United States Patent Office.

ALBERT M. HASTINGS, OF ROCHESTER, AND STOUGHTON PETTEBONE, OF NIAGARA FALLS, NEW YORK.

Letters Patent No. 69,663, *dated October* 8, 1867.

IMPROVEMENT IN TREATING STRAW, WOOD, AND OTHER MATERIALS FOR THE MANUFACTURE OF PAPER.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that we, ALBERT M. HASTINGS, of the city of Rochester, county of Monroe, and State of New York, and STOUGHTON PETTEBONE, of Niagara Falls, county of Niagara, and State aforesaid, have invented a new and improved Mode of Treating Straw, Wood, or any other Fibrous Material used in or for the Manufacture of Paper-Pulp, by subjecting the same to the action of caustic alkali liquor of any desirable strength, in a closed cylinder or vessel at low temperatures, not in any case exceeding 300° Fahrenheit, accompanied with internal agitation of the contents of the vessel or cylinder, produced by wings, brackets, or any other means or appliances by which the necessary agitation can be produced. A rotating cylinder furnished with the aforesaid wings or brackets is preferred in the practical treating and working of large quantities of stock; and we do hereby declare that the following is a full and exact description of our invention.

The method heretofore ordinarily employed for treating straw or wood and other similar substances, has been to boil such material in a strong solution of caustic alkali liquor in an iron vessel under a steam pressure of from seventy pounds to one hundred and fifty pounds to the square inch, and, in the case of woody fibres, under a much greater pressure. The result of such treatment is that the fibre becomes burnt and weakened, and the material is reduced almost to a paste or fine pulp, so that it becomes, for that reason, very difficult to bleach, and when subsequently manufactured into paper the fibre is found to be short and brittle, and therefore unfitted, without the addition of rag or rope fibre, to make a merchantable paper.

We have found by careful experiment that while heat is necessary to quicken the chemical action of the alkali liquor, the direct action of high steam pressure upon the material when confined in a close vessel is very injurious to the fibre, and that the material so treated will yield but a comparatively small percentage of paper. We have also ascertained by experiment that low temperatures, ranging from twenty-five pounds to fifty pounds steam pressure, accompanied by thorough agitation of the material while exposed to the action of the alkali liquor, will destroy the silex and gummy parts of the material, and will discharge the coloring matter without any injury to the fibre. The time required for this mode of manipulation is longer than that required under the mode ordinarily in use as above described, but the increased percentage of yield, and the greater strength and softness of the fibre will more than compensate for the difference in time. The use of steam or heat is necessary to secure the proper and sufficiently expeditious chemical action of the alkali liquor upon the material treated, but the practical difficulty to be overcome has been to use only enough steam or heat to accomplish the object, and not enough to injure the fibre of the material under treatment.

To enable others skilled in the art to which our invention pertains to make and use the same, we will describe it more particularly.

The straw or wood is first cut up into short lengths, for convenience in filling the apparatus used. The material is then placed in an iron cylinder or rotary capable of resisting a moderate pressure, and so constructed that the contents, while under treatment, shall be continually and powerfully agitated. This agitation may be produced by wings or brackets fastened to the interior sides of the cylinder, or by arms attached to a shaft passing through the cylinder and forming the axis upon which it revolves. The cylinder should be furnished with one or more man-holes for charging and discharging the material, secured in the ordinary way by man-hole plates. The solution of caustic alkali liquor of the desirable strength is now introduced into the cylinder while hot by means of a force-pump or otherwise. In order to maintain the heat by which the chemical action is facilitated, we now use steam either in a jacket or separate compartment outside of the rotary, or allow it to pass directly into the cylinder until a moderate pressure is obtained. The agitation of the contents of the cylinder should be commenced upon the first introduction of the alkali liquor, and maintained throughout the entire process. If the steam is allowed to pass into the cylinder great care should be taken not to greatly exceed the boiling point.

By practical working we find that in order to preserve the softer and finer portions of the fibre, and to avoid injury to its strength, it is not safe to use any greater pressure of steam than is ordinarily used to dry paper upon the drying-cylinders of a paper machine.

We do not intend to confine ourselves to any particular apparatus; but what we claim, and desire to protect by the issue of Letters Patent, is—

The treating of straw, wood, or other fibrous material, for the manufacture of paper-pulp, by boiling the same in a solution of caustic alkali liquor of suitable strength, in a closed cylinder or vessel, at low temperatures, not in any case to exceed 300° Fahrenheit, accompanied with internal agitation of the contents of the vessel or cylinder, produced by wings, brackets, or any other means or mechanical appliances, and preferably by the use of a rotating cylinder furnished with wings or brackets, as above described.

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Witnesses:

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