(No Model.)

J. G. STEPHENS.

APPARATUS FOR CLEANSING PULPY MATTERS FROM FIBERS.

No. 328,356. Patented Oct. 13, 1885.

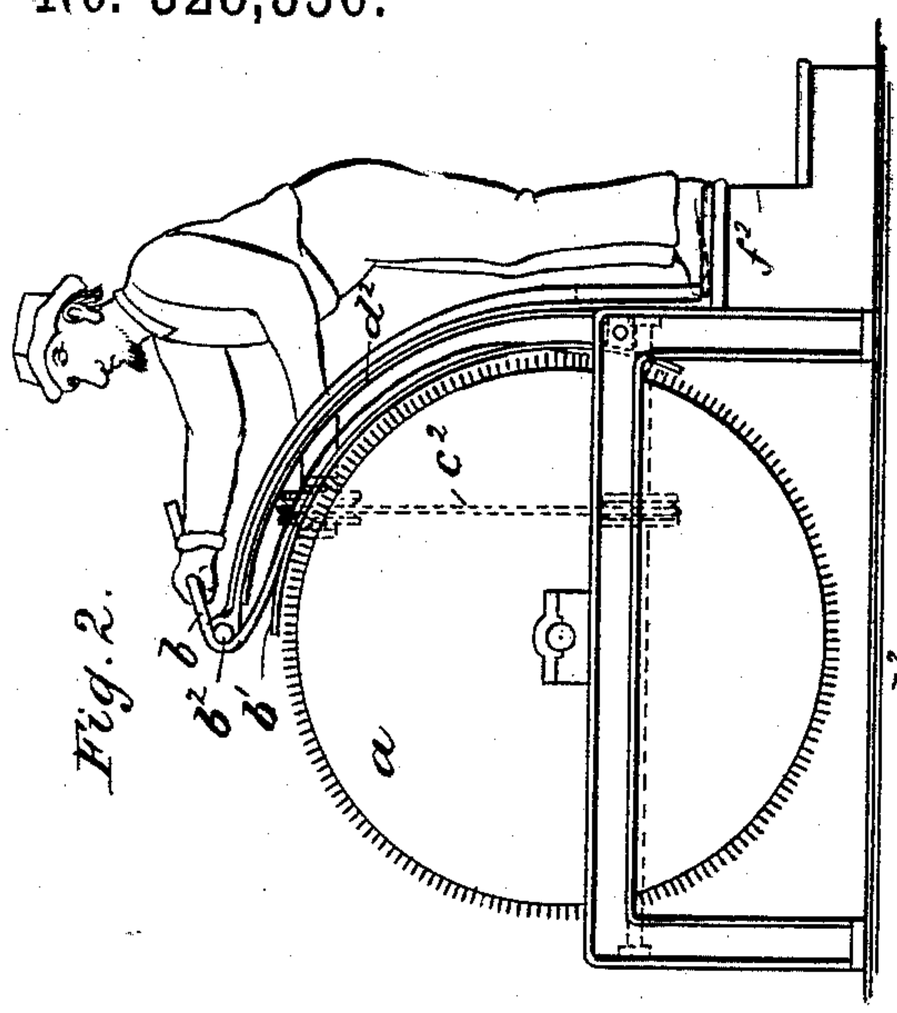

Fig. 2.

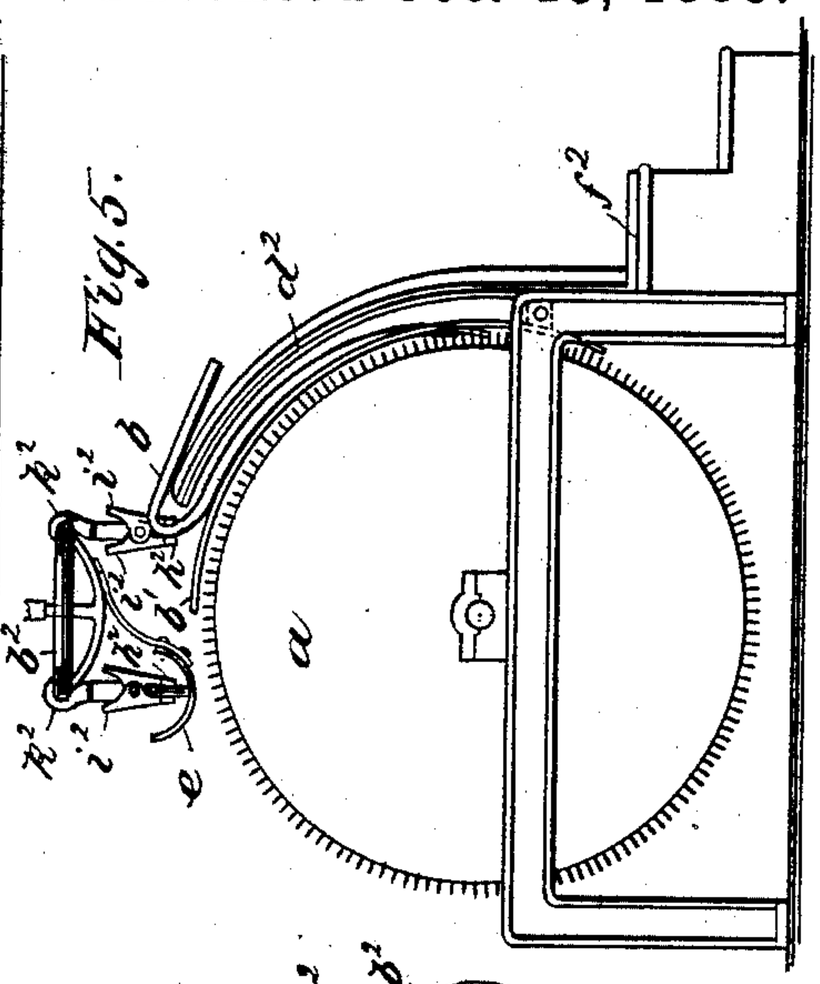

Fig. 5.

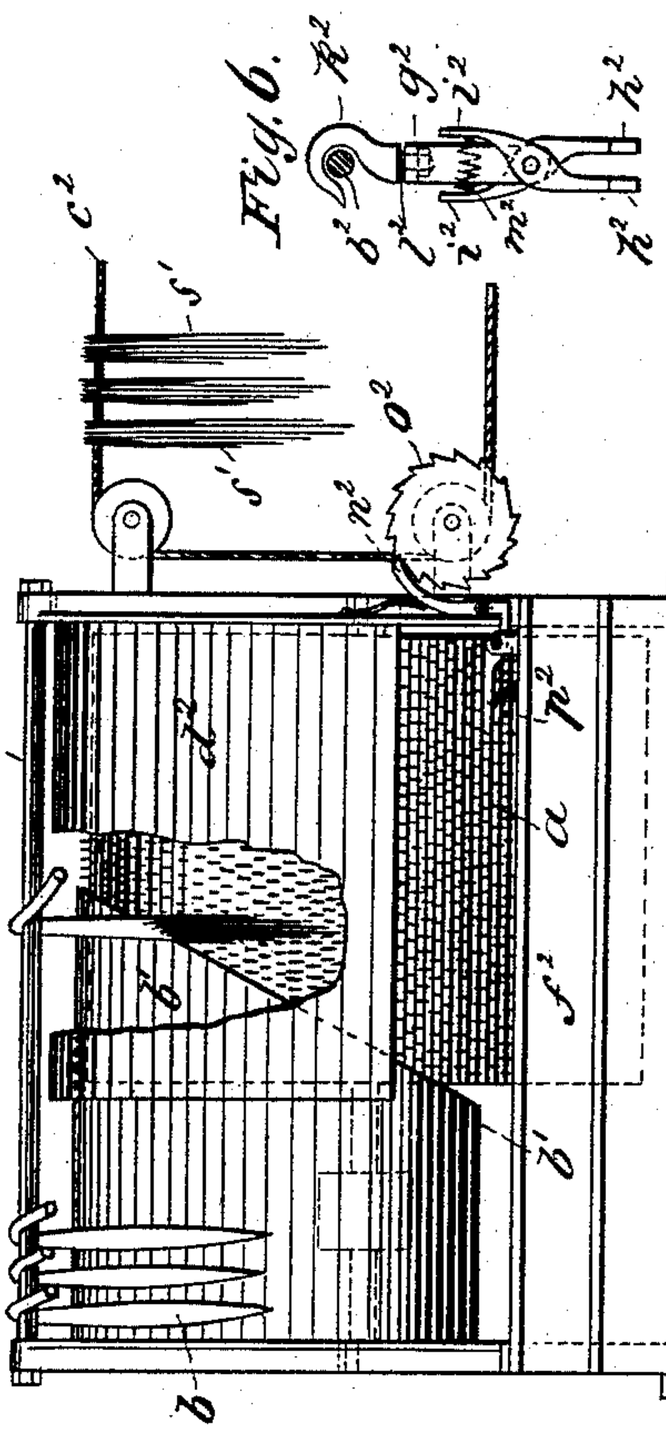

Fig. 6.

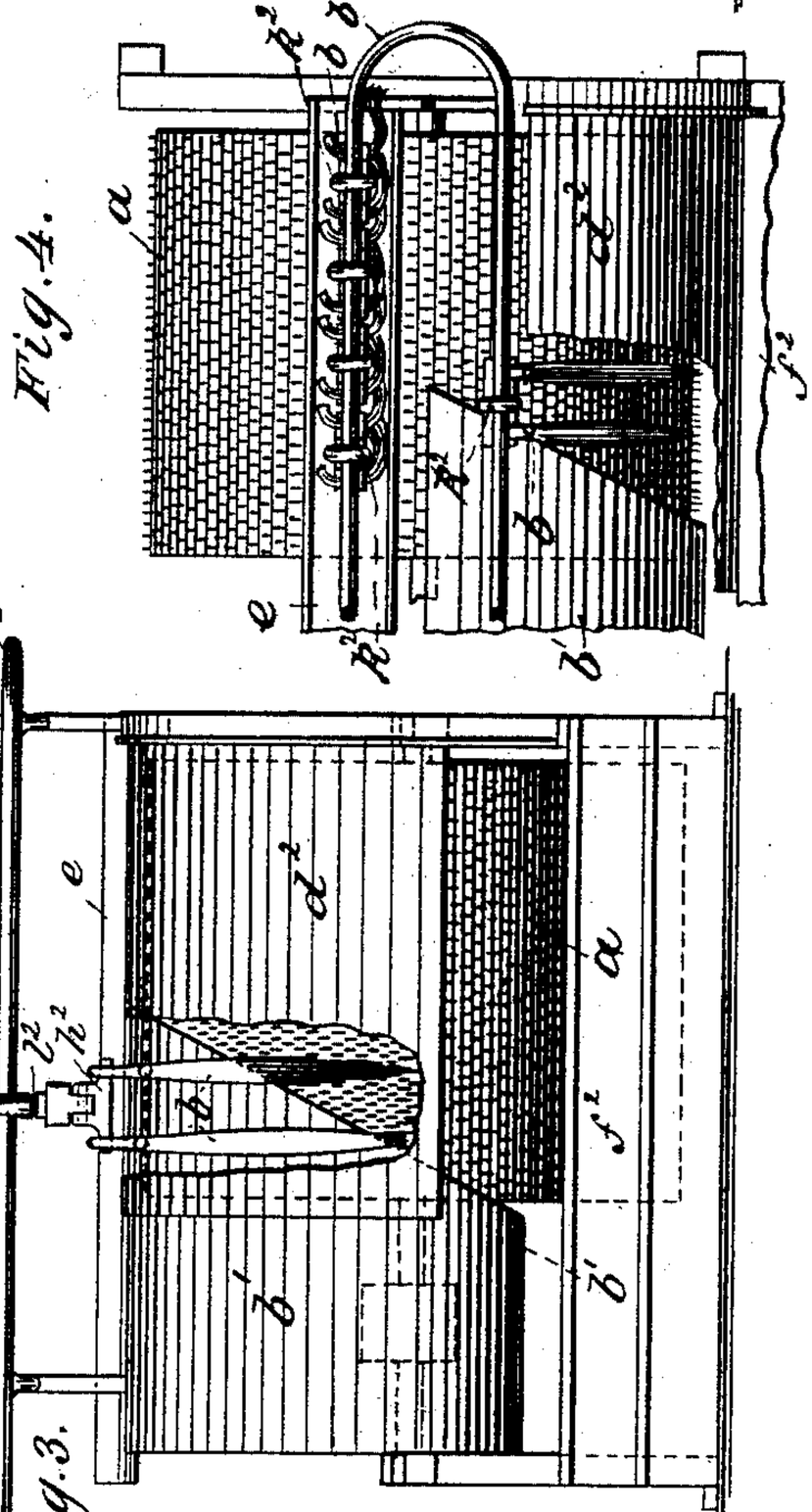

Fig. 4.

Fig. 1.

Fig. 3.

WITNESSES

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR CLEANSING PULPY MATTERS FROM FIBERS.

SPECIFICATION forming part of Letters Patent No. 328,356, dated October 13, 1885.

Application filed June 10, 1885. Serial No. 168,239. (No model.)

To all whom it may concern:

Be it known that I, JOHN GEORGE STEPHENS, a subject of the Queen of Great Britain, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Apparatus or Machinery for Cleaning and Separating the Pulpy Matters from the Fibers of Leaves and Plants, of which the following is a specification.

My invention consists of improved apparatus or machinery for removing the pulpy or fleshy matters of the stalks and leaves of fiber-producing plants—such as henequin or sisal, istle or tampico, pita, hemp, and others of like character—by which the said fibers can be cleaned, separated, and prepared with great rapidity, and at the same time be more thoroughly cleaned, and be left in a better natural condition for industrial purposes, and with less waste of the fibers than as heretofore prepared.

The method of operation consists in suspending the leaves, stalks, or other fiber-bearing substance in front of a rapidly moving combing or carding cylinder or belt clothed or armed with fine sharp teeth, pins, or studs of any approved form adapted for carding or combing, as distinguished from scraping and scutching, and running downward along the fiber-bearing substance, which is suspended in such manner that the teeth of the card or comb are made to run lightly against the same and rapidly cut and comb away the pulp therefrom, preferably beginning at the lower end, gradually working upward along the whole range of the suspended part, so as to cause but little stress and no crushing, breaking, or tearing effect whatever on the fiber as when scraped; and the essential feature of the mechanism employed consists of said carding cylinder or belt adapted for thus carding or combing away the pulpy matters, and provided with contrivances for conducting the fiber-bearing leaves, stalks, or other objects to and sidewise along the combing or carding device and away therefrom in a manner to enable the work to be accomplished rapidly, all as hereinafter described, reference being made to the accompanying drawings, in which—

Figure 1 is a front elevation of a small portable carding or combing machine adapted for carrying out the improved method of cleaning fibers, part of the protecting-guard being broken away. Fig. 2 is an end elevation of the same. Fig. 3 is a front elevation of the same with the grip mechanism for suspending the leaves. Fig. 4 is a plan view of the apparatus represented in Fig. 3. Fig. 5 is an end elevation of the same. Fig. 6 is a detail of the clutch mechanism.

The method now in use of disintegrating fiber-bearing leaves and plants and cleaning the pulpy matters away from the fibers consists of first crushing the pulpy substance, then scraping away the pulp as much as it can be removed in that manner, and finally or simultaneously washing away the fiber to remove the rest of what may be sufficiently disintegrated by the crushing and scraping to be so removed; but the scraping is not as effectual as is desirable, in that the pulpy matters lying between the fibers cannot be scraped away, and it is also objectionable because many of the fibers are cut or broken apart by the edges of the scrapers and wasted with the pulp, and those fibers that are naturally round, and particularly the round and tubular fibers—such as are obtained from the henequin plant—are materially injured by the crushing and flattening effect of the scrapers. The scraping process is also slow, and demands excessive power; hence I have contrived the method of combing or carding the pulpy matters by means of teeth or pins of sufficient fineness to work into the pulpy matters and between the fibers in a much easier, more effectual, and less injurious manner, as follows:

For cutting away the pulp I employ an ordinary carding-cylinder, *a*, except that I prefer to have the pins or teeth of larger dimensions and stronger capacity than are used in cotton or woolen machinery, for green leaves, and preferably of angular form in cross-section; but for retted or chemically-treated leaves I may employ fine wires or bristles, and I suspend the leaves or stalks *b* containing the fiber in front of that side of the cylinder or belt that runs downward, and move them sidewise along the same suitably for combing

away the pulp from the fibres, which remain suspended, so that the teeth of the card or comb run freely between the fibers and thoroughly cut and carry away the pulp, and clean the fibers effectually without pulling and straining, tearing, or crushing them, the leaves or stalks being free to be forced away from the points of the teeth and escape the tensile strain by the lateral thrusts of the teeth in case the resistance of the pulp is too great for the strength of the fibers.

For the purpose of causing the carding-teeth to begin at the lower ends and gradually work upward along the leaves or stalks as the fibers are freed from the pulp below the point or points of action of the teeth on the pulp, to prevent clogging and straining the fibers, and thus enable the teeth to work freely in the pulp, and also to facilitate the application of the leaves to and removal of them from the card, I cause the leaves to move sidewise along in front of the cylinder, and employ a shielding-apron, b', between the hanging leaves and a portion of the cylinder, and being so shaped that it fends off the leaves except at the lower end at first, and allows them to gradually touch higher up the card as they move along until the leaves are dessed nearly to the grip-clutch by which they are suspended and carried.

For a simple means of suspending the leaves in contact with the cylinder, and also for moving them sidewise along the same, I employ a rod or bar, b^2, suitably located and placed horizontally over and (more or less) back of the front or descending side of the cylinder, as best adapted for the purpose, across which to place the leaves and hold them by one end, so that the greater portion of the rest will hang in contact with the teeth, the leaves being held by hand or by any suitable clutch supported by the rod. To begin with, I fix the leaves in this position over the fending-shield, which prevents contact of the leaves with the teeth until the leaves are properly adjusted and secured, and then moves them along in contact with the teeth by which the pulp and other foreign matters are quickly combed away in small fine particles, that are easily detached by the points of the quickly running teeth without strain on the fibers. The rapidly-running teeth carry the leaves and fibers sidewise along the cylinder parallel with the movement of the leaves along the bar, even though the movement on the bar be as rapid as the attendant can shift the leaves along the bar, so that as one passage of the leaves is sufficient for effectually cleaning them with a cylinder of not more than three feet long, the rapidity of the process is limited only by the rate of the supply of the leaves to the cylinder; but as the same action of the teeth on the leaves may be had by shifting them forward and backward a short distance each way along the cylinder, so as to obtain the same length of range by the aggregate of several short movements of the leaves, a cylinder of much shorter length may be used with equal results in respect to the efficiency of the work and the quantity of product.

If desired, the action of the teeth on the fibers may be continued indefinitely subsequently to the clearing of the pulp for smoothing and polishing the fibers to any desired extent. After thus treating the portion of the leaves first presented to the cylinder in this manner I reverse and hold them by the dressed fibers, so as to present the undressed portion to the cylinder and treat it therewith in like manner, thus completing the whole. Then I deliver the fibers to any receptacle, as an endless rope, c^2, on which I hang the bunches of fibers s', the rope being suitably contrived to carry the fibers slowly along in the sun or in a drying-house to dry. Any suitable guard, d^2, may be placed between the cylinder a and the operator's stand f^2, to protect the operator from the teeth of the cylinder, and the bar b^2 may be supported on said guard or otherwise, as preferred; but instead of holding and feeding the leaves by hand I propose to employ clutch devices g^2, suspended from the rod or bar b^2, which in this case will be located a little higher above the cylinder, the said clutch devices consisting of any suitable gripping-jaws, h^2, in which the leaves may be gripped with sufficient power to hold them against the pull of the cylinder, and being suspended on the bar or rod b^2 by a hook, k^2, ring, or other device adapted to be shifted along the bar by the attendant more easily than he can shift the leaves held directly on the bar, and to which the jaws will be swiveled at l^2, to enable the clutch to be turned half-way round for shifting it after one part of the leaf has been dressed to present the other part to the cylinder, the jaws being pivoted together with a spring, m^2, to close them for effecting the grip on the leaves, said jaws having lever-handles i^2 by which to open them for applying the leaves, and for shifting the leaves lengthwise after combing the first part, to present the whole of the uncombed part to the cylinder in the second operation and to discharge the fibers when completely dressed.

The bar b^2 may consist of an endless way, as in Figs. 3, 4, and 5, when the suspending-clutches are used, for enabling said clutches to be shifted back along it to the place of starting, when the leaves may be supplied to the clutches and the clutches shifted to the position most convenient for the operator by an assistant operator, thus enabling the principal operator to feed the machine continuously for greater expedition of the work. The clutches may be shifted back to the assistant for him to take out the fibers, if desired, for still further expediting the work, the suspended fibers being passed back along over the cylinder in a trough, e, which protects them from contact with the cylinder.

Power may be applied to the cylinder in any approved way, as by a crank or pulley,

and the drying-rope may be geared with the driving power for continuous movement, or it may be shifted intermittingly by a pawl, n^2, and ratchet-wheel o^2, the pawl being actuated by a foot-lever, p^2, suitably arranged for enabling the operator to work it from time to time as demanded by the collection of the fibers thereon.

It is to be noted that the teeth or pins of the carding cylinder or belt give lateral movement to the portions of the leaves and fibers having contact therewith, and move them along even with the parts carried in the chains by the side push which the pins give the fibers while running rapidly along and between them, and from where the pins enter between the fibers they run along the whole of the rest of their length and pass from between them at the ends, carrying away all the detached particles of matter and keeping the fibers straight and separate from or parallel with each other.

Although I have represented and described the application of the leaves or plants so that the points or upper ends as they grow are dressed first, I do not mean to be limited in this respect, as it is only the preferable way. The stems or butts may be dressed first, if desired.

A conical cylinder may be used without the guard for graduating the action of the teeth from the points of the leaves upward, the leaves being fed onto the small end of the cylinder.

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

1. The combination, with a carding or combing cylinder having combing or carding teeth or pins, and being adapted for the feeding of leaves or plants sidewise along the same, of a feeding bar or rail adapted for suspending the leaves or plants in the described relation with and feeding them along said cylinder, as herein set forth.

2. The combination, with a carding or combing cylinder having combing or carding teeth or pins, and being adapted for the feeding of leaves or plants sidewise along the same, of a feeding bar or rail and suspending-clutches thereon, adapted for suspending the leaves or plants in the described relation with and feeding them along said cylinder, as herein set forth.

3. The combination, with a carding or combing cylinder having combing or carding teeth or pins, and being adapted for the feeding of the leaves or plants sidewise along the same, of a feeding bar or rail and suspending-clutches thereon, adapted for suspending the leaves or plants in the described relation with and feeding them along said cylinder; also a trough adapted for enabling the dressed fibers to be moved along over and without contact with the cylinder, substantially as described.

4. The combination, with a carding or combing cylinder or belt having combing or carding teeth or pins, and being adapted for feeding the leaves or plants sidewise along the same, of a fending guard or shield adapted to cause the leaves or plants to touch the card first at their points and to gradually increase the range of the contact along said leaves or plants and the cylinder or belt, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN GEORGE STEPHENS.

Witnesses:
W. J. MORGAN,
S. H. MORGAN.