

S. T. LAMB.
Fiber-Cleaning Machinery.

No. 140,050.

Patented June 17, 1873.

Fig. 3.

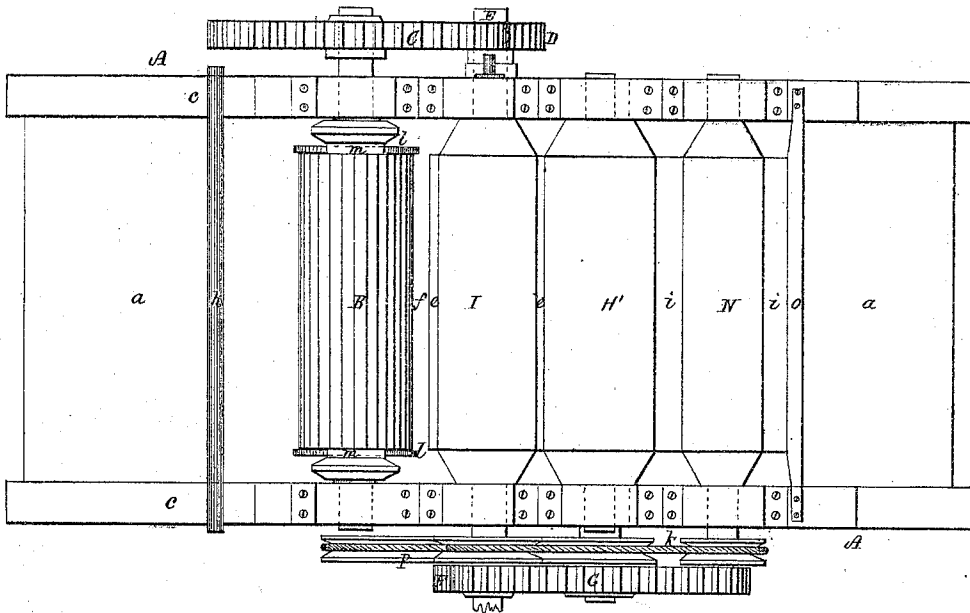
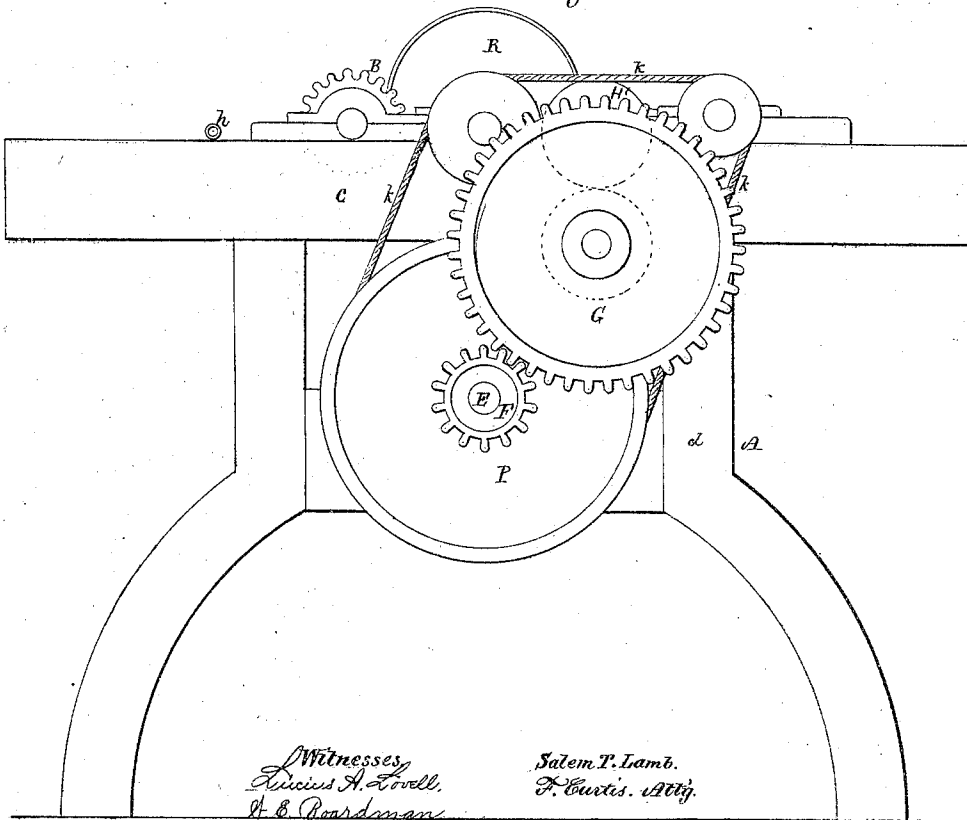


Fig. 1.



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Fig. 4.

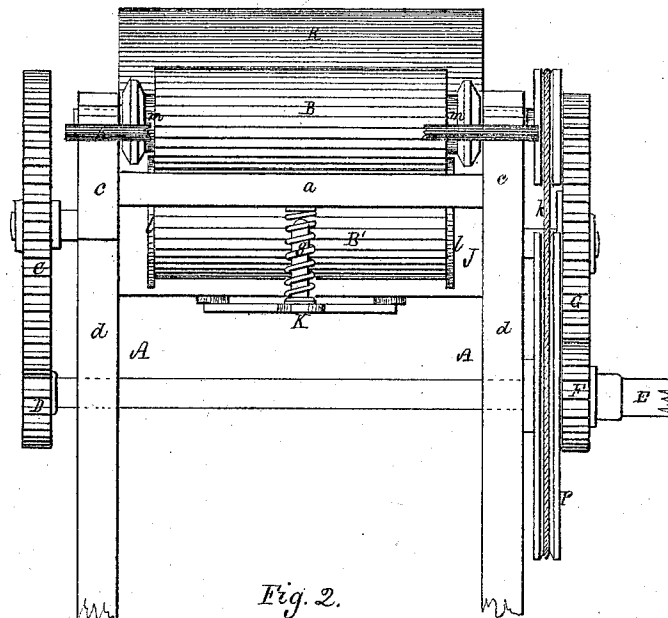
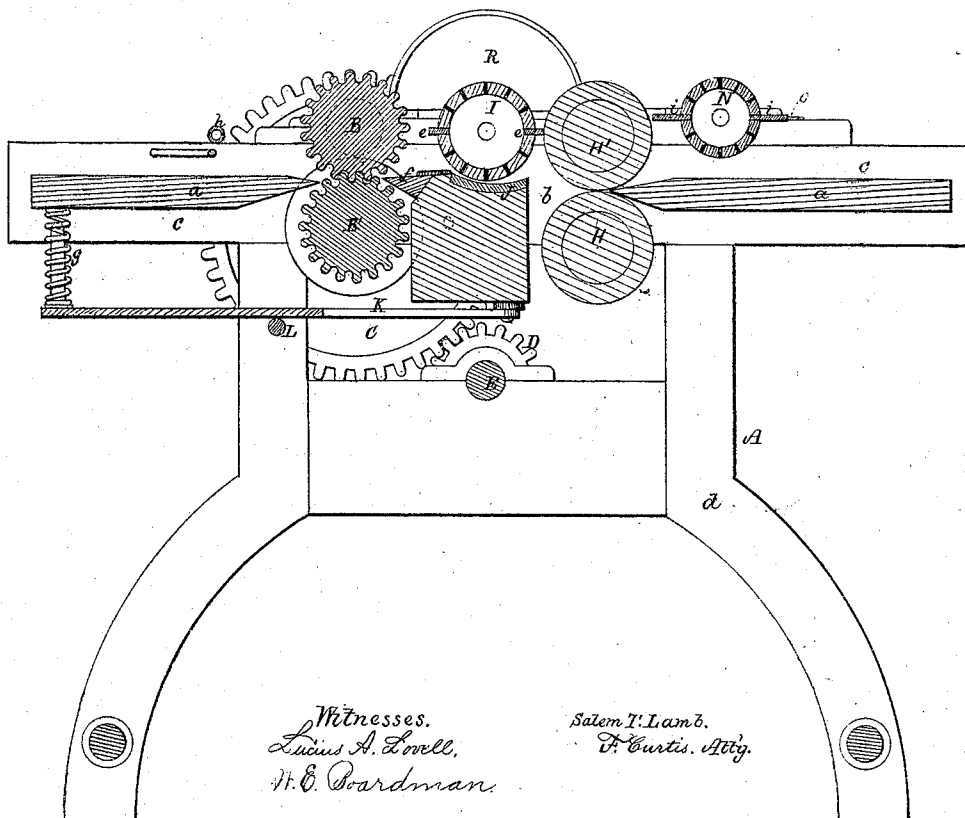


Fig. 2.



UNITED STATES PATENT OFFICE.

SALEM T. LAMB, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN FIBER-CLEANING MACHINES.

Specification forming part of Letters Patent No. **140,050**, dated June 17, 1873; application filed March 24, 1873.

To all whom it may concern:

Be it known that I, SALEM T. LAMB, of Boston, Suffolk county, Massachusetts, have invented certain new and useful Improvements in Fiber-Cleaning Machinery, of which the following is a specification:

These improvements are based upon a class of machines for cleaning the fibers of various plants from the pulpy fleshy body of the same in which they are enveloped, in which the following elementary features are embodied: First, a pair of fluted or longitudinally-corrugated rollers for bruising or crushing the plant and freeing the fibers to a certain extent; secondly, one or more revolving scrapers, operating in connection with an elastic bed placed below them, for scraping from the fibers the viscid pulpy matter which incloses them; and, thirdly, in one or more pairs of elastic draft-rollers for drawing forward the mass of fibers as they emerge from the crushing-rollers, the whole being supported within a suitable frame, and operated by proper mechanism.

A notable instance of the class of machinery upon which my improvements are based is seen in Letters Patent of the United States numbered 126,337, and issued on the 30th day of April, 1872, to William B. Shedd.

The improvements herein explained consist, first, in the employment, in combination with one or both of the crushing-rolls, of a revolving scraper or "doctor," so arranged as to press against the periphery of such roll, and being attached to an adjustable table in such manner as to adapt itself to the movements of the latter, as hereinafter explained, the purpose of this doctor being to prevent the adhesion to and collection about the circumference of the roll of fibers or other substances which would otherwise waste the material and invalidate the working of the machine to its full capacity. Secondly, these improvements will be found to consist in a peculiar formation of the rotary scraping-roll, by producing it of a hollow cylinder, whose walls are pierced with a series of attenuated holes, or one otherwise made permeable or reticulated, in order that a spray or shower of water may be discharged upon the mass of fibers passing between the scraper and its bed, the force with which this

shower or spray is precipitated upon the fibers depending upon the extent of centrifugal force generated by the revolution of the cylinder, the purpose of the water being to soften and dissolve the gummy matters and juices expressed from or otherwise adhering to the fibers, lubricate the passage of the latter through the machine, and maintain a low temperature of the scraping or cleaning roll and its knives, which would otherwise oftentimes become unduly heated. Fourthly, these improvements consist in so disposing the scraping or cleaning roll and draft-rolls of the machine in immediate proximity to each other, in order that, while each performs the functions originally required of it, the knives or scrapers of the former act upon the periphery of the latter, and constitute revolving doctors, to prevent the fibers from winding about and accumulating upon the same, which, but for this, or its equivalent, would ensue, and result in great waste and loss of material, and clog and retard the operations of the machine, while the lower draft-roller serves in such position to seize and introduce between the two any stray fiber which might incline to fall into the waste passage provided for the escape of the debris or fleshy, gummy, or viscid matters resulting from the separation of the fibers and pulp of the plant or material to be cleaned. Fifthly, these improvements consist in the employment of an auxiliary or additional hollow roll or drum provided with peripheral vanes or wings of India rubber or other suitable material, and situated immediately adjacent to the draft-rollers, or so closely thereto, that the wings wipe at each revolution against the periphery of the upper roller, the results of this construction of the hollow shaft, and the relation of the two being that any stray fiber which might cling or stick to the periphery of the upper draft-roll will be detached therefrom, the fiber issuing from between the two draft-rollers will be aided in its advance by the rotation of the vanes impinging upon it, and the final cleaning of the fiber greatly facilitated, the body of the roll being foraminous or reticulated, and water being supplied to the interior in order to act upon and soften any solvent, gummy, or gelatinous matters or impurities adhering to the fibers at this time,

and thus assist the last-named revolving roll or scraper in entirely cleaning the fibers. The roll or drum is preferably applied in such manner as to enable its position to be varied with respect to the draft-roll, to equalize or compensate for any wear that may result.

The drawings accompanying this specification represent in Figure 1 a side elevation; in Fig. 2, a vertical central and longitudinal section; in Fig. 3, a plan; and in Fig. 4, an end elevation of a machine embodying my improvements.

In these drawings, A represents the frame of the machine, composed of a horizontal table, *a*, formed with a central aperture or well, *b*, two side rails, *c c*, bounding the table *a*, and two side standards, *d d*, united by suitable cross bars or rods. B B' represent two rolls scored with longitudinal corrugations, placed one over the other, with their peripheries in contact or meshing into one another, by which they rotate together, these rolls being disposed in the front part of the aperture *b*, and their journals being supported in suitable boxes applied to the side rails *c c*. To the journal of the lower crushing-roller B' is affixed a spur-gear, C, which meshes into a pinion, D, affixed in turn to the rear end of a horizontal driving-shaft, E, such shaft being disposed below the said crushing-rolls, and supported in boxes affixed to the end standards of the machine-frame. The driving-shaft E carries a pinion, F, which engages a spur-gear, G, fixed upon the journal of a horizontal roller, H, the two journals of such roller being supported in boxes applied to the side rails *c c*, before named, while above the roller H, and resting or bearing upon it, or nearly so, is a second and like-sized roller, H', such two rollers being composed of or covered with India rubber or other suitable elastic or semi-elastic substance. These rollers should be applied adjustably to the machine-frame. These two last-named rolls constitute the draft-rolls, and are designed to seize and draw forward the mass of mangled leaf and fiber, which has been subjected to the action of the crushing-rollers, and of the scraper, to be hereinafter explained. Between the upper crushing-roller B and upper draft-roller H' is disposed the scraping or cleaning roll I, this latter roll having journals which rotate in boxes upheld by the rails *c c*, and being provided with a number of longitudinal peripheral blades, *e*, which rotate immediately above a yielding bed or bar, J, disposed transversely of the machine-frame and between its end standards, such bed being supported in position by a journal, L, projecting from each end, which extends into a bearing in the adjacent end standard *d*, the bed, by this means, being susceptible of vertical play toward and away from the cleaning-roller and its blades. To the forward upper corner of the bed J, I hinge or pivot a thin plate, *f*, which bears against the periphery of the under crushing-roll B', and serves, as before stated, to prevent adhe-

sion and collection about such periphery of fibers or other portions of the plant or material being operated upon. The bed J is forced upward closely to or in contact with the blades of the roll I, by means of a forked lever, K, which is supported upon a horizontal rod or fulcrum, L, mounted within the end standards of the machine-frame, the inner end or arms of such pressure-lever bearing against the under side of the bar J, while the outer end of the lever is depressed by the stress of a spring, *g*, which is interposed between it and the table *a*, the arrangement of the whole being shown in Fig. 2 of the accompanying drawings.

The upper surface of the bed J should be a segment of a circle struck from near the axis of the rotary scraper I as a center, and this concave surface should be covered with *lignum-vite*, Babbitt metal, bone, or other hard or semi-elastic substance, which will maintain a polished surface under wear and the action of the plants or leaves treated by it.

The roll I is, as before stated, hollow, and its walls pierced with numerous minute holes, and water is to be admitted to the interior of this roll from any proper means of supply, or with any degree of pressure which practice may determine best, such water being discharged in a spray or light shower upon the mangled plants or materials below. This machine is designed to strip and prepare for the market fibers of the plants belonging to the order of exogens, such as ramie or China-grass, hemp, jute, &c., as well equally fibers of the plants belonging to the order of endogens—such as the *Agave Americana*, plantain, penguin, bromelia, sylvestris, or other plants the fibers of which will repay such trouble; and in thus operating upon various plants or materials I have found that a small quantity of water judiciously applied at the right stage of treatment has a very beneficial effect in softening or dissolving the gummy, viscid, and pulpy portions of the plants, and assisting very materially in separating them from the fibers which they envelop. A large amount of water which will deluge the plants, and the machine as well, is not desirable or effectual; but it should be administered in small quantities, in gentle showers or sprays, which will dissolve but not beat the plant or material.

It has heretofore been found that the plants or materials are not in the best condition to be treated—that is to say, are often partially dry before being subjected to the action of the machine, and the use of water, therefore, as a solvent under these conditions is a very valuable adjunct to the machine, and, in fact, in many instances almost a necessity. I have therefore incorporated in the machine herein illustrated improved means of discharging water upon the materials or fiber at various points in its progress through the machine.

In advance of the crushing-rollers B B' I place transversely to the table *a* a hollow fo-raminous showering pipe or cylinder, *h*, into

which water from a suitable source is suffered to flow, this water escaping in minute streams, and being precipitated upon the plants or materials below it previous to their entry between said crushing-rollers, and serving as a preparatory step to soften, to some extent, the fleshy pulpy portions of the plants or materials operated upon. N in the drawings represents a second hollow roll or drum, placed in rear of the upper draft-roller H', and about on a level therewith, the journals of such rollers revolving in boxes applied to the rails *c c*, while its periphery is armed with a series of radial vanes or wings, *i i*, &c., composed of India rubber or other suitable material, while the body of the roll is pierced with a series of small orifices, through which water in a fine shower will fall upon the mass of fiber below, and, as before stated, aid very materially in softening the gummy fleshy matter which may adhere to the fibers, and allow the latter to leave the machine in a clean state, free from all impurities or objectionable substances. The rollers H' and N, are placed so closely together that the blades *i* of the latter wipe against the periphery of the former, with results before stated, while the lower roller, H, serves to seize and return to the action of the two any stray fibers which would otherwise be wasted. In rear of the roll N I place a horizontal bar, O, which spans the table *a*, and is situated in close proximity to or in contact with the edges of the blades *i* as they revolve, the purpose of this scraper, as before stated, being to free or clean the blades from any fiber, or pulpy, or gummy matter which inclines to adhere to them.

The rolls or drums I and N are revolved by an endless band or cord, *k*, which passes partially about them, and also about a large drum or pulley, P, affixed to the front journal of the driving-shaft E, and between the pinion F and standard *d*, the said drums being by this means driven at a much higher rate of speed than the rolls B B' and H H', as this has been found to be desirable. Upon each end of the lower crushing-roll B', and closely up to each journal, I mount a thin collar, *l*, which enters a corresponding annular channel, *m*, created in the upper roll, the collars and channels thus arranged serving to properly guide the leaves, and prevent any portion thereof from getting access to and clogging the journals of the said rolls B and B'. R in the accompanying drawings represents a hood or shield, placed over the rotary scraper or drum I, the purpose of such hood being, as before stated, to intercept and deflect upon the plants or leaves such quantities of water as would other-

wise be thrown off by the centrifugal force of the revolving drum and wasted. This hood may be placed over one or both the drums I and N, or over other portions of the machine.

I have contemplated attaching a pipe to the machine at some convenient point to discharge a blast of air upon the refuse portion of the plants or the debris resulting from the separation of the fibers, this pipe to communicate with a blowing-engine suitably situated. The best locality for the discharge of air will undoubtedly be within the hood which covers a portion of the machine.

I claim—

1. In machinery for cleaning fibers, a rotary scraper-drum or hollow cylinder, having reticulated or foraminous walls to permit the escape of water introduced into said drum from a suitable source and under suitable pressure, substantially as and for the purposes shown and set forth.

2. In combination with the crushing-rollers and draft-rollers, the intermediate foraminous rotary scraper-drum for discharging water upon the material passing through the machine, and for operating upon the material passing between it and the bed below, substantially as set forth.

3. The combination with the draft-rolls H H' and bed *a* of the rotary cylinder N with blades *i*, under the arrangement as shown and set forth.

4. The combination, with the crushing-rollers, the intermediate foraminous rotary scraper-drum, and the draft-rollers, of the perforated drum N with arms or blades *i*, the said drums being designed to discharge water upon the material, and to operate substantially as shown and set forth.

5. The combination, with draft-rollers H H', bed *a*, and perforated drum N having arms or blades *i*, of the doctor or scraper O, substantially as herein shown and described.

6. In machinery for cleaning fibers, the combination, with crushing-rolls and draft-rolls, of an intermediate perforated rotary scraper-drum discharging water upon the material between the two sets of rolls and operating upon the said material, as described, and a water-pipe placed in advance of the crushing-rolls to discharge water upon the material as it enters the machine, substantially as shown and set forth.

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