W. A. & A. M. SHELY.

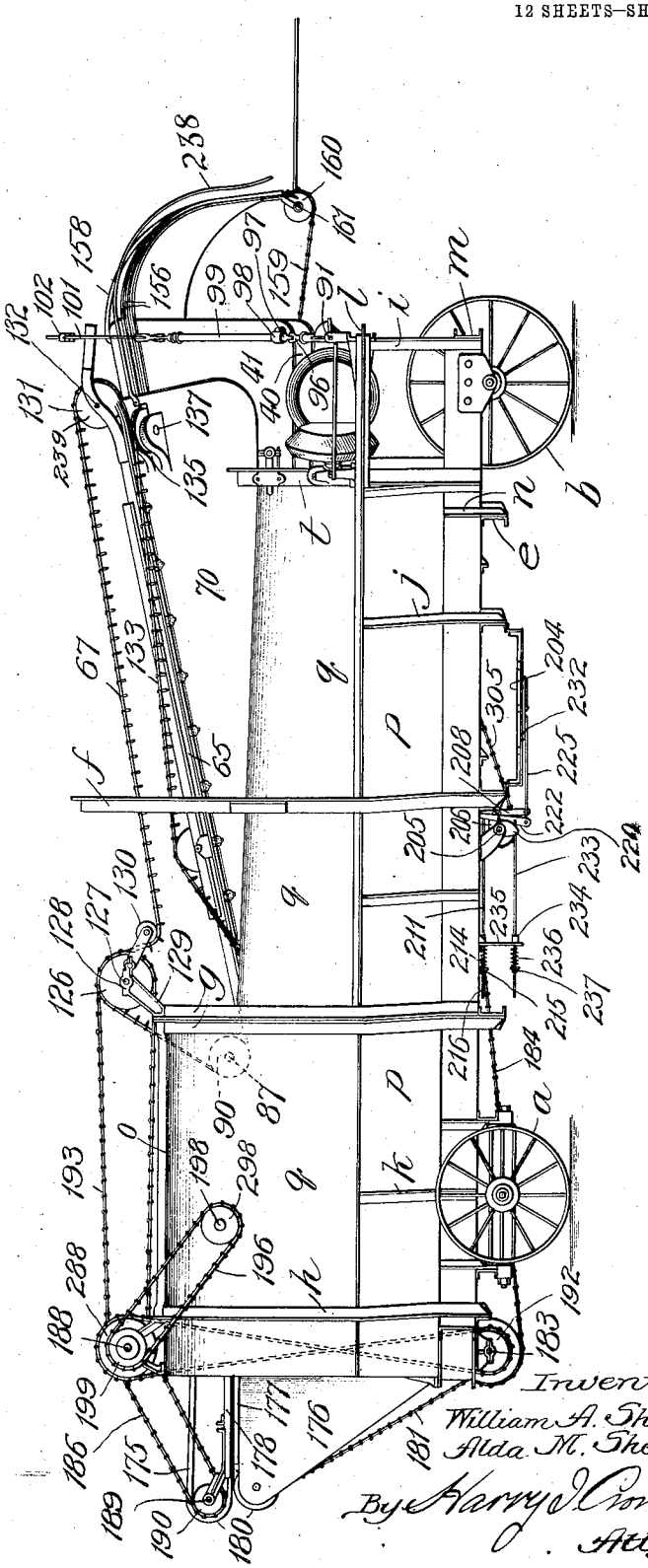
MACHINE FOR BREAKING AND CLEANING FIBROUS MATERIAL.

APPLICATION FILED AUG. 8, 1905. RENEWED MAY 29, 1912.

1,047,998. Patented Dec. 24, 1912.

12 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Chas. E. Clayton.
John Enders.

Inventors:
William A. Shely and
Alda M. Shely,
By Harry J. Conner
Atty.

W. A. & A. M. SHELY.

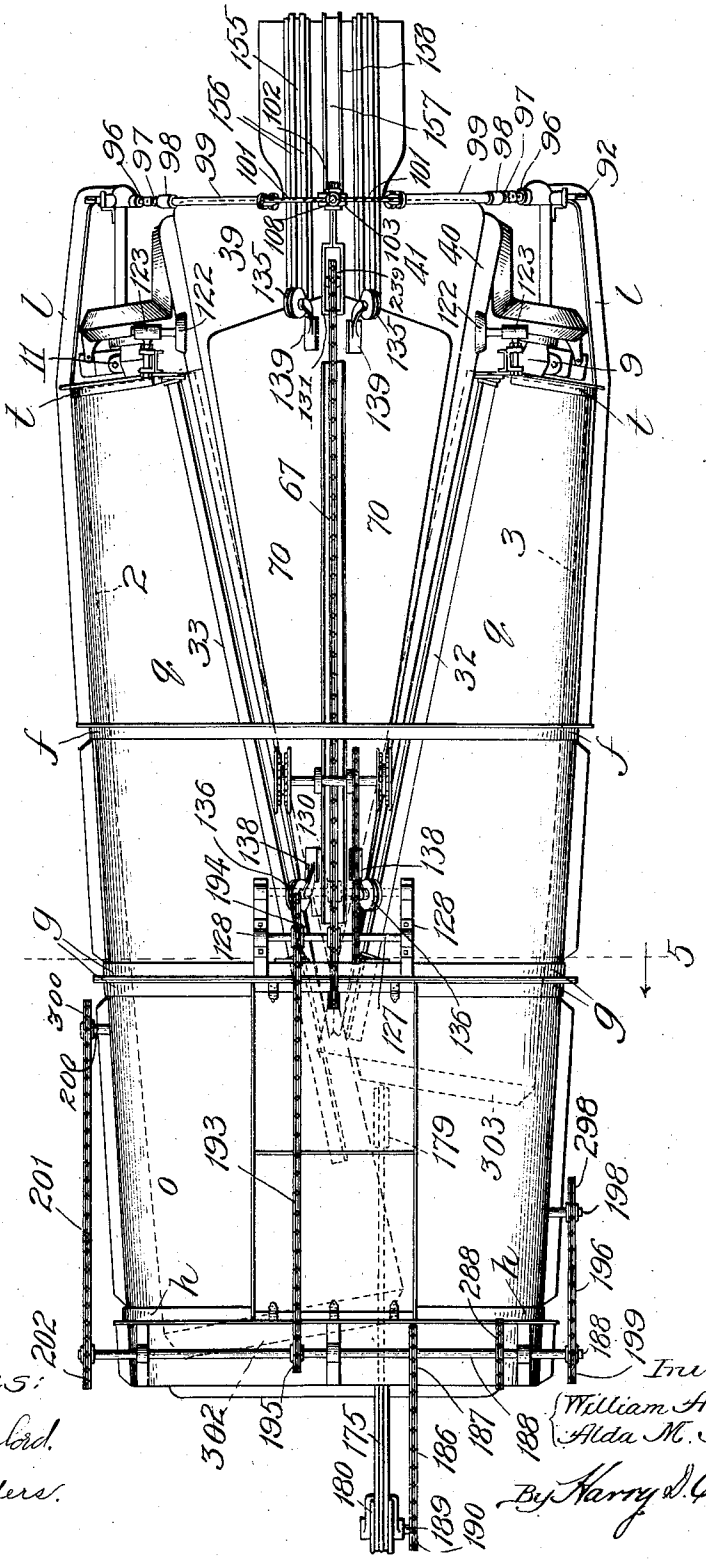
MACHINE FOR BREAKING AND CLEANING FIBROUS MATERIAL.

APPLICATION FILED AUG. 8, 1905. RENEWED MAY 29, 1912.

1,047,998. Patented Dec. 24, 1912.

12 SHEETS—SHEET 2.

Fig. 2.



Witnesses:
E. E. Gaylord.
John Enders.

Inventors:
William A. Shely and
Alda M. Shely,
By Harry D. Power
Atty.

W. A. & A. M. SHELY.

MACHINE FOR BREAKING AND CLEANING FIBROUS MATERIAL.

APPLICATION FILED AUG. 8, 1905. RENEWED MAY 29, 1912.

1,047,998. Patented Dec. 24, 1912.

12 SHEETS—SHEET 3.

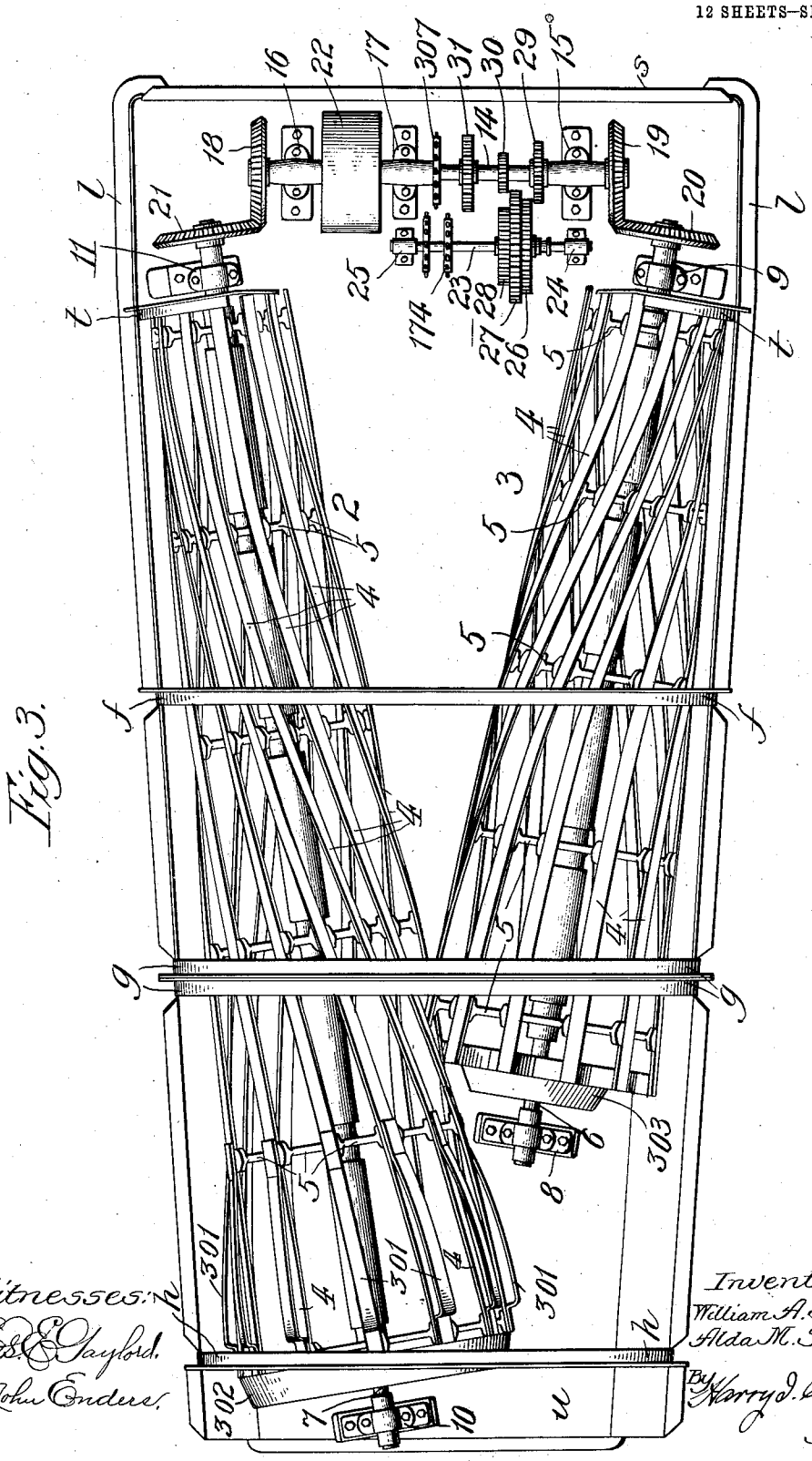


Fig. 3.

Witnesses:
Chas. E. Gaylord.
John Enders.

Inventors:
William A. Shely and
Alda M. Shely,
By Harry D. Gamer
Atty.

W. A. & A. M. SHELY.

MACHINE FOR BREAKING AND CLEANING FIBROUS MATERIAL.

APPLICATION FILED AUG. 8, 1905. RENEWED MAY 29, 1912.

1,047,998. Patented Dec. 24, 1912.

12 SHEETS—SHEET 4.

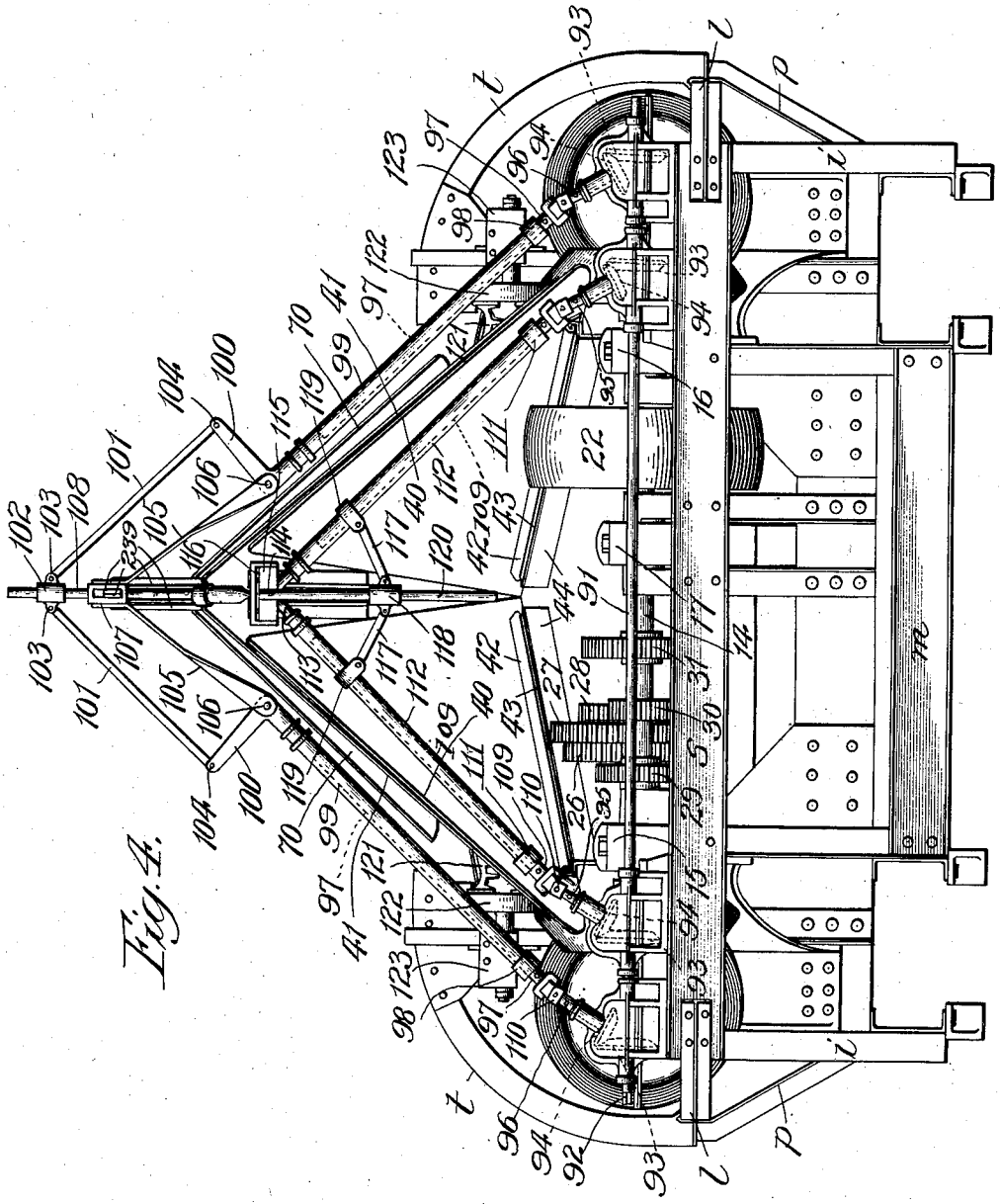


Fig. 4.

Witnesses:
Chas. E. Gaylord.
John Enders.

Inventors:
{ William A. Shely and
Alda M. Shely.
By Harry D. Cromer
Atty.

W. A. & A. M. SHELY.

MACHINE FOR BREAKING AND CLEANING FIBROUS MATERIAL.

APPLICATION FILED AUG. 8, 1905. RENEWED MAY 29, 1912.

1,047,998. Patented Dec. 24, 1912.

12 SHEETS—SHEET 5.

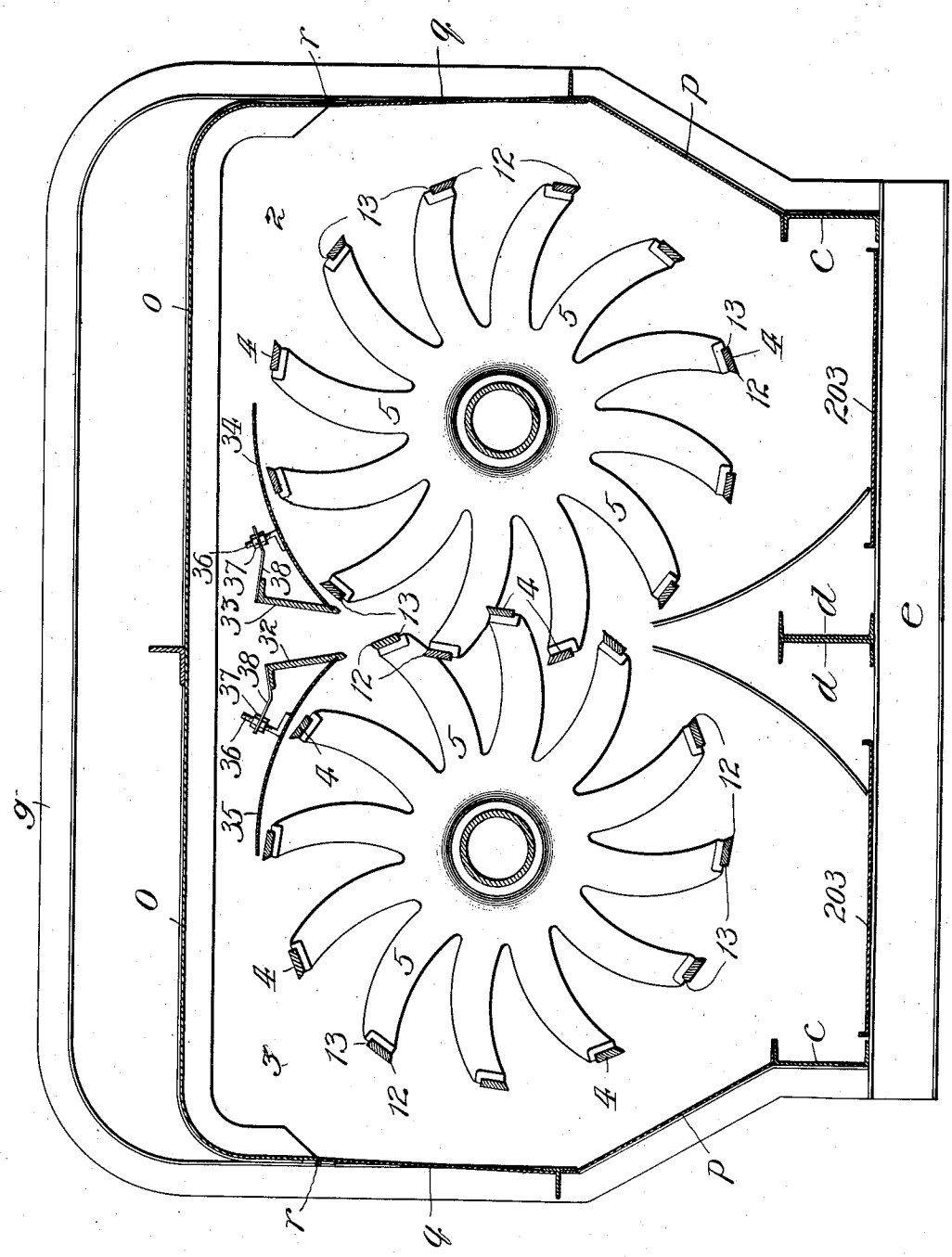


Fig. 5.

Witnesses:
E. S. Gaylord.
John Enders.

Inventors:
{ William A. Shely and
Alda M. Shely,
By Harry J. Power
Atty.

W. A. & A. M. SHELY.

MACHINE FOR BREAKING AND CLEANING FIBROUS MATERIAL.

APPLICATION FILED AUG. 8, 1905. RENEWED MAY 29, 1912.

1,047,998. Patented Dec. 24, 1912.

12 SHEETS—SHEET 6.

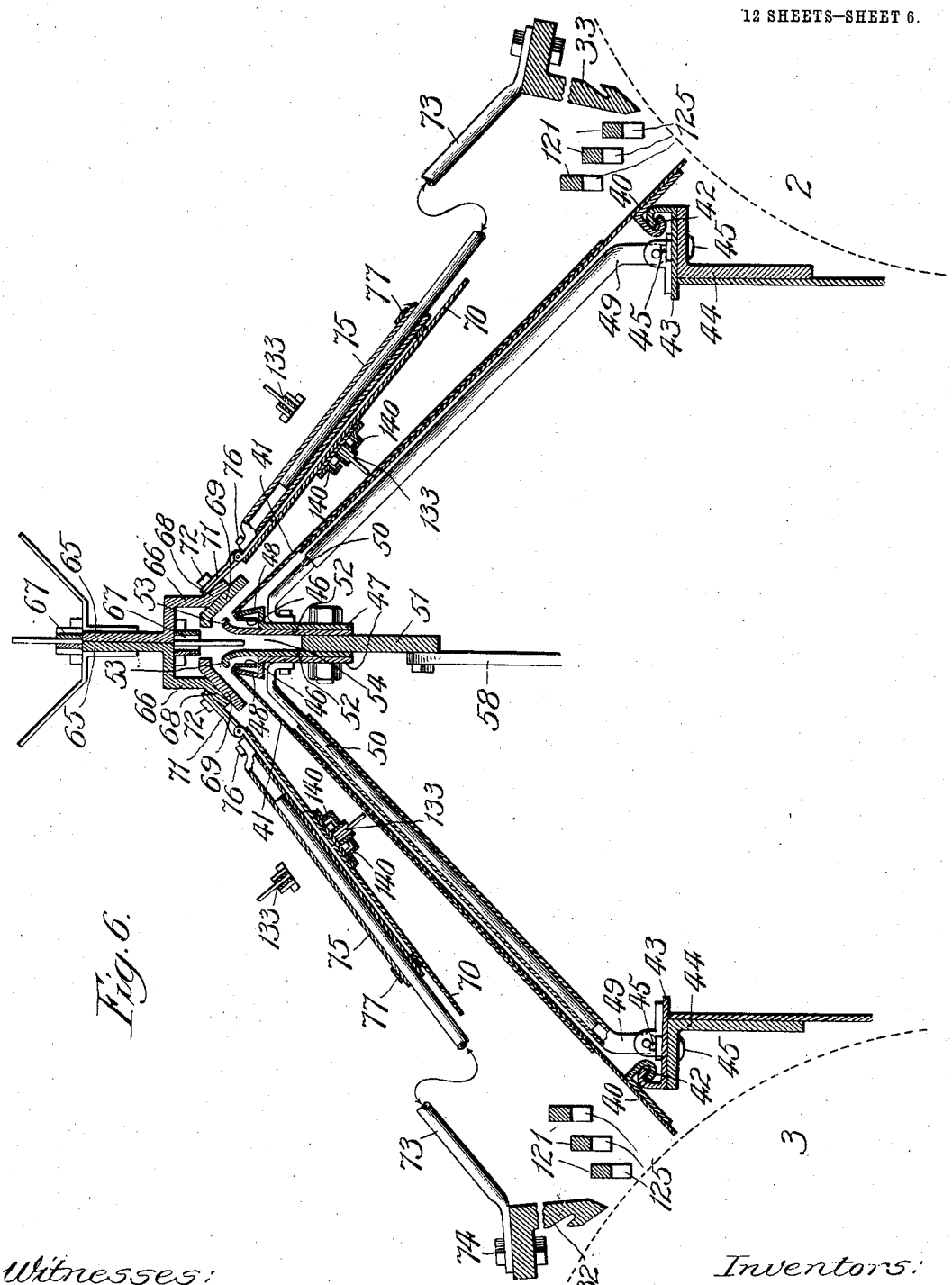


Fig. 6.

Witnesses:
C. C. Skyford.
John Enders.

Inventors:
William A. Shely and
Alda M. Shely,
By Harry D. Power
Atty.

W. A. & A. M. SHELY.

MACHINE FOR BREAKING AND CLEANING FIBROUS MATERIAL.

APPLICATION FILED AUG. 8, 1905. RENEWED MAY 29, 1912.

1,047,998. Patented Dec. 24, 1912.

12 SHEETS—SHEET 7.

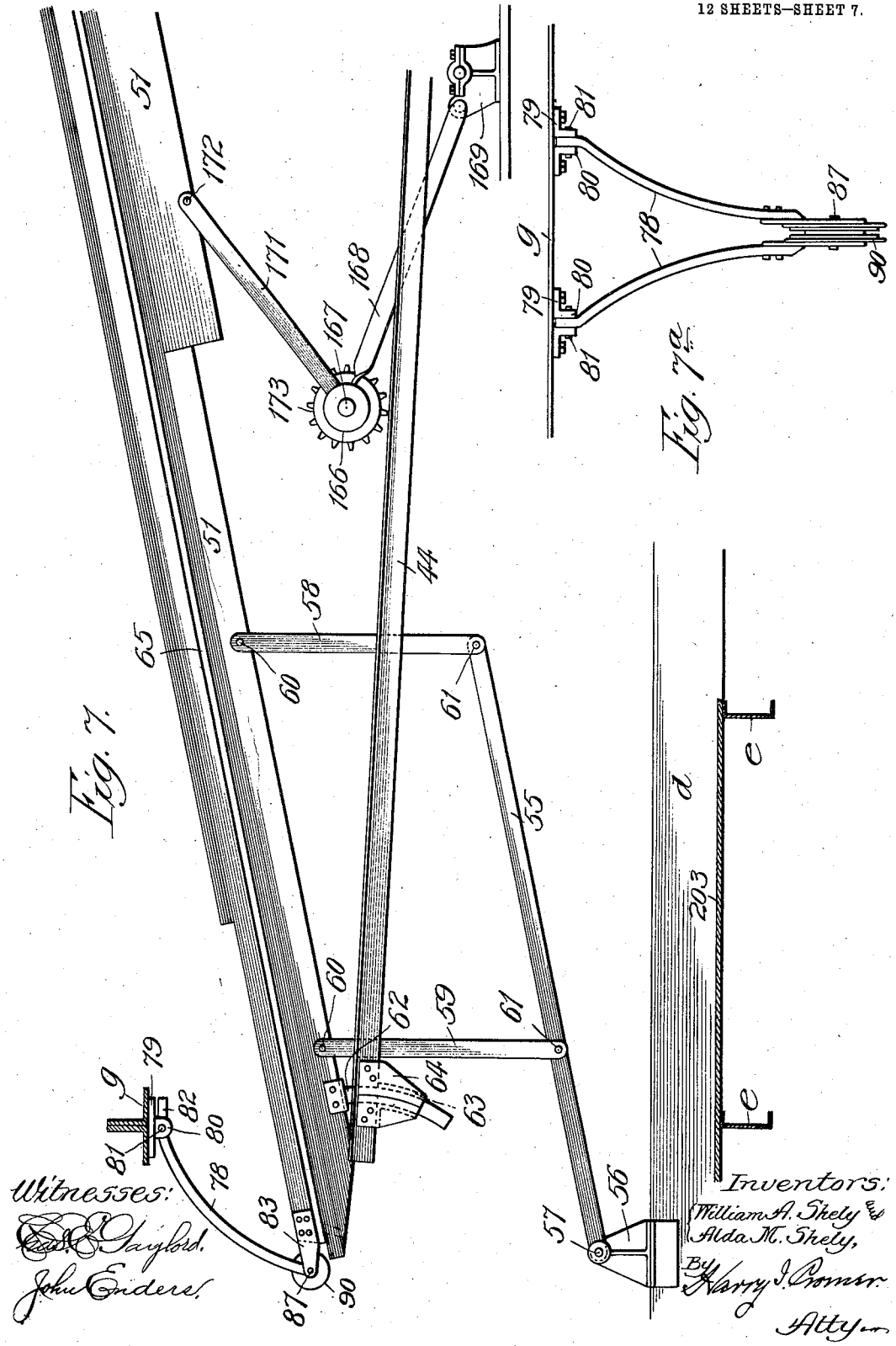


Fig. 7.

Fig. 7a.

Witnesses:
C. E. Gaylord.
John Enders.

Inventors:
William A. Shely &
Alda M. Shely,
By Harry J. Bonner
Atty.

W. A. & A. M. SHELY.

MACHINE FOR BREAKING AND CLEANING FIBROUS MATERIAL.

APPLICATION FILED AUG. 8, 1905. RENEWED MAY 29, 1912.

1,047,998. Patented Dec. 24, 1912.

12 SHEETS—SHEET 8.

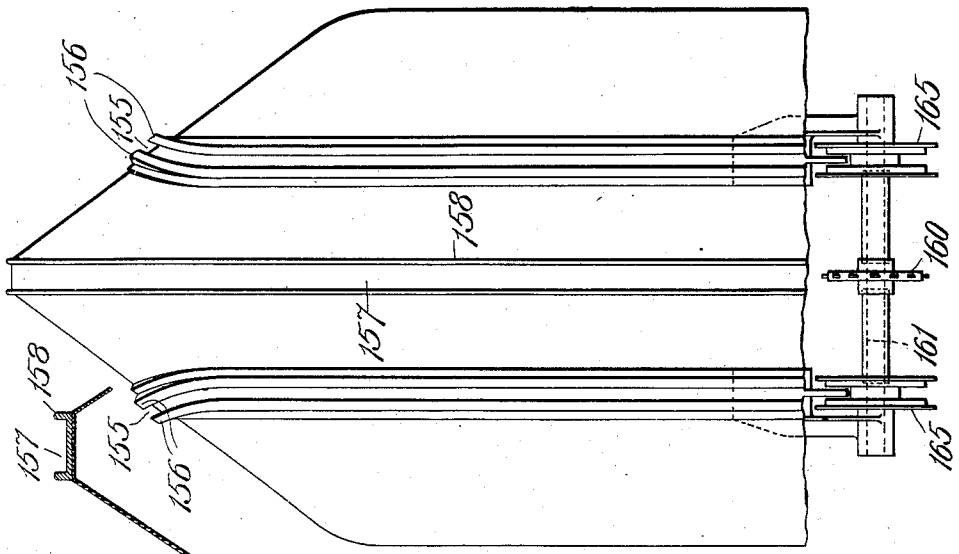


Fig. 8.

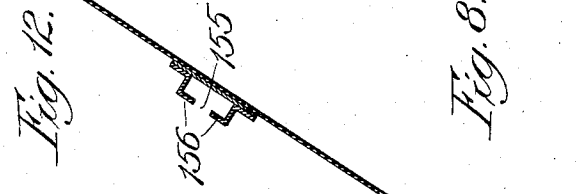


Fig. 12.

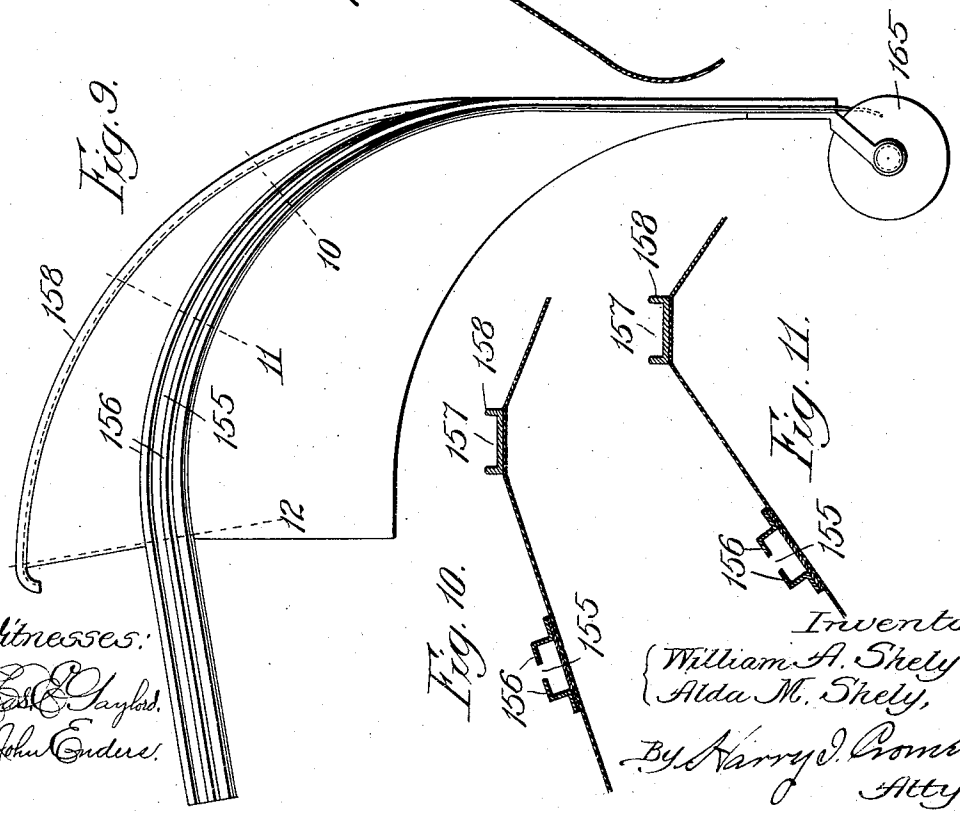


Fig. 9.

Fig. 10.

Fig. 11.

Witnesses:
Chas. E. Gaylord.
John Enders.

Inventors:
William A. Shely and
Alda M. Shely,
By Harry J. Conner
Atty.

W. A. & A. M. SHELY.

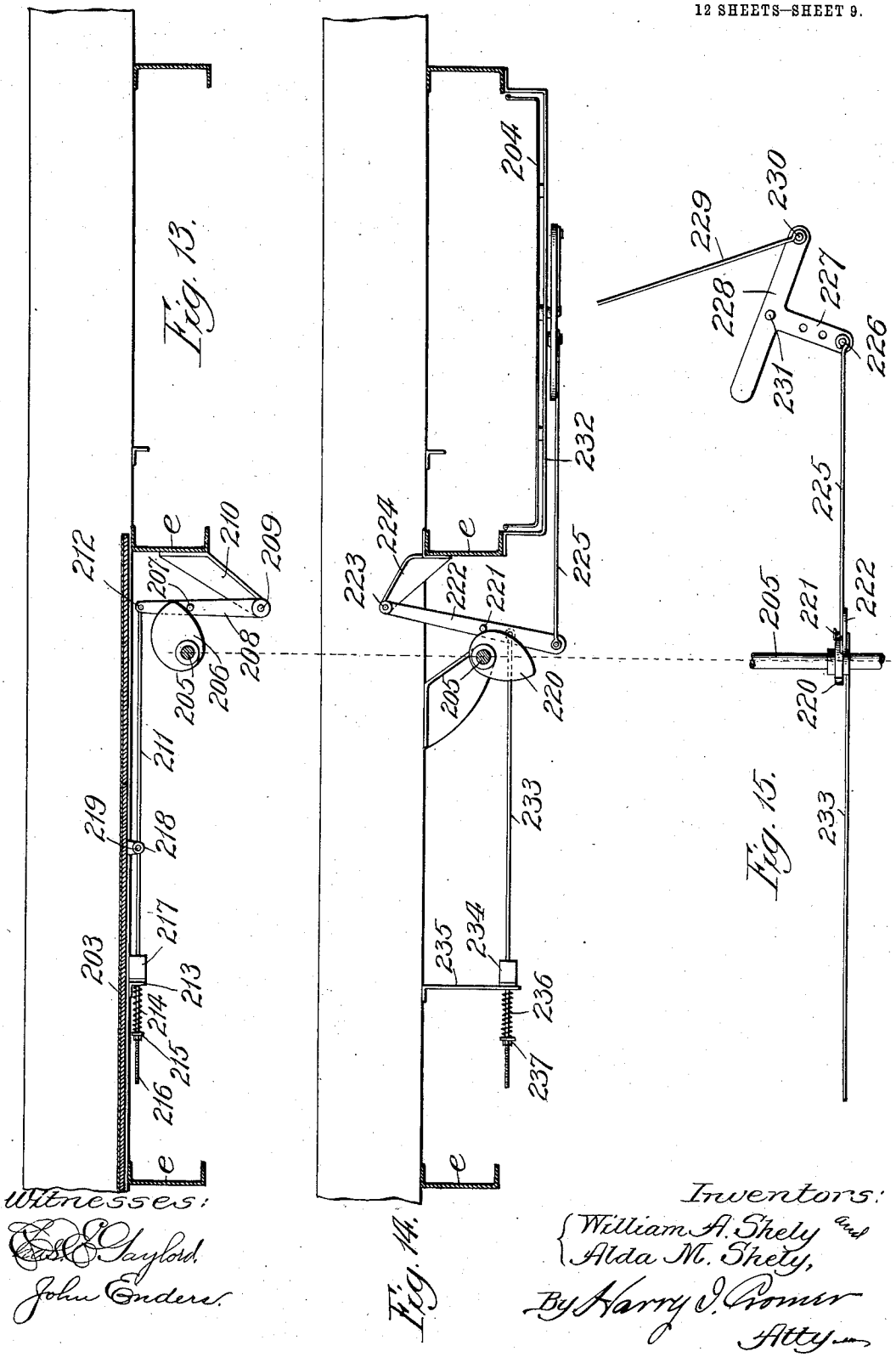
MACHINE FOR BREAKING AND CLEANING FIBROUS MATERIAL.

APPLICATION FILED AUG. 8, 1905. RENEWED MAY 29, 1912.

1,047,998.

Patented Dec. 24, 1912.

12 SHEETS—SHEET 9.



Witnesses:
Chas. S. Gaylord.
John Enders.

Inventors:
{ William A. Shely and
Alda M. Shely,
By Harry J. Cromer
Atty.

W. A. & A. M. SHELY.

MACHINE FOR BREAKING AND CLEANING FIBROUS MATERIAL.

APPLICATION FILED AUG. 8, 1905. RENEWED MAY 29, 1912.

1,047,998. Patented Dec. 24, 1912.

12 SHEETS—SHEET 10.

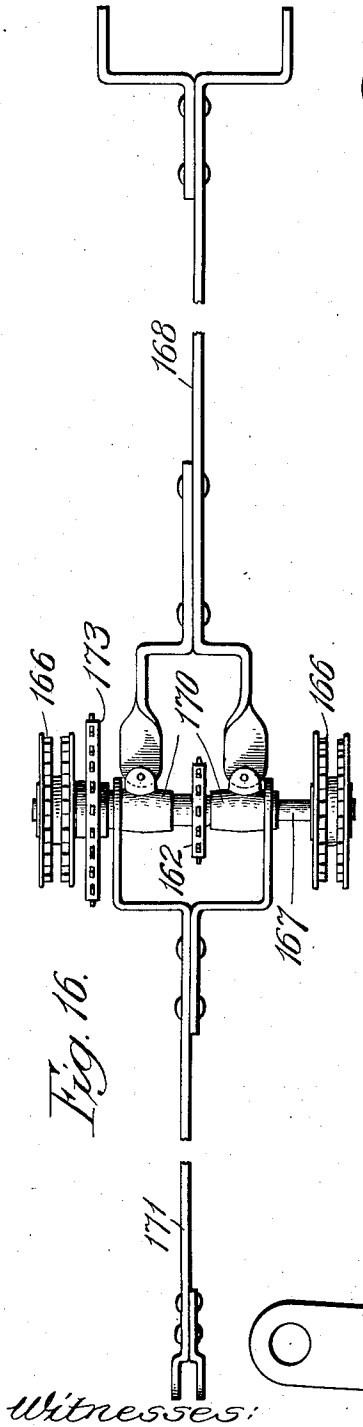


Fig. 16.

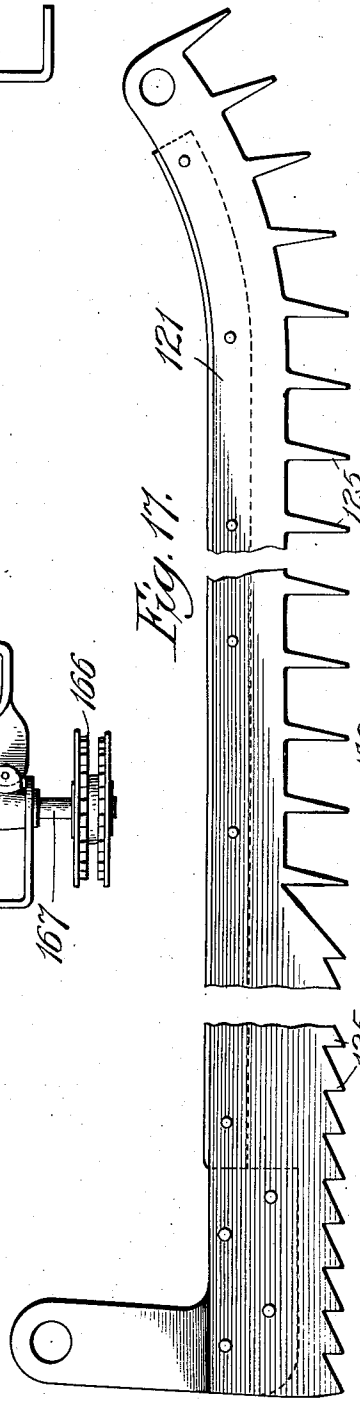


Fig. 17.

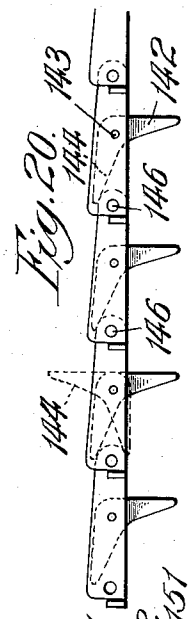


Fig. 20.

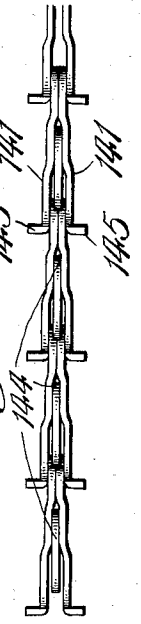


Fig. 21.

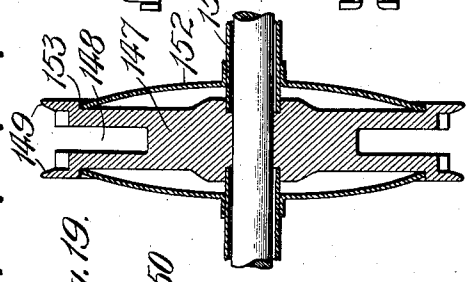


Fig. 19.

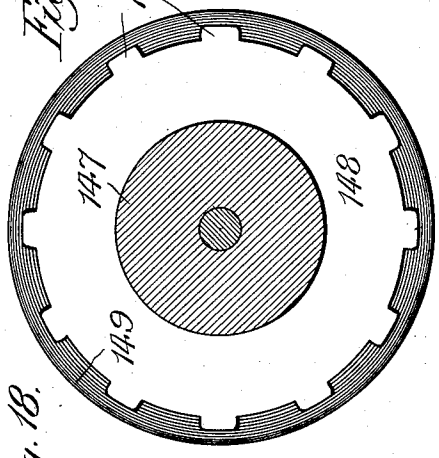


Fig. 18.

Witnesses:
Chas. E. Gaylord.
John Enders

Inventors:
{ William A. Shely and
Alda M. Shely,
By Harry D. Bonner
Atty.

W. A. & A. M. SHELY.

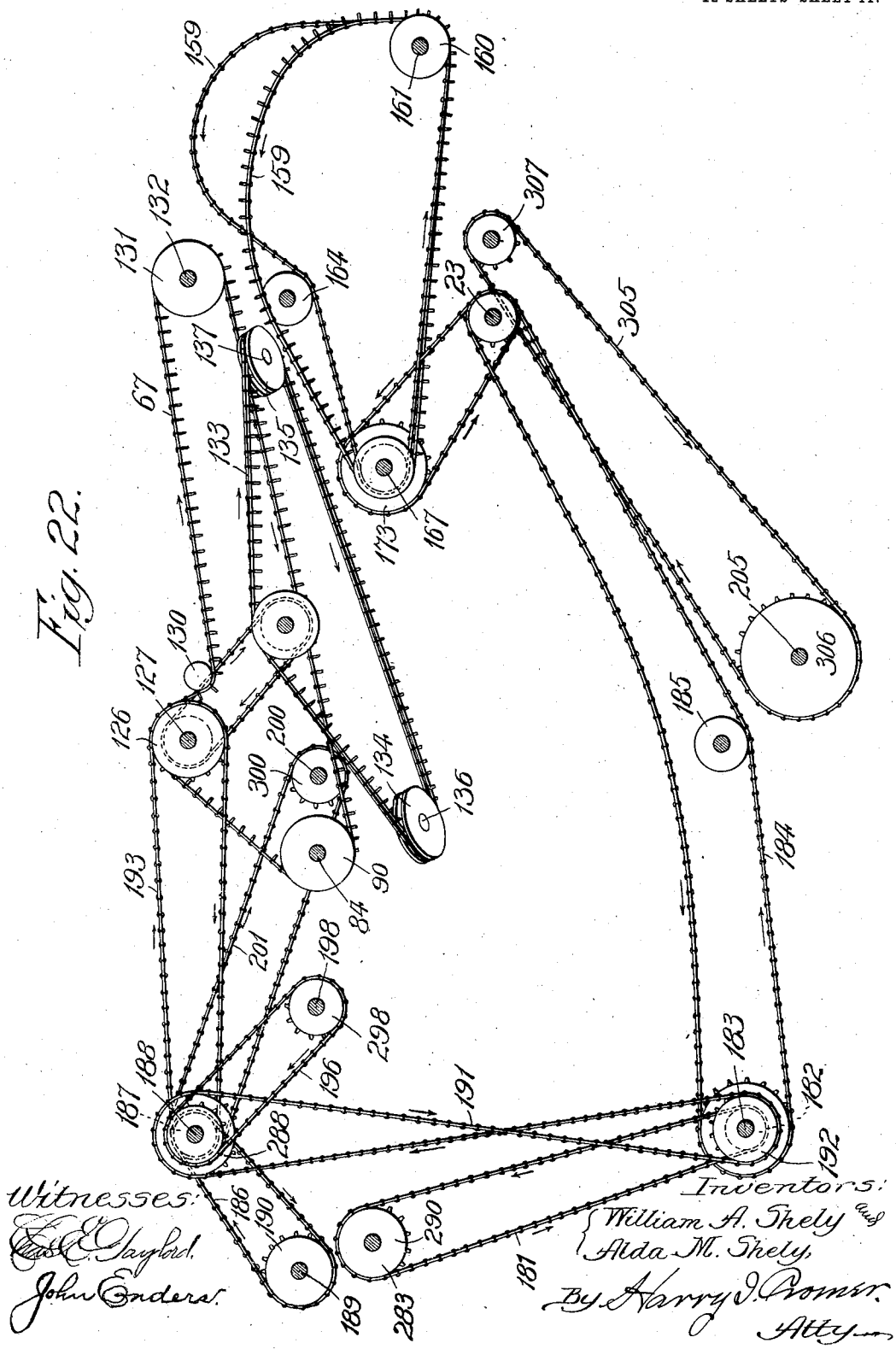
MACHINE FOR BREAKING AND CLEANING FIBROUS MATERIAL.

APPLICATION FILED AUG. 8, 1905. RENEWED MAY 29, 1912.

1,047,998. Patented Dec. 24, 1912.

12 SHEETS—SHEET 11.

Fig. 22.



Witnesses:
Chas. E. Gaylord.
John Enders.

Inventors:
William A. Shely and
Alda M. Shely,
By Harry D. Bonner.
Atty.

W. A. & A. M. SHELY.

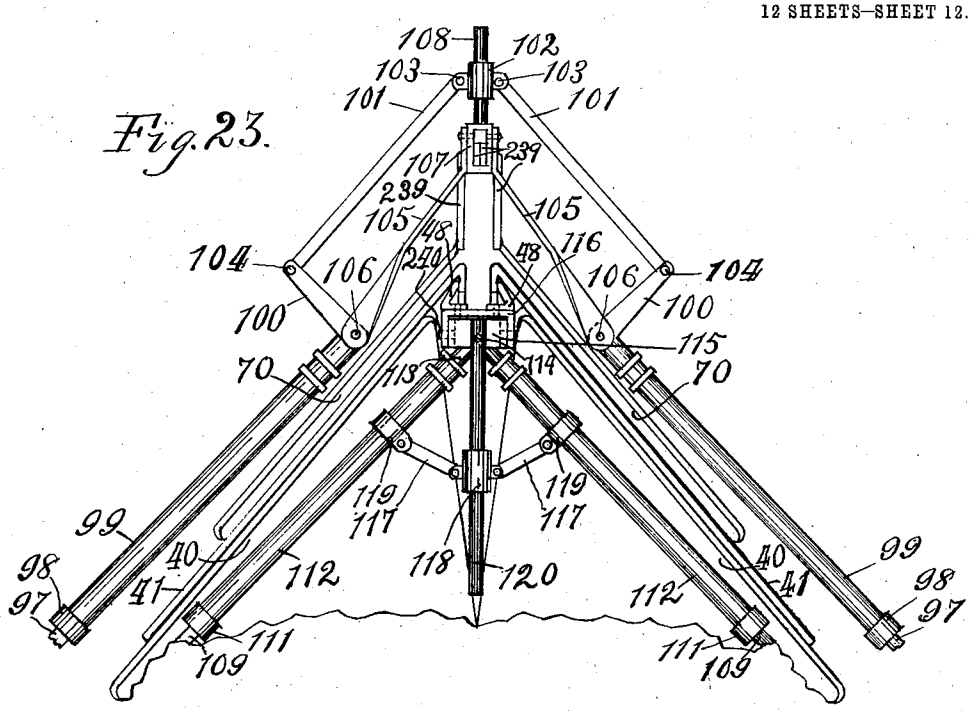
MACHINE FOR BREAKING AND CLEANING FIBROUS MATERIAL.

APPLICATION FILED AUG. 8, 1905. RENEWED MAY 29, 1912.

1,047,998. Patented Dec. 24, 1912.

12 SHEETS—SHEET 12.

Fig. 23.



Witnesses:
Nellie E. George.
Rufus Cope

Inventors.
William A. Shely and
Alda M Shely
By Harry J. Cromer
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM A. SHELY AND ALDA M. SHELY, OF CHICAGO, ILLINOIS.

MACHINE FOR BREAKING AND CLEANING FIBROUS MATERIAL.

1,047,998. Specification of Letters Patent. Patented Dec. 24, 1912.

Application filed August 8, 1905, Serial No. 273,252. Renewed May 29, 1912. Serial No. 700,544.

To all whom it may concern:

Be it known that we, WILLIAM A. SHELY and ALDA M. SHELY, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have jointly invented certain new and useful Improvements in Machines for Breaking and Cleaning Fibrous Material, of which the following is a specification.

This invention relates to machines for breaking and scutching, or cleaning, fibrous material, such as flax, hemp, sisal, rami, and other fibrous plants and materials.

In the art to which this invention relates machines are known which are adapted to feed the stalks laterally into contact with rotary cylinders arranged in oblique relation to each other and having spiral ribs or beater blades, the stalks being fed between break bars and such cylinders, as illustrated and described in our former United States Patents Nos. 759,197, 759,198 and 759,199. A feed table having inclined sides and provided with feed chain mechanism and reciprocating or vibrating toothed bars for feeding the stalks—such table being adapted to have its apex raised and lowered—is also known.

It is found in practice, however, that in machines having rotary beaters which are cylindrical—in other words, of the same diameter throughout their entire length and provided with mechanism for feeding stalks laterally at a substantially uniform speed into position to be operated upon by such cylinders from the ends of the stalks toward the center—the ends of the stalks will be beaten and scutched to a greater extent than the central portions. It is also found to be very desirable that the rotary beaters should be of skeleton or open-work form and that the beater blades should have an outer peripheral surface portion receding toward the heel of the blade; that suitable means should be provided for holding the portion of the stalks projecting beyond the breaker bar in position to be thoroughly scutched and cleaned by the rotatable beaters—the shield mechanism for thus holding the fiber being adjustable; that means be provided whereby the central portion of the stalks may be subjected to the operation of the "long cylinder" or rotatable beater after passing beyond the breaking edge of the breaker bar, so as to be thoroughly whipped and cleaned before being discharged from the machine, that a suitable feed chain-supporting device should be provided in the form of a saddle mounted above the apex of the main feed table and having suitable means for supporting such saddle and its feed chain mechanism in parallel relation to the upper edge or apex of the main feed table in different adjusted positions; and that means be provided for raising and lowering the apex of the main feed table and the saddle, with its feed chain mechanism, to different adjusted positions and holding them parallel in any desired adjusted position.

It is likewise desirable to provide means for enabling the apex of the main feed table to be raised and lowered and the inclined side portions thereof extended or collapsed as desired, without materially altering the position of the lower edges of the table with relation to the break bars and rotary beaters, and without materially altering the position of the lower end of the apex or rear point of the central ridge of the table, and also adapted to permit the lower rear portions of the feed chain mounted upon the saddle to extend as closely as possible to the point of convergence between the rotary beaters and the feeding mechanisms.

It is also desirable to provide means for keeping the feed chains in operative position with relation to the feed tables and saddle, and taut in all positions to which they may be adjusted in use; to provide a portable framework suitably inclosed and adapted to cover the rotary beaters and efficiently support the working parts; to provide means for preventing the fiber from winding around the rotating parts in the form of stationary shields for all rotating parts of the machine, including the shafts and wheels; to provide suitable means for discharging the hurds or pith of the stalks from the machine; and to provide simple and efficient mechanism for operatively connecting and driving or operating the various parts which constitute the complete organized machine.

The principal object of our invention is to provide a simple, economical and efficient machine for breaking and scutching or cleaning fibrous material, possessing the advantages and adapted to accomplish the desirable purposes above set forth.

Other and further objects of the invention will appear from an examination of

the drawings and the following description and claims.

The invention consists in the features, combinations and details of construction hereinafter described and claimed.

In the accompanying drawings—Figure 1 is a side elevation of a machine constructed in accordance with our improvements; Fig. 2 a plan view of the machine; Fig. 3 a plan view of the conical rotary beaters with the upper parts of the machine removed; Fig. 4 a front end elevation, showing the mechanism for raising and lowering the feed table and saddle mechanism; Fig. 5 an enlarged transverse sectional elevation, taken on line 5 of Fig. 2 looking in the direction of the arrow and showing the rotary beaters and the break bars and shields and inclosed framework in section; Fig. 6 a sectional distorted detail view in transverse elevation of the upper portion or main feed table, and saddle mechanism, with other parts removed, and showing the position of the rotary beaters in dotted lines; Fig. 7 a longitudinal sectional elevation of a portion of the machine, showing the mechanism for supporting the main feed table so as to permit its adjustment vertically; Fig. 7ª a rear elevation in detail showing the bracket or supporting arm which supports the rear end of the saddle; Fig. 8 a front view of the supplementary feed table; Fig. 9 a side view thereof; Fig. 10 a fragmentary sectional view, taken on line 10 of Fig. 9; Fig. 11 a fragmentary sectional view, taken on line 11 of Fig. 9; Fig. 12 a similar view, taken on line 12 of Fig. 9; Fig. 13 a longitudinal detail sectional view in elevation, showing the longitudinally vibrating hurd-discharging pan and its operating mechanism; Fig. 14 a similar longitudinal detail sectional view in elevation, showing one of the transversely vibrating hurd-discharging pans with its operating mechanism; Fig. 15 a detail plan view of the shaft and bell crank lever and rod mechanism for operating the hurd-discharging pans; Fig. 16 a plan view of the mechanism for movably supporting the central sprocket wheel shaft mechanism; Fig. 17 a detail view in elevation of one of the vibrating toothed feed parts, with bars broken away; Fig. 18 a view in elevation of one of the sprocket wheels for operating the toothed feed chains, such as the top central feed chain; Fig. 19 a sectional view of the sprocket wheel shown in Fig. 18, showing the kind of non-rotatable casing or shield used on all rotating shafts and exposed wheels; Fig. 20 a detail view in elevation of a fragment of one of the toothed feed chains; Fig. 21 a plan view of the chain shown in Fig. 20; Fig. 22 a diagrammatic view of the driving and feed chain mechanisms of the machine and the shaft and wheel mechanism for operating and supporting the same and Fig. 23 a detail view in elevation of the mechanism for supporting, guiding and adjusting the forward ends of the saddle and feed table respectively.

In constructing a machine for breaking and cleaning fibrous material in accordance with our improvements, a portable framework formed preferably entirely of metal is provided. This framework is mounted upon front and rear supporting wheels *a* and *b* in any ordinary and well-known manner, and is provided with side sills *c* extending longitudinally of the machine,—preferably in oblique relation to each other,—forming a bottom framework somewhat wider at the forward feeding end of the machine than at its rear or discharging end. Longitudinal center sills are provided, formed of channel irons *d*, and these longitudinal center sills are supported upon the transverse beams *e*, which are also formed preferably of channel beams with their outer ends suspended from the side sills, as hereinafter described. A plurality of metallic stays or bows *f*, *g* and *h* are provided, formed of angle irons, each of which extends transversely across the framework and has its opposite ends extending downward on opposite sides of the framework and secured to one of the transverse or needle beams *e* and the side sills, the upright portions of such bows forming what may be termed side stakes having their upper ends connected by the upper portions of the bows. Side stakes or upright side frame members *i*, *j* and *k*, formed of angle irons, extend upward and outward at an incline above the side sills to longitudinal side rails *l* formed of T-irons, the stake members *i* being secured to a transverse channel beam *m* forming the end sill, and the members *j* being secured at their bottom ends to one of the transverse needle beams. The remaining transverse needle beams are each provided at their outer ends with upright tie pieces *n*, formed of angle irons and secured to the side sills, by means of which such transverse beams are suspended from the side sills, so as to support the longitudinal center sills and floor.

The inclosing shell is formed of metallic top plates *o*, inclined side plates *p*, and side doors *q*, pivotally secured on the opposite sides of the machine by means of hinges *r*. An upper transverse rail or end sill *s* extends across the front or feed end of the machine, being formed preferably of channel iron, and curved upright stays or ribs *t* extend upward and inward from the side T-rails *l* near the front end of the machine, forming additional supports for the curved outer inclosing shell portion. These side T-rails are curved at their forward ends and secured to the upper transverse end beam or rail *s* at the forward end of the machine, and

a transverse end sill *u* is provided at the rear or discharge end, extending from side to side of the frame. A suitably inclosed framework is thus provided, adapted to cover the operating parts to a sufficient extent to prevent the hurds from being thrown out in all directions when the machine is in operation and to form a protecting cover for the rotary beaters hereinafter described.

In order to provide breaking and scutching mechanisms adapted to operate upon the stalks from their opposite ends toward their centers in such manner that they will be beaten uniformly as far as possible throughout their entire length and without being injured by excessive beating at the opposite ends or insufficient beating throughout their central portions, rotary beaters 2 and 3 are provided, which are conical in form, being of less diameter at their forward than at their rear ends. These beaters are each formed of a multiplicity of spiral metallic beater bars or blades 4, which extend longitudinally thereof, providing spaces therebetween, each of such spiral beater blades being secured to the outer ends of the arms of supporting spiders or skeleton wheels 5, which are mounted in fixed relation to the shafts 6 and 7, respectively, of such rotary beaters, such spiders being each of larger diameter in the direction of the rear ends of the beaters. These rotary beater-supporting shafts are journaled in bearing boxes 8, 9, 10 and 11, which are mounted in the framework of the machine, and said shafts and beaters extend in oblique relation to each other longitudinally of the machine, converging at substantially the longitudinal center and having their forward and smaller ends diverging so as to form a space between the beaters in the form of an acute angle, over which the feeding table and feeding mechanisms hereinafter described are mounted. The diverging arms of these spiders, with the spiral beater blades, thus form rotating skeleton frames which are conical in general outline and adapted to beat the material more rapidly at the large rear ends of the beaters, and while the more central portion of the stalks are exposed to the action of the beater blades.

In order to enable the material to be operated upon to be thoroughly broken and cleaned, without weakening or breaking the fibers longitudinally in the process of breaking and scutching the hurds therefrom, thus minimizing the production of tow, the outer faces of the spiral beater blades or bars are inclined inward from their front edges 12 rearward to their heels or rear edges 13, as shown in Fig. 5. One of the rotary beaters is made longer than the other and extends rearward beyond the point of convergence of the beaters and transversely of the machine across its longitudinal center, so that fibrous material lying transversely of the machine and fed laterally of the stalks will have its central portion exposed to the action of such relatively large rearwardly projecting end portion of the longer rotary beater, as hereinafter more particularly described.

To provide means for rotating the beaters and operating the machine, a main driving shaft 14 is mounted at the forward or feed end of the machine, extending transversely thereof and journaled in the bearing boxes 15, 16 and 17. This main driving shaft is provided at its opposite outer ends with bevel gear wheels 18 and 19 in toothed engagement with similar gear wheels 20 and 21, which are mounted upon and in fixed relation to the rotary shafts of the beaters above described at the forward ends of such shafts. A main driving belt pulley 22 is mounted upon the main driving shaft, adapted to be connected by means of a belt with an engine or any suitable source of power. A supplementary shaft 23 is mounted parallel with the main driving shaft and journaled in bearing boxes 24 and 25, being provided with suitable spur gears 26, 27 and 28 slidably mounted and feathered so as to rotate therewith, such gears being adapted to engage spur gears 29, 30 or 31, respectively, on the main shaft, according to the relative speed at which the supplementary shaft is required to be driven by the main shaft and gear mechanism. The speed of the supplementary shafts may thus be changed when desired. These spur gears of the main driving and supplementary shafts are adapted to be moved into and out of toothed engagement with each other by the movement of the said gears upon the supplementary shaft in either direction longitudinally of the main shaft and into or out of toothed engagement with the desired gear wheel on such main shaft.

Break bars 32 and 33 extend in oblique relation to each other and in substantially parallel relation to the rotary beaters above described on the inner side of such beaters and above their centers. Between the lower edges of the break bars and the spiral beater blades of the rotary beaters, the fiber is required to be fed, in order to be broken therebetween. One of these break bars—that which is adjacent to the longer of the two conical rotary beaters—is made longer than the other and longer than the short rotary beater, so that after the fibrous material passes beyond the short rotary beater, its central portion may be subjected to the action of the longer beater. The lower edge of this longer break bar is cut away near its rear end, so that it extends upward at an incline toward the rear end adjacent to the enlarged portion of the long beater, and the beater blades of the longer beater are pro-

vided with laterally projecting portions 301 secured thereto, which extend out laterally and toward the rear end of the beater at an incline forming a bulging or enlarged portion, adapted to whip out the hurds remaining in the fiber after the fiber passes beyond the short beater or scutching cylinder. Stationary conical guiding shields 302 and 303, formed of sheet metal and of less diameter at their large ends than the beaters, are mounted at the discharge ends of the beaters, so as to extend under the ends of the spiral beater blades and project downward and rearward at an incline beyond the ends of the beaters, guiding the fibrous material away as it is discharged.

By making the rotary beaters conical, as above described, it will be readily seen that the beating of the fiber is more uniform and better results are therefore obtained and less tow or waste produced than would be possible with rotary beaters of equal diameter throughout their length—the fibrous material being fed at a uniform speed, as required, in order to enable the feeding to be constant. It is also very desirable to provide means for holding the fiber or projecting portions of the stalks in position to be operated upon by the rotary beaters while extending beyond the edge of the break bars against the spiral beater blades, and after having the hurds broken or partly scutched out. It is also desirable that the extent to which the stalks are subjected to the action of the beaters in this manner be gaged and modified as desired. In order to accomplish this, schutching shields 34 and 35 are provided, having concave lower scutching surfaces substantially parallel with respective rotary beaters and extending from the lower edges of the break bars in the arc of a circle outward over the rotary beaters, as shown particularly in Fig. 5. These shields extend substantially the entire length of the breaker bars and rotary beaters, one being longer than the other, corresponding to the difference in length of such breaker bars.

To enable the scutching shields to be adjusted with relation to the rotary beaters, each shield is provided with a threaded stud 36, and an adjusting nut 37 is mounted in threaded engagement with each of such studs and held in position by means of a supporting arm 38, which is secured to the adjacent breaker bar and extends over the shield. The nuts being thus held constantly at the same distance from the rotary beaters, it will be readily seen that the shields may be moved toward or from the rotary beaters and held in any desired adjusted position and at the most suitable distance therefrom by the rotation of the nuts in the required direction. By means of these shields the fiber is caused to bound back against the rapidly rotating spiral beater blades, and vibrates between the scutching shields and blades until the hurds are thoroughly beaten out and the fiber thoroughly cleaned. The extent to which the stalks are subjected to this scutching operation while between the shields and the rotating blades may be governed with great accuracy, and changed as required by the nature and condition of the material.

It is well known that hemp and other material to be operated upon varies greatly in length, and in order to provide suitable means for feeding such material between the breaker bars and rotary beaters and enable the feeding mechanisms and feed table to be adjusted as required by the different lengths of the stalks to be treated—so that the efficiency of the device and particularly of the feeding mechanism in operation will not be diminished by reason of the different adjusted positions of the parts, a feed table 39 is provided, which is triangular in form, having its side edges in oblique relation to each other and substantially parallel with the rotary beaters and breaker bars. This table is formed preferably of triangular inclined lower side portions 40 and overlapping upper triangular side portions or folds 41, formed of sheets of metal of the desired weight and mounted in sliding engagement with each other, so that both sides of the table are adapted to be extended or collapsed and the central or apex portion raised or lowered, as desired. The lower folds or sections of the table are flexibly secured near their lower edges by means of hook members 42, which are formed of angle irons having their inwardly and downwardly projecting flanges bent to form hooks, as shown particularly in Figs. 4 and 6, such angle irons being secured to the under side of the lower sections of the feed table by means of rivets, or in any ordinary and well-known manner. Similar hooks 43 are mounted upon fixed angle iron members 44 of the supporting framework, to which they are secured by means of bolts 45, in hooked engagement with the hooks 42 upon the feed table, so that the lower edges of the feed table are thus flexibly held in position and adapted to permit the sides of the table to be adjusted to different inclines, without materially changing the position of the lower edges of the table with relation to the rotary beaters and break bars.

The upper sections of the feed table are provided with depending flange portions 46, forming hooks, which are in hooked engagement with longitudinally extending metallic supporting plates 47, having upper transversely extending angles 48 adapted to engage the depending flanges of such upper feed table members and forming a flexible joint and suitable support for holding such members in operative position. This per-

mits the feed table to be adjusted with its apex and sides at any desired angle which conditions may require. To afford additional rigidity and strength to the feed table and enable the adjustments to be made without injuriously affecting its efficiency, hollow pipes or tubes 49 are flexibly secured at their lower ends near the lower edges of each of the lower sections of the feed table, and pipes 50, having an outer diameter substantially equal to the inner diameter of such lower pipe sections, extend slidably into the lower pipe sections and have their upper ends flexibly secured near the upper edges of the upper sections of the feed table—as shown in Fig. 6—thus providing telescopic pipe or tube mechanism adapted to permit the adjustment of the table and form a suitable support, and means for increasing the rigidity of the relatively movable sections or folds of the table.

The back bone or center rail of the collapsible and extensible feed table comprises, as already suggested, two side members 47. These side members are secured to a central member 51, which is mounted therebetween and extends—with the side members—the entire length of the feed table, as shown in Figs. 6 and 7. Interposed between the central member of the back-bone or center rail and the side members are upwardly projecting plates or backbone members 52, having outwardly curved upper edge portions 53 which form the central supports for the stalks as they are moved along the feed table. These outwardly curved members, being mounted on opposite sides of the central member of the back-bone, extend above the upper edge of such central member and provide a space 54 therebetween, as shown in Fig. 6.

In order to provide suitable means for pivotally supporting the feed table and permitting its movement in a vertical plane upon a pivotal center at the rear end thereof, a pivoted guiding and supporting bar 55 has its rear end pivoted in a supporting bracket 56, by means of a pivot pin 57 which is directly beneath the rear point or lower end of the apex of the table. This bar is connected with the back-bone or center rail of the table by means of upright links 58 and 59, which are of equal length and in parallel relation to each other, and are thus adapted to hold the pivoted supporting and guiding bar 55 constantly in parallel relation to the back-bone and apex of the feed table—the links being pivotally connected to the back-bone or center rail by means of pivots 60 and to the pivoted supporting and guiding bar by means of pivots 61, as shown in Fig. 7.

To permit the pivotal movement of the apex portion of the table—which is required in order to extend and collapse the inclined sides to correspond with the length of the stalks—and at the same time prevent undesirable longitudinal movement, a curved depending guide bar or segment 62 is mounted upon the center rail or back-bone of the table, a short distance forward of the rear end thereof, and extends slidably into a similarly curved or segmental slot 63 in a guide 64, which is secured to a fixed portion of the framework—such as the angle iron 44 shown in Fig. 7. This arrangement of supporting and guiding mechanisms for the apex and vertically movable central portions of the feed table enables the pivotal point of such movement to be at the end of the backbone or point of the table, without needlessly occupying the space at the point of convergence of the rotary beaters and feed table apex. The bottom edges of the table being hinged to rigid portions of the supporting frame, the lengthening of the sides of the table is accomplished by raising the central ridge and upper leaves or folds, without materially affecting the position of the lower edges and extreme rear end of the table.

In order to provide suitable means for feeding the material longitudinally of the table and laterally of the stalks, so that the stalks are gradually fed between the break bars and rotary beaters in such manner as to enable them to be operated upon progressively and simultaneously from the outer ends toward the center, and in order to enable such feeding mechanism to be raised and lowered to correspond with the raising and lowering of the apex of the feed table, we provide what may be termed a saddle, comprising a pair of upper Z-bars 65, which are secured together and extend longitudinally over and parallel with the apex or backbone of the feed table throughout its entire length, each of such Z-bars having lower angular portions 66 which extend outward laterally. A space is thus provided between the Z-bar members of the saddle ridge in the form of a slot which extends throughout the length of such saddle portion and forms a guiding slot for a toothed central feed chain 67, hereinafter more particularly described. To form a suitable support for such feed chain, the extreme lower edges of the Z-bars are bent out laterally, so as to form downwardly and outwardly extending inclined flanges 68, to which a pair of similarly inclined side plate members 69 are secured. The upper edges of the inclined side plates extend inward and in parallel relation to each other and form supporting tracks for the lower lap of the central feed chain 67, which passes between the Z-bar members above described. Side flaps or wings 70, formed of sheet metal and preferably rectangular, are pivotally secured at their upper edges to the central ridge portion of the saddle, by means of

hinges 71 and bolts 72. Extensible and collapsible supports for the pivoted inclined side flaps of the saddle are provided, in the form of telescoping pipes, each set of which consists of a lower pipe member 73 secured loosely or flexibly at its lower end to the breaker bar by means of a bolt 74, which passes through an elongated slot in the end of the pipe, and an outer telescoping pipe member 75 secured at its upper end, by means of a bolt 76, to the pivoted flap of the saddle near its upper edge. The lower ends of these outer pipe members are secured near the lower edge of the pivoted flap members by means of metallic straps 77, which form loops of sufficient length to permit a slight play of the pipe members longitudinally of the saddle. These telescoping pipes may thus be moved with the saddle members or plates 70 to different inclined positions. The rear end of the saddle is so mounted as to have a slight vertical movement in order to enable it to accommodate itself to the somewhat varying quantities of the stalks which are required to pass between it and the apex of the feed table. To accomplish this, supporting arms 78 are pivotally secured at their upper ends to a fixed member of the framework, such as the angle iron bow or stay *g*, by means of supporting brackets 79, having depending lugs 80, through which lugs and supporting arms a pintle or pivot pin 81 extends. The upper ends of these supporting arms may project beyond the point of pivotal connection with the fixed frame member as at 82, so as to limit the downward movement of such supporting arms; and the lower ends of such arms are connected with the rear end of the saddle by means of a bracket 83 secured to the saddle and pivotally connected with the lower ends of the supporting arms by means of a stub shaft 87, which is mounted in rearwardly extending arm portions of the bracket 83 as shown in Fig. 7. This stub shaft may also rotatably support an idler sheave pulley 90, which is mounted thereon between the arms of the bracket 83 and over which pulley the central toothed feeding chain 67 extends, as more particularly hereinafter described.

In order to provide means for supporting the front ends of the feed table and saddle mechanism and for simultaneously raising and lowering them while in parallel relation and supporting them in different adjusted positions, we provide an operating shaft 91, mounted in suitable bearings in the framework and extending transversely across the forward end thereof, as shown in Fig. 4, such shaft being provided with a squared end portion 92 for receiving a crank, by means of which it may be operated. A pair of bevel gears 93 are mounted at each end of this shaft in toothed engagement with bevel gears 94 upon the lower inclined ends of stub shafts 95 and 96, respectively. The inclined stub shafts 96 are operatively connected, by universal joint members, with the lower ends of upwardly extending supporting screws 97, which are spirally threaded and in engagement with the threaded axially perforated sleeve portions 98 of hollow pipe or tube members 99, which extend upward at an incline and are operatively connected with the saddle on opposite sides thereof and at its front end. These supporting and operating hollow tube members 99 are each provided at their upper ends with an upwardly and outwardly projecting arm 100. The outer ends of such arms are each provided with an inclined link 101, each of such links having their upper ends pivotally connected to a sleeve 102 by means of pivots 103, and their lower ends pivotally connected to the outer ends of the arms 100 by means of pivots 104. Links 105 have their lower ends pivotally connected to the operating and supporting pipes 99 at or near their axial centers, by means of pivots 106, and their upper ends riveted to a sleeve or socket member 107 having a horizontal perforation into which extend the forward ends of the curved arms 239 which are rigidly secured to the saddle, and between which arms is mounted the pulley or wheel 131 which supports the central or main toothed feed chain 67. A vertical guiding rod 108 extends downward through the axial perforation of the slidable sleeve 102 and is rigidly secured at its lower end to the sleeve or socket member 107 which supports the arms 239 and thereby the forward end of the saddle and the forward portion of the main feed chain. The rod thus forms a guide adapted to hold the saddle constantly in a central position and prevent any play thereof transversely of the machine when the saddle is being raised or lowered.

Upwardly extending supporting and operating screws 109 are secured to the inclined stub shafts 95 by means of universal joint members 110, which are identical with the universal joint members which connect the stub shafts 96 with the operating screws 97. Axially perforated and threaded sleeves 111, mounted upon and in fixed relation to pipes 112, are in threaded engagement with said screws 109. The upper ends of the pipes 112 have diminished portions 113, which are pivotally secured by means of a horizontal pivot pin 114 longitudinally of the machine to a rocking box or socket member 115. This socket member is rockingly mounted upon and between the depending arms of a U-shaped bracket 116 by means of horizontal pivots 240 which extend transversely of the machine, such last mentioned pivots permitting the socket to rock with relation to its supporting bracket but not

transversely of the machine. The bracket member 116 is secured to the central upper portion of the feed table at the forward end thereof—preferably riveted to the angle members 48, as shown in Fig. 23. Below the upper pivotally connected ends of these operating pipes 112, and at equal distances from such ends, are mounted links 117, having their lower ends pivotally secured to a sleeve 118, such links extending upward and outward transversely of the machine at an incline in opposite directions from such central sleeve and being pivotally secured to the operating tubes or pipes 112 by means of clips 119. An upright guiding rod 120 is rigidly connected at its upper end with the rocking or pivoted socket member 115 and extends downward from the upper end of the operating pipes through the sleeve 118 and serves to guide the sleeve vertically in line with the pivotal point at the upper converging ends of such operating and supporting tubes or pipes, thus firmly bracing and guiding the telescoping pipes and feed table. The bevel gears upon the operating shaft 91, and also those upon the stub shafts 95 and 96 are of uniform size, so that the rotation of the shaft in one direction will turn the screws in all the operating and supporting pipes at the same rate of speed. The screws are all provided with screw-threads of the same pitch, so that the rotation of the operating shaft in one direction will cause the central portion or apex of the feed table with upper folds to be raised at the same time with the saddle and at the same rate of speed, holding the saddle and the backbone of the feed table constantly in parallel relation to each other, and with the required space therebetween to permit the passage of the stalks to be operated upon. By reversing the direction of rotation of the operating shaft, the saddle and central ridge portion of the feed table may be lowered while in parallel relation to each other, and all of said parts are supported in any desired adjusted position by the means above described.

It will be noted that the bases of the outer saddle-supporting and operating screws and pipes are a sufficient distance outside of the lower edges of the feed table to permit the material to be operated upon to pass between the feed table and its supporting mechanisms and such saddle-supporting and operating mechanisms. It will also be noted that the arrangement of the levers and connecting links and sleeves at the upper ends of the outer saddle-operating pipes serves to retain the saddle at the longitudinal center of the machine in all positions and prevents the saddle and the mechanisms supported thereby from tipping transversely of the machine.

Toothed vibrating feed bars 121 are mounted upon opposite sides of the feed table near the lower edges thereof parallel with and on the inner sides of the long and short break bars respectively—there being three of said toothed feed bars on each side—having their forward ends pivotally mounted upon supporting wheels 122, which are rotatably mounted in bearings 123, so that their axes extend in oblique relation to the longitudinal axes of such toothed bars. The rear ends of said bars are similarly mounted upon supporting wheels not shown but identical with the wheels 122. The front ends of these toothed gyrating feed bars are curved upward, as shown in Fig. 17, and provided with teeth 124 of greater length than the teeth 125 at the rear ends of the rods—the last-mentioned teeth being adapted to efficiently feed the fibrous portions of the stalks after the hurds have been broken or wholly or partially beaten out, and the longer teeth being adapted to feed the stalks before the hurds have been broken out.

The central toothed feed chain 67 extends around the idler sheave pulley 90, at the rear end of the saddle, and over a driving pulley 126 which is mounted upon a shaft 127, supported in bearing portions 128 of the forwardly extending supporting arms 129, which are secured to the bow *g*. From such driving wheel the said chain extends into engagement with an idler 130 and around an idler 131 at the forward end of the saddle, which last mentioned idler is mounted upon a stub shaft 132, the lower lap of such chain passing along the under side and center of the saddle through the slot between the angular portions of Z-bars 65, already described, so that its teeth project downward while moving rearward through such slot until their lower ends pass between the upper edges of the ridge or apex of the feed table. Similar toothed chains 133 are mounted upon the saddle and supported thereby on opposite sides of the center of the feed table, as indicated in Figs. 1 and 6 and illustrated diagrammatically in Fig. 22. These side feed chains extend over idler pulleys 134 and 135, mounted on stub shafts 136 and 137, respectively, such stub shafts being supported upon the saddle by means of brackets 138 and 139, as shown in Fig. 2. The lower laps of these side feed chains extend between Z-bars 140 on the under side of the hinged flaps of the saddle, which Z-bars form tracks and guiding slots extending the entire length of the saddle and provide a space and tracks on both sides of the chain adapted to receive the supporting lateral shoulders of the toothed feed chains and hold them in operative position.

The toothed chains 67 and 133 are of the construction shown in Fig. 20, each being formed of a multiplicity of links 141 arranged in pairs side by side, each pair of

such links having a tooth 142 pivotally mounted therebetween upon a pivot 143, and each of such teeth being provided with an integral arm 144 extending at right angles to the tooth portion proper and movable into engagement with the end of the next adjacent link or pair of side link members. Each of the link members is provided with a laterally projecting shoulder 145 at one end, the shouldered ends of the links being bent outward laterally so as to receive the ends of the next adjacent link members therebetween, to which they are flexibly attached by means of a rivet 146. The pulleys over which these toothed feed chains pass may all be of the form shown in Figs. 18 and 19, each of such pulleys consisting of a main body portion 147, having an annular peripheral slot 148, through which the teeth or integral arm portions of the teeth pass. They are also provided with flange portions 149 and sprocket teeth 150 on each side of such annular peripheral slot. These sprocket teeth are of course required on all wheels which drive the chains, and operatively engage the lateral shoulders of the chains, but may be dispensed with if desired upon such idler wheels as merely serve to support and guide the chains.

All of the chain-engaging wheels and all rotating shafts upon which such wheels or other gear wheels are mounted, are provided with non-rotating shields, consisting of hollow tubes 151, mounted and encircling the shafts and having annular stationary shield disks 152 secured thereto, with their outer peripheral edges in engagement with annular shoulder portions 153 of the wheels on opposite sides thereof, as shown in Fig. 19. This covering for all of the rotating members of the machine is essential, for the reason that the fibrous material cannot otherwise be prevented from winding around the rotating parts and ultimately injuring or stopping the operation of the machine.

In order to provide suitable means for feeding the stalks to be operated upon to the main feed table, a preliminary feed table is provided at the forward end of the main feed table. This preliminary feed table consists of a flat upright portion 154, having guiding slots 155 on each side, formed between Z-bars 156, for guiding toothed feed chains, such as the one illustrated in Fig. 20, and a central guiding slot 157 is formed by a channel beam 158 curved to form the central ridge and chain-guiding track. The flanges of the channel extend upward and are adapted to guide a plain sprocket chain 159, having ordinary oblong links adapted to engage the sprocket teeth of a sprocket wheel 160 upon a shaft 161 and the sprocket teeth of the sprocket wheel 162 upon shaft 167—shown in Figs. 16 and 22. This central chain passes upward along the central slot to the upper edge and rear end of the preliminary feed table to a point adjacent to the central toothed feeding chain 67, and then downward through an opening in the main feed table, under an idler 164 and into engagement with the sprockets, as described. The toothed side chains have their transverse shoulders in engagement with the Z-bars on opposite sides of the slots which form guides for such chains, and move, preferably, at a slightly greater speed than the central chain. These side chains extend over peripherally slotted sheave pulleys 165 at the bottom of the supplementary feed table and are driven by toothed peripherally slotted sprocket wheels 166, which are mounted upon the same shaft 167 on which the driving sprocket 162 is mounted. This shaft 167—as shown in Figs. 7 and 16—is so mounted as to keep the chains constantly sufficiently taut to operate properly, notwithstanding the movement of the feed table to different adjusted positions. In order to accomplish this, the shaft is mounted upon an upwardly and rearwardly extending supporting arm 168, having its lower end pivotally mounted upon a supporting bracket 169 and its upper end secured to non-rotatable sleeves 170, which encircle the shaft 167, and an upper arm 171 which extends upwardly and rearwardly at an incline and has its lower end secured to the shaft and its upper end to a depending portion of the back-bone or center rail of the feed table by means of a pivot pin 172. Both ends of each of these supporting arms are forked, as shown in Fig. 16, so as to enable them to be pivotally mounted and yet hold them and the floating shaft 167 against any undesirable transverse play or tipping of the shaft.

A driving sprocket wheel 173 upon this bodily movable shaft 167, and in fixed relation thereto, is operatively connected with the supplementary shaft 23, being mounted in engagement with a sprocket 174 on such supplementary shaft. This supplementary shaft, as already described, is adapted to be connected with the main driving shaft and operated thereby.

As above suggested, the movement of the side chains upon the supplementary feed table at a slightly faster speed than the central chain—which may also be a feed chain—causes the opposite ends of the stalks to advance more rapidly than the central portions, and the upper portion of the supplementary feed table has upper side portions, which, as shown in Fig. 9, are inclined where such supplementary table is connected with the main feed table, at an angle corresponding to the incline at which the sides of the main feed table are most commonly used. This inclined upper portion of the

supplementary feed table converges into the flat upright portion thereof. In other words, the table sides are inclined at a gradually increasing pitch toward the opposite sides, the steepest pitch being at the upper rear end and corresponding approximately to the pitch of the inclined sides of the main feed table, and its upper central ridge portion is curved and extends above the side edges, which are also curved. By this means, when the stalks are fed upward along the flat portion of the supplementary table until they come to the inclined portion thereof, they are enabled to be gradually pressed downward and forward as they are bent at their longitudinal centers, until the opposite ends of the stalks extend downward at an incline corresponding substantially to the incline of the main feed table, when they may pass from the supplementary feed table under the feed chains of the saddle without becoming tangled. The position of the steep upwardly extending flat portion of the supplementary table enables the stalks to be carried upward in such a manner that no matter how many stalks are fed into engagement with the feed chains at the lower end of such table, all in excess of what can be carried by the chains will drop down, thus affording as far as possible a uniform supply of stalks to be fed to the main feed table.

After the stalks have passed the entire length of the short rotary beater, they pass between rubber conveyer or feed belts 175 and 176, which extend from the end of the short rotary beater rearward parallel with the longitudinal center of the machine and at an oblique angle to the rearwardly projecting end of the long rotary beater. The upper lap of the lower rubber belt and the lower lap of the upper one are held rigidly in position by means of braces or supports 177 and 178, between which they pass, and suitable anti-friction rollers may also be provided for engaging the belts, if desired. These conveyer belts are mounted, as already suggested, at one side of the longitudinal center of the feed table, and are thus adapted to grasp the stalks between them—at a distance from the center of such stalks—as they leave the rear portion of the central toothed feeding chain 67, at which time the central portions of the stalks have not yet been operated upon by the beaters. The rubber conveyer belts carry the stalks rearward, and gradually nearer to the rearwardly projecting end of the long beater and between its beater blades and the lower edge of the adjacent long break bar, until the entire central portions of the stalks have been cleaned and the hurds thoroughly removed therefrom by the enlarged rear portion of the long rotary beater. When this is accomplished, the beating and scutching of the stalks is complete, and the fiber is then discharged from the rear end of the machine by the rubber conveyer or feed belts above described.

The front ends of the feed belts are mounted upon idler pulleys 179 and the rear ends upon pulleys 180, as shown in Fig. 2. The lower feed belt is driven by means of a sprocket chain 181, which passes over a sprocket wheel 182 on shaft 183 and over a sprocket 283 on the shaft 290, which supports the lower rear feed belt-carrying pulley. Shaft 183 is connected by means of a chain 184 with the supplementary driving shaft 23, and thereby with the main driving shaft. An idler pulley 185 serves to keep the last mentioned chain tightened. The upper rubber conveyer or feed belt is driven by a sprocket chain 186, which passes over a sprocket wheel 187 upon a shaft 188, and over a sprocket wheel 190 on the shaft 189. The shaft 188 is driven by a cross chain 191, which extends around the driving sprocket wheel 192 on the shaft 183 and over sprocket 288 on shaft 188. The driving sprocket wheel 126, which drives the central toothed feeding chain 67, is driven by a sprocket chain 193, which passes over a sprocket wheel 194 on the shaft 127 and over a sprocket wheel 195 on the shaft 188. The longer set of toothed feeding bars or gyrators is secured, as already described, to the wheel 122′ on shaft 198, which shaft is driven by a sprocket chain 196 which passes over a pulley 298 on the shaft 198, and over a pulley 199 on the shaft 188. The shorter set of vibrating toothed feed bars is mounted upon the wheel 122′ on shaft 200, shown in Fig. 22, and this shaft, and thereby the short gyrating feed bars, is driven by a sprocket chain 201, which passes over a sprocket wheel 300 on shaft 200 and over a sprocket wheel 202 on the shaft 188.

In order to provide suitable and efficient means for discharging the shives or hurds and waste from beneath the rotary beaters, a pair of upper rear discharging pans 203 are mounted so as to be slidable in a horizontal plane over the needle beams at the bottom of the framework,—one beneath each of the rotary beaters. These upper discharging pans extend from the rear portion of the beaters forward, so that their forward edges are over a discharge pan 204 which extends transversely of the machine entirely across the bottom portion thereof and beneath the forward portion of both rotary beaters, so that material which alights upon the rear or upper discharging pans will be discharged into the lower pan, and from such lower pan thrown out transversely of the machine.

To provide suitable mechanism for discharging the shives or hurds and waste from the rear upper discharging pans into the lower discharging pan, a shaft 205, connect-

ed by a chain 305 with the main drive shaft, is mounted transversely of the frame and provided at each end with a cam 206 in sliding engagement with a pin 207 upon a vibrating lever 208, which lever has its lower end pivotally mounted upon a pivot or shaft 209, supported by a bracket 210. We prefer to use two of these levers—one on each side of the machine. The upper swinging ends of these vibrating levers are provided with longitudinally movable rods 211, which are pivotally secured to such vibrating levers by means of pivot pins 212. These rods extend rearward through a perforated bracket 213 on the pan, which may be formed of an angle iron, and said rods project beyond the bracket a sufficient distance to permit a spring 214 to be mounted back of the bracket and between it and a nut 215, which is in threaded engagement with the threaded end portion 216 of the rod. The peripheral surface portion of the cam or cams 206 is so proportioned that the rotation of the shaft 205 will throw the vibrating levers forward at a gradually increasing speed and suddenly release the levers when they reach their forward limit of motion, thus permitting the spring to quickly return the levers, and pans connected therewith, to initial position. This gives the pans a slow initial movement forward and in the direction of their discharging edge, such movement gradually increasing, and a quick sharp return movement to initial position, which causes the hurds and waste material to be discharged in a step by step manner over the forward edges of the pans and into the lower transversely arranged pan, hereinafter described.

A perforated stop 217 is mounted, preferably, upon each longitudinal vibrating rod, so as to limit its movement in the direction in which it is operated by the spring. Each rod 211 is secured in fixed relation to the vibrating pan by means of a perforated stud 218, secured to the bottom of the pan and having a set screw 219 engaging the rod, so that any movement of the rod will cause a corresponding movement of the pan. The lower transversely extending discharging pan is mounted with its rear side in position to receive the material discharged from the forward edge of the upper discharging pans above described, and is vibrated transversely of the machine so as to discharge the material laterally. To accomplish this, a cam 220—similar to the cams 206 already described—is mounted upon the shaft 205 and in sliding engagement with an operating pin 221 upon a pivoted vibrating lever 222, which has its upper end pivotally secured by means of a pivot 223 to a supporting bracket 224, the lower end of said vibrating lever being provided with an operating rod 225, pivotally secured thereto at one end and pivotally connected at the other end by means of a pivot 226 with an arm 227 of the bell crank lever. This bell crank lever has another arm 228 pivotally connected with a rod 229, such rod being flexibly secured at one end to the discharging pan and at the other to said bell crank lever by means of a pivot pin 230. The bell crank lever is rockingly mounted upon a pivot 231, which is mounted on a fixed portion 232 of the frame. The vibrating lever 222 is also provided with a rod 233, having a stop 234 mounted thereon and in fixed relation thereto, such stop being adapted to engage a perforated bracket 235, which is secured to a rigid portion of the framework and through which said rod passes. A spiral spring 236 is mounted upon the rearwardly projecting end of said rod and between the bracket 235 and the threaded nut 237, which is in threaded engagement with the rod. By this means the rotation of the shaft 205 will cause the cam 220 to throw the vibrating lever 222 forward at a slow initial and gradually increasing speed and suddenly release the lever so as to permit it to quickly return to initial position, the return movement being produced by means of the spring 236. The vibrating pan is, as above suggested, connected with the bell crank lever arm 228, which has a movement transversely of the machine, corresponding to that of the vibrating lever 222, but in a different direction. In this way, the hurd-discharging pan is caused to move laterally of the machine toward its discharging end, first slowly and at a gradually increasing speed, and is then suddenly thrown back to initial position by the action of the spring 236 and the mechanisms which operatively connect such spring with said pan.

It will thus be seen that both the upper and lower discharging pans move in a horizontal plane toward discharging position, first rapidly and at a gradually increasing speed, and then suddenly back to initial position, so as to discharge the material therefrom in a step by step manner and without any movement in a vertical plane. It is found very desirable to dispense with any movement of the pans in a vertical plane in order to economize space beneath the operating mechanisms, so that the machine may be portable, but at the same time not of any greater height than is essential.

Curved arms 238 extend from the front end of the feed chain-supporting saddle forward and downward over the supplementary feed table on each side of its rear apex and slightly above the inclined side portions thereof, so as to depress the stalks and hold them down in position to pass beneath the feed chain-supporting saddle and between its feed chain mechanism and the main feed table.

The hooked angle iron members 43, which

flexibly support the lower edges of the feed table, may be provided with elongated slots—not shown—extending transversely thereof and through which the bolts 45 extend. These hooked angle iron members and the lower edges of the table supported thereby are thus adjustable transversely of the machine and with relation to the break bars and rotary beaters, so as to enable the distance from the lower side portions of the table to the adjacent break bars to be regulated. The break bars are also adjustable transversely of the machine. The space between the rotary beaters and break bars, and also the space between the break-bars and the lower side portions of the feed table, may thus be regulated as circumstances require. The length of that portion of the stalks between the break-bars and the fulcrum point, or point of engagement between the stalks and the table, can thus be regulated, as well as the length of the portion of the stalks extending between the break bars and the rotary beaters. It should also be noted that the enlarged ends of the rotary beaters prevent the fibrous material from hugging or binding around them, so as to be injured or broken by reason of their great length at the rear ends of the rotary beaters.

We claim:—

1. In a machine of the class described, the combination of a tapered rotary beater, feeding mechanism extending obliquely with relation thereto, and screw mechanism for adjusting the feeding mechanism to different oblique positions with relation to the tapered rotary beater.

2. In a machine of the class described, the combination of a plurality of rotary beaters arranged in oblique relation to each other, feed-chain mechanism extending obliquely with relation to such beaters, and means mechanical for adjusting the feed-chain mechanism to different operative positions with relation to the beaters.

3. In a machine of the class described, the combination of a rotary beater provided with a central shaft, a plurality of laterally extending arms mounted upon such shaft and a plurality of beater blades mounted upon such supporting arms forming a tapered rotary beater having a rear end portion of larger diameter than the forward end thereof, means for rotatably supporting such beater and means for automatically feeding fibrous material obliquely rearward and toward the beater.

4. In a machine of the class described, the combination of a plurality of tapered rotary beaters arranged side by side and having their large ends both in the direction of the rear end of the machine, and mechanism for automatically feeding fibrous material along and in engagement with said beaters in the direction of the larger ends thereof.

5. In a machine of the class described, the combination of a plurality of tapered rotatable beaters, a break bar mounted adjacent to each of said beaters, and means for feeding fibrous material between said break bars and the beater mechanism and in the direction of the larger ends of the beaters, the larger ends of the beaters both being in the direction of the rear end of the machine, and the relatively small ends having a space between them which diminishes in the direction of the rear ends of the beaters.

6. In a machine of the class described, the combination of a feed table having an upwardly and downwardly movable central portion, pivoted table-supporting arm mechanism connected to such movable central portion of the table and having its pivotal center below one end thereof, and guide mechanism mounted forward of the pivotal center of such table-supporting mechanism for guiding such movable table portion.

7. In a machine of the class described, the combination of a feed table having an upwardly and downwardly movable central portion, pivoted table-supporting mechanism flexibly connected with such movable central portion of the table and having its pivotal center below one end thereof, a frame portion upon which such table is mounted provided with a slotted guiding member forward of the pivotal center of the pivoted table-supporting mechanism, and a curved guiding arm secured to the movable table portion at a distance from the end of the table and slidably mounted in such slotted guiding member.

8. In a machine of the class described, the combination of a frame, a feed table having its opposite sides flexibly secured to the frame and having a central portion, one end of which is movable upward and downward with relation to such flexibly secured side portions, pivoted table-supporting mechanism secured to the upwardly and downwardly movable central portion of such table and having its pivotal center below one end thereof, and guiding arm and sleeve mechanism mounted at a distance from the end of the table in sliding engagement with each other, one of such members being secured to the table and the other to the frame for guiding and holding the rear central end portion of the table centrally and permitting the adjustment of the forward central portion to different raised or lowered positions.

9. In a machine of the class described, the combination of a frame, a feed table having its side edges hinged to the frame and having a central portion, one end of which is movable upward and downward with relation to such hinged side edges, pivoted supporting mechanism extending beneath and secured to such movable central portion of

the table, means for raising and lowering the upwardly and downwardly movable central portion of the table to different adjusted positions, and guiding mechanism connected with the forward upwardly and downwardly movable central end portion of the table for holding it centrally between the hinged side portions thereof in different adjusted positions.

10. In a machine of the class described, the combination of a frame, a feed table having its side edges hinged to the frame and having a central portion, one end of which is movable upward and downward with relation to such hinged side edges, pivoted supporting mechanism extending beneath and secured to such movable central portion of the table, means for raising and lowering the upwardly and downwardly movable central portion of the table to different adjusted positions, guiding mechanism connected with the forward upwardly and downwardly movable central end portion of the table for holding it centrally between the hinged side portions thereof in different adjusted positions, and guide mechanism for guiding the rear central portion of the table and supporting it centrally with relation to the hinged side portions.

11. In a machine of the class described, the combination of a frame, a feed table having its side edges hinged to the frame and having a central portion, one end of which is movable upward and downward with relation to such hinged side edges, pivoted supporting mechanism extending beneath and secured to such movable central portion of the table, means for raising and lowering the upwardly and downwardly movable central portion of the table to different adjusted positions, guiding mechanism connected with the forward upwardly and downwardly movable central end portion of the table for holding it centrally between the hinged side portions thereof in different adjusted positions, feed chain supporting mechanism mounted above such table and supported independently thereof, and feed chain mechanism mounted wholly on such feed chain-supporting mechanism and supported over and wholly independent of the feed table forming a space between all of such feed chain mechanism and the feed table from end to end and side to side of such table.

12. In a machine of the class described, the combination of a frame, a feed table having extensible and collapsible inclined portions and a central ridge portion, one end of which is movable upward and downward with relation to the other, means for flexibly securing the side edges of such feed table to the frame, means for raising and lowering the upwardly and downwardly movable central portion thereof, and telescoping pipe mechanism extending downward and outward transversely at an incline beneath and in supporting engagement with such movable inclined side portions, the outer ends of such telescoping pipe mechanism being connected with the frame and the inner ends with the movable portion of the table.

13. In a machine of the class described, the combination of a feed table having a central portion, one end of which is movable upward and downward with relation to the other end, means for raising and lowering the upwardly and downwardly movable portion of such table, saddle mechanism extending longitudinally of the table and forming a space between such saddle mechanism and the table from end to end thereof, feed chain mechanism mounted upon and supported by such saddle over the table and forming a space between such feed chain mechanism and the table for receiving material to be operated upon, and means for raising and lowering such saddle and feed chain mechanism and supporting the same in different adjusted positions with the under side portions thereof above and in substantially parallel relation with the table longitudinally thereof.

14. In a machine of the class described, the combination of a feed table having an upwardly and downwardly movable end portion, supporting arm mechanism flexibly connected with such upwardly and downwardly movable end portion of the table, and spirally threaded screw mechanism in threaded engagement with such supporting arm mechanism for raising and lowering the end of the table.

15. In a machine of the class described, the combination of a feed table having an upwardly and downwardly movable end portion, supporting arms flexibly connected with such movable end portion and provided with hollow threaded portions, spirally threaded screws mounted in threaded engagement with such hollow threaded portions of the supporting arms, and means for rotating such screws and thereby raising and lowering the end of the table with which such supporting arms are connected.

16. In a machine of the class described, the combination of a feed table having one end pivotally mounted and its opposite end portion movable upward and downward with relation to such pivoted end, means for raising and lowering the upwardly and downwardly movable end portion of the table, saddle mechanism mounted over such table having one end pivotally supported and its opposite end movable upward and downward with relation to such pivoted end, feed mechanism mounted upon such saddle, and means for raising and lowering the movable end of the saddle and thereby the feeding mechanism.

17. In a machine of the class described, the combination of a feed table having one end pivotally mounted and its opposite end movable upward and downward with relation thereto, a feed chain supporting frame mounted above such feed table having one end pivotally mounted independently of the table and the other end movable upward and downward with relation to such pivoted end, and feed chain mechanism mounted upon such feed chain supporting frame.

18. In a machine of the class described, the combination of a feed table having one end pivotally mounted and its opposite end movable upward and downward with relation thereto, a feed chain supporting frame mounted above such feed table having one end pivotally mounted independently of the table and the other end movable upward and downward with relation to such pivoted end, feed chain mechanism mounted upon such feed chain supporting frame, and means for raising and lowering the upwardly and downwardly movable ends of the feed table and feed chain supporting frame and maintaining them in substantially uniform relation to each other.

19. In a machine of the class described, the combination of a feed table having one end pivotally mounted and its opposite end movable upward and downward with relation thereto, a feed chain supporting frame mounted above such feed table having one end pivotally mounted independently of the table and the other end movable upward and downward with relation to such pivoted end, feed chain mechanism mounted upon such feed chain supporting frame, supporting arms flexibly connected with such upwardly and downwardly movable ends of the feed table and feed chain supporting frame, and spirally threaded screws in threaded engagement with such supporting arms for raising and lowering them and thereby the feed table and feed chain supporting frame.

20. In a machine of the class described, the combination of a feed table having one end pivotally mounted and its opposite end movable upward and downward with relation thereto, a feed chain supporting frame mounted above such feed table having one end pivotally mounted independently of the table and the other end movable upward and downward with relation to such pivoted end, feed chain mechanism mounted upon such feed chain supporting frame, supporting arms flexibly connected with such upwardly and downwardly movable ends of the feed table and feed chain supporting frame, spirally threaded screws in threaded engagement with such supporting arms for raising and lowering them and thereby the feed table and feed chain supporting frame, and an operating shaft connected with the spirally threaded screws for rotating them and thereby raising and lowering the ends of the feed table and feed chain supporting frame.

21. In a machine of the class described, the combination of a feed table having one end pivotally mounted and its opposite end movable upward and downward with relation thereto, a feed chain supporting frame mounted above such feed table having one end pivotally mounted independently of the table and the other end movable upward and downward with relation to such pivoted end, feed chain mechanism mounted upon such feed chain supporting frame, supporting arms flexibly connected with the feed table and with the chain supporting frame and provided with guiding rod and sleeve mechanism for maintaining such feed table and feed chain supporting frame in central position, and spirally threaded screws in threaded engagement with such supporting arms for raising and lowering them and thereby the feed table and feed chain supporting frame.

22. In a machine of the class described, the combination of a feed table having one end pivotally mounted and its opposite end movable upward and downward with relation thereto, a feed chain supporting frame mounted above such feed table having one end pivotally mounted independently of the table and the other end movable upward and downward with relation to such pivoted end, feed chain mechanism mounted upon such feed chain supporting frame, supporting arms for raising and lowering the upwardly and downwardly movable ends of the feed table and feed chain supporting frame, and vertical guiding rod and sleeve mechanism operatively connected with such supporting arms and with the feed table and feed chain supporting frame, respectively, for guiding and maintaining them centrally during the upward and downward movements thereof and in different adjusted positions.

23. In a machine of the class described, the combination of a feed chain supporting frame having one end movable upward and downward with relation to the other, supporting arms flexibly connected with the upwardly and downwardly movable end of such frame and provided with guiding lever arms, and guiding rod and sleeve mechanism slidably connected together and operatively connected with the chain supporting frame and guiding lever arms for guiding such frame and holding it centrally in different adjusted positions.

24. In a machine of the class described, the combination of a feed chain supporting frame having one end movable upward and downward with relation to the other, supporting arms flexibly connected with the upwardly and downwardly movable end of

such frame and provided with guiding lever arms, guiding rod and sleeve mechanism slidably connected together and operatively connected with the chain supporting frame and guiding lever arms for guiding such frame and holding it centrally in different adjusted positions, spirally threaded screws in threaded engagement with such supporting arms, and shaft and gear mechanism connected with such screws for raising and lowering the supporting arms and thereby the feed chain supporting frame.

25. In a machine of the class described, the combination of a feed chain supporting frame having one end movable upward and downward with relation to the other, supporting arms flexibly connected with the upwardly and downwardly movable end of such frame and provided with guiding lever arms, guiding rod and sleeve mechanism slidably connected together and operatively connected with the chain supporting frame and guiding lever arms for guiding such frame and holding it centrally in different adjusted positions, a feed table mounted beneath and independently of such feed chain supporting frame, supporting arms flexibly connected with such feed table for raising and lowering the end portion thereof, screw mechanism in threaded engagement with such supporting arms, and shaft and gear mechanism operatively connected with such screw mechanism for operating it and thereby raising and lowering such feed table and feed chain supporting frame.

26. In a machine of the class described, the combination of a feed chain supporting frame, means for pivotally supporting and permitting the free upward movement of one end thereof, feed chain mechanism mounted upon such frame, and means for raising and lowering the opposite end of such frame with relation to such pivoted end.

27. In a machine of the class described, the combination of a feed chain supporting frame, means for pivotally supporting and permitting the free upward movement of one end thereof, feed chain mechanism mounted upon such frame, means for raising and lowering the opposite end of such frame with relation to such pivoted end, and means for operating such feed chain mechanism.

28. In a machine of the class described, the combination of a feed chain supporting frame, means for pivotally supporting and permitting the free upward movement of one end thereof, feed chain mechanism mounted upon such frame, means for raising and lowering the opposite end of such frame with relation to such pivoted end, a feed table mounted beneath such feed chain supporting frame adjacent to the feed chain mechanism and having an upwardly and downwardly movable central portion, and means for raising and lowering such central portion of the feed table.

29. In a machine of the class described, the combination of a feed chain supporting frame, means for pivotally supporting and permitting the free upward movement of one end thereof, feed chain mechanism mounted upon such frame, means for raising and lowering the opposite end of such frame with relation to such pivoted end, a feed table mounted beneath such feed chain supporting frame adjacent to the feed chain mechanism and having an upwardly and downwardly movable central portion, means for raising and lowering such central portion of the feed table, fiber-treating mechanism mounted adjacent to the edges of such table, and means for operating such fiber-treating mechanism.

30. In a machine of the class described, the combination of a feed chain supporting frame, feed chain mechanism mounted thereon, means for pivotally supporting one end of such frame, means for raising and lowering the opposite end thereof, telescoping pipe mechanism secured to such feed chain supporting frame for bracing it and extending downward and outward transversely at an incline, and means for supporting the lower ends of such telescoping pipe mechanism.

31. In a machine of the class described, the combination of a main feed table provided with inclined side portions, a supplementary feed table having rear inclined side portions, and feed chain mechanism extending over such supplementary feed table for feeding fibrous material on to the main feed table.

32. In a machine of the class described, the combination of a main feed table having inclined side portions, means for feeding fibrous material over such main feed table, a supplementary feed table mounted at one end of the main feed table and having inclined side portions increasing in pitch in the direction of the main feed table, and means for feeding fibrous material over such supplementary feed table and on to the main feed table.

33. In a machine of the class described, the combination of a main feed table having inclined side portions, means for feeding fibrous material over such main feed table, a supplementary feed table mounted forward of the main feed table having a relatively flat front portion and a rear portion provided with inclined sides merging into such relatively flat portion, and means for feeding fibrous material over such supplementary feed table and on to the main feed table.

34. In a machine of the class described, the combination of a main feed table hav-

ing inclined side portions, means for feeding fibrous material over such main feed table, a supplementary feed table mounted forward of the main feed table having a relatively flat front portion and a rear portion provided with inclined sides merging into such relatively flat portion, and feed chain mechanism mounted upon such supplementary table and extending over the relatively flat and inclined side portions thereof to the main feed table, and means for operating such feed chains.

35. In a machine of the class described, the combination of a main feed table having inclined side portions, means for feeding fibrous material over such main feed table, a supplementary feed table having relatively flat front and inclined rear side portions forming a central ridge at the rear end thereof, feed chains extending on opposite sides of such ridge toward the main feed table, and means for operating such feed chains.

36. In a machine of the class described, the combination of a main feed table having inclined side portions, means for feeding fibrous material over such main feed table, a supplementary feed table having relatively flat front and inclined rear side portions forming a central ridge at the rear end thereof, feed chains extending on opposite sides of such ridge toward the main feed table, a shaft mounted at the front end of such supplementary feed table provided with sprockets for supporting the forward portion of such feed chains, and driving chain mechanism connected with such shaft for operating it and thereby the feed chain.

37. In a machine of the class described, the combination of a main feed table having inclined side portions, means for feeding fibrous material over such main feed table, a supplementary feed table having relatively flat front and inclined rear side portions forming a central ridge at the rear end thereof, feed chains extending on opposite sides of such ridge toward the main feed table, a shaft mounted at the front end of such supplementary feed table provided with sprockets for supporting the forward portion of such feed chains, a central driving chain extending along the ridge portion of the supplementary table and operatively connected with the feed chains, and means for operating such driving chain and thereby the feed chains.

38. In a machine of the class described, the combination of a main feed table having inclined side portions, means for feeding fibrous material over such main feed table, a supplementary feed table mounted forward of the main feed table having a relatively flat front portion and a rear portion provided with inclined sides merging into such relatively flat portion, means for feeding fibrous material over such supplementary feed table and on to the main feed table, and guiding arms extending over the inclined side portions of the supplementary table in the direction of the main feed table for depressing the fibrous material operated upon.

39. In a machine of the class described, the combination of a main feed table having extensible and collapsible inclined side portions, and a central portion having one end movable upward and downward with relation to the other, means for feeding fibrous material over such main feed table, a supplementary feed table mounted forward of the main feed table having relatively flat front and inclined rear side portions and forming a central ridge at the rear end thereof, means for feeding material from such supplementary table on to the main feed table, and means for raising and lowering the central front portion of the main feed table and thereby extending and collapsing the inclined sides thereof.

40. In a machine of the class described, the combination of a feed table having a central upwardly and downwardly movable receiving end portion and provided with feed chain mechanism for feeding fibrous material on to such receiving end, shaft and sprocket mechanism for operating such feed chain mechanism, and pivoted supporting arms upon which such feed chain operating shaft and sprocket mechanism is movably mounted.

41. In a machine of the class described, the combination of a feed table having a central upwardly and downwardly movable receiving end portion and provided with chain mechanism for feeding fibrous material on to such receiving end portion, shaft and sprocket mechanism for operating such chain mechanism, pivoted supporting arm mechanism pivotally mounted below such shaft and extending upward at an incline in the direction thereof, and supporting arm mechanism pivotally connected with the movable portion of the table and extending downward at an incline toward such supporting arms forming a movable support for such shaft and sprocket mechanism.

42. In a machine of the class described, the combination of a feed table having an upwardly and downwardly movable central portion, fiber-treating mechanism mounted adjacent to such table, feed chain mechanism for feeding material toward such fiber-treating mechanism, means for adjustably supporting such feed chain mechanism, shaft and sprocket mechanism for operating such feed chain mechanism, and means for operatively connecting such shaft and sprocket mechanism with a suitable source of power.

43. In a machine of the class described, the combination of a frame, fiber-treating

mechanism mounted therein, a reciprocatory discharging pan mounted beneath such fiber-treating mechanism and movable back and forth longitudinally thereof, reciprocatory discharging pans extending beneath the discharging portion of such longitudinally movable pan and movable back and forth transversely of the frame, and means for reciprocating all of such discharging pans at a relatively slow speed in their discharging directions and at a relatively fast speed in their return movement.

44. In a machine of the class described, the combination of a frame, fiber-treating mechanism mounted therein, a reciprocatory discharging pan mounted in and movable longitudinally of the frame and forming a bottom portion therefor, reciprocatory discharging mechanism extending beneath the discharging portion of such longitudinally movable pan and movable transversely of the frame, shaft and cam mechanism operatively connected with such longitudinally and transversely movable discharging mechanisms for moving them in their discharging directions, and spring mechanism for returning them to initial position at a relatively rapid speed.

45. In a machine of the class described, the combination of a frame, fiber-treating mechanism mounted therein, reciprocatory discharging pans mounted beneath such fiber-treating mechanism, each movable in a discharging direction at a relatively slow speed and in a return direction at a relatively rapid speed, shaft and cam mechanism, lever mechanism operatively connecting such shaft and cam mechanism with the pans for moving them in discharging directions, and spring mechanism operatively connected with the pans for returning them to initial position at a relatively rapid speed.

46. In a machine of the class described, the combination of fiber-treating mechanism, feed chains for feeding fibrous material into position to be operated upon thereby, rotatable shafts and wheels for supporting and operating such feed chains, and non-rotatable hollow inclosing shields encircling such rotatable shafts and forming shields for the sides of such wheels.

47. In a machine of the class described, the combination of fiber-treating mechanism, feed chain mechanism for feeding fibrous material into position to be operated upon thereby, rotatable shafts and wheels upon which such feed chains are mounted, and hollow non-rotatable shields encircling and inclosing such rotatable shafts and provided with laterally extending shielding disk portions adjacent to the sides of the rotatable wheels for preventing fibrous material from becoming entangled with such rotatable shafts and wheels.

48. In a machine of the class described, the combination of fiber-treating mechanism, a toothed feed chain having a multiplicity of side link portions pivotally connected and provided with feeding teeth pivotally mounted between such side link portions, and integral arms extending at an angle to such teeth and between such side link members of the chain.

49. In a machine of the class described, the combination of fiber-treating mechanism, feed chains each having a multiplicity of side link members pivotally connected and provided with laterally extending shoulders on opposite sides of such chains, and feeding teeth pivotally mounted between such side link members, each provided with an integral arm extending at an angle thereto and movable into position between the side link members when the teeth are in extended position.

50. In a machine of the class described, the combination of fiber-treating mechanism, toothed feed chains each having a multiplicity of side link members pivotally connected and provided with laterally extending shoulders on opposite sides of such chains, feeding teeth pivotally mounted between such side link members, each provided with an integral arm portion extending at an angle thereto and movable into position between the side link members when the teeth are in extended position, and chain supporting wheels provided with peripheral slots for receiving such arm portions of the teeth.

51. In a machine of the class described, the combination of fiber-treating mechanism, toothed feed chains each having a multiplicity of side link members pivotally connected and provided with laterally extending shoulders on opposite sides of such chains, feeding teeth pivotally mounted between such side link members, each provided with an integral arm portion extending at an angle thereto and movable into position between such link members when the teeth are in extended position and movable from between such side link members when the teeth are out of operative position, and chain supporting wheels provided with peripheral slots for receiving such arm portion of the teeth and having sprocket teeth adapted to engage the lateral shoulders of such chains.

52. In a machine of the class described, the combination of fiber-treating mechanism, a toothed feed chain having a multiplicity of side link members pivotally connected and provided with laterally extending shoulders on opposite sides of such chain, feeding teeth pivotally mounted between such side link members of the chain and having integral arm portions extending at an angle thereto and movable into position between the side link members of the

chain when the teeth are in extended position, a driving sprocket provided with peripheral teeth adapted to engage such lateral shoulders of the chain and having a central slot for receiving the arm portions of the teeth when such teeth are out of operative position, a shaft upon which such sprocket is mounted, a hollow non-rotatable shield encircling and inclosing such shaft and provided with laterally extending disk portions in engagement with such sprocket, and means for rotating such shaft.

WILLIAM A. SHELY.
ALDA M. SHELY.

Witnesses:
HARRY I. CROMER,
JENNIE MACEDWARD.