

L. Dean,
Pulp Digester.
No. 100,135. Patented Aug. 9. 1870.

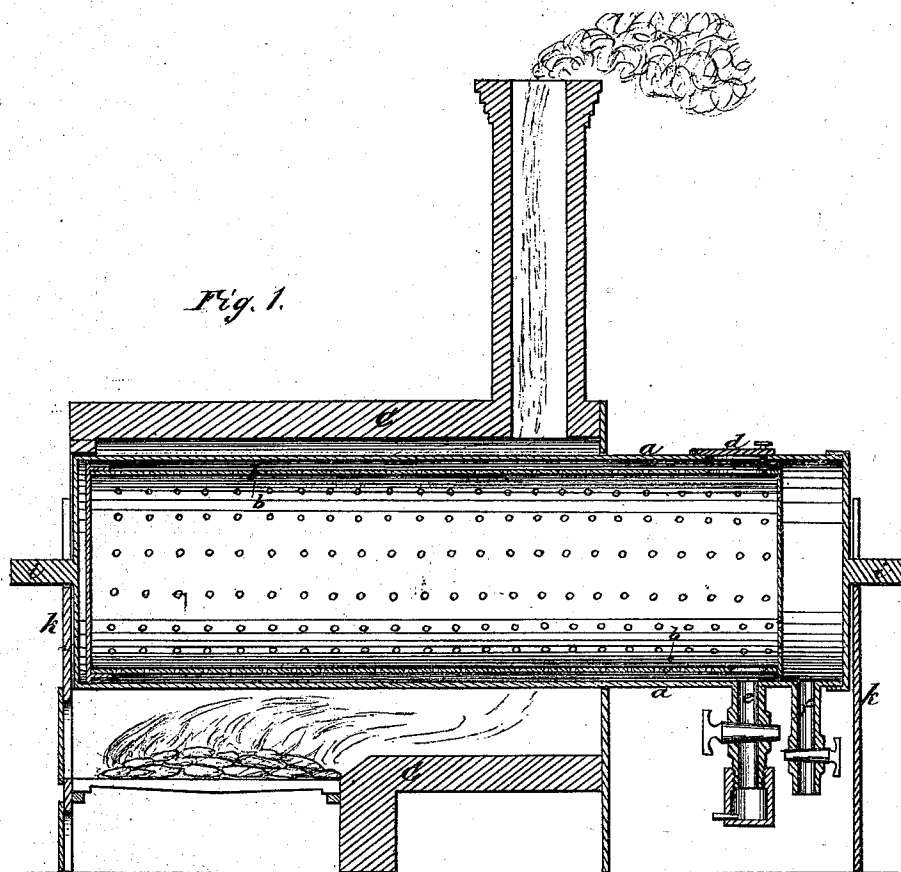
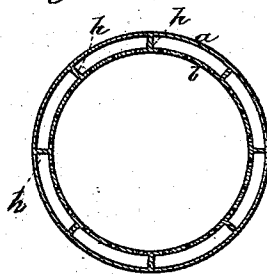


Fig. 2.



Witnesses.
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LORENZO DEAN, OF FORT EDWARD, NEW YORK.

Letters Patent No. 106,135, dated August 9, 1870.

IMPROVEMENT IN BOILER FOR REDUCING FIBROUS MATERIALS TO TEXTILE STOCK.

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

To all whom it may concern :

Be it known that I, LORENZO DEAN, of Fort Edward, in the county of Washington and State of New York, have invented a new and improved Boiler for Reducing Fibrous Material to a Textile Stock; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing making a part of this specification, in which—

Figure 1 is a sectional elevation, and

Figure 2 is a transverse vertical section.

The invention relates to the reduction of Esparto grass or straw or other fibrous material to a textile stock, whence paper or felt may be manufactured by boiling or "cooking" the grass within a revolving boiler, containing any suitable chemical solution.

Heretofore this process has been carried on in a single-shell boiler, the outside of which is exposed directly to the flames of the furnace, and it has been found that, to prevent the material in such a boiler from scorching, and so being rendered useless, it is necessary to keep the boiler about half filled with the liquid solution, and that even then such of the material as sticks upon the overlapping edges of the boiler-plates or rivets, or is backed up on the heated surface of the boiler, is sure to become singed if the boiler should become overheated. Were it not for the liability to scorch, very much less of the liquid would be used, the amount manufacturers are, for this reason, compelled to employ being considerably in excess of what is necessary to moisten the material and produce steam, which is the principal disintegrating agent in the process, and taking up so much of the space in the boiler as to leave insufficient room for steam to act in.

To reduce the quantity of liquid to the point which simple economy demands, without, at the same time, exposing the material to the danger of scorching, was the problem the solution of which is the object of this invention.

The invention, therefore, consists in the combination, with the ordinary single-shell boiler, of an interior perforated boiler of thinner material than the outer one, for holding the substance to be reduced, said inner boiler being provided with longitudinal external ribs of a uniform width, sufficient to bring the outer edges of the ribs into contact with the inner surface of the outer boiler, and thus maintain an annular chamber between the inner and outer shells, which, being filled with the liquid solution, as the boiler revolves, preserves the inner shell, and the material therein contained, from overheating. By this means I am enabled to reduce the quantity of liquid to within the normal limits and gain the requisite steam-space.

In the drawing—

a is the outer shell, and *b* the perforated inner shell of the boiler.

c is the furnace in which the boiler is partially inclosed, and out of which the boiler extends to a sufficient distance to afford space, outside the furnace, for the man-hole *d*, the stock-tester *e*, and the cock *f*, by which the liquid contents of the boiler are drawn off.

h are the longitudinal external ribs of the inner shell.

i i are the trunnions on which the boiler revolves, and *k k*, the standards which uphold the trunnions.

In using this boiler, to one ton of Esparto grass, straw, or other fibrous material, after the same has been soaked in tepid water, and disintegrated in a machine upon which I have made application for Letters Patent, I add in the boiler the compound produced by slacking from three to five barrels of lime, according to the quality of the lime and toughness of the fiber, in from six to ten hundred gallons of water. After the lime-water has become well incorporated with the fibrous material, which incorporation may be assisted by boiling, there is then added from three to five hundred gallons of water, in which there has been dissolved from one hundred and seventy-five to two hundred pounds of alum, or its equivalent in crude alum, according to the toughness of the fiber. The boiler is then set in rotation, and its contents "cooked" from three to six hours, according to the quality of stock it is desired to make, which is ascertained by drawing a sample from the boiler by the stock-tester.

When the stock has been reduced to the proper quality, the liquid is drawn off from the boiler, through the cock *f*, leaving the stock in the inner shell. It may be convenient to throw in a hogshead or so of water prior to drawing off the liquid, for the purpose of effecting a complete separation between the liquid and the stock.

After drawing off the liquid, a sufficient quantity of water is thrown into the boiler, at different times, to wash the stock, such washing being effected by the continued rotation of the boiler. There is then pumped into the boiler from three to four hundred gallons of a solution composed of from fifty to two hundred pounds of caustic or uncaustic soda-ash, or its equivalent, from fifteen to thirty pounds of borax, and from six hundred to one thousand gallons of water. The boiler is then set in motion and heat applied to it, and the material, in this way, reduced from two to six hours, the stock-tester indicating when the disintegration of the fibers has proceeded far enough.

If, at any time, in the judgment of the operator, there is not enough of the alkaline solution to reduce the material to a textile-fibred stock, he may add more, and continue the rotation of the boiler and the reducing process.

The solution above spoken of may consist of wa-

ter and soda alone, instead of water, soda, and borax, when it is desired to produce a textile-fibred material or stock different from the one produced by foregoing process.

If it is desired to bleach this material or stock, it may be done in the boiler in the same manner as in an engine-tub or vat, by keeping the boiler in rotation, or the material or stock may be removed from the boiler and bleached, and further reduced by the ordinary method.

For certain kinds of slack for felting and paper purposes I propose not to use any alkaline solution, but a larger quantity of lime and alum, and the washing out of these may complete the process.

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

1. The boiler herein described, consisting essentially of the outer shell *a* and the inner perforated shell *b*, having a smooth interior, in combination with the furnace *c*, substantially in the manner and for the purpose set forth.

2. The process of reducing fibrous material to a textile-fibred stock, substantially as herein described.

LORENZO DEAN.

Witnesses:

JAMES MCINTYRE,
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