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PROCESS OF PAPER MAKING.

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This invention relates to a process of retaining in the newly formed web of paper or board a higher percentage of sizing, filler, etc., than is possible by means heretofore practiced.

With a view to improving the writing, printing or water proof qualities of paper or board or to increasing the durability and to provide a more attractive finished sheet, certain grades of paper while in the preliminary stages of manufacture are treated with an emulsion of soda ash and resin and subsequently or before are treated with sulphate of aluminum. The latter is used to effect a precipitation of the resin and also to provide a vehicle for the distribution and retention of resin. The alumina-resin combination adheres in part to the fibers of the paper making pulp and produces the effect designated as "sizing" in the finished paper. The size-alum process is usually applied to the stock in the beaters. Filler such as clay or other inert material when used is also applied in the beater or later in the precess.

Because of the nature of the paper making fibers only portions of the resin of the size and the filler furnished remain in the sheet of paper. The unretained balance is drained off with the white water during the formation of the paper.

I have found that the addition of freshly prepared metallic hydroxide applied to the stock, just previous to the delivery to the paper machine, has the effect to cause the retention of more of the resinous material and filler in the paper being formed and hence improves the sizing quality and finish of the paper made by my process. Besides, an economy of chemicals is effected because less of size, etc., is wasted by being allowed to run off with the white water.

In practice for the purpose of producing an efficient absorbent I have added a mixture of soda ash and sulphate of aluminum in the ratio of 32 to 68, to the stock at the head box on the paper machine. This ratio may be varied to suit the requirements, depending upon the quality of the stock applied to the machine and the desired characteristics of the finished paper. Instead of feeding soda ash and sulphate of aluminum as a dry mixture, these may be added separately, either dry or in solution. Other substances than those mentioned above may be used without departing from the spirit of this invention as, for instance, hydrated lime and an iron salt or a combination of iron salts. I have also successfully used a mixture of calcium carbonate and sulphate of aluminum for the production of aluminum hydroxide. In this case a double reaction results which involve, first the evolution of carbon dioxide by the action of the acidity of the aluminum sulphate component. The carbon dioxide in turn forms a soluble salt, calcium bi-carbonate, and this reacts with the dissolved sulphate of aluminum to produce aluminum hydroxide.

My process is to be distinguished from any wherein a primary precipitation of the size-alum precipitate occurs, but involves coagulation of the finely divided resinous precipitate already formed but which due to a high degree of dispersion is readily drained off and lost during the formation of the paper or board.

Since I employ a mixture of acid and alkaline components in my coagulant, mixed in substantially chemically equivalent proportions, I do not cause any astringency of the fibers. In fact I have found it possible to effect good sizing of container board and at the same time to permit a reduction in the ratio of alum to size furnished for the primary sizing precipitate, thereby reducing the acidity of the sized product. This is advantageous because with a reduction of acidity there is an accompanying increase in the strength of the paper or board made.

The primary reason when using heretofore known processes for maintaining acidity in sized paper is to insure efficient size precipitation. By my process the addition of the components necessary to produce a freshly prepared non-colloidal metallic hydroxide precipitate, at a time and under conditions when a coagulating precipitate is most effective the size-alum precipitate is retained in the sheet and the paper or board contains less of strength deteriorating acidity than heretofore customarily maintained.

Claims:

1. The process of making paper consisting of adding substances to produce a metallic hydroxide to paper making stock subsequently to the addition of size and size-precipitating chemicals and at or before delivery to the paper making machine.

2. The process of making paper consisting of adding an alkaline substance and a metal-

lic salt to the paper making stock subsequently to the addition of size and size precipitating chemicals.

3. The process of making paper consisting of adding an alkaline substance and a metallic salt to the paper making stock subsequently to the addition of size and size precipitating chemicals at or before delivery to the paper making machine.

4. The process of making paper consisting of adding substances to cause the production of a metallic hydroxide subsequently to the addition of size and size precipitating chemicals.

5. The process of making paper consisting of adding soda ash and sulphate of aluminum to the paper making stock at or before delivery to the paper making machine.

6. The process of making paper consisting of adding soda ash and sulphate of aluminum to paper making stock subsequently to the addition of size and size precipitating chemicals at or before delivery to the paper making machine.

7. The process of making paper consisting of adding substances causing the production of a coagulating precipitate in the presence of the paper making stock at or before the delivery to the paper making machine.

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