

UNITED STATES PATENT OFFICE.

ROGER GREEN SMITH, OF PASADENA, CALIFORNIA.

PROCESS OF TREATING PAPER PULP.

No Drawing.

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This invention relates to improved methods of treating paper pulp, particularly in the process of dissolving out of the pulp certain organic matter which has resisted the action of previous treatments.

A further object of this invention is to provide a paper pulp treatment that will attain a higher white than was possible with the same amount of bleaching action on the untreated pulp, and, that when so treated will develop a higher strength on making into paper.

Other objects will appear in the detailed description of the method or process, as follows:

For each ton of paper pulp, the solution for the treatment is a mixture with water of from $5\frac{1}{2}$ to 8 pounds of salt cake or commercial sodium sulphate, and also a mixture with water of from 20 to 30 pounds of commercial sulphuric acid of 66° Bé. strength. As may be desired add the acid to the pulp first and then follow by adding the salt, and as desired I mix the solutions of salt and acid and add the resulting mixture to the pulp. In general it has been found that when the pulp is very alkaline it is best to add the acid first and the salt afterwards; if the pulp to be treated is very thin it is better to mix the acid and salt together before adding to the pulp.

There may be used as a substitute in place of the above amounts of sodium sulphate, equivalent amounts of nitre cake or of commercial sodium bisulphate, but the procedure in this instance is in every other way the same as before stated.

It has been found that the solvent action of the solutions above stated are often increased by the addition of some other acid and to this end there is employed to great advantage sulphurous acid. To accomplish this purpose, introduce into the solutions above named from $2\frac{1}{2}$ to $3\frac{1}{2}$ pounds of sulphurous acid gas, for each ton of pulp treated, and so introduce this gas that as little as possible will be lost by evaporation.

Unless working with very large amounts of the above mentioned chemicals, it is preferred to so conduct the procedure that it produces the sulphate and the sulphurous acid at the place where pulp is treated. To do this, mix with water from 5 to 7 pounds of sodium sulphite, for every ton of pulp, and also mix with water from 20 to 30 pounds of

sulphuric acid of 66° Bé. strength, and then either mix these solutions together and add to the pulp or add the acid first to the pulp and the salt later, as described above. The result of this combination is the formation of a sulphate and sulphurous acid. Since only a part of the sulphuric acid is used in this reaction there is left an excess sufficient to correct any alkaline condition of the pulp.

If the treated pulp is to be bleached, it has been found that it is necessary to remove as much as possible of the solution containing the dissolved matter. This is because on the addition of the ordinary bleaching liquor of the pulp mill to the solution of the organic matters these same organic matters are at once thrown out of solution and again appear on the pulp. If the treated pulp is not to be bleached it is not always necessary to remove the solvent solution. In order to separate the pulp and this solvent solution, it is expedient to pass the pulp mass, containing pulp, water, solvent and excess acids, over a wet machine or a decker or as may be chosen, to wash the pulp in one of the ways well known in the industry.

When pulp is bleached it generally has been found to have lost in strength and in the case of some pulps which bleach less easily, such as sulphate pulps, losses in strength of 25% and even 40% have been usual. When any pulp is to be made into paper the strength is approximately due to the original strength of the fibres and to the way they are developed by beating or hydrating. It is well known that this strength is somewhat proportional to the amount of hydration and that the amount of hydration is somewhat proportional to the amount of beating given the stock, provided this beating does not unduly shorten the fibres. The object and effect of this invention is to save or restore as much as possible of the strength frequently lost in bleaching and to add to the strength of the unbleached stock or bleached stock.

If it is desired to apply this process to use on textiles, make up these solutions as stated above and then pass the textiles through the solution, using one of the machines now in practice for impregnating the cloth with chemicals and working it in those chemicals. Take the cloth or yarn after proper previous treatment and after thoroughly washing it, squeeze out as much of the water as possible and then pass the same through the treat-

ment, and then through a second wash and squeeze.

I claim as my invention :—

- 5 1. The improvement in the process of treating paper pulp which consists in introducing therein after digestion and before beating of an aqueous solution of a sulphate and an acid.
- 10 2. The improvement in the process of treating paper pulp which consists in introducing therein before beating a substantial proportion of a sulphate and sulphuric acid.
- 15 3. The improvement in the process of treating paper pulp which consists in adding thereto before beating a substantial propor-

tion of sodium sulphite and sulphuric acid so as to introduce therein a sulphate, sulphurous acid and sulphuric acid.

4. The improvement in the process of treating paper pulp which consists in adding thereto before beating about five to seven pounds of sodium sulphite and about twenty to thirty pounds of sulphuric acid for each ton of pulp.

5. An improvement in the process of treating paper pulp which consists in adding thereto before beating a sulphate, sulphurous acid and sulphuric acid.

In testimony whereof I affix my signature.

ROGER GREEN SMITH.