# UNITED STATES PATENT OFFICE.

HARRISON B. MEECH, OF FORT EDWARD, NEW YORK.

## IMPROVEMENT IN TREATING STRAW FOR PAPER-PULP.

Specification forming part of Letters Patent No. **50,835**, dated November 7, 1865.

*To all whom it may concern:*

Be it known that I, HARRISON B. MEECH, of Fort Edward, in the county of Washington and State of New York, have invented a new and improved process for treating straw for the purpose of preparing the same to be converted into pulp for the manufacture of white paper for writing, printing, and other purposes for which white paper is used; and I hereby declare that the following is an exact description of said process.

The character and quality of the pulp made from straw depends entirely upon the mode of treatment by which it is produced. If the alkaline liquor used in the reduction of the straw be of too high a degree of strength, there will be not only a waste of the alkali, but the fiber will be in a measure reduced to a pasty condition and will waste largely during the after process of washing the stock; besides, the quality of the stock will be injured by being made short, and thereby injuring the strength of the paper to be manufactured therefrom.

Another difficulty has attended the treatment of straw preparatory to the manufacture of pulp therefrom, and that is there has been too much agitation during the period of boiling or cooking the straw.

The usual course of treatment by those using rotary boilers has been to commence the rotation of them as soon as the heat began to be applied, and to continue their rotation until the boiling or cooking was finished and the mass treated was ready to be discharged. The effect of this continued agitation was to separate the portions of straw first acted upon from the stock or stem of the straw and expose such finer portion thus separated to the further action of the alkali, thereby reducing it to a semi-fluid or pasty condition. My experience has been that the less agitation there is of the straw during the period of its treatment in alkali without permitting it to burn the better. There is another evil consequence attending the too early rotation of the boiler while introducing the liquor and raising the temperature. If the boiler is rotated while the contents are unequally saturated with the alkaline liquor, the consequence will be that the contents of the boiler will be agglomerated together in uneven and unequal mass, making it impossible afterward to treat the mass evenly. For that reason I have found that the better way was to allow the rotary to remain at rest while charging the same with the straw and the necessary amount of liquor. By this means the mass in the boiler was undisturbed until the liquor was fully in, and when the rotation afterward commenced the action within the rotary would be more even and uniform. I have thus found it to be the best practice not to commence rotating the boiler until I had fully charged it with the straw and liquor, and had let the steam into and put the fire under the same.

My only object in rotating the boiler during the treatment of the straw is to prevent burning the material within the rotary. For that reason as soon as a temperature indicated by an internal pressure of one hundred pounds to the square inch within the boiler is attained I stop the fire and cease rotating the boiler. The principle is this: There should be as little agitation of the straw as possible after the boiling has progressed far enough to begin to separate the fine particles of straw from the stock. This point is reached as soon as the one hundred pounds pressure is obtained. Then the boiler should rest, the fire be stopped, and it should be permitted to stand and cook for about three hours longer, when it will be found that the stock is well prepared for washing. I also find it advisable to use a much weaker liquor for boiling than has been heretofore used. A liquor marking from 3° to 5° of strength Baumé has formerly been used. The result was that the fiber was much shortened and injured thereby. Much of the stock was thereby converted to a paste and washed away in the after treatment. I have found it better to use a much weaker solution of caustic alkali, marking in strength from 1° to 2° Baumé, and never exceeding 2° strength. I have also found that it is much better to increase the quantity of liquor, even when by so doing the strength of the boiling liquor is reduced. Thus I use about eighteen hundred gallons of the weaker liquor where others use about fourteen hundred gallons—that is, were I to take their liquor at fourteen hundred gallons to twenty-two hundred pounds of straw, I should find it a better practice to add from four hundred to six hundred gallons of clear soft water, thereby reducing the strength of their boiling-liquor in that proportion. The reason for this is, first, by increasing the quantity of the boiling-

liquor the straw being treated is more completely immersed continually in the boiling-liquor; second, the strength of the liquor thus diluted does not injure the fibers of the stock being treated, and the result is I get a more uniform, longer, and better fiber.

My method of preparing my boiling-liquor is as follows: It is composed of water, soda-ash, and lime, and also grease or other like alkaline and oleaginous substance. In preparing such liquor I use three iron pans, holding one thousand gallons each, with agitators to mix the soda-ash and lime with the water. I also use a reservoir holding about two thousand gallons. I then take five hundred and fifty pounds of soda-ash, dissolve it in a pan of water holding one thousand gallons, to which I add about three hundred and eighty-five pounds of unslaked lime, or sufficient lime to combine with and properly caustify the soda-ash, which will be according to the strength of the lime. By means of siphon I draw about one-third of this liquor into the reservoir. I then add water to that in the pan, agitate it, let it settle, and draw off, as before, into the reservoir. I proceed in this way four times, or until I have in my reservoir about eighteen hundred gallons of liquor testing at from 1° to 2° Baumé. What remains in the pan I use in the preparation of the liquor for the next boiling. Of the liquor thus prepared I use about seventy gallons to the one hundred pounds of straw prepared and packed in the boiler, as follows: In addition to this liquor, I take about sixteen pounds of grease or other oily substance, and twelve pounds of soda-ash or potash, and boil them in sixty gallons of water by steam until a soapy solution is produced.

I prepare my straw thus: I cut it into lengths of about two inches, pass it through a fanning-mill to separate any grain there may be in it. I remove all weeds and sticks, then pass it through heavy iron rollers for the purpose of crushing the knots and straw and increasing the surface exposed to the action of the alkali. I then charge my rotary with it, packing it in as closely as two men can do by stamping it in, for I find the more compact I can make the straw within the boiler the more perfect is the action of the alkaline solution upon it. My boiler is six feet in diameter and twenty-two feet in length, and I thus put into it about twenty-eight hundred pounds of straw to a boiling. Having thus charged my boiler with straw, I then pour upon the straw within the boiler the soapy solution prepared as about hot, together with a weak alkaline solution, prepared as above described, taking care that the boiler shall remain stationary while filling in the entire quantity of liquor, for reasons already stated. After my boiler is thus full, charged with straw and the proper amount of boiling-liquor and soapy solution, I commence rotating it and letting in steam from the adjoining boiler in the method well known to the art, and, also, I put a fire under the rotating boiler and raise the temperature thereby to such a degree as is indicated by an internal pressure of one hundred pounds to the square inch within the boiler. As soon as this degree of temperature is indicated I stop the rotation of the boiler and remove the fire from beneath the same and permit it thus to remain for from two to three hours, when the straw is properly cooked and prepared for washing and treating in the manner well known to the art and trade of paper-making.

By this particular method of treatment I obtain a superior quality of stock for the manufacture of paper-pulp. The fiber is freed from foreign substances, is long, strong, and little or none of it is reduced to a paste or a state by which it is wasted in the after-washing process.

Having thus fully described my improvement, what I claim as my invention, and for which I desire to secure Letters Patent, is—

1. My above-described method of treating straw or other material preparatory for making paper-pulp by so charging it into the boiler, letting into and onto it the liquor and solutions, applying the steam and fire heat, rotating the boiler, and letting the same remain at rest, in the manner substantially and for the purpose above described.

2. The use of a weak alkaline liquor, not to exceed 2° of strength, (Baumé,) in the treatment of straw under pressure, in the manner substantially and for the purpose above described.

3. The combination of the use of such weak alkaline liquor with my method of treating straw, as set out in my first claim herein, in the manner substantially and for the purpose above described.

HARRISON B. MEECH.

Witnesses:

ASAHEL WING,

A. C. HOSSMAN.