

No. 759,197.

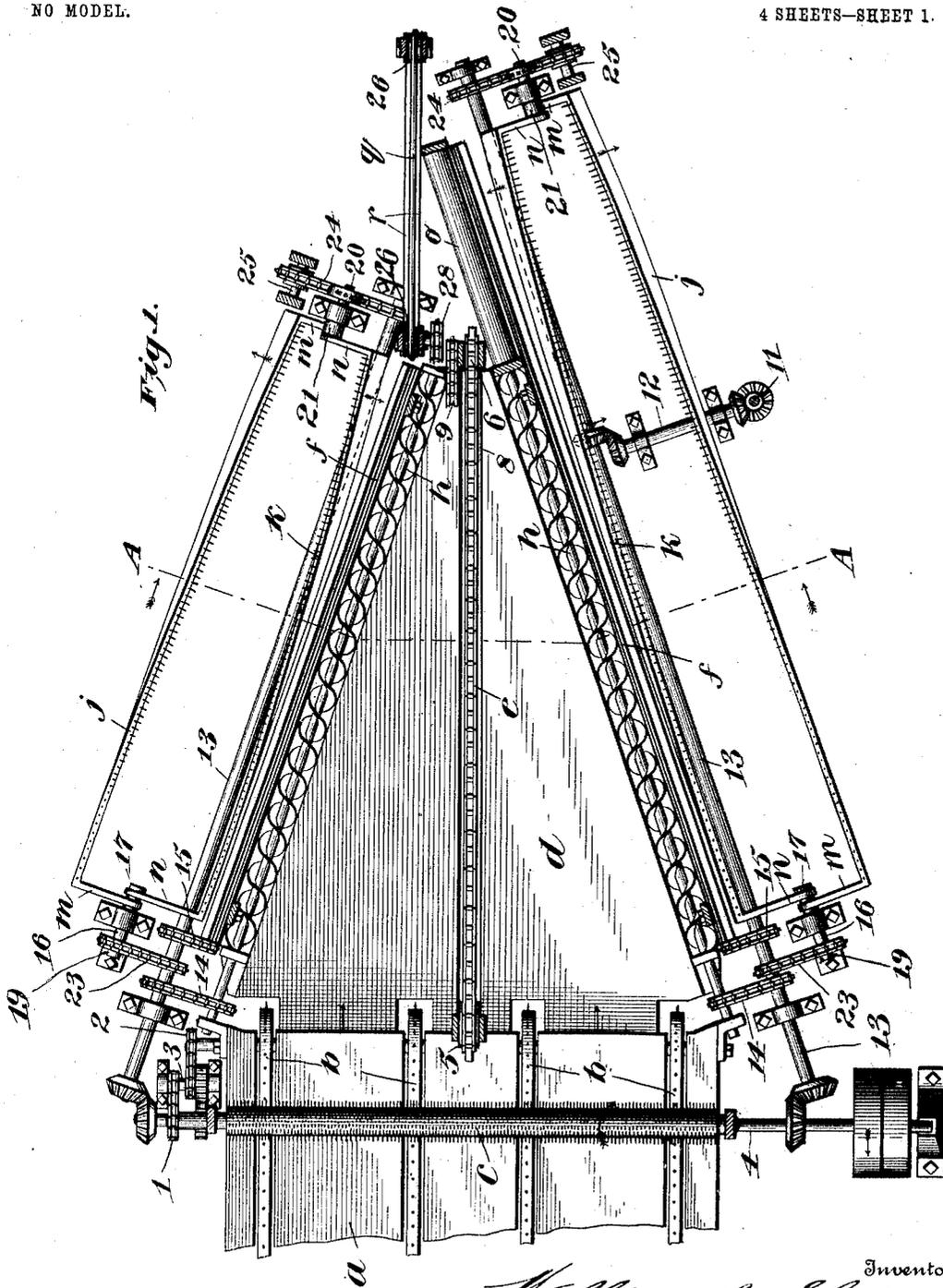
PATENTED MAY 3, 1904.

W. A. & A. M. SHELBY.  
MACHINE FOR BREAKING AND CLEANING FIBROUS MATERIAL.

APPLICATION FILED MAR. 3, 1903.

NO MODEL.

4 SHEETS—SHEET 1.



Witnesses

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By

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Their Attorney

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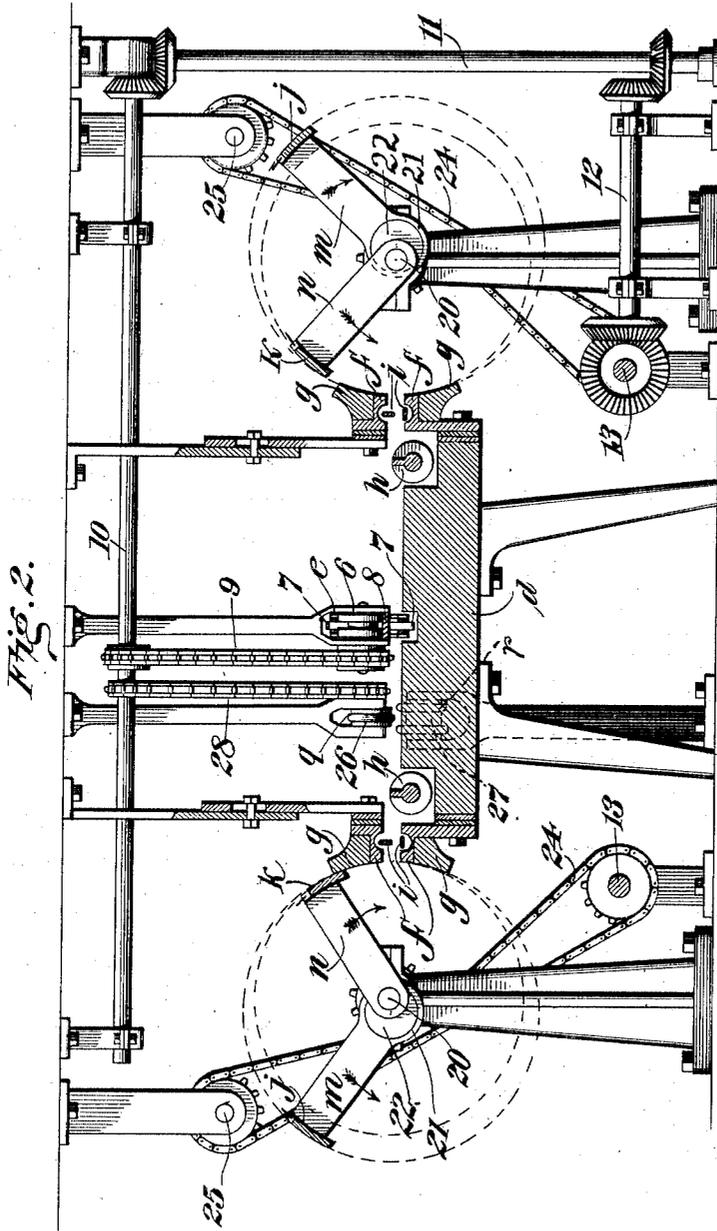


Fig. 2.

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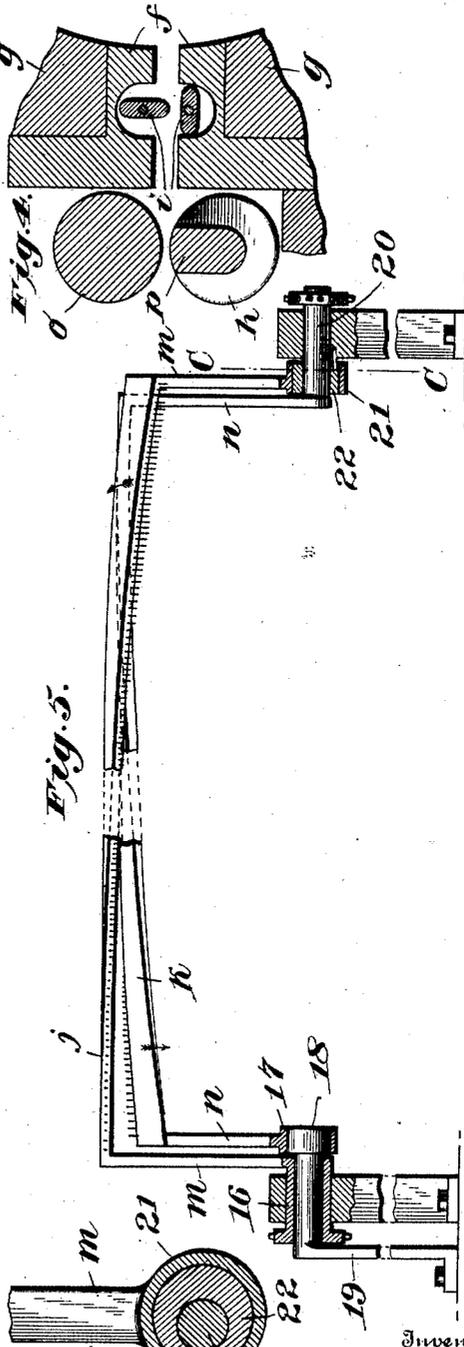
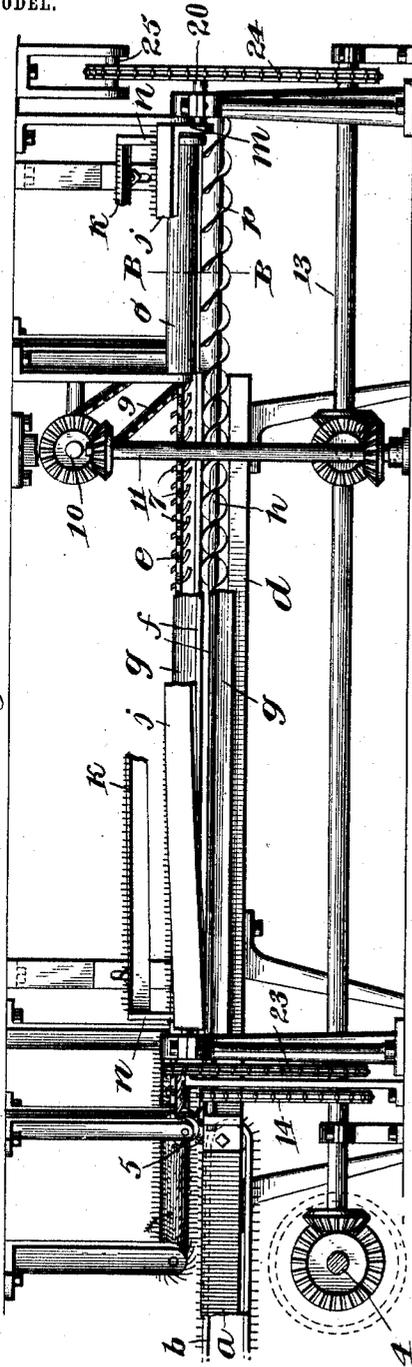
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4 SHEETS—SHEET 3.

Fig. 3.



Witnesses

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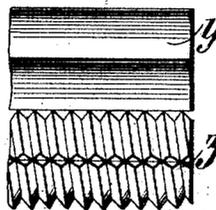
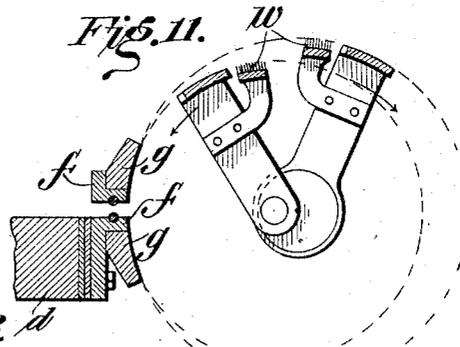
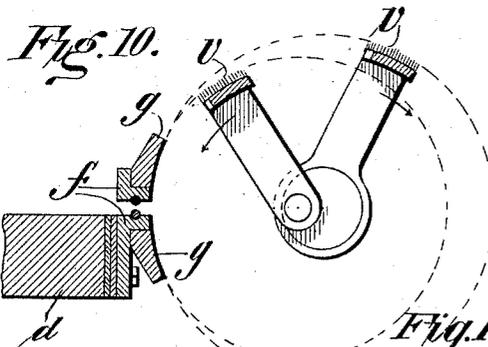
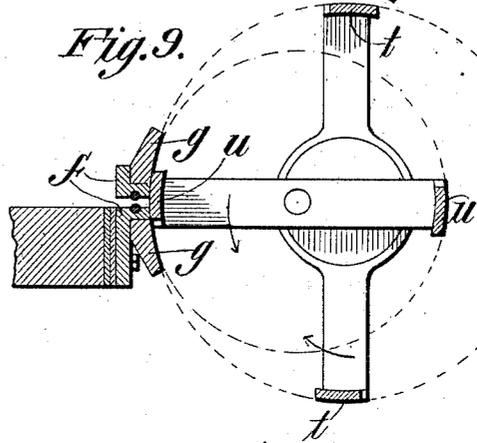
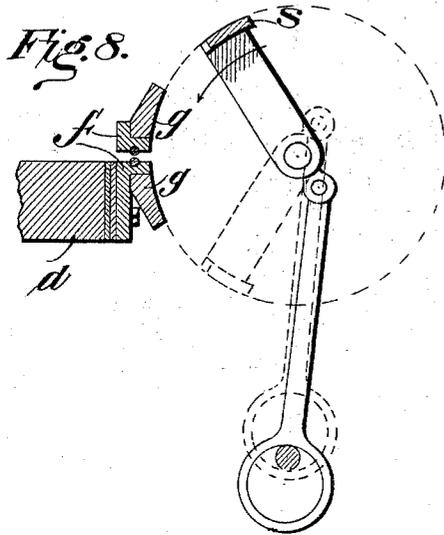
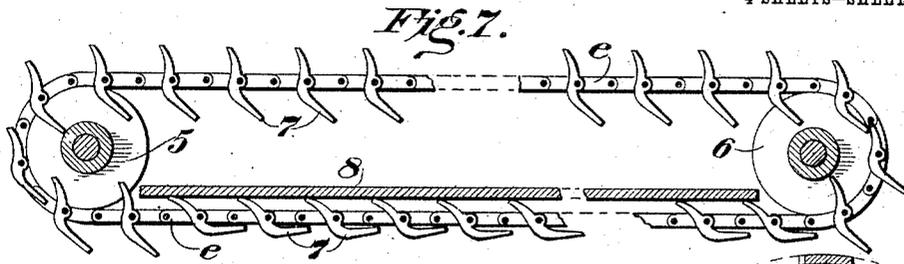
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4 SHEETS—SHEET 4.



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# UNITED STATES PATENT OFFICE.

WILLIAM ADONIRAM SHELY AND ALDA MERRILL SHELY, OF CHICAGO,  
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## MACHINE FOR BREAKING AND CLEANING FIBROUS MATERIAL.

SPECIFICATION forming part of Letters Patent No. 759,197, dated May 3, 1904.

Application filed March 3, 1903. Serial No. 145,885. (No model.)

*To all whom it may concern:*

Be it known that we, WILLIAM ADONIRAM SHELY and ALDA MERRILL SHELY, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Breaking and Cleaning Fibrous Material; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to machines for breaking and scutching or cleaning fibrous material, such as flax, hemp, jute, sisal, and other fiber-yielding plants.

The principal object is to provide an efficient machine with improved breaking and scutching mechanism adapted to operate with rapidity alternately in opposite directions upon the same portion of the material, breaking and scutching such material alternately on opposite sides thereof, whereby the tendency of unretted material to bend instead of breaking is overcome and the fibers are treated very effectively.

In certain prior machines the fibrous material is passed between rotary cylinders or reels having overlapping or intermeshing ribs or blades, between which the material is broken and more or less scutched; but such machines can effectually break only small stalks and can act only on such parts of the fibers as come between the ribs or blades, while the other parts are apt to become tangled and clogged up with the shreds and waste ejected from the superimposed portions of the fibers undergoing treatment. The present invention is essentially different from such machines in that distinct breaking and scutching actions occur in rapid alternation on the same portion of the material, the fibers being broken and scutched first on one side in one direction and then on the other side in the opposite direction and the broken portions thereof being continually whipped or combed out lengthwise during the passage of the material through the machine. The invention is distinguished by the employment of parallel break-bars, two oppositely-

moving alternately - acting breaking and scutching devices cooperating therewith. The fibrous stalks to be treated are fed laterally along and between said break-bars, and the projecting parts thereof are subjected to the rapid alternate action of said devices, which break and scutch the stalks alternately against the upper and lower break-bars and comb out the fibers lengthwise, as above explained. Means is also provided for presenting the material to the action of such breaking and scutching devices progressively from the ends of the stalks toward their centers, and preferably two sets of said parallel break-bars and cooperating devices are employed, arranged in such manner that the stalks or fibers will be treated progressively toward their centers from opposite ends simultaneously.

The invention will first be described with reference to the accompanying drawings, which form a part of this specification, and will then be pointed out more particularly in the claims annexed.

In said drawings, Figure 1 is a top plan view of a machine embodying our invention, certain overhanging parts being broken away. Fig. 2 is an enlarged transverse section thereof, taken on line A A of Fig. 1 looking in the direction of the arrow. Fig. 3 is an elevation looking directly toward one of the converging sides of the machine, parts being broken away. Fig. 4 is an enlarged detail section on line B B of Fig. 3. Fig. 5 is a detail side elevation of a preferred form of breaking and scutching mechanism. Fig. 6 is an enlarged detail section on line C C of Fig. 5. Fig. 7 is a detail view of the main carrier or feed-chain with its stalk-clamps. Figs. 8, 9, 10, and 11 represent in transverse section different modifications of the breaking and scutching mechanism. Fig. 12 is a detail view of another form of breaking and scutching mechanism; and Figs. 13 and 14 are fragmentary side and end views, respectively, of a modified form of auxiliary feed devices.

The letter *a* designates a feed-table along which the flax, hemp, or other fibrous stalks are fed laterally by endless feed-chains or carriers *b* to the breaking and scutching mech-

anisms. Extending across the delivery end of this table is a regulating-roll *c*, having backwardly-inclined teeth adapted to level the stalks and push back any oversupply thereof, thus rendering the feed of stalks to the machine practically uniform. The roll *c* and also the shaft of the rear carrier-drums are represented in Fig. 1 connected by sprocket-and-chain gearing 1 and 2 with an idle shaft 3 geared to the main driving-shaft 4. A suitable arrangement of driving mechanism is illustrated herein; but this may be modified, if desired.

Adjoining the delivery end of table *a* is a platform *d*, which is preferably substantially triangular in shape, having its sides converging toward its rear end. As the stalks pass from table *a* they are moved laterally along platform *d* by an endless carrier *e*, traveling in the medium line of said platform and provided with suitable devices for engaging the stalks. As shown, the carrier passes around drums 5 and 6, journaled in hangers, so that the lower run of the carrier travels just above the surface of the platform, and said carrier is provided with pivoted fingers 7, which at the lower run are caused to grasp the stalks by contact of the tail ends of said fingers under a fixed bar or plate 8, located between the carrier-drums. (See Figs. 2, 3, and 7.) The rear carrier-drum 6 is shown in Figs. 1 and 2 provided with a sprocket connected by chain 9 with a sprocket on an overhead shaft 10, which is driven through intermediate shafts 11 and 12 and suitable gearing from one of the side driving-shafts 13. Said shafts 13 are parallel with the converging sides of the platform and are driven from the main shaft 4 through bevel-gearing.

At each side of the platform and substantially parallel therewith a pair of break-bars *f, f* are arranged one above the other and slightly separated, so that the ends or portions of the stalks which project beyond the sides of the platform can pass between said bars. The spaces between the upper and lower break-bars are uninterrupted throughout, so that the fibrous stalks can enter freely between them at the front of the machine and pass out at the rear. As shown, the upper break-bars are fastened to hangers, while the lower break-bars are secured to the sides of the platform. In some cases the side edges of the platform could serve for the lower break-bars; but preferably both the upper and lower break-bars are made separate and are supported in such manner that they can be adjusted both vertically and laterally in order that the machine may be used for treating different fibrous materials varying in coarseness and texture. Concaves *g* may be attached to the outer sides of the break-bars, as shown in Figs. 2, 8, 9, 10, and 11. These concaves increase the scutching effect on the fibers caused by the breaking and scutching

devices which cooperate with the break-bars, as hereinafter described, and they are particularly useful where pulpy and leguminous materials are being treated.

Arranged alongside and within the opposite pairs of break-bars, and preferably slightly below the surface of the platform, are auxiliary feeding devices, which assist in moving the stalks and in keeping their ends in position. These auxiliary devices may be of any suitable type, according to the material to be treated. Those shown in Figs. 1, 2, and 3 consist of feed-screws or worm-shafts *h*, having sufficient pitch to forward the stalks along between the break-bars, said worm-shafts being driven from shafts 13 by sprocket-and-chain gearing 14. In place of these auxiliary feed-screws *h* such devices as shown in Figs. 13 and 14 might be substituted, particularly when treating such materials as sisal, plantain, and grasses. Such figures show a coarsely-threaded shaft *z*, having equidistant longitudinal grooves and a cooperating fluted shaft *y*, whose longitudinal ribs correspond with the grooves in shaft *z*. These shafts rotate oppositely and serve to feed the material and also to hold it more securely during the action of the breaking and scutching devices. Other styles of auxiliary feed devices may also be employed.

In Figs. 2 and 4 flat oppositely-rotating blades *i* are shown located in longitudinal grooves in the opposed faces of each pair of break-bars, the blades of each set being driven by providing their shafts with intermeshing gears and connecting one shaft with adjacent driving-shaft 13, as by sprocket-and-chain gearing 15. (See Fig. 1.) These blades are useful when treating hard materials. They are timed to rotate with the breaking and scutching devices and set so that the blade in the break-bar against which the break is to occur will always be flat, while the other stands vertical to clamp the stalks during the breaking operation. When treating soft materials, it is desirable to substitute rollers for said blades, as shown in Figs. 8 to 11. However, neither the blades nor the rollers are essential, and hence they may be dispensed with.

Exterior to and cooperating with each pair of break-bars is a suitable mechanism or a pair of oppositely-moving breaking and scutching devices, adapted to act in rapid alternation on the ends or parts of the fibrous stalks which project outwardly between the break-bars and break them alternately against the upper and lower break-bars. The breaking and scutching mechanism shown in Figs. 1, 2, 3, and 5 is preferred. This consists of a pair of oppositely-revolving blades *j* and *k*, one of which, *j*, describes a greater circle than the other, while their centers or axes of revolution are set eccentrically to each other, so that each blade is brought into operative relation with the break-bars when passing

them, while the blade, *k*, describing the smaller circle, revolves within the larger circle described by the other blade, permitting the blades to pass each other at diametrically opposite points in each revolution. Each blade *j* is shown supported at its ends by arms *m*, and each blade *k* is shown similarly supported by arm *n*, the latter being shorter and located within or between the former arms.

As shown in Fig. 5, the front arm *m* of each mechanism is mounted on a tubular driving-spindle 16, while the corresponding arm *n* is mounted on a hub 17, journaled on an eccentric-bearing 18, which is fixed on an arm extending through said spindle from a fixed standard 19. The rear arm *n* of each mechanism is mounted on a driving-spindle 20 in alinement with the eccentric-bearing 18, while the corresponding arm *m* is mounted on a hub 21, journaled on an eccentric sleeve or bearing 22, inclosing spindle 20 and fixed to the journal-box thereof, bearing 22 being in alinement with spindle 16. In other words, the journals of each pair of arms are in alinement, but the journals of the shorter arms are eccentric to those of the longer arms. Spindles 16 and 20 are rotated in opposite directions by suitable connections with the adjacent driving-shaft 13—for instance, by chain 23 passing around sprockets on shaft 13 and spindle 16 and chain 24 passing around sprockets on shaft 13 and idle shaft 25 and engaging a sprocket on spindle 20 at one side. In this way the blades *j* and *k* are properly supported and can be driven in opposite directions, the eccentric-bearings 20 and 22 being so adjusted that the blades can pass each other, while each blade can come close to and properly coact with its respective break-bar and concave. This rapid alternate action occurring on opposite sides of the stalks results in breaking them effectively, overcomes the tendency of unretted material to bend instead of breaking, and facilitates separation of the cellular matters, shreds, and waste. The fibers are also whipped and scraped or combed by the blades for the entire lengths thereof which project through the break-bars, and as the stalks move along the platform these projecting lengths increase, owing to the convergence of the break-bars, so that the beneficial scutching and whipping action of the blades becomes more appreciable. The continuously-lengthening fibers hang upon the blades until the latter move beyond them, and preferably the blades are revolved more rapidly than the free ends of the fibers would fall by gravity, so that the fibers are effectively scutched both by the ascending and descending blades. The blades may be provided with teeth on their rear edges, as shown, which will comb or card the fibers, particularly long fibers, as the fibers hang onto and pull over the rear edges of the retreating blades.

It is desirable to arrange the break-bars and coacting blades relatively inclined to each other, since if both were straight and parallel the entire row of stalks would be broken simultaneously, causing heavy jars and requiring more power to operate the machine. Hence the blades *j* and *k* are preferably spirally twisted or otherwise relatively inclined to the break-bars, so that they have a shear-like action with the bars, striking the stalks successively from one end of the platform to the other instead of striking the whole row simultaneously.

The beneficial effect of operating alternately in opposite directions upon opposite sides of the material can also be accomplished with a single reciprocating or oscillating device. Fig. 8 shows an oscillating blade *s* supported by a rocker-arm driven by an eccentric and pitman.

It is obvious that more than two oppositely-revolving blades might be employed in each mechanism, as illustrated in Fig. 9, where blades *t* revolve in one direction and intermediate blades *u* revolve in the opposite direction.

When the machine is to be used for treating materials which do not require breaking, such as sisal and New Zealand flax, brushes or cards *v* may be substituted for blades *j* and *k*, as shown in Fig. 10. If desired, brushes *w* may be attached to the blades to follow them in operation, as shown in Fig. 11.

Another form of breaking and scutching mechanism is represented in Fig. 12, wherein two spiral ribs or blades *r* are shown mounted on oppositely-rotating arms, the circle transcribed by one blade being larger than that transcribed by the other. This form of mechanism is illustrated and described, but not specifically claimed, in a prior application for patent for a machine for breaking and cleaning fibrous material, Serial No. 184,993, originally filed by us March 3, 1903, and renewed December 12, 1903.

As the fibers pass along platform *d* they are broken and scutched almost wholly; but their central portions, grasped by carrier *e*, must yet be treated. This is preferably performed by a continuation of one set of break-bars and coöperating mechanism which extend beyond those of the other set and beyond the rear end of the platform. To insure continued rearward feed or the material, a roller *o* is placed over the rear portion of the extended feed-screw, so as to clamp the fibers therewith just as they are released by the central carrier, and this clamping may be increased by making the extended portion of the feed-screw partly solid, so that a segment of its periphery is unbroken, as indicated at *p* in Figs. 3 and 4. As the fibers move rearward their central portions are subjected to the action of the extended breaking and scutching mechanism, so that when eventually delivered from

the machine the fibers are thoroughly cleaned throughout. To assist in moving the fibers along the extended mechanism, secondary feed mechanism may be employed, adapted to grasp the cleaned portions of the fibers passing from the shorter mechanism and carry them along until the breaking and cleaning operation is completed. The secondary feed mechanism shown consists of endless tubular compressible belts, Figs. 1 and 2, one of which, *g*, is arranged above and intermediate two others, *r*, and coöperates therewith to grasp the fibers. The upper belt *g* passes around pulleys 26, journaled in hangers, and the lower belts *r* pass around pulleys 27, mounted in standards. (See dotted lines in Fig. 2.) The belts may be driven by any suitable connection. As shown, the front pulley 26 has a sprocket connected by chain 28 with overhead shaft 10.

Owing to the convergence of the break-bars and coöperating mechanisms, as the fibrous stalks move along the supporting-platform their ends project farther and farther between the break-bars, and hence the stalks become broken and cleaned gradually from both ends toward their centers. The breaking and scutching devices are preferably alike at opposite sides of the machine, and they work together, so that the opposite ends of the stalks are operated upon simultaneously. This progressive action simultaneously on opposite halves or portions of the material results in certain practical advantages. The material does not have to be clamped so tightly by the carrier, since the pull on the stalks by each mechanism is counteracted by the pull of the opposite mechanism. As the work progresses from both ends of the stalks toward the centers, all cellular matters, shreds, and waste are separated little by little from the fibers and prevented from accumulating and clogging or encumbering the uncleaned portions of the stalks, as in the case of machines having the opposite mode of operation, in that they work from the centers toward the ends of the stalks. Furthermore, by this mode of treatment the fibers are less liable to be injured, and after the woody and cellular matters are separated the fibers are continually whipped or combed out lengthwise, and consequently are delivered from the machine in excellent condition for further treatment.

It will be understood that the word "stalks" as used in the claims includes any fibrous material capable of being treated by machines of this character. It will also be understood that the expression "alternately acting" as applied to the breaking and scutching blades includes any equivalent arrangement, such as where one blade revolves two or more times to each revolution of the other or where several blades are used, one or more of which revolve in one direction while the others revolve in the opposite direction.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a machine for treating fibrous material, breaking and scutching mechanism, means for operating said mechanism in rapid alternation in opposite directions, whereby said mechanism acts alternately on the same portion of the material, simultaneously breaking and scutching the same, and means for feeding the stalks or material laterally along said mechanism.

2. In a machine for treating fibrous material, means for holding or presenting the material endwise, and oppositely-moving alternately-acting breaking and scutching devices arranged to operate at the same point or along the same line alternately on opposite sides of the material.

3. In a machine for breaking and cleaning fibrous material, the combination with a pair of parallel and slightly-separated break-bars, between which the material is presented, of independent oppositely-moving alternately-acting breaking and scutching devices coöperating respectively with the upper and lower break-bar.

4. In a machine for breaking and cleaning fibrous material, the combination with a pair of parallel and slightly-separated break-bars, between which the material is presented, of oppositely and synchronously revolving breaking and scutching blades alternately coacting with the upper and lower break-bar respectively.

5. In a fiber breaking and cleaning machine, a pair of parallel and slightly-separated break-bars, means for feeding the fibrous material laterally along and between said break-bars, and mechanism acting repeatedly and alternately on opposite sides of the same portion of such material, breaking it alternately against the upper and lower break-bar.

6. In combination, alternately-acting breaking and scutching devices, means for causing them to act alternately and in opposite directions, and means for feeding fibers progressively thereto, whereby the fibers are repeatedly and progressively subjected to the independent actions of such devices and alternately broken and scutched on opposite sides; substantially as described.

7. In a machine for breaking and cleaning fibrous material, oppositely-revolving breaking and scutching blades arranged to operate in rapid alternation on the same portion of the material, the axle or axles of one blade enclosing the axle or axles of the other and being set eccentrically thereto.

8. In combination, adjacent break-bars, a concave beside each break-bar, breaking and scutching means beside and adapted to coact alternately with the respective break-bars and their concaves, and mechanism for operating

said means, whereby the same portion of the material is repeatedly and alternately operated on from opposite sides.

9. In combination, a pair of adjacent break-bars, a concave beside each bar, a pair of oppositely-moving alternately-acting devices coacting with said bars and concaves and means for operating said devices, whereby the same portion of the material being operated upon is repeatedly subjected to the alternate action of said devices, substantially as described.

10. In combination, adjacent concaves, oppositely-moving alternately-acting scutching devices coacting with said concaves, and means for operating said scutching devices, whereby the same portion of the fibrous material is repeatedly subjected to the alternate action of said devices, substantially as described.

11. In a fiber breaking and cleaning machine, the combination of break-bars, means for feeding the stalks laterally along said bars, and alternately-acting breaking and scutching devices cooperating with said bars and acting progressively on the stalks as they travel laterally along the bars.

12. In a machine for breaking and cleaning fibrous material, the combination with a pair of break-bars, means for presenting the stalks or fibers endwise between the same, of oppositely-moving spiral breaking and scutching blades arranged to operate alternately on the same portion of the material, striking the row of stalks successively.

13. In a machine for breaking and cleaning fibrous material, means for feeding the stalks of fibers laterally, and oppositely-moving devices arranged to operate in rapid alternation on the same portion of the material and each time successively from one end of the row of stalks presented thereto to the other.

14. In a breaking and scutching machine, a pair of break-bars, mechanism for feeding fibrous material between said bars, a pair of independent oppositely-moving and alternately-acting breaking and scutching devices opposite and respectively coacting with the break-bars, whereby the same portion of the material being operated upon is repeatedly subjected to the actions of said devices.

15. In a breaking and scutching machine, break-bars, means for feeding fibrous material between said bars, and breaking and scutching devices mounted beside and respectively coacting with the break-bars, said devices acting alternately upon the fibers projecting between the bars, with auxiliary feed devices for the fibers extending along said bars; substantially as described.

16. In a machine for breaking and scutching fibrous material, the combination of oppositely-disposed pairs of break-bars, mechanism for feeding fibrous material simultaneously between said bars, and opposite alternately-acting breaking and scutching devices

beside each pair of bars, respectively coacting with one bar of such pair; substantially as described.

17. In a breaking and scutching machine, the combination of a pair of break-bars, means for feeding fibrous material along and between said bars, and similar oppositely-rotating breaking and scutching devices mounted beside and respectively coacting with the break-bars, with auxiliary feed devices for the fibers extending along said bars, substantially as described.

18. In a machine for breaking and scutching fibrous material, the combination of oppositely-disposed pairs of break-bars, mechanism for feeding fibrous material simultaneously along and between said bars, and pairs of opposite rotary breaking and scutching devices beside each pair of bars, respectively coacting therewith, said breaking and scutching devices acting alternately, substantially as described.

19. In a breaking and scutching machine, a pair of break-bars, a concave beside each break-bar, oppositely-moving breaking-blades respectively coacting with one of the bars and its concave, and means for feeding fibers between and along said break-bars and concaves, substantially as described.

20. The combination of adjacent concaves, oppositely-moving scutching devices respectively and alternately coacting therewith, and means for feeding fibers along and between the concaves, substantially as described.

21. The combination of a pair of concaves or scutching surfaces, scutching devices beside and coacting with said concaves, and operating alternately on the same portions of the fibers, and means for feeding fibers between said concaves; substantially as described.

22. The combination of a pair of concaves or scutching surfaces, a pair of oppositely-moving scutching devices beside and respectively coacting with said concaves, said devices acting alternately on the same portions of the fibers, and means for feeding fibers between and along said concaves; substantially as described.

23. The combination of a break-bar, and a movable blade coacting therewith provided with teeth on its rear edge adapted to comb the broken fibers; substantially as described.

24. The combination of a pair of breaker-bars, and movable breaker-blades respectively coacting with said bars, said blades having teeth adapted to comb the broken fibers; substantially as described.

25. The combination of a breaker-bar and breaking mechanism coacting therewith, with an auxiliary feed-screw beside the breaker-bar; for the purpose and substantially as described.

26. The combination of the breaker-bars,

oppositely-movable breaking devices coating therewith, and means for feeding fibers along said bars, with an auxiliary fiber-feed screw beside and coating with the bars; substantially as described.

27. The combination of a pair of break-bars, means for feeding fibers therebetween, oppositely-revolving blades coating with said bars, and brushes moving with the blades; substantially as described.

28. The combination of break-bars and oppositely-revolving blades coating therewith provided with teeth on their rear edges adapted to comb the fibers after they are broken; substantially as described.

29. The combination of a pair of breaker-bars, oppositely-revolving breaker-blades respectively coating with said bars, said blades having teeth adapted to comb the fibers after they are broken, and means for feeding the fibers along and between the bars; substantially as described.

30. The combination of opposite breaker-bars, the opposite breaking mechanisms coating therewith, and an auxiliary fiber-feed screw beside each breaker-bar; for the purpose and substantially as described.

31. The combination of the breaker-bars, the oppositely-revolving breaking-blades coating therewith, and means for feeding fibers between and along said bars, with an auxiliary fiber-feed screw beside and coating with the bars; substantially as described.

32. The combination with the breaker-bars, of rotary fiber-holding devices between the bars; substantially as described.

33. The combination of the parallel breaker-bars, with the flat-sided rotary fiber-holding devices between said bars and coating therewith; substantially as described.

34. The combination of two fiber breaking and cleaning mechanisms, one being extended beyond the other, and means for feeding fibers simultaneously to said mechanisms, with an auxiliary feed for carrying the fibers along the extended portion of the longer mechanism comprising a partly-filled screw and a coating roller; substantially as described.

35. The combination of two converging fiber breaking and cleaning mechanisms adapted to operate simultaneously upon opposite ends of the same fiber, and one mechanism being extended in rear of the other, with means for feeding fibers simultaneously to and between the said mechanisms, and an auxiliary feed for carrying the fibers along the extended portion of the longer mechanism, said auxiliary feed comprising a partly-filled screw and coating roller; substantially as described.

36. In a machine for breaking and scutching fibrous material, the combination of oppositely-disposed pairs of break-bars, means for feeding fibrous material simultaneously along and between said bars, pairs of breaking and scutching devices beside each pair of

break-bars, one set of break-bars and coating breaking and cleaning devices extending beyond the other; substantially as described.

37. In a breaking and scutching machine, the combination of oppositely-disposed break-bars and means for feeding fibrous material simultaneously along said bars, with pairs of alternately-acting breaking and scutching devices beside the break-bars, one set of breaker-bars and coating breaking and scutching devices extending beyond the other, and auxiliary feed devices for moving the fibers along the extended portions of the longer break-bars; substantially as described.

38. In a machine for breaking and scutching fibrous materials, the combination of oppositely-disposed pairs of break-bars, a scutching-surface beside each break-bar, means for feeding fibrous material simultaneously along and between said bars, breaking and scutching blades beside each pair of break-bars and scutching-surfaces, adapted to alternately coact with one of the bars and its adjacent scutching-surface; substantially as and for the purpose set forth.

39. In a machine for breaking and scutching fibrous material, the combination of oppositely-disposed pairs of break-bars, means for feeding fibrous material simultaneously along and between said bars, a pair of opposite breaking and scutching devices beside each pair of break-bars, said breaking and scutching devices acting alternately, and one set of break-bars and coating breaking and cleaning devices extending beyond the other; substantially as described.

40. In a breaking and scutching machine, the combination of oppositely-disposed pairs of break-bars, and means for feeding fibrous material simultaneously along and between said bars, and a pair of opposite similar breaking and scutching devices beside each pair, said breaking and scutching devices acting alternately, one set of break-bars and coating breaking and cleaning devices extending beyond the other; with auxiliary feed devices for moving the fibers along the extended portions of the longer break-bars; substantially as described.

41. In a machine for breaking and scutching fibrous materials, the combination of oppositely-disposed pairs of break-bars, a scutching-concave beside each break-bar, and means for feeding fibrous material simultaneously along and between said bars and concaves, with breaking and scutching blades beside each pair of break-bars adapted to alternately coact therewith and with its adjacent concaves, and auxiliary fiber-feeding devices beside each pair of break-bars; substantially as and for the purpose set forth.

42. The combination of two adjacent breaking mechanisms, each adapted to repeatedly break the same portion of the material subjected thereto alternately in opposite direc-

tions; with means for actuating said mechanisms, and means for feeding fibrous material to said mechanisms, whereby opposite ends of such material are simultaneously operated upon by said mechanisms and the fibrous material cleaned from both ends progressively toward the center thereof.

43. The combination of two adjacent breaking and scutching mechanisms, each adapted to repeatedly break and scutch the same portion of the material subjected thereto alternately in opposite directions; with means for operating said mechanisms, and means for feeding fibrous material to said mechanisms whereby the opposite ends of such material are simultaneously operated upon by said mechanisms and the fibrous material progressively cleaned and scutched from both ends progressively toward the center thereof.

44. In a machine for treating fibrous material, breaking and scutching means acting upon the material repeatedly and alternately in opposite directions, and means for effecting said repeated and alternate action progressively from the ends of the stalks toward the centers.

45. In a machine for treating fibrous material, opposite mechanisms each acting repeatedly and alternately in opposite directions on opposite sides of the same portion of the material, and means for presenting the stalks to said mechanisms progressively from opposite ends thereof toward the centers, substantially as described.

46. In a fiber breaking and scutching machine, the combination of adjacent break-bars, breaking and scutching means beside and adapted to coact alternately with the respective break-bars, and mechanism for operating said means, whereby the same portion of the material is repeatedly and alternately operated on from opposite sides.

47. In a fiber breaking and scutching machine, the combination of oppositely-rotatable breaking and scutching blades, break-bars arranged parallel with such blades and provided with a space therebetween, and means for feeding the fibrous material obliquely across and between the break-bars and into engagement with such oppositely-rotatable blades, substantially as described.

48. In a fiber breaking and scutching machine, the combination of a pair of break-bars provided with a space therebetween, and breaking and scutching blades journaled beside such bars having their respective axial centers substantially in the same plane with the space between the break-bars, substantially as described.

49. In a fiber breaking and scutching machine, the combination of a pair of break-bars provided with a space therebetween, oppositely-rotating scutching-ribs journaled upon different axial centers, both of which are arranged substantially in the same plane with the space between such bars, and means for

rotating such ribs in opposite directions, substantially as described.

50. In a fiber breaking and scutching machine, the combination of two pairs of break-bars, each provided with a space between the respective bars thereof, and breaking and scutching blades journaled opposite each pair of such bars upon different axial centers, the respective journals being substantially in the same planes with the spaces between such bars, and means for rotating such blades in opposite directions, substantially as described.

51. In a fiber breaking and scutching machine, the combination of two sets of break-bars, each provided with a space between the respective bars thereof, a set of breaking and scutching blades journaled beside each set of such break-bars, and a second set of breaking and scutching blades rotatably mounted upon the same side of the break-bars and having their axial center intermediate such break-bars and the axial center of the other set of blades, substantially as described.

52. In a fiber breaking and scutching machine, the combination of two sets of break-bars, each provided with a space between the respective bars thereof, a set of breaking and scutching blades journaled beside each set of such break-bars, a second set of breaking and scutching blades rotatably mounted upon the same side of the break-bars and having their axial center intermediate such break-bars and the axial center of the other set of blades, chain-and-sprocket mechanism for operating such blades in opposite directions, and shaft-and-gear mechanism for driving such sprockets and thereby operating the breaking and scutching blades in opposite directions, substantially as described.

53. In a fiber breaking and scutching machine, the combination of a pair of break-bars provided with a space therebetween, a set of breaking and scutching blades journaled beside such bars and having their outer sides describing surfaces in parallel relation to the bars, and a second pair of breaking and scutching blades journaled on the same side of such bars having their axial center intermediate the break-bars and the axial center of the other set, substantially as described.

54. In a fiber breaking and scutching machine, the combination of a pair of break-bars provided with a space therebetween, a set of breaking and scutching blades journaled beside such bars and having their outer sides describing surfaces in parallel relation to the bars, a second pair of breaking and scutching blades journaled on the same side of such bars having their axial center intermediate the break-bars and the axial center of the other set, similar break-bars and breaking and scutching blades mounted obliquely to and extending at one end beyond the ends of such bars and blades, means for feeding fibrous material obliquely between both sets of bars,

supplementary feeding mechanism comprising endless belts for feeding the fibers to the extended end of the break-bars and breaking and scutching blades, means for operating the  
5 feeding mechanism, and means for rotating the breaking and scutching blades, substantially as described.

55. In a fiber-treating machine, guides or bars along between which the material is fed  
10 at an angle, and mechanism for operating repeatedly and in opposite directions upon the

same portion of the material as it travels angularly between said guides or bars, the latter holding the material to the action of said mechanism.

In testimony whereof we affix our signatures  
in presence of two witnesses.

WILLIAM ADONIRAM SHELY.

ALDA MERRILL SHELY.

Witnesses:

FRANK CLARK,

JOHN EDWARD WARD.