No. 821,447. PATENTED MAY 22, 1906.

H. S. ALBRECHT.

FIBER REDUCING MACHINE.

APPLICATION FILED OCT. 10, 1904.

3 SHEETS—SHEET 1.

Fig. I.

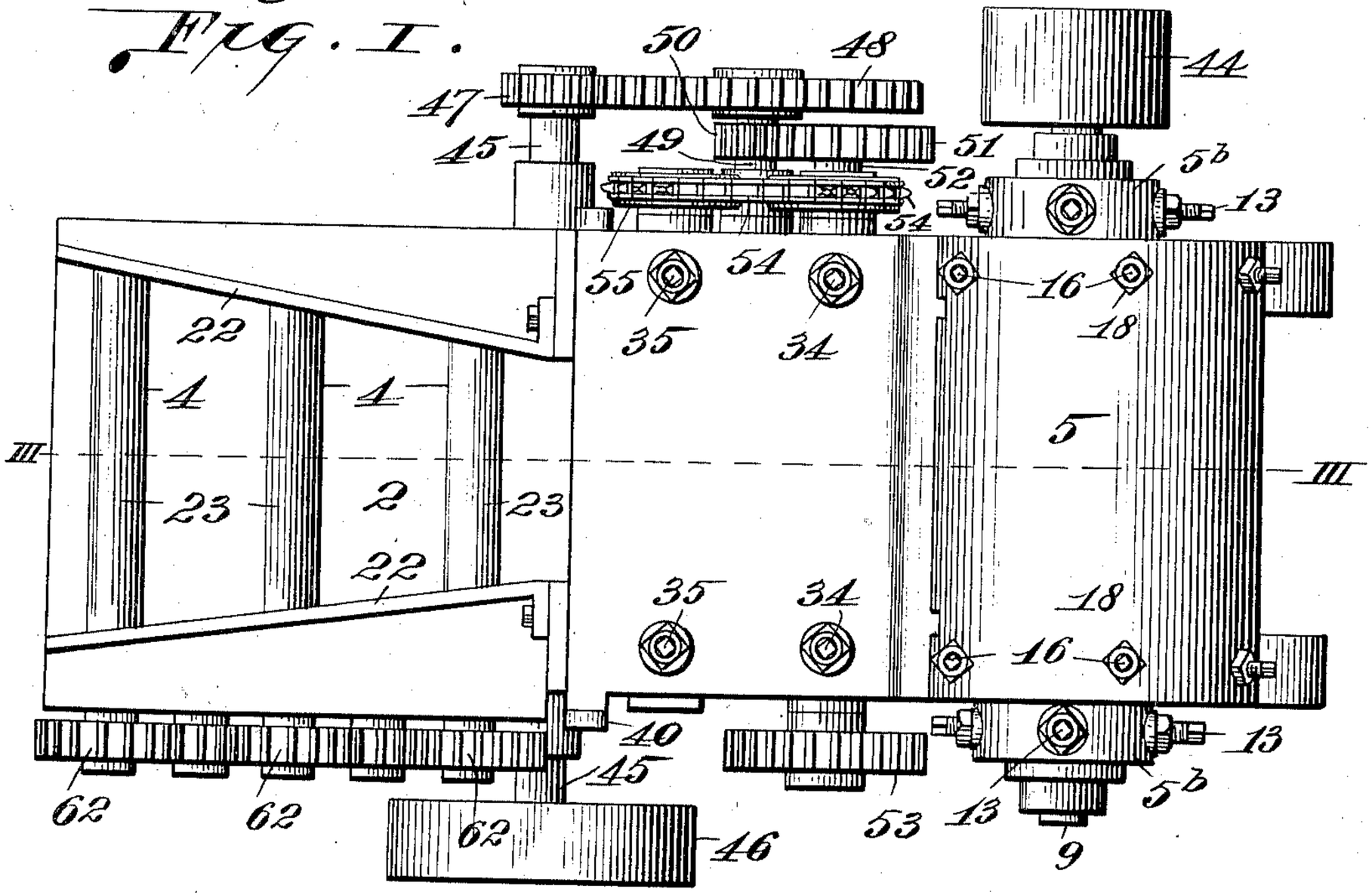
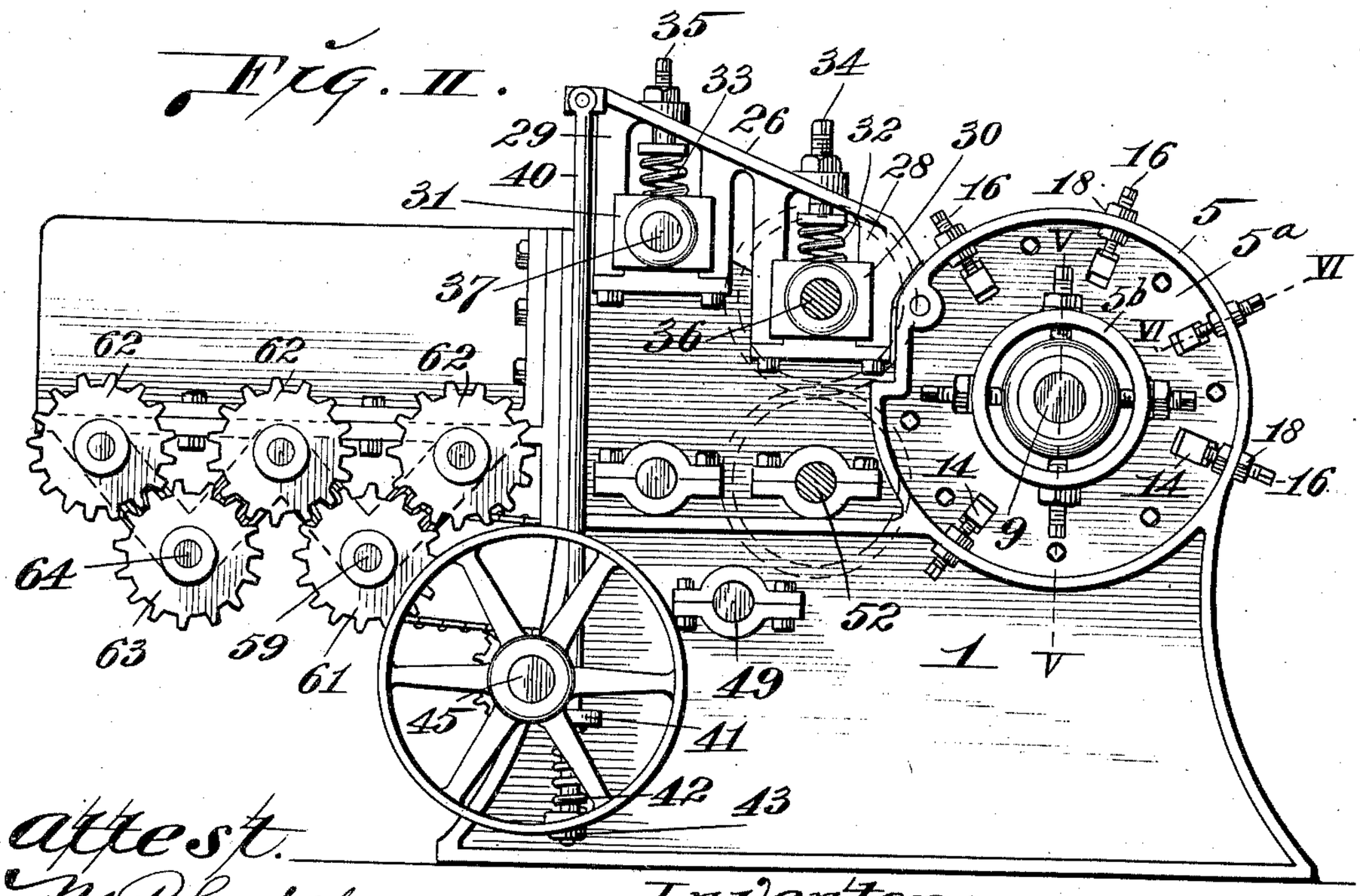


Fig. II.



attest.

M. F. Smith

E. O. Knight

Inventor:

H. S. Albrecht.

By Knight Bros Attys.

No. 821,447. PATENTED MAY 22, 1906.

H. S. ALBRECHT.

FIBER REDUCING MACHINE.

APPLICATION FILED OCT. 10, 1904.

3 SHEETS—SHEET 2.

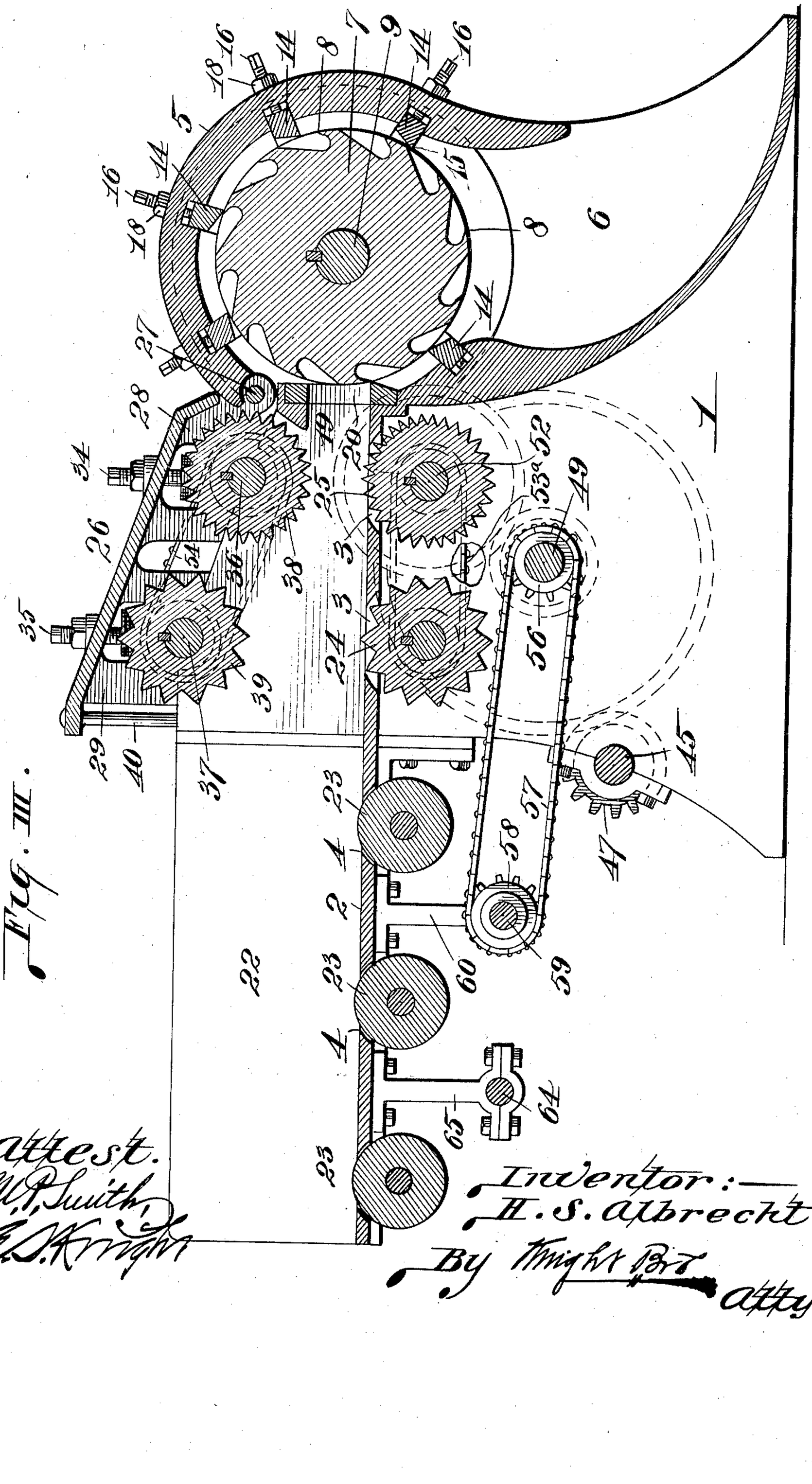


Fig. III.

Attest.
W. P. Smith,
E. L. Knight

Inventor:—
H. S. Albrecht.
By Wright Bros
Attys.

No. 821,447. PATENTED MAY 22, 1906.

H. S. ALBRECHT.

FIBER REDUCING MACHINE.

APPLICATION FILED OCT. 10, 1904.

3 SHEETS—SHEET 3.

Fig. IV.

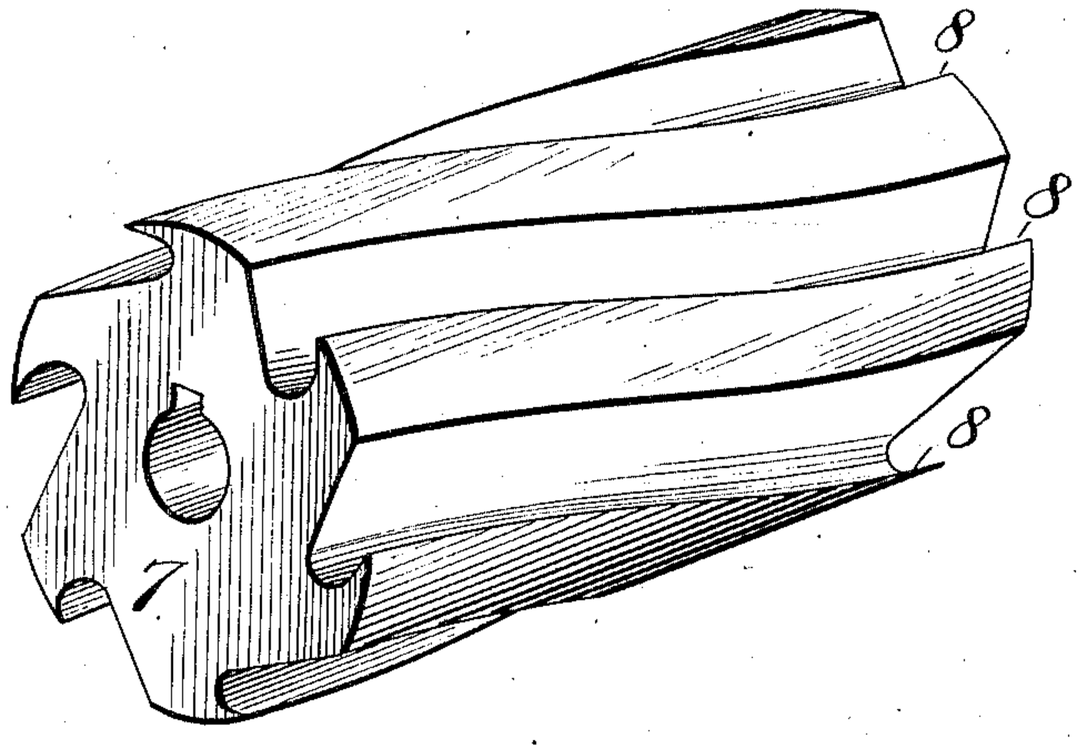


Fig. V.

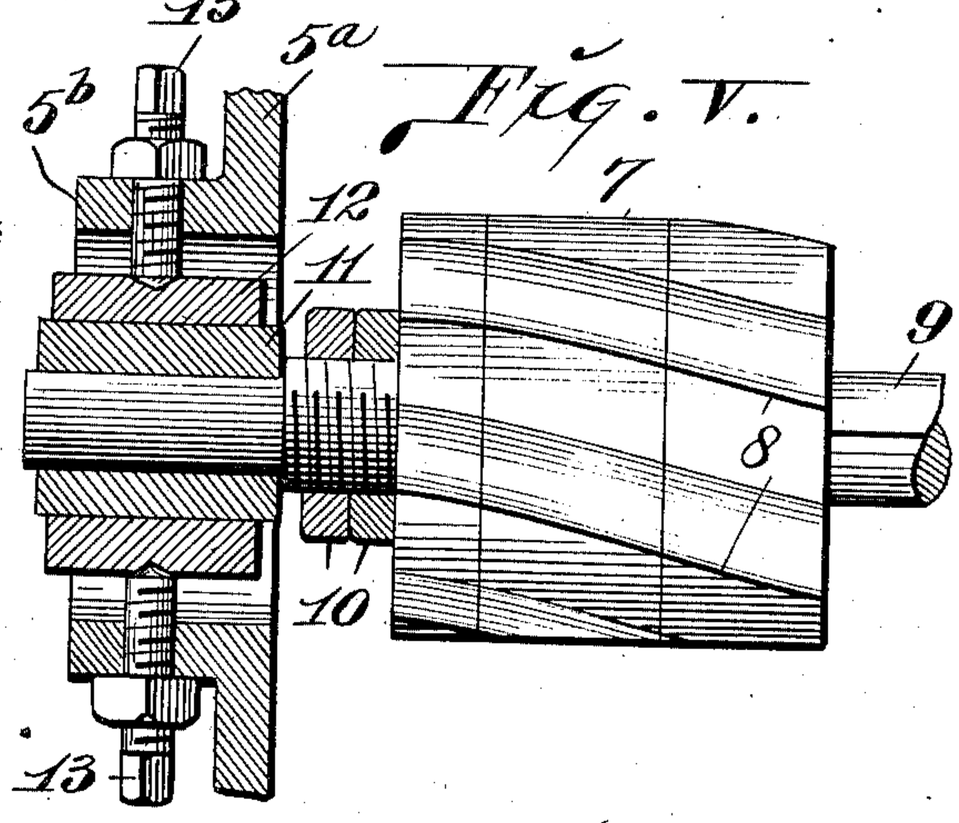


Fig. VI.

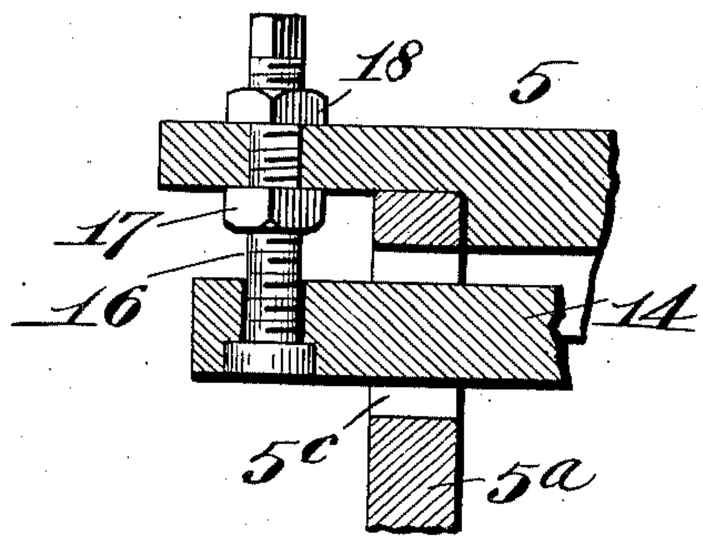


Fig. VII.

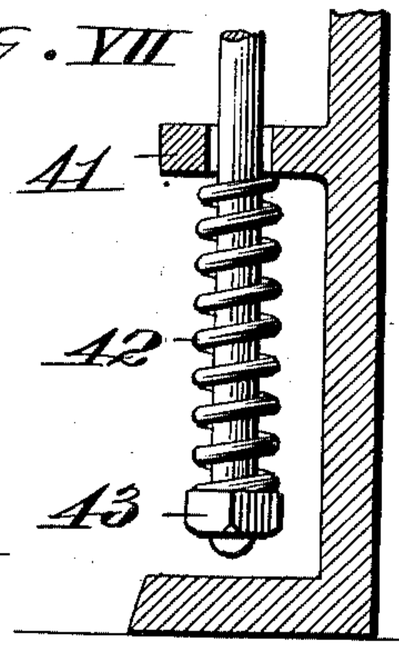
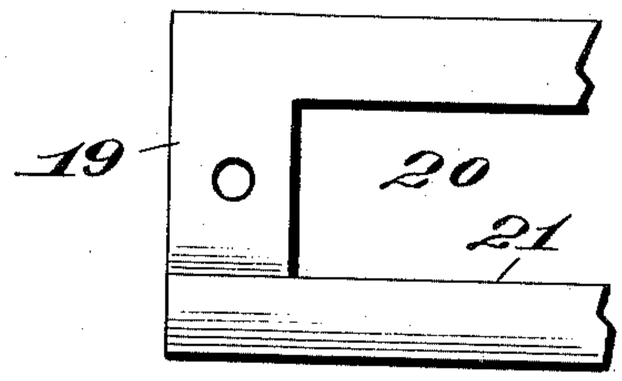


Fig. VIII.



Attest:—
M. P. Smith
E. C. Knight

Inventor:—
H. S. Albrecht.
By Knight Bros Attys

UNITED STATES PATENT OFFICE.

HERMAN S. ALBRECHT, OF ST. LOUIS, MISSOURI.

FIBER-REDUCING MACHINE.

No. 821,447. Specification of Letters Patent. Patented May 22, 1906.

Application filed October 10, 1904. Serial No. 227,814.

To all whom it may concern:

Be it known that I, HERMAN S. ALBRECHT, a citizen of the United States, residing in the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Fiber-Reducing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to a machine for use in reducing various materials—such as wood, bark, and straw—to render them finely divided or comminuted.

Figure I is a top or plan view of my machine. Fig. II is a side elevation. Fig. III is a vertical longitudinal section taken on line III III, Fig. I. Fig. IV is a perspective view of the cutter-cylinder. Fig. V is a longitudinal section taken on line V V, Fig. II, through one of the bearings of the cutter-cylinder. Fig. VI is a longitudinal section taken on line VI VI, Fig. II, through a portion of the cutter-cylinder casing and one of the adjustable cutter-bars therein. Fig. VII is a vertical section through one of the base-frame legs of the machine and showing in elevation the lower end of one of the tension-rods. Fig. VIII is a partial view of one of the throat cutter-plates of the machine.

1 designates the base-legs of my machine, which are surmounted by a table 2, containing transversely-extending slots 3 and 4. (See Fig. III.)

5 designates a cutter-cylinder casing located at the rear of the table 2, the said casing having a curved contour longitudinally of the machine, having closed end walls 5^a, and being open at the front side facing the table 2. Beneath the casing is a discharge-chute 6.

7 is a cutter-cylinder located in the casing 5 and having a plurality of knives 8. The knives of the cutter-cylinder are preferably of spiral form, as shown in Fig. IV, and the cylinder may be either one integral piece, as seen in Fig. IV, or built up of a plurality of sections, as seen in Fig. V, in which latter instance the sections may be of uniform thickness or of a variety of thicknesses.

9 designates a shaft on which the cutter-cylinder is mounted and held by nuts 10, fitted to the shaft, as seen in Fig. V. The journals of this shaft are seated in center bearings 11, that are located in boxes 12. The boxes 12 are supported in central openings 5^b of the casing end walls 5^a by vertically and horizontally arranged screws 13, tapped into flanges projecting from the casing end walls, thereby providing for both vertical and horizontal adjustment of the boxes 12. 14 represents cutter-bars having knife-edges 15, (see Fig. III,) and arranged at intervals in the casing 5, surrounding the cutter-cylinder therein. These cutter-bars are loosely positioned in apertures 5^c in the casing end walls 5^a, and they are adjustably held to be moved to and from the cutter-cylinder by adjustment-screws 16, which are seated in the cutter-bars, as seen most clearly in Fig. VI, each adjustment-screw being provided with an inner nut 17 and an outer nut 18, located at opposite sides of the overhanging ends of the casing 5 and through the medium of which the screws may be set and held when the desired adjustment of the cutter-bars relative to the cutter-cylinder is secured.

19 designates a throat cutter-plate, (see Figs. III and VIII,) which is located at the rear end of the table 2. This plate is provided with a central opening 20, through which the material to be operated upon by the cutter-cylinder 7 passes from said table, and at one side of said opening is a knife-edge 21.

22 designates upright directing-plates mounted on the table 2 at the forward portion thereof, between which the material to be cut is fed, said plates being preferably more widely separated at their outer ends than at their inner ends in order to produce a converging feed of the material.

23 represents feed-rollers located beneath the table 2 and operating through the slots 4 therein.

24 is a forward toothed feed-roller that operates in the foremost table-slot 3, and 25 is a rear toothed feed-roller that operates through the rearmost table-slot 4, as seen in Fig. III.

26 designates an oscillating frame mounted at the rear end upon a cross-rod 27, extending transversely of the machine at the front of the casing 5. This frame is provided at its ends with vertical box-guides 28 and 29, (see Figs. II and III,) in which are slidably positioned boxes 30 and 31. The boxes 30 and 31 are respectively held in depressed positions within their guides by springs 32 and 33, surmounting them and in turn surmounted by set-screws 34 and 35, passing downwardly through the top of the oscillating frame at each end thereof.

36 and 37 are feed-roller shafts journaled, respectively, in the boxes 30 and 31 and extending transversely of the machine above the toothed feed-rollers 25 and 24. The shaft 36 carries a toothed feed-roller 38, surmounting the lower feed-roller 25, and the shaft 37 carries a toothed feed-roller 39, surmounting the feed-roller 24. The rollers 25 and 38, which are rearmost in the machine, are formed with teeth of approximately corresponding degree of size, and they are located in closer association with each other than the rollers 24 and 39, due to the bearing-boxes that support the shaft of the roller 38 being located in the oscillating frame 26 at a lower elevation than the boxes that support the roller-shaft 37. The teeth of the rollers 24 and 39 are of approximately the same degree of size and are coarser than the teeth of the rear rollers 25 and 38, and said rollers being more widely separated than the rear rollers provide a passage-way between them of greater dimensions than that between the rear rollers, the object being to enable the material to pass first through a greater area and be compressed and fed between the lowermost rollers and after compression delivered to the rear rollers which carry the material rearwardly through the throat-plate 20 to the cutter-cylinder 7.

For the purpose of avoiding undue strain upon the toothed feed-rollers and preventing breakage thereof by the too rapid feeding of material between them I apply to the oscillating frame 26, in which the upper toothed rollers are mounted, a pair of tension-rods 40. (See Figs. II, III, and VII.) These tension-rods extend downwardly from the front of the oscillating frame 26 and pass through ears 41, projecting from the frame-legs 1. Surrounding each tension-rod beneath said ears are springs 42, that are confined on the rods by nuts 43, applied to the rods. These tension-rods exert a constant downward pull upon the front of the oscillating frame 26, and therefore hold the upper toothed feed-rollers 38 and 39 to the material against which they operate; but in the event of pressure being exerted against said feed-rollers of sufficient degree to overcome the springs 32 and 33, surmounting the bearing-boxes of the rollers, the oscillating frame is permitted to rise when the springs 42 of the tension-rods are compressed as a consequence of the undue strain.

The various parts of my machine are driven by the mechanism that will be next described. The cutter-cylinder 7 is driven independently of the feed mechanism through the medium of a pulley 44, to which a suitable driving-belt may be applied to drive the cutter-cylinder at a higher rate of speed. 45 is the main driving-shaft of the feed mechanism, on which is a belt-pulley 46. The shaft 45 extends transversely through the machine to the opposite side thereof from that at which the belt-pulley is located and bears a pinion 47. This pinion meshes with a spur-wheel 48 on a shaft 49, that extends transversely to the machine. (See Figs. I to III, inclusive.) The shaft 49 also has fixed thereto a pinion 50, that meshes with a spur-wheel 51, fixed to a shaft 52, on which the lower toothed feed-roller 25 is mounted. This shaft 52 is geared to the surmounting feed-roller shaft 36 by a pair of intermeshing spur-wheels 53 on said shafts at the far side of the machine from that at which the spur-wheel 51 is located. The uppermost of the spur-wheels 53 is seen in Fig. I, and both of said spur-wheels are indicated in dotted lines Fig. II. Power is transmitted from the shaft 52 to drive the lower toothed feed-roller 24 by a sprocket-chain 53[a] operating on sprocket-wheels on the shaft 52 and the shaft of said feed-roller 24. (See Fig. III.) Power is transmitted from the shaft 36 of the upper rear toothed feed-roller 38 to the shaft 37 of the upper forward toothed feed-roller by a sprocket-chain 54 operating on sprocket-wheels 55 on said feed-roller shafts. 56 is a sprocket-wheel centrally mounted on the shaft 49, and 57 is a sprocket-chain operating on said sprocket-wheel and leading to and around a sprocket-wheel 58 on a shaft 59, supported by a hanger 60, located beneath the table 2. The shaft 59 operates to drive the series of feed-rollers 23 through the medium of a chain of gear-wheels 61, 62, and 63, the gear-wheel 61 being fixed to the shaft 59, those 62 being fixed to the shafts of the feed-rollers 23, and the gear-wheel 63 being fixed to a shaft 64, journaled in hangers 65, suspended beneath the table 2. The gear-wheel 61 meshes directly with two of the gear-wheels 62, as seen in Fig. II, and one of these wheels 62 by meshing with the gear-wheel 63 acts to rotate the last named, which transmits motion to the third gear-wheel 62, so that all of the feed-rollers 23 will be rotated in a corresponding direction.

In the practical use of my machine the material to be reduced or comminuted is placed upon a table 2 and first fed rearwardly thereon by the feed-rollers 23, by which material is conveyed to a position between the toothed feed-rollers and is operated upon first by the feed-rollers 24 and 39 to compress it and direct it to the rear feed-rollers 25 and 38, that force it through the throat cutter-plate 19. As the material passes through said throat-plate the knives of the cutter-cylinder 7 operate thereupon and chop it between said knives and the knife-edge 21 of the throat cutter-blade and deliver it into the casing 5. The material gathered in the pockets between the knives is then carried by the cutter-cylinder and advanced consecutively to the cutter-bars 14, and the knife-edges of said cutter-bars by operating against

said material act to comminute it as it is thrown out of the pockets.

The purpose of furnishing a plurality of cutter-bars 14 surrounding the cutter-cylinder is to provide for the cutting of any material that may enter the cylinder-casing in a crosswise position instead of feeding straightway thereinto. If the material was fed entirely in a straightway condition, it would all be cut fine as it passes over the cutter-bar beneath the throat cutter-plate. It is infeasible, however, as will be obvious, to arrange the straw or other material being cut so that the straws will lie parallel with each other, and much of the material is always crosswise of the remainder, and consequently will enter into the pockets in the cutter-cylinder instead of being cut as it passes over the throat-plate and past the cutter-bar 14 beneath it. This material is therefore carried around the cylinders to the succeeding cutter-bars instead of being thrown out through the outlet 6, and due to centrifugal motion it is gradually discharged from the pockets as it approaches the succeeding cutter-bars, thereby causing it to be cut by such succeeding bars.

I claim as my invention—

1. In a fiber-cutting machine, the combination with a pair of upright directing-plates converging toward their inner ends, of two series of toothed feed-rollers arranged at the inner ends of the directing-plates to receive the material between them, the outer rollers of the two series being more widely separated and having larger teeth than the inner ones, a throat cutter-plate receiving the material from the inner rollers, and a cutter operating upon the material delivered from the throat cutter-plate.

2. In a fiber-cutting machine, the combination with means for compressing the fiber and a throat cutter-plate through which the compressed material is delivered, of a cutter-casing into which the material is delivered, a plurality of cutter-bars arranged within said casing, a rotary cutter having a plurality of knives extending from one end of the cylinder to the other and pockets between the knives for holding the material cut from the supply and subjecting the same to the action of the cutter-bars within the casing, means for adjusting the rotary cutter toward the cutter-plate, and means for adjusting the cutter-bars toward the rotary cutter.

3. A feeding mechanism for fiber-cutting machines, comprising a table having transversely-extending slots, converging upright directing-plates mounted at the forward portion of the table, feed-rollers located below the table and operating in the slots, the rear two of which are toothed and are located beyond the converging directing-plates, a swinging frame yieldingly supported at one end above the lower toothed feed-rollers, and feed-rollers carried by the swinging frame, the outer one being a greater distance above the rollers below the table than the inner one.

4. In a machine of the character described, the combination of a casing, a cutter mounted in said casing, an apertured throat-plate at the entrance-way into said casing, a table leading to said throat-plate, lower feed-rollers operating through said table, an oscillating frame surmounting said table, upper feed-rollers surmounting said lower feed-rollers, boxes slidably positioned in said oscillating frame and in which said upper feed-rollers are journaled, springs surmounting said boxes, and means for yieldingly holding said oscillating frame, substantially as set forth.

5. In a machine of the character described, the combination of a casing, a cutter mounted in said casing, an apertured throat-plate at the entrance-way into said casing, a table leading to said throat-plate, lower feed-rollers operating through said table, an oscillating frame surmounting said table, upper feed-rollers surmounting said lower feed-rollers, boxes slidably positioned in said oscillating frame and in which said upper feed-rollers are journaled, springs surmounting said boxes, and spring-controlled tension-rods connected to said oscillating frame, substantially as set forth.

HERMAN S. ALBRECHT.

In presence of—
E. S. KNIGHT,
NELLIE V. ALEXANDER.