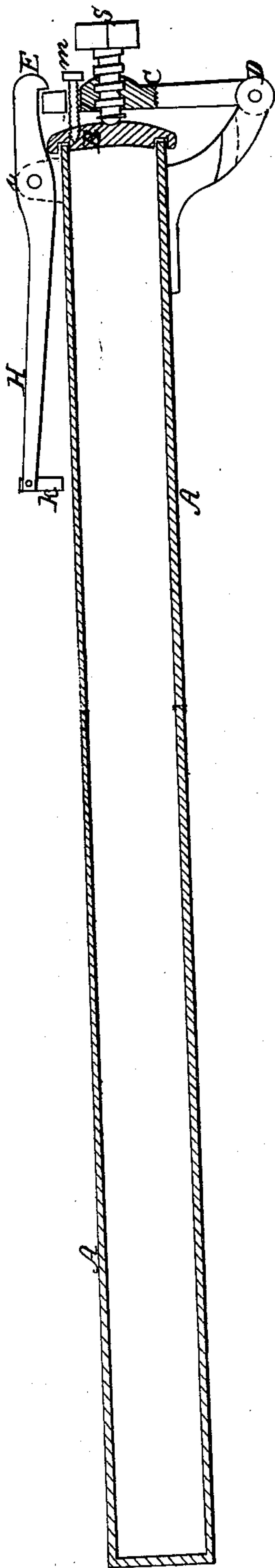


A. S. Lyman.
Paper Making.

Nº 21,077.

Patented Aug. 3. 1858.



UNITED STATES PATENT OFFICE.

A. S. LYMAN, OF NEW YORK, N. Y.

SEPARATING THE FIBER OF WOOD.

Specification of Letters Patent No. 21,077, dated August 3, 1858.

To all whom it may concern:

Be it known that I, A. S. LYMAN, of the city, county, and State of New York, have invented a new and improved mode of effecting the separation of the fibers of wood for the manufacture of paper and of flax and other fibrous substances for the manufacture of cloth and for other purposes; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon.

It is well known that the fibers of most kinds of wood are arranged in the form of very minute tubes in which the sap circulates.

My improved method of separating these fibers consists in placing the wood or other fibrous material in a strong cylinder or box in which it is subjected to the action of hot water, steam, compressed air or other fluid under pressure; for the purpose of charging its tubes and then causing it to be suddenly projected from the said cylinder or receptacle into the atmosphere or into a partial vacuum where each of the tubes is by the expansive force acting within it, burst open and the whole of the mass converted into fiber.

The accompanying drawing which forms part of this specification exhibits a longitudinal central section of a cylinder, or as from its operation it may be termed a gun for effecting the separation of fibers. This gun may be of any suitable length and caliber but I consider for practical purposes it will be convenient to have it about seven inches diameter internally and from twenty to twenty-five feet long as it may then be made by taking a piece or pieces of lap welded iron tubing and permanently closing one end. The other end is fitted with a movable head or cap B which is fitted to it after the fashion of a valve with a suitable packing for making a steam tight joint, and in order to provide for securing this cap valve B, firmly in its place, to close the gun, I attach to one side of the gun by a rigid arm and hinge joint D, a strong lever *c*, which is capable of being brought to a position across the cap B, and secured in that position by a hook E, at one end of the lever H, which is attached to the gun on its opposite side by the hinge joint *i*. The other end of the lever E, has hinged to it a prop piece *k* which is

employed to rest upon the side of the gun for the purpose of securing the hook E upon the lever *c*.

S is a screw working in the lever *c*, for the purpose of securing the cap closely to the mouth or muzzle of the gun and *m* is one of the screw bolts which attach the cap loosely to the lever *c*. Several of these bolts fastened firmly in the valve B and sliding in the lever *c* are used for the purpose of retaining the cap B at the time of the explosion. This gun is to be placed in a slightly inclined position so that a small quantity of water shall settle near the breech end. It should be mounted in a very strong frame to sustain it against recoil. I prefer to have the wood or other fibrous substance saturated with water before it is put into the gun. When put in, the lever *c* is brought up and secured by bringing down the hook E of the lever H upon it and setting up the prop piece K. Then the strong screw *s* is driven in to close the cap B tightly. Next we expel the air by opening a small valve not shown and letting in the steam by another small tube not shown but near the opposite end of the gun from the air escape valve. When the air is expelled close the air valve and open the valve in another small tube connecting the boiler and gun so that the water that condenses in the gun may run back down into the boiler. If large sticks of wood are in the gun the steam must be admitted for some minutes to heat them through. If hemp, flax, or straw is to be separated less time is required in the steam. I have found a pressure of one hundred and eighty lbs. per inch is about right for separating pine for paper, but a much less pressure will answer for flax or straw. When the heat has sufficiently penetrated the fibrous substance to be exploded, the cap B may be set free which is done by removing the prop piece *k* when if the angle on the hook E is properly made the pressure of the steam in the cylinder gun will raise the end E of the lever H and drive off the cap B and free that end of the gun. The small quantity of hot water at the breech of the gun now drives out the contents of the gun into the atmosphere. As it emerges from the gun, being freed from outside pressure, the sudden conversion of a portion of the water in its tubes or fibers into steam of high tension bursts and separates these fibers.

It is evident that the apparatus employed

in the performance of my invention and the mode of performing it may be modified considerably without departing from the principle thereof. For instance, instead of using
5 a separate boiler to supply steam to the gun the steam may be generated and the water heated in the gun itself by placing therein a quantity of water and applying the necessary heat to the exterior of the gun. Again,
10 before subjecting the fibrous substance to the action of water or steam the air may be extracted from it by means of an air pump. It is also evident that instead of water alcohol or other liquid or any elastic gas may be
15 used. The invention may also be applicable to the separation of the fibers of other than vegetable substances and for a variety of purposes.

What I claim as new and desire to secure by Letters Patent is—

The mode of separating the fibers of wood, flax, or other fibrous substance, for paper, cloth or other purposes, by charging the mass with hot water, steam, compressed air
25 or other elastic fluid while in a cylinder or other suitable receptacle and then causing it to be projected from said receptacle into the atmosphere or any space where it is subjected to a sufficiently less pressure to cause
30 its disruption by the sudden expansion of the fluid within it substantially as above specified.

AZEL STORRS LYMAN.

Witnesses:

EDM. F. BROWN,
G. Y. A. LEE.