Patented Apr. 7, 1931 1,799,216

UNITED STATES PATENT OFFICE

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METHOD OF SIZING PAPER MAKING FIBERS

No Drawing. Application filed November 15, 1928. Serial No. 319,743.

Paper sizing is generally carried out by mixing the sizing ingredients with the paper stock in the beating engine or mixer in which the pulp is disintegrated, or where different pulps are mixed together. In the beater the mixing action is relatively slow, and material such as size or alum, when added to such a machine, will have ample opportunity to react with any impurities present in the wet stock, and so coagulate or destroy the sizing element; for there are times when these reactions are so destructive that it is impossible to obtain satisfactory sizing even with excessive amounts of sizing material.

In my Patent No. 1,589,947, I have disclosed a method in which the alum is added to the paper stock before the size is added, and in this case the alkaline impurities in the stock are neutralized and the remaining alum reacts with the size, the size being added between the Jordan and the paper machine. This sizing method is applicable to certain conditions of use.

In my Patent No. 1,558,845, I have disclosed a method whereby the size may be added to the paper stock in the beating engine, and only coagulated by the alum after the stock has passed through the Jordan. This process meets another combination of stock conditions.

In my Patent No. 1,585,469, I have disclosed a method whereby the alum reacts with the stock impurities and the remaining alum reacts with the size within the Jordan engine. This process operates successfully under another set of conditions.

In these methods and the methods in common use in the industry, either one of the sizing ingredients first comes into contact with the paper stock before it is reacted upon the other sizing ingredient, and it is only when there are no impurities whatever in the paper stock or in the mill waters, that true reactions occur between the resin size and the alum.

I have discovered that there are certain concentrations of stock or water impurities that make it very difficult to obtain sizing results if either sizing ingredient is allowed to react first with such impurities, and that I can overcome this difficulty if I either allow the size and alum to react with each other before they touch the stock or to react upon each other simultaneously as they are mixed with the stock. These reactions are best carried out continuously in the following manner:

The size and alum are first prepared in the dilute condition and streams of size and alum are allowed to mingle just before they enter a stream of pulp stock.

This reaction between the size and alum may also take place within the pulp stock if the stock is thoroughly stirred or agitated as they are being added. This can be accomplished by adding a stream of size and alum along with the paper stock as it is entering the Jordan engine. In this case the mixing action is so rapid that the size and alum will react with each other before either have time to react with stock impurities. The same result can be obtained if any other type of rapid mixer were substituted for the Jordan engine, to mix these ingredients together. This invention is distinct from what would occur if size were precipitated with alum and this precipitate added to the beating engine. Such practice will not produce good sizing results because by such a practice the precipitate will granulate and become spoiled before the paper was made.

In order to carry out my process successfully, the size and alum must be added continuously with but little time elapsing between the reaction of the sizing ingredients and mixing them with the stock, or else bring about the reaction simultaneously with the mixing with the stock. The value of this invention is particularly apparent when the stock impurities are above normal. It is possible to operate this process using a stream of dry powdered alum, although I prefer to use a solution of alum in water.

Having now described the invention, what is claimed as new, and for which Letters Patent of the United States is desired, is:

1. A method of sizing paper which consists in mixing a stream of sizing solution with a stream of alum, and then mixing them with a stream of pulp stock.

2. A method of sizing paper pulp which consists in forming a fresh dilute precipitate

of rosin and alumna, and adding this continuously to a stream of pulp stock.

3. A method of sizing paper which consists in adding a stream of size solution and a stream of alum to a stream of paper stock and mixing them together.

4. A method of continuous sizing which consists in adding the size and alum to the paper stock in such a manner that the size and alum react on each other as the mixing is taking place.

5. A method of sizing which consists in adding a stream of size and alum to the paper stock as the stock is passing through the Jordan engine.

6. A method of sizing paper which consists in treating the fibers simultaneously with solution of size and alum.

7. A method of sizing paper which consists in treating the fibers simultaneously and continuously with solution of size and alum.

8. A method of sizing paper which consists in adding continuously to the fibers a fresh precipitate of size and alum, which is formed just prior to the mixing action with the pulp.

9. A method of sizing paper stock containing impurities which consists in mixing the size and alum and stock together in such manner that the size and alum react upon each other in the presence of said impurities before either the size or the alum can react with the impurities.

Signed at New York, in the county of New York and State of New York, this 12th day of November, A. D. 1928.

JUDSON A. DE CEW.