

# UNITED STATES PATENT OFFICE.

HECTOR J. LAHOUSSE, OF PRAGUE, BOHEMIA, ASSIGNOR TO HIMSELF AND  
HOWARD LOCKWOOD, OF NEW YORK, N. Y.

## IMPROVEMENT IN PROCESSES FOR PULPING PAPER-STOCK.

Specification forming part of Letters Patent No. **153,775**, dated August 4, 1874; application filed  
April 4, 1874.

*To all whom it may concern:*

Be it known that I, HECTOR J. LAHOUSSE, of Prague, in Bohemia, have invented a new and Improved Process for Pulping Paper Stock, of which the following is a specification:

The object of my invention is to reduce the knots and joints of straw and similar fibrous materials, after being properly boiled to a uniform pulp, more effectually and uniformly than it is now done in the common pulping-engine, enabling the bleaching-liquor to penetrate and come in contact with all the fiber of the stock; also, to regulate and control more effectually the temperature of the stock which is being reduced, and the bleaching-liquor to a proper temperature for bleaching.

My invention consists in subjecting the pulp and the bleaching-liquor to the action of a grinding-mill, in lieu of the ordinary beating-engine, for reducing the knots and joints and for raising the temperature to the required point, whereby certain advantages are obtained, as hereinafter described.

The straw being properly boiled and all the alkali washed out, also treated in the wet machine, or not, according to circumstances, also treated in the paper engine or mixer, and thoroughly saturated with a bleaching-liquor of proper strength, and also agitated in a stuff-chest, I propose to take it from the latter by a pump or other means, and conduct it to a grinding-mill of ordinary or any approved construction, such as used for grinding grain, and pass it through to crush the knots and joints, and raise the temperature by the friction of the stones.

The mill performs a double office: First, by reducing the straw or similar fibrous materials, especially the knots and joints, to a fine and uniform pulp, enabling the bleaching-liquor to penetrate and come in contact with all the fibers of the stock, and also to act uniformly upon it, which has never successfully been done in any beating-engine at present in use; secondly, the friction created by the faces of the stones running together, in order to reduce the stock to a fine and uniform fiber, at the same time raises the temperature of the

stock and bleaching-liquor to between 85° and 110° Fahrenheit.

Thus it will be seen that while the stock is being reduced to a fine fiber, and becomes thoroughly incorporated with the liquor, the temperature is raised at the same time to the proper point for bleaching. The chlorine gas contained in the bleaching-liquor is set free and acts most effectually upon the stock at about 96° Fahrenheit.

From the mill the stock can be conducted to an air-blast, so that it may be cooled, and to complete the bleaching operation by being brought in contact with cool air. Instead of this, it may be run into a tub the shape of a paper or beating engine, and agitated by a paddle-wheel for several hours, bringing all the stock in contact with air and light, which would produce the same effect.

There are other points in the manufacture of pulp from straw and similar fibrous materials in which this method of pulping and bleaching has decided advantages over the present processes.

The stock need not be as much subdued preparatory to the treatment in the grinding mill, thereby saving chemicals and producing a larger per cent., and a very much stronger fiber.

In the present way of bleaching, the stock has to be over subdued or treated in order to get the knots and joints soft, which very severe treatment, in great part, destroys the texture and strength of the fibers and reduces the percentage of yield.

If the knots and joints are not soft, there is no means of reducing them to a uniform fiber with any of the present systems. An ordinary paper-engine would chop the knots and joints into small lumps, in which condition they would not take the bleach, and consequently will show as yellow spots in the paper.

It has been determined that chlorine gas will impart its bleaching qualities to the stock most effectually between 85° and 110° Fahrenheit. A higher temperature is a decided detriment, and the stock thus treated is very liable to "go back in color." Heretofore the desired temperature has been obtained by in-



roducing a small jet of steam into the stock while undergoing the bleaching process. Steam from one pound to sixty pounds' pressure would be from 212° to 300° Fahrenheit. A jet of steam introduced into the stock at such a temperature, say for two hours—the necessary time to bring the whole mass up to the proper point—would come in contact with a large per cent. of the stock, and produce bad results.

At no time is any part of the stock, while passing through my pulping and bleaching mill, exposed to a higher temperature than the maximum for good and proper bleaching.

The pulping and bleaching portion of my process is carried on about as follows: After the straw is boiled under pressure, in a caustic alkali in a close vessel, it is washed in the usual manner to get rid of the spent liquor and coloring matter. It is then mixed with a solution of bleaching-liquor (chlorate of lime in solution) in a paper-engine or other suitable apparatus. From this it is run through the stones for the purpose of reducing the stock to a uniform fiber, which enables it to better absorb the bleaching-liquor; also, while passing through the stones, is at the same time produced the additional and important effect of raising the temperature to the proper point for good bleaching, say from 85° to 110° Fahrenheit, which produces the best results.

The temperature is regulated and maintained at the desired point in the following manner: In order to reduce the stock to a uniform fiber, the stones are set in close proximity to each other, and one of them is run at the rate of two hundred (200) revolutions per minute. Through this mill is run a

stream of pulp about equal to fifty pounds per hour of dry paper-stock, the friction raising the temperature. If the stock gets too hot, increase the flow of pulp to the mill; if too cool, decrease it. If it is necessary to increase the quantity of pulp which is passing through the mill, and at the same time keep up the proper temperature, increase the number of revolutions per minute to two hundred and fifty (250) or even more.

For the following reasons I consider that this process possesses marked advantages over all other systems known to me: First, chemicals are saved and the product of pulp from each ton of straw increased, since it is not necessary to subdue the straw until all the joints are soft, as the stones brush them out to a fiber; second, the friction of the stones produces the combined effect of raising the temperature to the proper point for setting free the chlorine gas, and at the same time reducing the stock to a fine fiber, in which condition it is most easily acted upon by the gas.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

The method of treating paper-stock subsequent to the boiling process, by first cooling and mixing it with the bleaching-liquors, and, secondly, grinding the pulp together with the bleaching-liquors, to reduce the knots and joints, and to utilize the friction of the mill to heat the pulp to the proper bleaching temperature, substantially as specified.

The above specification of my invention signed by me this sixth day of March, 1874.

HECTOR JOSEPH LAHOUSSE.

Witnesses:

S. E. DE VECCHY,

Prof. OSCAR COCORDA.