(No Model.)

7 Sheets—Sheet 1.

E. W. ROSS, Dec'd.

M. F. Ross, Executrix.

CANE CUTTER.

No. 548,009. Patented Oct. 15, 1895.

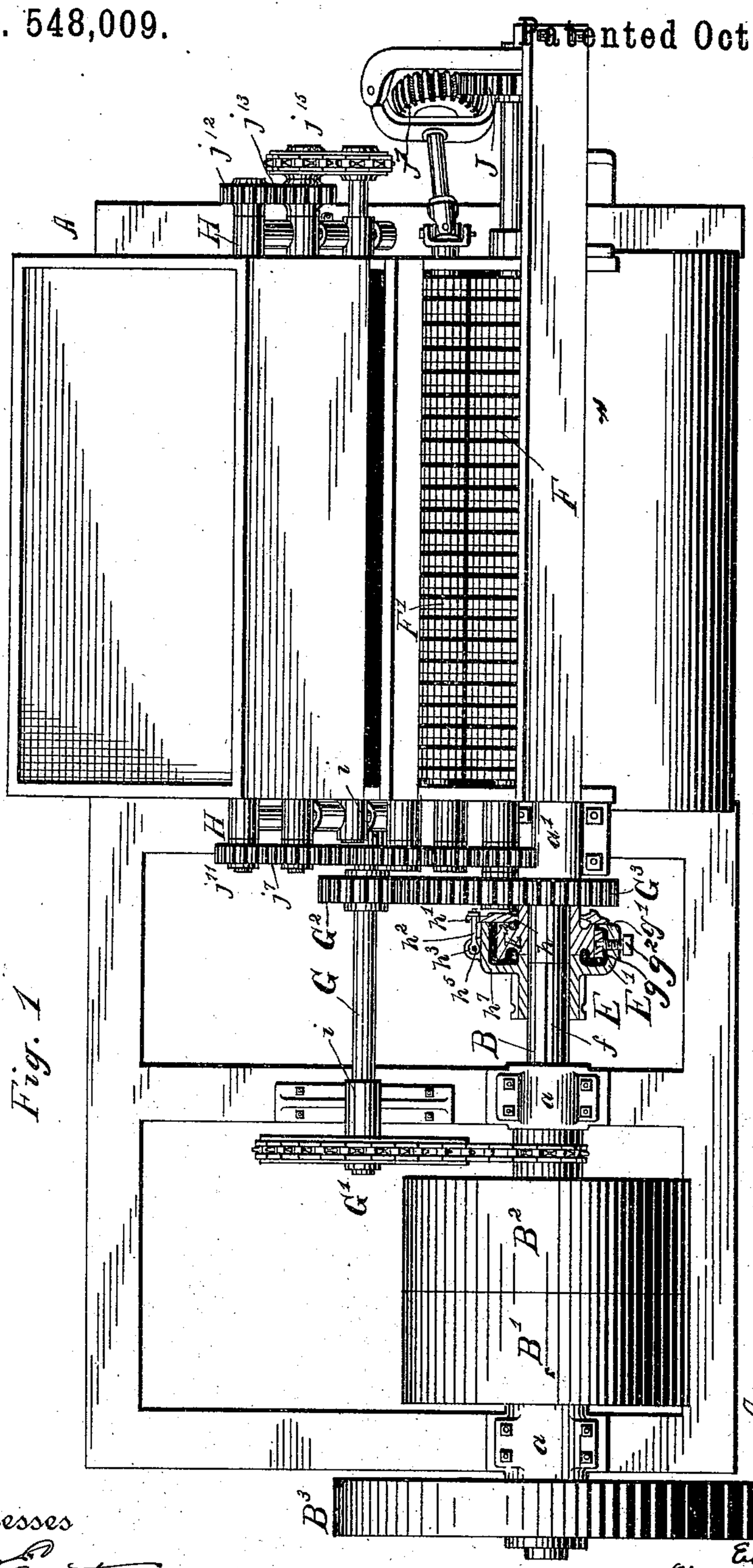

Fig. 1

Witnesses
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CANE CUTTER.

No. 548,009.

Patented Oct. 15, 1895.

Fig. 2

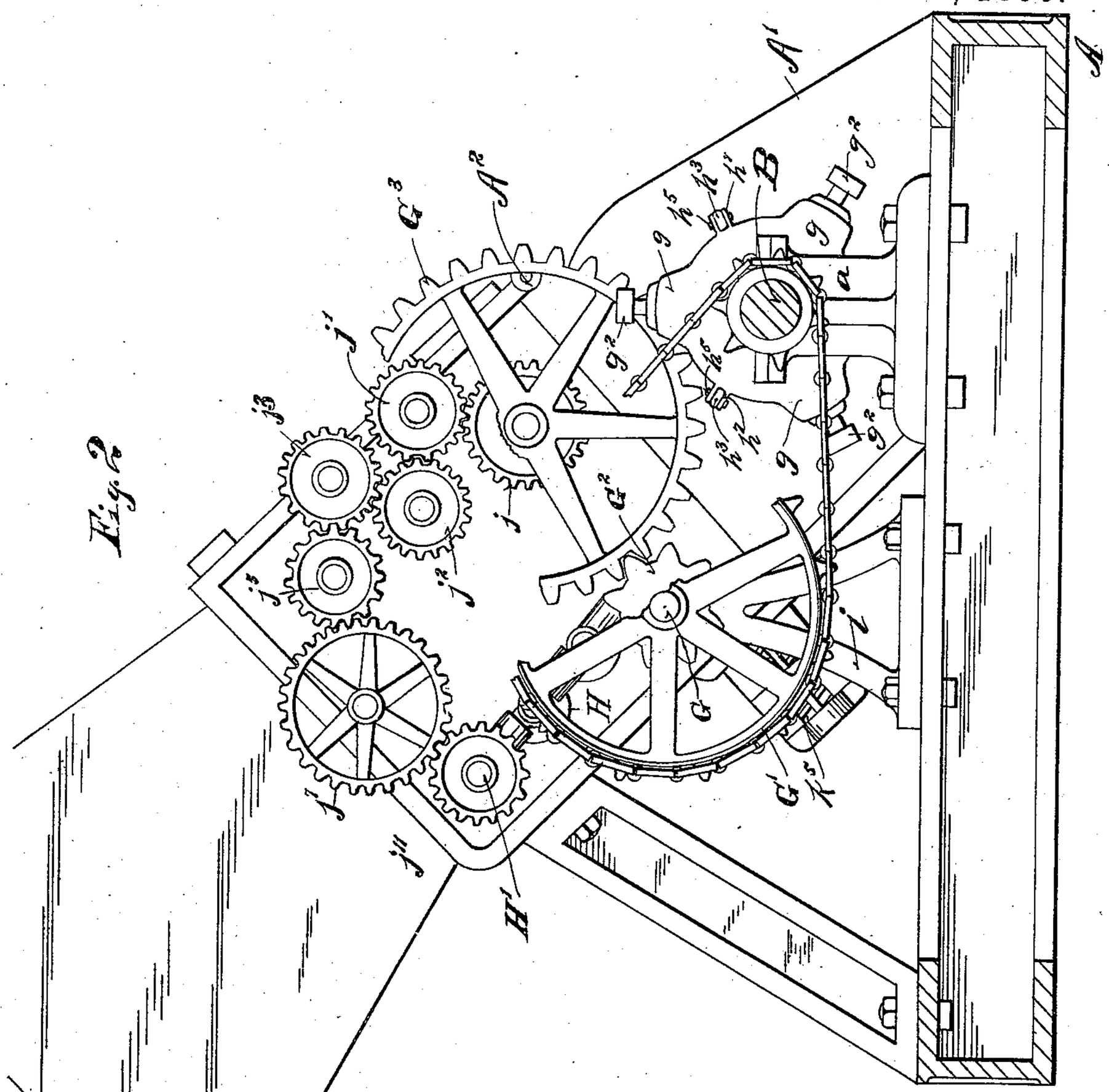
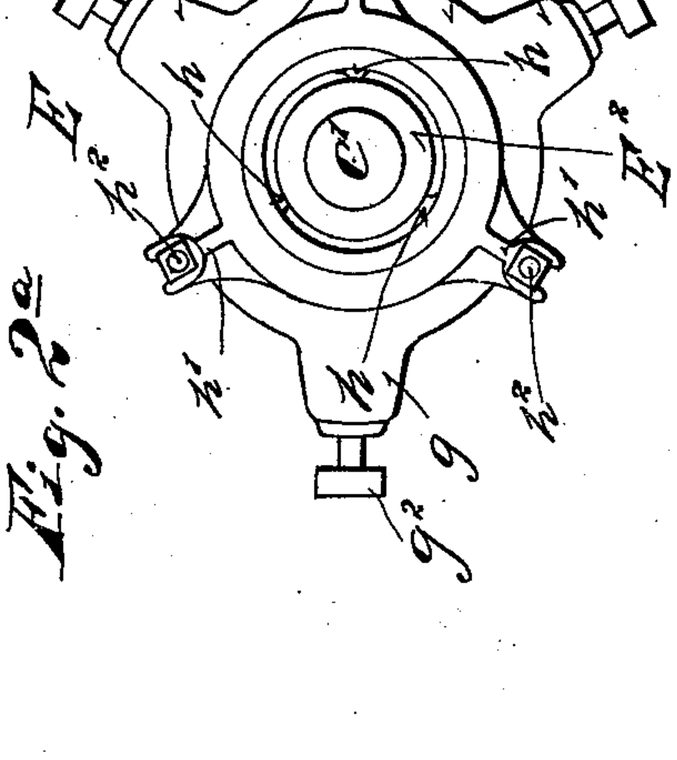


Fig. 2a



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(No Model.) 7 Sheets—Sheet 3.

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CANE CUTTER.

No. 548,009. Patented Oct. 15, 1895.

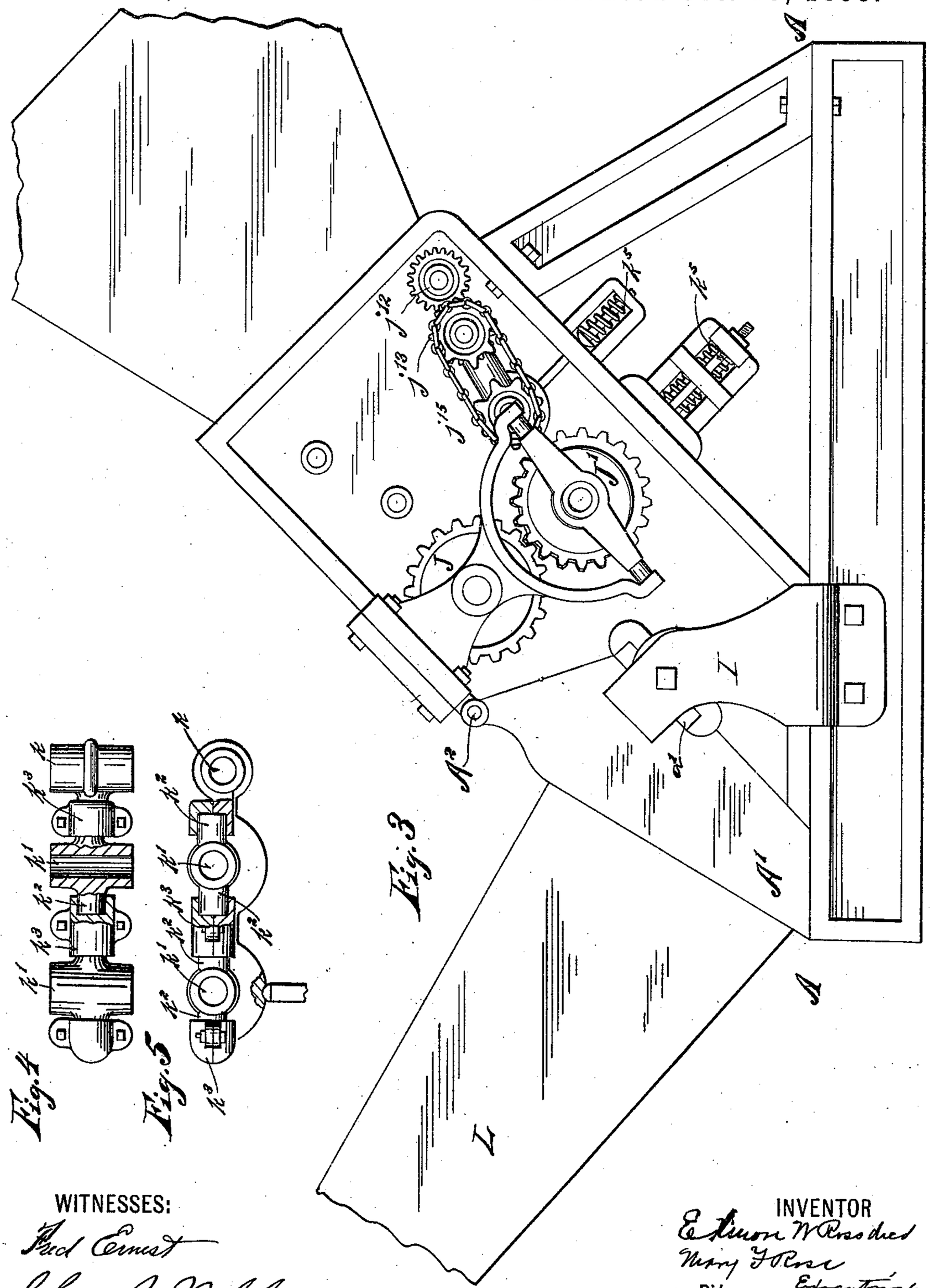

Fig. 3

Fig. 4

Fig. 5

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CANE CUTTER.

No. 548,009.

Patented Oct. 15, 1895.

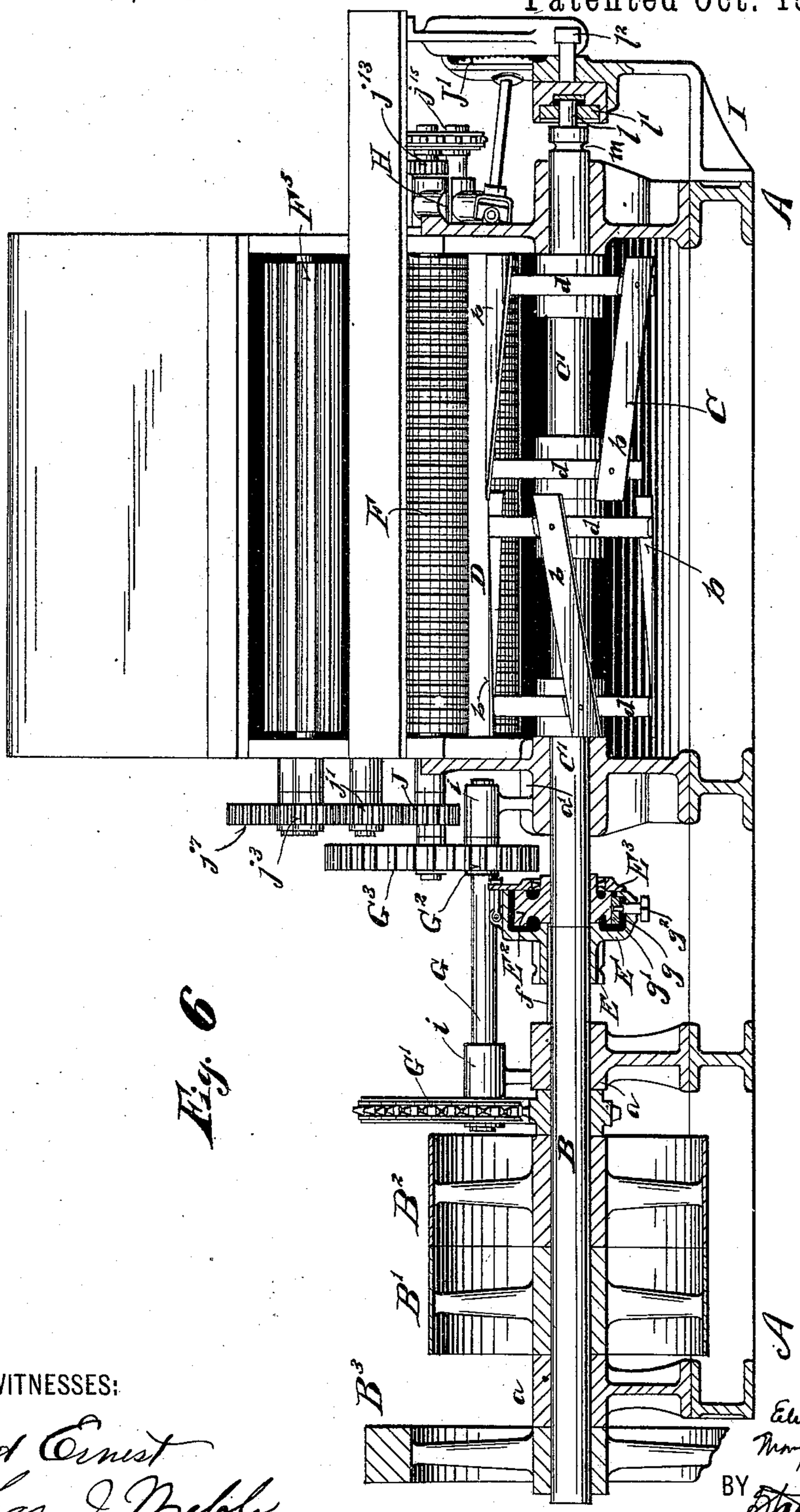

Fig. 6

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No. 548,009. Patented Oct. 15, 1895.

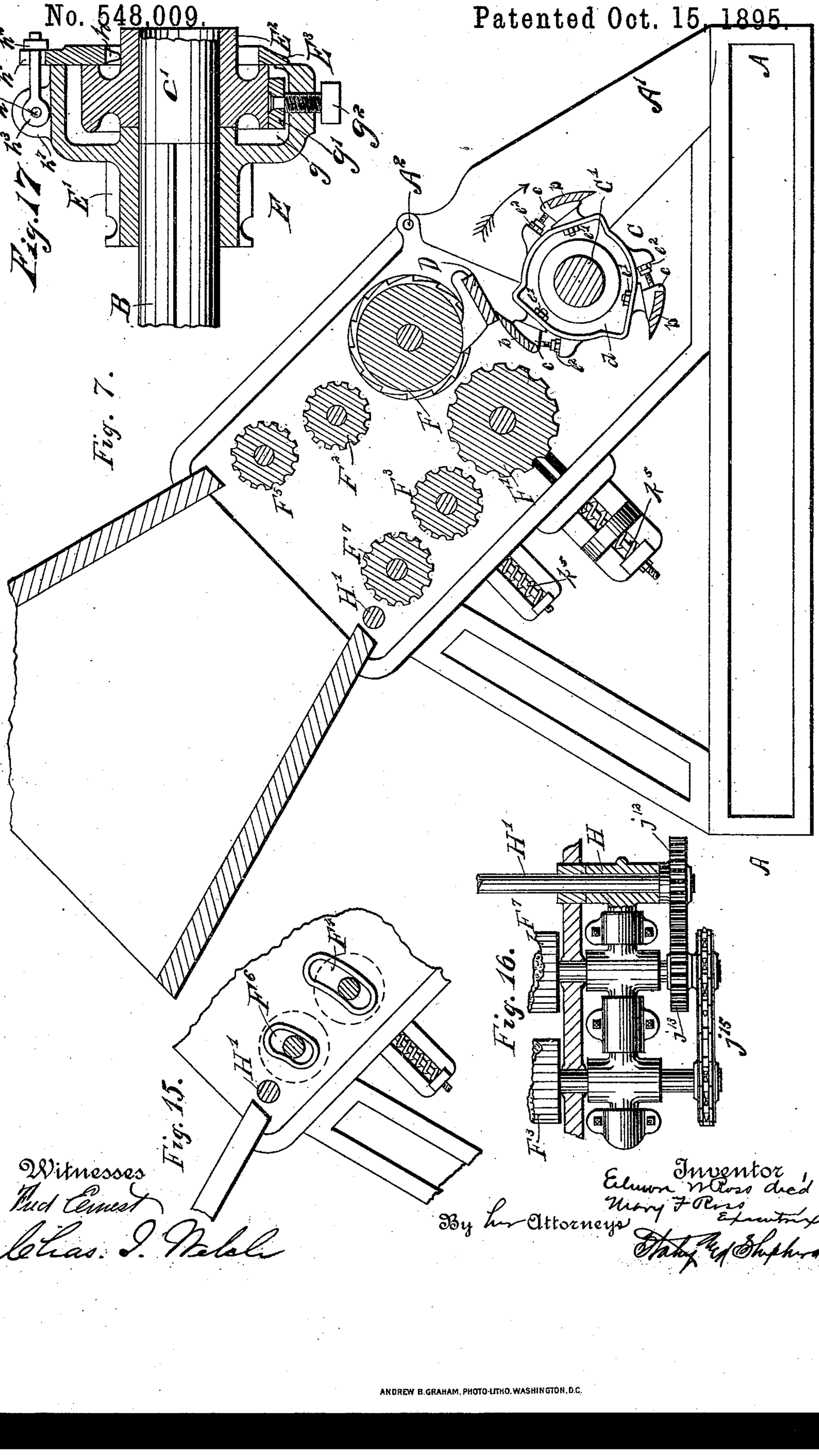

Fig. 7.

Fig. 15.

Fig. 16.

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CANE CUTTER.

No. 548,009. Patented Oct. 15, 1895.

Fig. 9

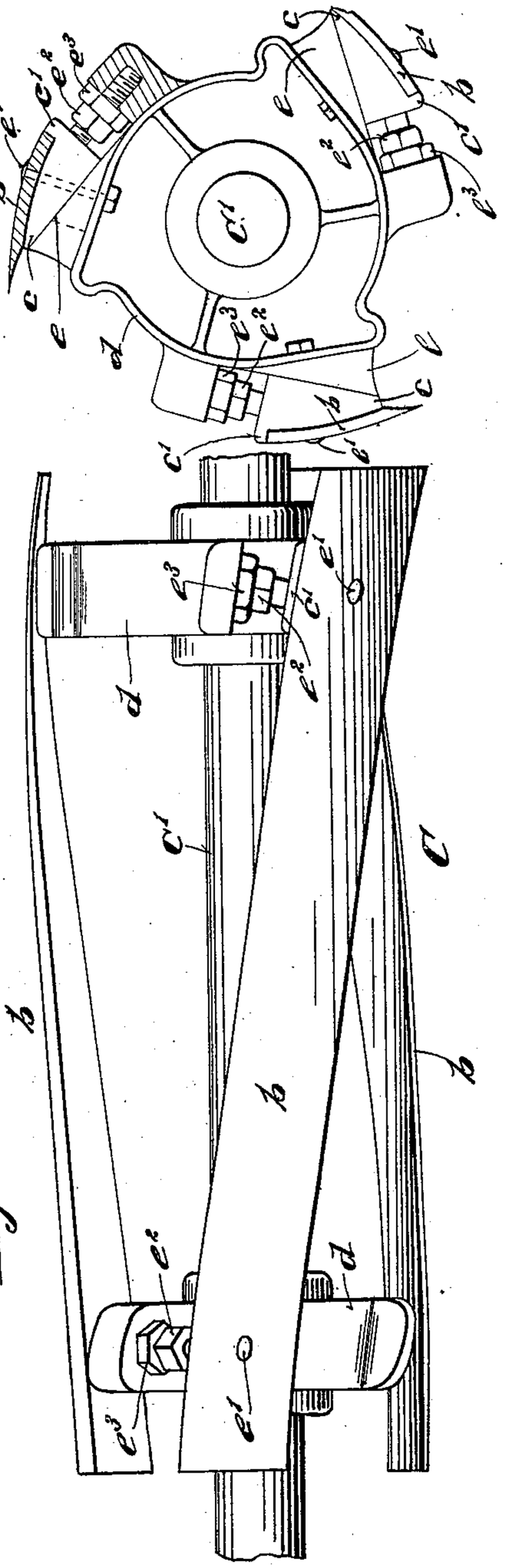

Fig. 8

Fig. 10

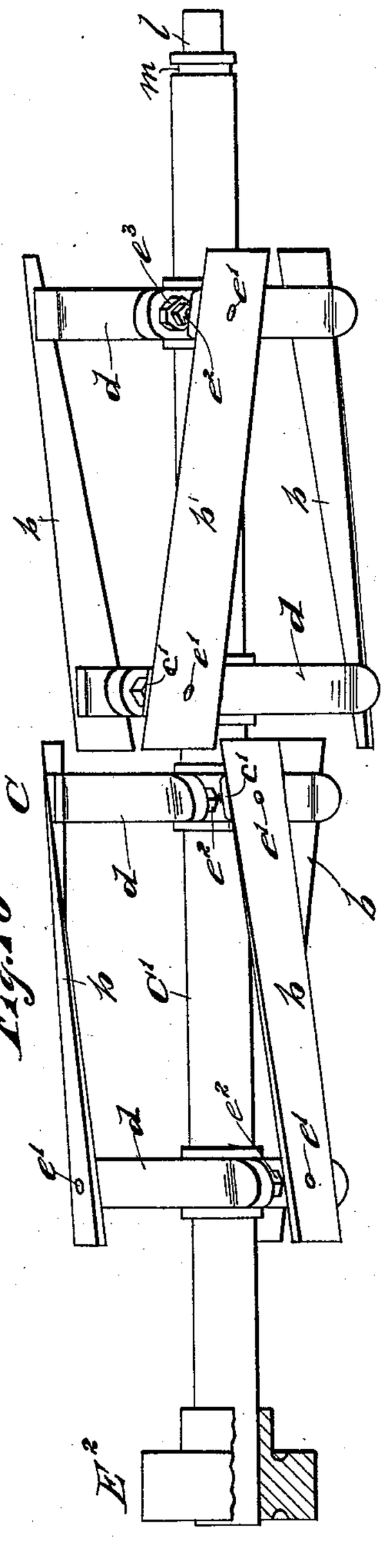

Fig. 11

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(No Model.) 7 Sheets—Sheet 7.

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CANE CUTTER.

No. 548,009. Patented Oct. 15, 1895.

Fig. 11

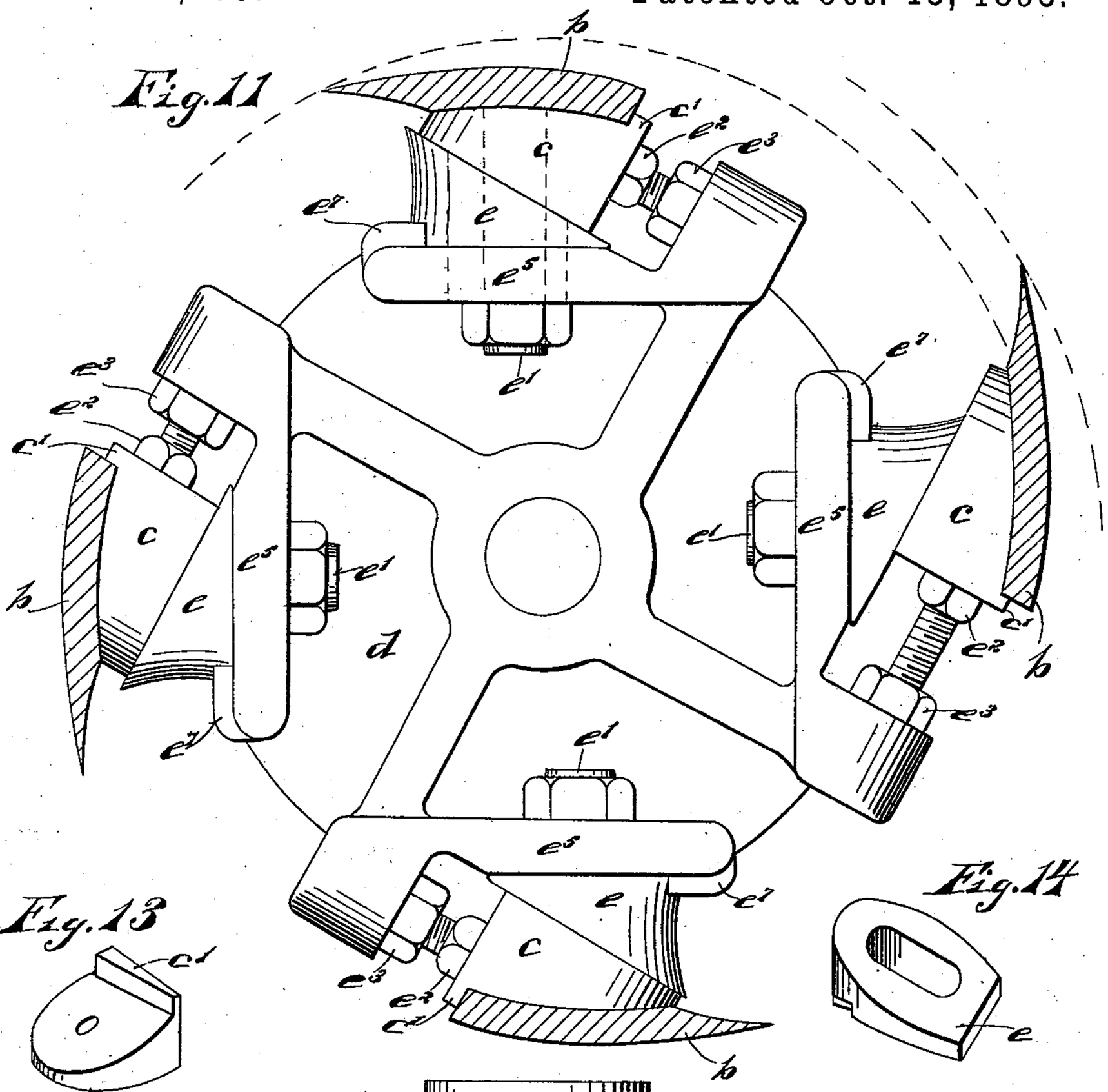
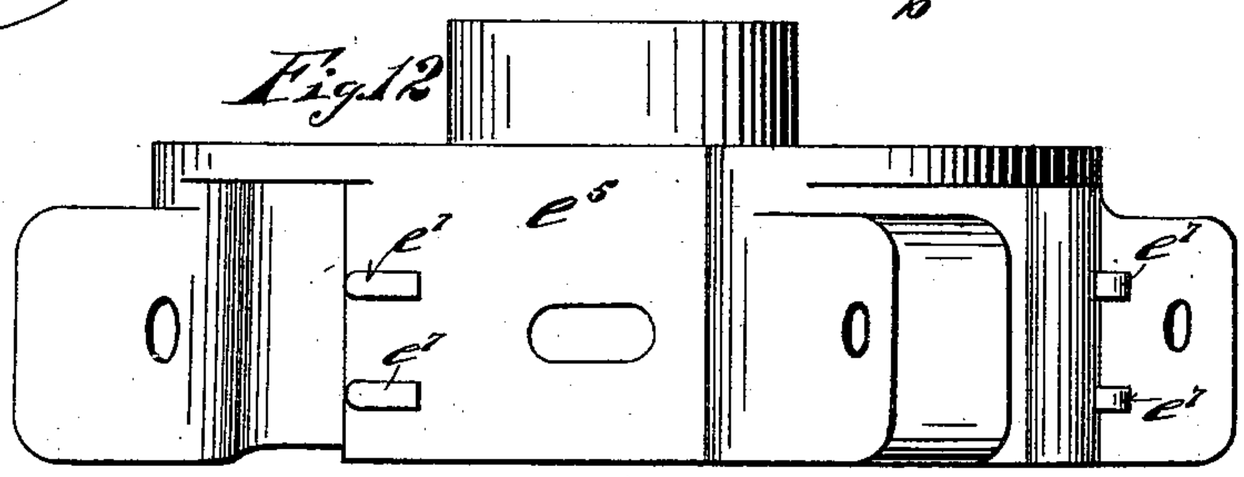


Fig. 13

Fig. 14

Fig. 12



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BY Dodge and Shepherd

ATTORNEYS

UNITED STATES PATENT OFFICE.

MARY F. ROSS, OF SPRINGFIELD, OHIO, EXECUTRIX OF ELMORE W. ROSS, DECEASED.

CANE-CUTTER.

SPECIFICATION forming part of Letters Patent No. 548,009, dated October 15, 1895.

Application filed May 5, 1894. Serial No. 510,236. (No model.)

To all whom it may concern:

Be it known that ELMORE W. ROSS, deceased, late a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, did invent certain new and useful Improvements in Cane-Cutters, of which the following is a specification.

Said invention relates to improvements in cutters for tropical canes, sorghum, fibers, &c., the machine being especially adapted for cutting sorghum and tropical canes into small lengths across the stalks, and thus across the cells containing the juice, which run lengthwise of the stalks or canes. It has been found that it is desirable in the manufacture of sorghum to have canes of this character cut into small lengths, whether the sugar is afterward extracted by the diffusion process or acted upon by the roller-mills for this purpose. In a machine of this character used in sugar-making the constructions should be such that the machine can run continually night and day during the summer season with only such occasional stops as are absolutely necessary to change and sharpen the knives. It is necessary, therefore, that the machine be strongly and compactly built and be so designed and arranged as to prevent delays or breakages occasioned by choking or by the introduction of foreign matter or from other causes which would compel the machine to lie idle while such breakage was repaired.

The object of this invention is to provide in a cutter of this character a novel arrangement of the cutting or knife cylinder and the driving mechanism whereby the knife-cylinder may be readily removed from the machine and be replaced by another cylinder when the cutting-knives become dull.

The further object of this invention is to provide, in combination with the removable cylinder and the driving mechanism, a yielding coupling, which will permit the knife-cylinder to stop independent of the driving mechanism, and thus prevent breakages by the introduction of foreign substances or from other causes.

The further object of this invention is to provide a novel arrangement of the driving and feeding mechanism in connection with the detachable knife-cylinders and knives.

The further object of this invention is to provide novel arrangements of the feeding mechanism, together with supplemental rolls for feeding the cane uniformly to the cutting-cylinder.

The further object of this invention is to provide a novel arrangement of parts by which the feeding-rolls and the supplemental rolls forming the feeding mechanism are adapted to yield or move independently at each end to accommodate varying sizes and quantities of cane or other material.

The further object of this invention is to provide a novel arrangement of the cutting-blades on the cutting-cylinder to prevent the canes from being forced diagonally across the line of cut and to prevent end strain on the cutting-cylinder shaft.

The further object of this invention is to provide means for preventing an end movement of the cylinder-shaft and the detachment of the yielding coupling.

These objects are attained by the constructions set forth in the accompanying drawings, in which—

Figure 1 is a plan view of a machine embodying the invention. Fig. 2 is a partial sectional view showing one side of the hopper and the arrangement of the driving and feeding mechanisms and the means of communicating power thereto. Fig. 2ª is a detail of the clutch. Fig. 3 is an end view showing the opposite side of the hopper and its mechanisms. Figs. 4 and 5 are respectively a plan and side view of the vibrating arm or bearings in detail, hereinafter referred to. Fig. 6 is a longitudinal sectional view taken on the line of the main and cylinder shafts. Fig. 7 is a transverse sectional view taken through the hopper and feed-rolls. Fig. 8 is a partial side view of the knife-cylinder. Fig. 9 is an end view of the same. Fig. 10 is a side elevation view of the cylinder and cylinder-shaft. Figs. 11 and 12 are respectively an elevation and side view of a modification in the form of a knife-head and in the arrangement of the knives thereon to form a knife-cylinder. Figs. 13 and 14 are detail views of parts of the same. Figs. 15 and 16 are detail views showing the arrangement of the pivoted rocking bearings for the supplemental feed-rolls

and the slotted frame-openings through which the roll-shafts operate. Fig. 17 is a detail view in section of the detachable friction-clutch on an enlarged scale.

Like parts are represented by similar letters of reference in the several views.

The machine herein set forth is of that style which is known as the inclined force-feed in distinction from those machines characterized by a level bed with an automatic carrier-feed, the hopper and feeding mechanism being in this case placed in a plane at an angle to the horizontal and inclined downwardly toward the cutting-cylinder.

In the said drawings, A A represent the main frame or bed-plate of the machine, on which the operating parts are supported. B is the main driving-shaft supported in suitable bearings *a a* on said bed-plate or frame, said bearings being provided with removable caps or covers to permit a ready removal of the knife-cylinder, as hereinafter specified. That portion of the frame A′ above and in front of said bearings is also hinged at A^2, as shown in Fig. 7, to permit ready access to the knife-cylinder and its bearings for the purpose of removal or otherwise. B′ B^2 are pulleys on said main frame, on which the driving-belt runs to supply the power to the machine, one of said pulleys being connected rigidly to the shaft and the other adapted to turn loosely thereon, forming tight and loose pulleys in the ordinary manner.

B^3 is a fly-wheel, which is preferably arranged and constructed as shown in Patent No. 255,196, granted to said ELMORE W. ROSS, but, if desired, may be secured rigidly to the shaft B in the ordinary manner.

C is a knife-cylinder mounted on the shaft C′, adapted to turn in suitable bearings *a′ a′* at each end thereof and in line with the main shaft B. The knife-cylinder C is composed of a series of cutting blades or knives *b*, supported upon suitable knife-heads *d* on the shaft C′. The cylinder C is adapted to be revolved in the direction of the arrow in Fig. 7, so as to bring the knives or blades *b* in close proximity to a stationary cutter-bar D, which extends transversely across the lower part of the hopper just back of the feeding-rolls in what is termed the "throat" of the machine.

In a machine of this character it is necessary that the knives cut across the entire length of the cutting-bar, which is quite long in the ordinary-sized machines. It is also desirable that the knives or blades be placed spirally about the cylinder in order that a shearing cut may be secured. When thus arranged, a heavy pushing or crowding of the canes in the direction of the shear of the knives and a corresponding thrust of the knife-cylinder in the opposite direction are experienced, which results in forcing the canes to feed diagonally across the fixed cutting-plate, thus producing a long diagonal cut instead of a square cut, and at the same time by the heavy thrust upon the knife-cylinder causing a wear upon the ends of the bearings and knife-head hubs. To overcome these difficulties, the knife-cylinder is formed in sections, and the blades forming the respective sections spirally about the same cylinder are arranged in such a manner that the shear of the knives in one section is in the opposite direction from the shear of the knives in the other section, so that the inclination of one set of knives to press the material and the knife-cylinder in one direction is overcome by the opposite shear in the other set of knives. The knives are preferably arranged, as shown in Fig. 10, so that the knife-sections at each end of the cylinder incline toward the center. The knives are also arranged in one section slightly in advance of the corresponding knives in the other section. The arrangement of the knives in sections, with the knives in one section in advance of those in the other section, relieves the cylinder momentarily from a long continuous cut, thus using the power more uniformly than when a single long knife is used.

As before stated, the knives are supported upon knife-heads *d*. It has been the common practice to secure the knives directly to the heads by means of bolts extending through said knives and connected to the knife-heads. In order that the knives may travel in the proper circle as the cylinder is revolved, they are made in the arc of a circle in cross-section. They are also arranged spirally about the cylinder. When thus constructed considerable difficulty has been experienced in adjusting the knives, since a movement of one end of the knife greater or less than at the other end of the knife at once detaches it from its firm seat by changing the angle of the knife, and thus preventing a greater or less circle to the bearing or seat than that upon which it was originally formed and tempered. In this machine, in connection with the knife-heads *d*, are used small saddle-plates *c*, on which the knives rest. These saddle-plates are each formed on their upper edge to conform to the circle of the knife-blade and are provided at the rear with upwardly-projecting flanges *c′*, adapted to come squarely against the back of the knife and retain at all times the same relative position with said knife. These saddle-plates are rested on inclined bearing-faces *e* on the knife-heads *d* and are secured thereto by fastening-bolts *e′*, which pass through said knives and saddle-plates and through the bearing-supports *e*, which are preferably formed in the nature of a flange on said knife-heads *d*. The hole through which the fastening-bolt *e′* passes is made slightly slotted or larger than the bolt *e′*, so that an adjustment of the saddle and the knife thereon may be secured by loosening said bolt. Immediately behind each of the saddle-plates and adapted to rest in contact therewith is an adjusting-screw e^2, which screws into a projecting flange or boss formed on the knife-head, the said screw e^2 being screwed into said boss or projection

from the side on which the saddle-plate is located, the head of the said screw resting against the saddle-plate. A jam-nut e^3 is also provided, adapted to be tightened against the boss or projection e^5 and thus hold said screw firmly therein. By this construction the knife may be readily adjusted forward or backward, and as the end of the knife is adjusted the back edge of the knife, resting against the flange of the saddle-plate, twists the said saddle-plate around with it, always retaining, therefore, the same solid seat for the knife, so that no rocking of the knife can occur, or can the knife be twisted out of its original and correct form by tightening the fastening-bolt e'.

In the modifications shown in Figs. 11 to 14, inclusive, the inclined seats or bearing-faces e, on which the saddles c rest, are made in the nature of separate blocks adapted to rest on the peripheral flanges e^5 on the knife-head, the knife-head being provided with small projecting lugs e^7, against which the bearing-blocks e rest to prevent said bearing-blocks from being forced longitudinally as the saddle is moved along the inclined faces. In Fig. 11 is shown one of the knives and saddles pushed up along the inclined bearing-seat to show the rapid adjustment secured by this construction. It will be noted that by this construction and as indicated by dotted lines in said view, as the knives are forced outwardly the clearance at the back of the knife is increased. As before stated, the cylinder-shaft C′ and the main shaft B are located in the same horizontal line. These shafts in the present machine are connected together by a yielding coupling E, the outer portion E′ of which is secured to the main shaft B and the inner portion E^2 secured to the cylinder-shaft C′. The outer portion E′ is preferably secured to the shaft B upon a spline or feather-key f so that it turns readily with said shaft, but is capable of a longitudinal movement thereon. The other or inner portion E^2 is secured rigidly to the cylinder-shaft C′. The outer portion E′ of the coupling is formed in the nature of a casing adapted to receive the inner portion E^2. The inner portion E^2 is turned off on its periphery and fits loosely in said casing. This outer casing is provided with pockets g, preferably three in number, adapted to receive bearing-blocks g', which are adapted to be moved to or from the part E^2 by set-screws g^2 passing into said pockets. Located about the inner portion E^2 is a fastening-ring E^3, provided with bearing-faces h, adapted to rest on the hub of the part E^2 and having projecting ears h' to receive fastening-bolts h^2, which are provided at one end with eyes h^3, adapted to receive pins h^5, which secure them to projecting ears h^7 on the outer portion E′ of the coupling. By this construction the parts of the coupling are held firmly together. By loosening the bolts h^2, however, the said bolts may be thrown back out of the ears h' of the fastening-ring E^3, permitting the said ring to be removed and the outer portion E′ of the clutch to be withdrawn from the inner portion, thus readily uncoupling the shafts to permit the knife-cylinder to be removed. The bearing-blocks are made of any suitable material and are adapted to be forced against the inner portion E^2 of the coupling to produce any desired amount of friction between the parts to cause the knife-cylinder to revolve with the main shaft, but at the same time to form a yielding connection which will permit the knife-cylinder to be retarded or to stop suddenly while the driving mechanism continues to revolve, this being accomplished by the slipping of the bearing-blocks upon the periphery of the inner part of the coupling.

Immediately in front of the cutting-bar and the knife-cylinder in the hopper are the feeding-rolls F F′, one of which is provided with yielding bearings and adapted to move to or from the other stationary roll, as more or less material is fed between the same, in any usual or well-known manner. In order to provide for driving the feeding-rolls and the other portions of the feeding mechanisms, as hereinafter described, without interfering with the detachable cylinder, a counter-shaft G is provided, supported in suitable bearings i on the main frame, and connected to the main shaft at its outer end with a suitable sprocket or other gear G′ and at the other end by a spur-pinion and gear G^2 G^3 to the stationary feeding-roll F.

F^2, F^3, F^5, and F^7 are the supplemental rolls which are located in the hopper in front of the feeding-rolls F F′. These rolls are arranged in pairs, two pairs being shown in the drawings, though a greater or less number may be used, if desired. Each pair is arranged closer together than the next preceding pair, so that a converging throat is formed up to the feeding-rolls and knife-cylinder. The journals of the lower supplemental rolls F^3 F^7 of each pair pass through slotted openings F^4 F^6 in the frame, (see Fig. 15,) and are supported at each end by vibrating arms H, adapted to permit of an independent movement at each end of said rolls to compensate for varying quantities of material fed thereby. These vibrating arms H are each pivoted to a transverse shaft H′, which extends transversely through the hopper and conveys the power to drive the rolls from one end of the machine to the other, as hereinafter set forth. The power to drive the upper supplemental rolls F^2 and F^5 of each pair is communicated from a spur-gear j on the shaft of the feeding-roll F through an intermediate spur-gear j' to a spur-gear j^2 on the shaft of the supplemental roll F^2; from this through an intermediate gear j^3 to a spur-gear j^5 on the shaft of the supplemental roll F^5. From the spur-gear j^5, through the medium of an intermediate gear j^7 and its pinion j^{11}, power is transferred to the shaft H′; from the shaft H′ to the lower supplemental roll F^7 on the oppo-

site side of the hopper by a spur-gear j^{12} operating into a similar gear j^{13}; thence from the supplemental roll F^7 to the supplemental roll F^3 by a chain and sprocket-gear j^{15}. By the construction thus described and by the use of the intermediate gears of proper relative sizes a uniform peripheral speed of the supplemental and feed rolls is secured, while at the same time the rolls are arranged converging, as described, and the rolls of the respective pairs adapted to be separated to compensate for varying quantities of the material. The vibrating arms H, in which the bearings for the lower supplemental rolls are located, are each provided with an end bearing k for the shaft H′. The bearings proper k' for the roll-shafts are each provided with trunnions k^2, adapted to rest in suitable bearings k^3 in said arms, so that a rocking motion of the shafts is permitted, to allow one end of the supplemental rolls to move up or down independent of the other end. Springs k^5 serve to hold the supplemental rolls and the vibrating arms in their normal positions, but permit them to yield to accommodate the material.

In order to guard against longitudinal movement of the cylinder-shaft C′ and to insure the parts of the coupling E from being disconnected and to prevent strain upon the respective parts, the end of said shaft C′ is provided with a steel toe l, adapted to run in a bearing or step l' in a bracket I, secured to the main frame A A, a set-screw l^2 being provided to adjust the said bearing or step against the end of the said toe. The bearing l' for the toe l is adapted to set loosely in the bracket I, so that when the set-screw is loosened and the coupling disconnected the cylinder may be readily removed from its bearings.

Power to drive the lower feeding-roll F′ is transmitted from the upper feeding-roll F through the medium of a spur-gear J and a round-face gear J′, hung in a vibrating bearing and connected with a universal joint in the manner described and claimed in said ELMORE W. ROSS' former patents, Nos. 254,843 and 275,861.

The operation of the machine as thus described it is thought will be understood from the above description. The canes are fed to the supplemental rolls by means of an endless carrier or in any other desired manner, the discharge end of said carrier or conveyer being preferably located considerably above the hopper of the cutter, so that the material will be conveyed by gravitation through a chute into the hopper of the machine, the rolls and working parts of the machine being placed at about the same angle as the incline of the chute, thus avoiding the necessity of an extra carrier between the cane-carrier and the throat of the machine. The canes are drawn in by the supplemental rolls and gradually forced together until they meet the feeding-rolls, whence they are drawn into the knife-cylinder and are cut between the knives of said cylinder and the stationary cutter-bar, from whence they are discharged into a suitable receptacle or carried away by an elevator or carrier, as indicated at L in Fig. 3.

The bed-plate A A is extended underneath the several parts of the cutter, which are secured in rigid frames and bearings to said bed-plate in order to prevent any of these several parts getting out of alignment. As the two sections of the main shaft B and C′ are intended to be in exact alignment, and one end of the shaft C′ being inserted within the recess in the movable casing E′ on the shaft B, the slightest settling of any part of the machine would prevent the coupling from holding the two shafts B and C′ together and defeat and destroy the practical workings of the parts at this point, the solid frame, therefore, being intended to obviate the trouble occasioned by the settling of its foundation or the building in which it is located, as every part of the machine would retain its proper relation to the other parts, although the bed-plate would settle.

By the arrangement of the detachable knife-cylinder in connection with the main shaft and yielding coupling the knife-cylinder may be readily removed and be replaced by another with sharpened knives, the change occupying but a few minutes. The knives on the cylinder may be taken off and resharpened and be readily set to their position in readiness to be replaced on the machine when the knives on the other cylinder become dull. By this arrangement a probable breakage from foreign substances entering the knife-cylinder or from other reasons is also obviated, as by the yielding coupling the knife-cylinder may be permitted to come to a stop without any damage other than perhaps the nicking of the knives where the foreign matter was struck.

By the arrangement of the counter-shaft and feed-gear the feed mechanism is left undisturbed when the knife-cylinder is removed. By the feed-gear as described a uniform peripheral motion is imparted to the supplemental rolls and the feeding-rolls. By the use of one or more pairs of supplemental rolls a continuous feed of the machine is secured and the liability of choking by crooked canes or varying quantities of material is obviated.

By means of the vibrating arms and rocking bearings thereon for supporting the supplemental rolls one end of said rolls is permitted to drop down more than the other and thus compensate for a varying quantity of material on one side of the machine.

By the arrangement of the toe or step on one end of the shaft the danger of separation of the parts of the coupling and the wear on the knife-cylinder are reduced.

In the end of the shaft C′ and, if desired, at each end of the knife-cylinder is provided a groove m, adapted to receive a hook or rope forming part of the sling by which the knife-

cylinder is raised from its position in replacing the cylinder. This groove *m* prevents the hook or rope from sliding off from the end of said shaft and retains the same in position, thus obviating the liability of slippages and breakages resulting therefrom.

The machine as above described is especially adapted for use in sugar-making, though its utility is by no means confined to the cutting of cane. It is obvious, however, that it may be used for cutting any material for which it is adapted—such, for instance, for cutting fibers of various kinds in the manufacture of paper and for other purposes.

By the arrangement of the knife-heads and saddles, together with their adjusting-screws, means are provided by which the knives may be readily adjusted without straining a knife or putting it in a false position. The adjusting-screws, being screwed into their supporting bosses or bearings from the side on which the knife or saddle is located and each provided with a head between the said knife and bearing or boss, are held positively against displacement and cannot become loosened and drop into the cylinder-knives or into the other parts of the machinery, as not infrequently happens with other arrangements of the adjusting parts.

Having thus described the invention, what is claimed is—

1. In a cutter, the combination with a main frame, a driving mechanism, and a detachable removable cylinder supported in suitable bearings independent of said driving mechanism, a detachable connection between said driving mechanism and cylinder, and a feeding device to carry the material to said cylinder, and a countershaft forming an intermediate connection between the driving mechanism and the feeding device, said countershaft being independent of and having no connection with said cylinder whereby the removal of said cylinder is permitted without disturbing the driving mechanism or feeding device, substantially as specified.

2. In a cutter having a main shaft in two parts, one of said parts being provided with a driving mechanism and the other with a knife cylinder, a detachable coupling for connecting said parts, a feeding device opposite said knife cylinder, and a countershaft parallel with said main shaft adapted to form an intermediate connection between the driving portions of said shafts and said feeding device to permit the removal of the cutting cylinder without disturbing the driving or feeding mechanism, substantially as specified.

3. In a cutter, a main frame supporting a driving shaft, and a removable cutting cylinder journaled in suitable bearings in the same line with said driving shaft, said cutting cylinder being adapted to be removed from or replaced in its said bearings independent of the driving shaft, and a detachable friction coupling adapted to connect the said cylinder shaft and the driving shaft to cause the said shafts to rotate yieldingly together and to permit the removal of said cylinder shaft independent of the driving shaft, substantially as specified.

4. In a cutter, a knife head having outer peripheral bearing surfaces, and spirally-arranged knives connected to said peripheral surfaces to form a cutting cylinder, an independent knife seat or saddle between said peripheral surfaces and each of said knives, said peripheral surfaces and saddles being joined together in a plain surface at an angle to the chord of the arc of the cutting cylinder represented by said knife, and means for adjusting said saddle on said inclined seat, substantially as described.

5. In a cutter, a knife cylinder having one or more curved spiral knives about its periphery, independent seats or saddles for said knife or knives, each having an inclined bottom adapted to rest on a peripheral surface, of a knife head arranged at an angle to the chord of the arc represented by said knife, means for adjusting said saddles on the inclined surface of said knife head, and fastening bolts for securing said knives and saddles to said heads, substantially as specified.

6. In a cutter, a knife cylinder provided with one or more knives about its periphery, knife heads having outer peripheral bearing surfaces and independent knife seats or saddles interposed between said knives and said knife heads, the peripheral surfaces of said knife heads being arranged at an angle to the chord of an arc represented by said knife, and said knife head being correspondingly inclined so that when the saddle is adjusted on said surface it will carry the knife simultaneously forward in the direction of its rotation and upward in the direction of its periphery, substantially as described.

7. In a cutter, a knife cylinder composed of one or more knife heads having outer peripheral surfaces, spirally-arranged knives on said knife heads, independent saddles between said knives and knife head surfaces, each of said saddles having an adjusting screw behind and bearing against said saddles, and a fastening bolt extending through said knives, saddles and knife heads, substantially as described.

8. In a cutter, a knife cylinder composed of one or more knife heads, a cutting knife secured thereon, a stationary projection in the rear of said knife, and an adjusting screw, said adjusting screw being extended into said projection and provided with an enlarged head between the said projection and said knife, substantially as specified.

9. In a cutter, a knife cylinder having one or more spirally-arranged knives, one or more knife heads to which they are attached, independent seats or saddles for said knives, adjusting screws adapted to extend into a boss or shoulder on said knife heads, each of said adjusting screws having a head between said shoulder and knife head, and fastening bolts

extended through said knives, substantially as described.

10. In a cutter, a knife cylinder composed of one or more knife heads, a cutting knife secured thereon, a stationary projection behind said knife, and an adjusting screw extended into said stationary projection, said adjusting screw being provided with an enlarged head, and a jam nut between said stationary projection and said knife, substantially as specified.

11. In a cutter having a cutting mechanism and main feeding rolls, supplemental rolls arranged in pairs in front of said feeding rolls, one or more of said supplemental rolls being journaled in pivoted bearings supported in vibrating arms, substantially as and for the purpose specified.

12. In a cutter, the supplemental rolls arranged in one or more pairs, as described, the shaft of one of said rolls being journaled at each end in adjustable bearings in pivoted arms, and means, substantially as described, for communicating a rotary motion to said rolls through the pivotal center of said arms, substantially as specified.

13. In a cutter having a main frame, a main shaft in two parts supported on said main frame, a driving mechanism on one of said shafts, and a removable cutting cylinder provided with spirally-arranged knives on the other shaft, a cylinder shaft having one end abutting against and connected to the end of the driving shaft, and an end bearing at the other end to prevent the separation of the respective parts or shafts, substantially as specified.

14. In a cane cutter, a removable cutting cylinder, feeding mechanism for said cylinder, a driving mechanism connected directly to said cutting cylinder and also to said feeding mechanism, and a yielding detachable coupling having adjustable friction bearings between said cutting cylinder and driving mechanism, substantially as specified.

15. In a cane cutter, a yielding coupling connecting the driving and cylinder shafts, said coupling being made in two parts, one part having a friction surface and the other being provided with adjustable friction plates adapted to bear on said surface, one of said parts being movably connected to its shaft to permit the parts to be detached, substantially as specified.

16. In a cutter having a driving mechanism and a removable cutting cylinder, a yielding coupling consisting of an outer casing and an inner peripheral bearing, friction blocks in said casing, adjusting screws to move said friction blocks, a fastening ring to prevent the separation of the outer casing and the inner bearings, and means for connecting said casing to its shaft to permit it to be moved away from the other part of said coupling and at the same time prevent rotary movement of said casing on said shaft, substantially as specified.

17. In a cane cutter, a driving mechanism and a detachable movable cutting cylinder, a yielding coupling connecting the driving and cylinder shafts, said coupling being composed of an inner hub having a peripheral surface secured rigidly on one of said shafts, and a movable outer casing adjustably secured on the other shaft, pockets in said movable casing, adjustable friction plates in said pockets, and a clamping ring for connecting said outer casing to said peripheral bearing, and detachable means for securing said clamping ring to said casing, substantially as specified.

18. In a cane cutter, the combination with a main frame, of an independent driving mechanism supported on said main frame, a detachable removable cutting cylinder also secured in suitable bearings on said main frame and adapted to be removed therefrom independent of the driving mechanism, a feeding mechanism to convey the material to said cutting cylinder, and separate and independent connections between said driving mechanism and cutting cylinder and between said driving mechanism and feeding device, said cutting cylinder being connected to said driving mechanism by a detachable coupling, substantially as specified.

In testimony whereof I have hereunto set my hand this 12th day of April, A. D. 1894.

MARY F. ROSS,
Executrix of the estate of Elmore W. Ross.

Witnesses:
WM. A. JAYCOX,
FRANK C. BARKS.