

(No Model.)

3 Sheets—Sheet 1.

G. E. N. I. E. SUBRA.
APPARATUS FOR TREATING FIBROUS PLANTS.

No. 594,973.

Patented Dec. 7, 1897.

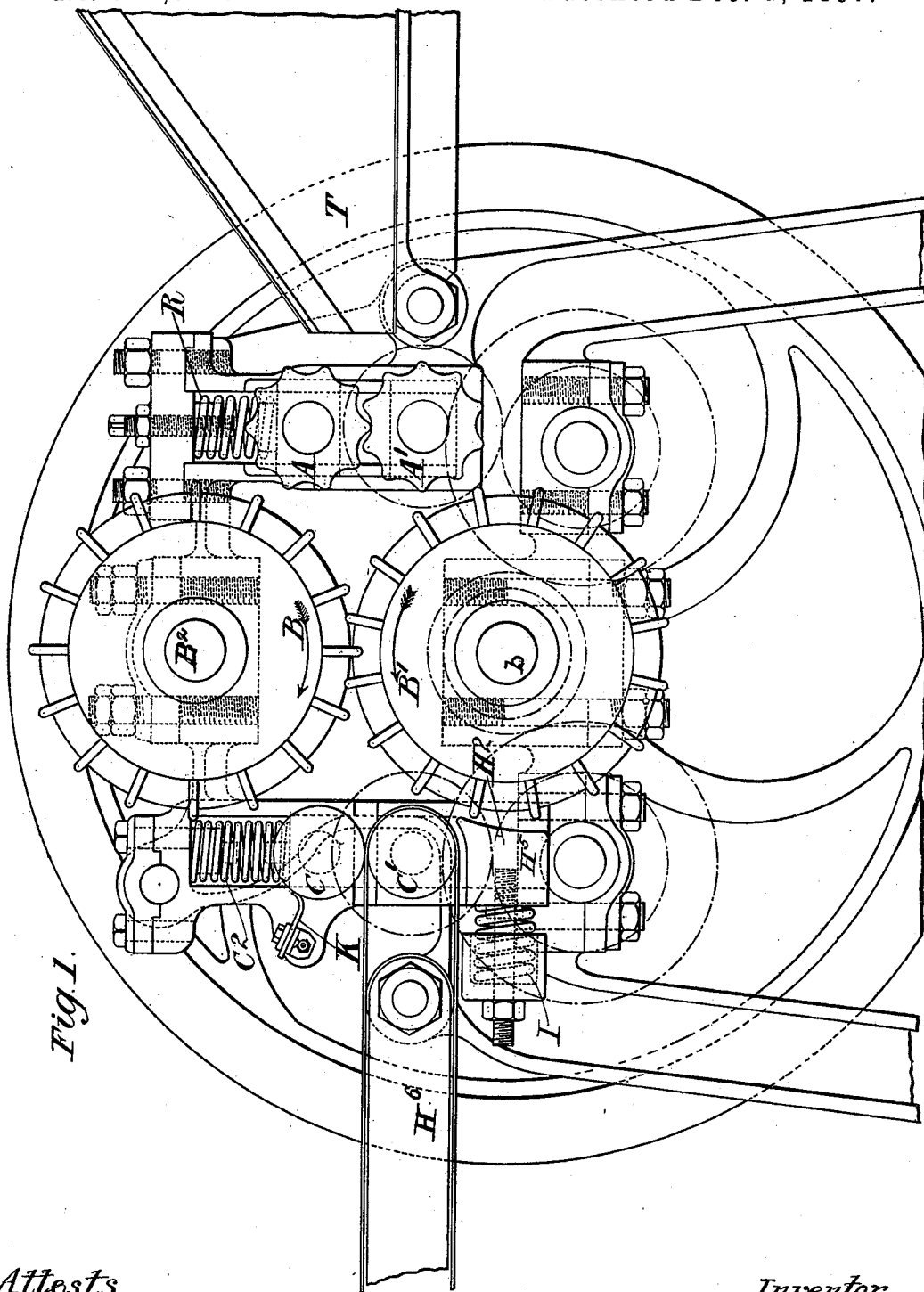


Fig. 1.

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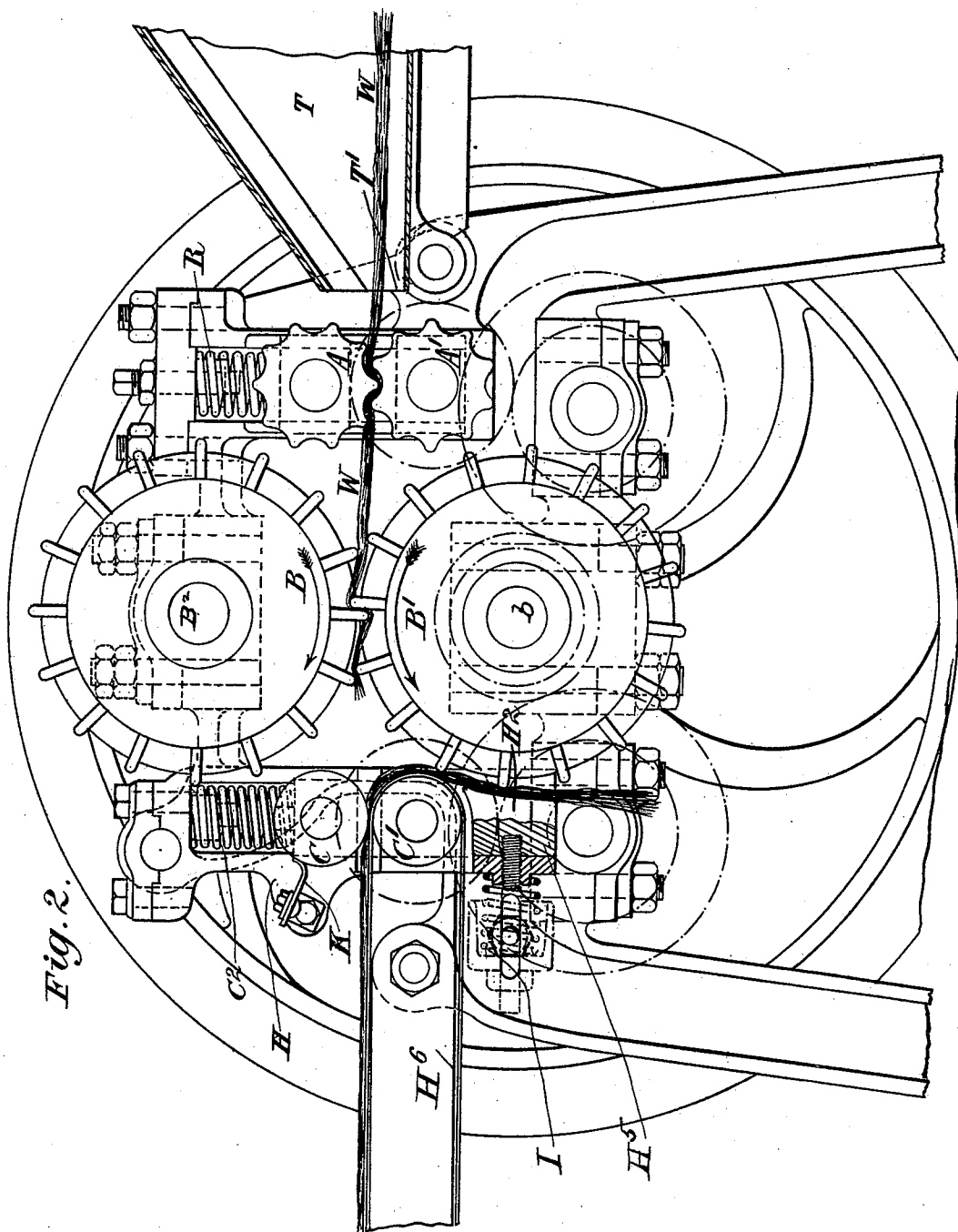


Fig. 2.

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Fig. 3.

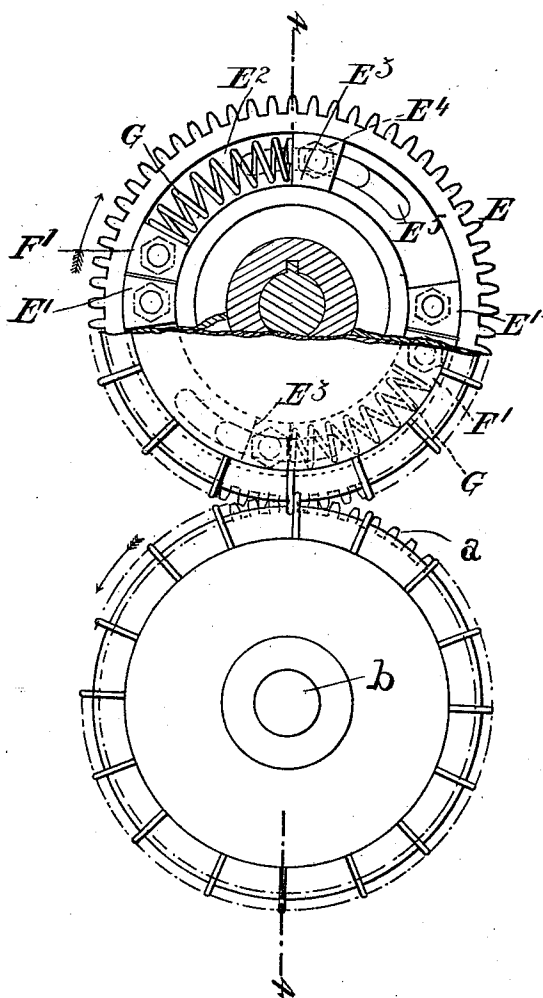


Fig. 4.

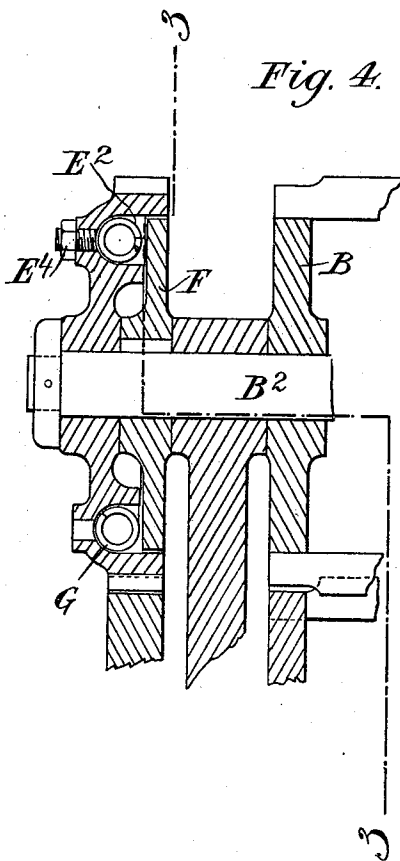
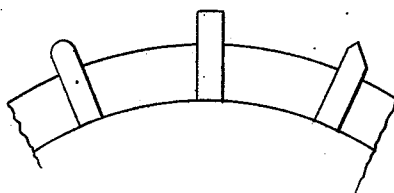


Fig. 5.



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UNITED STATES PATENT OFFICE.

GUSTAVE EMILE NOÉ ISIDORE ERNEST SUBRA, OF LONDON, ENGLAND,
ASSIGNOR OF ONE-HALF TO WALTER SMITH, OF SAME PLACE.

APPARATUS FOR TREATING FIBROUS PLANTS.

SPECIFICATION forming part of Letters Patent No. 594,973, dated December 7, 1897.

Application filed August 12, 1895. Serial No. 559,034. (No model.)

To all whom it may concern:

Be it known that I, GUSTAVE EMILE NOÉ ISIDORE ERNEST SUBRA, a citizen of the Republic of France, residing at London, England, have invented certain new and useful Improvements in or Relating to Apparatus for the Treatment of Various Fibrous Plants, of which the following is a specification.

This invention relates to machines for the treatment of ramie, hemp, flax, agave, aloes, jute, and the like for the purpose of freeing the fibers from the wood or pith whether in the green or dry state.

On reference to the accompanying drawings it will be seen that in its entirety this machine is characterized by, first, a pair of corrugated cylinders A A', which crush and retain the stems; second, a pair of cylinders B B' with blades which beat and disaggregate the wood and pulp; third, a pair of cylinders C C', which are smooth and so arranged as to treat the fiber ends of the stems which might otherwise be missed by the beater-blades of the cylinders B B', all with their respective gears mounted in a frame, with a fixed apron or table in front to aid the introduction to the machine of the stems or stalks of the textile material to be treated and an endless apron in the rear for the reception of the ribbons of treated fibrous material.

Figure 1 is a side view of the machine with the frame nearest the observer removed, the beaters in this instance being arranged for the treatment of dry materials. Fig. 2 is a view generally similar to Fig. 1, but with parts shown in section, this figure indicating the arrangement for the treatment of stems or plants in the green or natural state and shown as when treating only the tail end of the stalks. Fig. 3 is an elevation, partly in section, showing the arrangement of the spring gear-wheel for operating one of the beater cylinders or drums; and Fig. 4 is a cross-section through the gear-wheel and adjacent parts. Fig. 5 is a portion of an end view of one of the beater drums or cylinders, showing various shapes of the beater-blades.

Like letters indicate like parts throughout the drawings.

It is assumed that the machine is at work and the fibrous material under treatment is

ramie, (nettlewort or grass-cloth plant.) The stems or stalks W are passed into the machine through the opening T' of the apron or table T. They are crushed and drawn in with a certain regular speed by the ribbed or corrugated rollers A A', whereof the upper roller A is vertically movable in guides or ways on the frame and is subjected to a regular pressure determined by the springs R, duly adjusted therefor. The stems thus crushed pass on between the blades or arms of the beating and disintegrating drums or cylinders B B'. In the case of dried stems, Fig. 1, these beater-blades are regulated and secured in such manner that the blades of the one cylinder penetrate to a certain depth in the intervals between two blades of the other, each blade of one roller maintaining its position midway between two of the blades of the other roller.

The beater-blades may have their operating or outer edges round, square, or beveled, as indicated in Fig. 5, or otherwise suitably shaped.

The speed of the beating drums or cylinders B B' is much greater than that of the ribbed or corrugated cylinders A A'. Owing to the interpenetration of the beater-blades the woody matter of the stems treated is completely broken up and disaggregated progressively and proportionately to the advancement of the stems, whose speed of travel is regulated by the rollers A A'.

For treating green leaves and stalks the machine is generally constructed and arranged in accordance with the embodiment represented in Fig. 2. The lower beating drum or cylinder B' is rigid with or fixed upon its shaft b, and rigidly mounted upon the shaft is a gear-wheel a, through the medium of which motion is imparted to the upper beating drum or cylinder B indirectly and through the means to be described. The upper beating drum or cylinder B has a certain amount of spring-controlled play, and keyed to the shaft B² thereof is a disk F, having at diametrically opposite points and near the edge or circumference two abutments or stops F', which abutments or stops are engaged by corresponding abutments or drivers E', also disposed at diametrically opposite points on

the adjacent face of a driven gear-wheel E, mounted loosely on the shaft B². The said loose gear E is formed in its face adjacent the disk with a concentric groove or slideway E², into which the abutments F' on the disk enter, said abutments being arranged the one to contact with one of the abutments or drivers E' of the gear E on one side of the diameter thereof and the other to contact with the other driving-abutment on the other side of the diameter, it being understood that the said driving-abutments E' are fixed in the groove or slideway, while the abutments or stops F' are capable of moving therein, but are normally pressed or held against the abutments E' by the force or tension of the springs G, located or arranged in the concentric groove or slideway. These said springs are kept under compression or held at the desired tension by means of blocks E³, provided with bolts E⁴, which slide in grooves E⁵ and are secured in positions of adjustment by suitable nuts.

In treating fibrous material in its green state or condition the yieldable connections between the upper drum or cylinder and its movable gear are so adjusted that the blades of said upper drum will touch the blades of the lower drum, and in this way, as the upper drum is positively driven from the lower drum, there will be a yieldable action of the upper drum relative to its peripheral movement, and at the same time the material operated upon will be subjected to a rubbing, which will more effectually loosen the fiber from the wood and pulp.

The springs press against the stops F' on the disk F, as stated, so as to hold them close against the stops E' of the gear-wheel E while allowing them a certain elasticity of play, and in case any exceptional thickness of material passes between the beater-blades the upper blade while still rotating would give way by compressing the springs G', thus making room for the fibers between the blades of the two drums. By regulating and combining this pressure with the difference of speed between the beating-cylinders B B' and the crushing-cylinders A A' one obtains with precision a greater or less amount of scraping or rubbing action upon the material operated upon, according to the pressure of the springs and in proportion to the firmness of the stems.

In certain cases in the treatment of green stuff an injection of water may be useful and advantageous.

When it is desired to employ the machine for the treatment of dried stems, the springs are rendered immovable by fixing the stops on the disk F and gear-wheel E in such a manner that, as previously stated, the blades of one beating-cylinder penetrate to a certain depth into the interval between two blades of the other, and vice versa. In treating dried as in treating green stems the bundles of fibrous material pass away from the beaters between the two smooth cylinders C C'. The

linear speed of these cylinders C C' is equal to that of the ribbed or corrugated cylinders A A'.

In order to treat the ends of the stems, the following arrangement may be used: The upper cylinder C is vertically movable in slideways in a frame H, pivoted to the main frame of the machine at H', and also at its other end, (not shown in the drawings,) two springs C² applying a calculated or regulated pressure upon it. The lower cylinder C', carried (except as to rotation) immovably in the frame H, is encircled by an endless linen apron H⁶ for the continuous reception and removal of the fibrous strings or bundles. Immediately in the rear of the cylinders C C' and just below them and carried by or part of the frame H is an anvil-block H⁵, the face H² of which is curved to a radius equal to the extreme radius of the lower beating-cylinder and following its form. The whole is pressed against the lower beating-cylinder by two springs I (one at each end of the anvil-block H⁵) of calculated and adjustable strength. So soon as the tail ends of the stems leave the corrugated crushing-cylinders A A' and are free of the beating drums or cylinders they drop or fall down between the drum B' and anvil-block H⁵, and they are projected against this anvil-block H⁵ and beneath the lower cylinder C' by the beater B'. As the cylinder C as well as the apron draw the fibrous strings or bundles forward in the same direction they compel these tail ends of the stems to pass between the blades of the lower beating-cylinders B' and the face H² of the anvil-block H'. Thus in this case also the scraping action is produced only in the opposite direction, and the fibers of the tail ends are also cleared and loosened.

In Fig. 2 two sets of stems are shown for the sake of illustration. Those on the left of the drawing are supposed to have passed between the beater-drums, and their tails are shown projected against the anvil-block H, where they are being operated upon by the beaters of the lower drum B', while the smooth rollers C C' are gradually drawing them onto the traveling band, their tails rising vertically in front of the anvil-block against the motion of the beating-blades. Upon the right-hand side of the drawing the stems are shown in their first or starting position, where they have entered the machine between the corrugated rolls A A' and have passed onward to the rotating beater-drums B B', between the blades of which, as shown, they become distorted and crushed and the woody portion broken up. They are shown not carried through to the rollers C C', so as not to interfere with the stems shown on the left-hand side hanging down by the anvil-block.

A flexible blade or scraper K is provided to prevent the fibers from being wound round the upper cylinder C.

It will be understood from the "loaded" frame herein employed that a frame is meant

which is pressed toward the beaters by springs or other pressure.

I claim—

1. In a machine for decorticating fibrous materials, the combination of a pair of beating-drums having beater-blades, a driving-gear fixed upon the shaft of one of said drums, a disk fixed upon the shaft of the other drum and provided at opposite points with abutments or stops, and a loose gear upon said latter shaft having a concentric groove or slideway receiving said stops, said groove or slideway having corresponding abutting stops and being provided with springs and adjusting devices therefor, substantially as described and shown.

2. In a machine for decorticating fibrous materials, the combination of a pair of beating-drums, each having longitudinal blades, and the blades of one drum extending into the spaces between the others, a loose gear fixed upon the shaft of one drum, and provided at diametrically opposite points with abutting stops, and having concentric grooves, springs located in the grooves, a disk on the same shaft having corresponding stops which enter the grooves, and a driving-gear fixed upon the shaft of the other drum, substantially as described.

3. In a machine for decorticating textile

fibers, the combination of a pair of beating-drums having longitudinal blades, a pair of receiving-rolls located beyond said drums and a receiving-belt, and a spring-pressed anvil adjacent and between the lower roll and drum and having its operative face concaved, substantially as shown and described.

4. In a machine for disintegrating fibrous materials, the combination of a pair of feed-rolls, a pair of drawing-off rolls, an intermediate set or pair of beating rolls or cylinders, and means for producing a rubbing action of the beating-blades upon the material, substantially as shown and described.

5. In a machine for disintegrating fibrous materials, the combination of a pair of feed-rolls, a pair of drawing-off rolls, and an intermediate set or pair of beating-rolls, each provided with blades, with the blades of one cylinder touching those of the other, and means for imparting to one of said rolls a circumferential yielding action, substantially as described.

In testimony whereof I have hereto set my hand in the presence of the two subscribing witnesses.

GUSTAVE EMILE NOÉ ISIDORE ERNEST SUBRA.

Witnesses:

HARRY B. BRIDGER,

FRANK W. JARVIS.