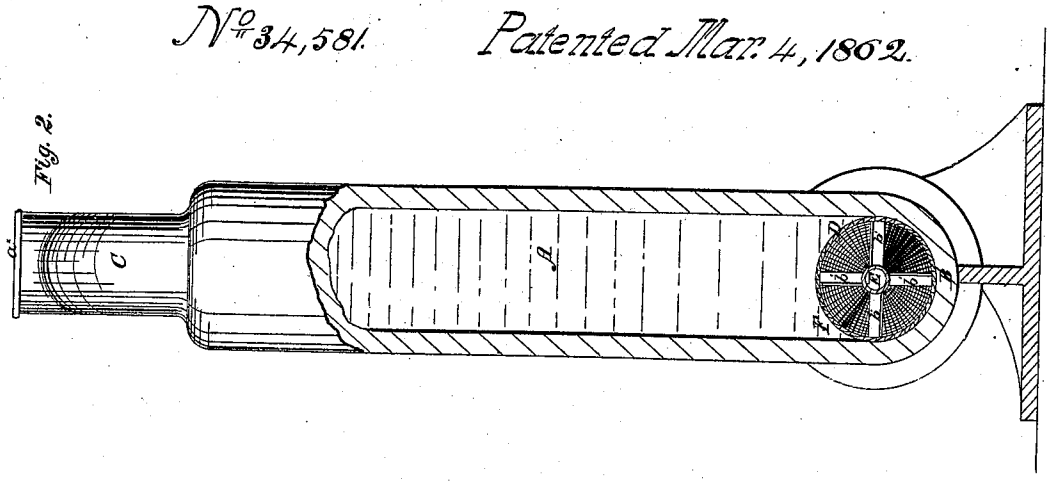
A. S. Lyman.
Wood Grinder.

No. 34,581. Patented Mar. 4, 1862.

Fig. 2.



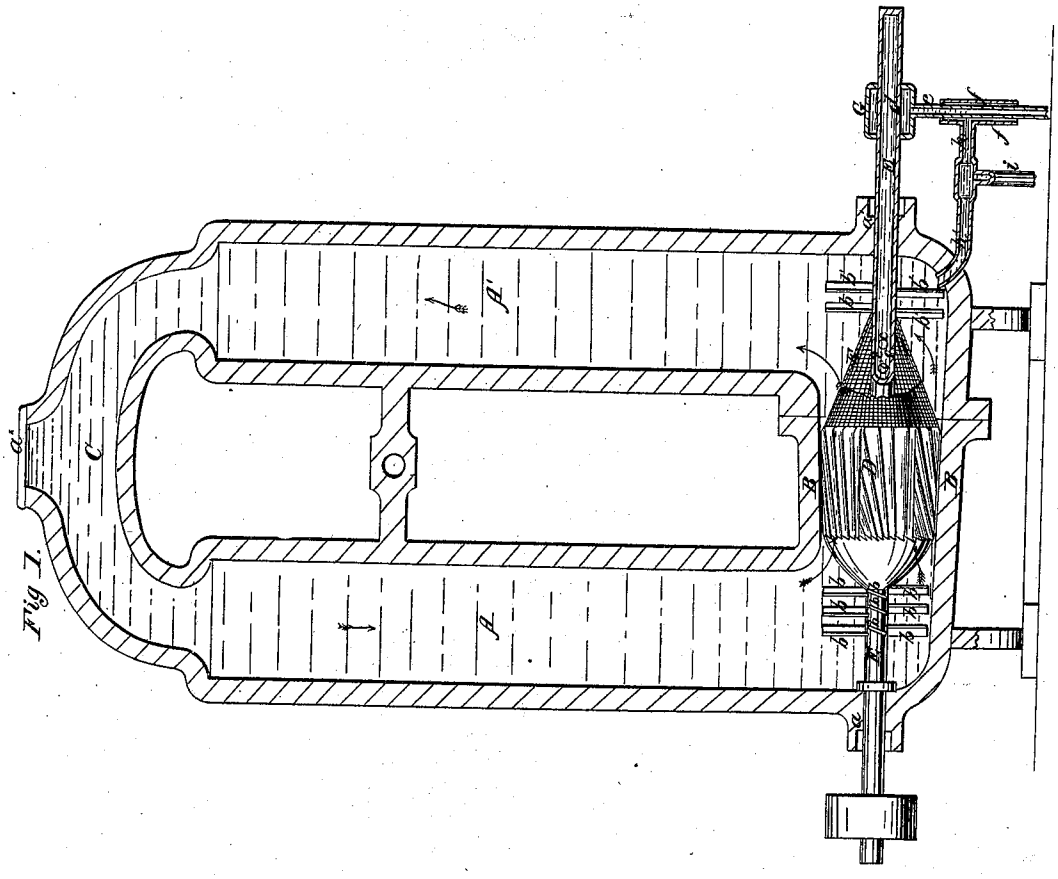


Fig. 1.

Witnesses,
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UNITED STATES PATENT OFFICE.

AZEL STORRS LYMAN, OF NEW YORK, N. Y.

IMPROVED PROCESS OF SEPARATING THE FIBERS OF WOOD AND OTHER SUBSTANCES FOR THE MANUFACTURE OF PAPER-PULP.

Specification forming part of Letters Patent No. **34,581**, dated March 4, 1862.

To all whom it may concern:

Be it known that I, AZEL STORRS LYMAN, of the city, county, and State of New York, have invented a new and Improved Process of Separating the Fibers of Wood, Flax, Hemp, and other Substances, and Extracting the Coloring-Matters Therefrom; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figures 1 and 2 are vertical sections at right angles to each other of an apparatus in which my invention is performed.

Similar letters of reference indicate corresponding parts in both figures.

This invention is based upon the known fact that when wood, hemp, flax, and other vegetable substances are heated in water at a temperature at which it boils under a pressure of several atmospheres the gummy and coloring matters by which the fibers are held together are dissolved, or at least so much softened that they hold the fibers but loosely together.

The invention consists in effecting the separation of the fibers of such substances by whipping, beating, rubbing, grinding, or picking them while they are exposed to the action of water at such temperature and under such pressure as above mentioned.

It also consists in the washing out of the coloring-matters and gums and other soluble parts from such substances by changing the water while the said substances are being whipped, beaten, rubbed, ground, or picked, and while they are at the same time subjected to the action of water or steam at such temperature and under such pressure as hereinbefore mentioned. The separated and bleached fiber thus obtained is applicable as paper-stock or in the manufacture of textile fabrics, according to its nature.

The apparatus in and by which my invention is performed may be of various constructions; but that which I have represented in the drawings is what I consider best adapted to the purpose.

A A′ are two upright trunks, of cylindrical or other form and of similar size, connected at their bottoms by a horizontal trunk B, which constitutes the casing of a mill, and at their upper ends by an arched pipe C, at the top of which is a bonnet *a**, which is removed for the purpose of introducing to the trunks A A′ the substance to be separated. The horizontal trunk B is of slightly conical form, and receives within it the toothed cone D, by which the substance to be heated is subjected to a grinding or rubbing action. This cone is secured firmly upon a central horizontal shaft E, which passes through stuffing-box bearings *a a′* in the lower parts of the cylinders A A′, and the said shaft has secured to it on opposite sides of the cone D two series of obliquely-arranged blunt-edged blades *b b* and *b′ b′*, which operate as beaters for beating the substance under treatment, and also with a screw-like action to cause the substance to be fed from the trunk A to the mill B D, and from the said mill to the trunk A′. The portion of the shaft E which passes through the trunk A may be solid; but the portion which passes through the trunk A′ is hollow and is perforated at *c c* to communicate with the interior of a conical screen F, which is united with the shaft and grinding-cone D. The latter portion of the shaft is also perforated at *d* outside of the trunk A to communicate with the interior of a stationary box G, which surrounds the said shaft, and which should be packed around the shaft with a stuffing-box at each end. This box is for the escape of water from the apparatus, and has attached to it an escape-pipe *e*. This pipe *e* is surrounded by a jacket-pipe *f*, through which fresh water is supplied to the apparatus, the said jacket having a pipe *h* leading from it to the bottom of the trunk. This pipe *h* has connected with it a steam-pipe *i* for the introduction to the apparatus of steam from a boiler suitably arranged.

The operation of the apparatus is conducted in the following manner: The bonnet *a* is removed and the trunks A A′ filled or partly filled with the substance to be treated, which, if it be wood, should be cut or split into sticks and free from knots. The apparatus is then filled up with water through the pipes *f h*, the bonnet *a** put on, and the water heated up to a temperature of from 300° to 400° Fahrenheit by the introduction through the pipes *i* and *h* of steam at suitable pressure. After

the water has stood at this temperature for a few moments the gums will have been softened sufficiently, and rotary motion is communicated to the shaft E to set the grinding-cone D and beaters *b b b b'* in operation. The beaters feed the substance under treatment to the grinding-cones D and carry them away therefrom, and while the beating and grinding proceed the said beaters produce a circulation of the whole of the water and solid matters through the apparatus in the direction of the arrows shown in Fig. 1, causing all parts of the substances to be repeatedly subjected to the beating and grinding-operations. As these operations proceed, the proper temperature in the apparatus is kept up by the continued introduction of steam at the pipes *i h*, and while pure water is allowed to flow in continuously through the pipes *f h* the water charged with gums and coloring-matters is allowed to escape through the screen F, hollow shaft E, box G, and pipe *e*, the screen being prevented from being choked up by the fiber by the centrifugal force given to the latter by the rapid rotary motion of the screen and beaters. This operation is continued until the water escaping at *e* becomes nearly clear, when most of the gummy and coloring matters will have been washed from the fibers. The heat carried off by the escaping water will be to a great extent saved by the introduction of the incoming pure water through the jacket-pipe *f*.

An apparatus operating in all essential respects the same as that described may be heated to raise the temperature of the water to the desired degree by the direct application of fire to its exterior.

I do not claim, broadly, the boiling of vegetable fiber under pressure; but

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

1. Effecting the separation of the fibers of wood, hemp, flax, or other vegetable matters by subjecting them in a closed vessel or vessels to the combined simultaneous action of a whipping, beating, rubbing, grinding, or picking apparatus and of water at a high temperature and pressure.

2. The washing out of the gummy and coloring matters or other soluble parts from the fibers by changing the water while the substances are being subjected to the combined or simultaneous action above specified.

AZEL STORRS LYMAN.

Witnesses:
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