in a fluent condition, separately with a dilute solution containing a soluble aluminate and with a dilute solution of rosin size containing free rosin acid, the solutions being diluted to such an extent that the free alkali in the aluminate solution will not saponify the free rosin acid in the soap solution.

In witness whereof, I have hereunto set my hand.

JUDSON A. De CEW.