No. 753,688. PATENTED MAR. 1, 1904.

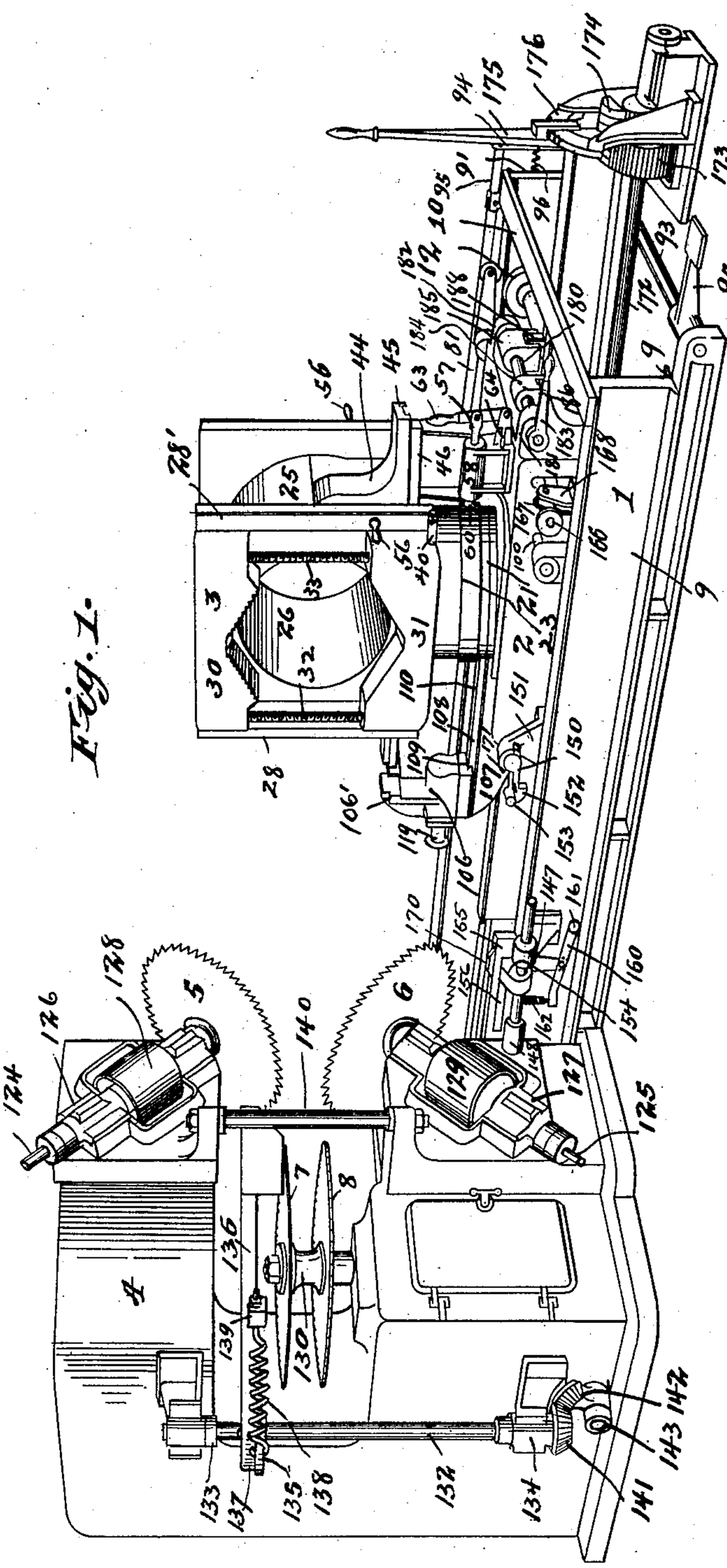
D. W. EDWARDS.

MACHINE FOR SAWING MINING TIMBERS.

APPLICATION FILED FEB. 9, 1903.

NO MODEL. 9 SHEETS—SHEET 1.

Fig. 1.



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NO MODEL. 9 SHEETS—SHEET 2.

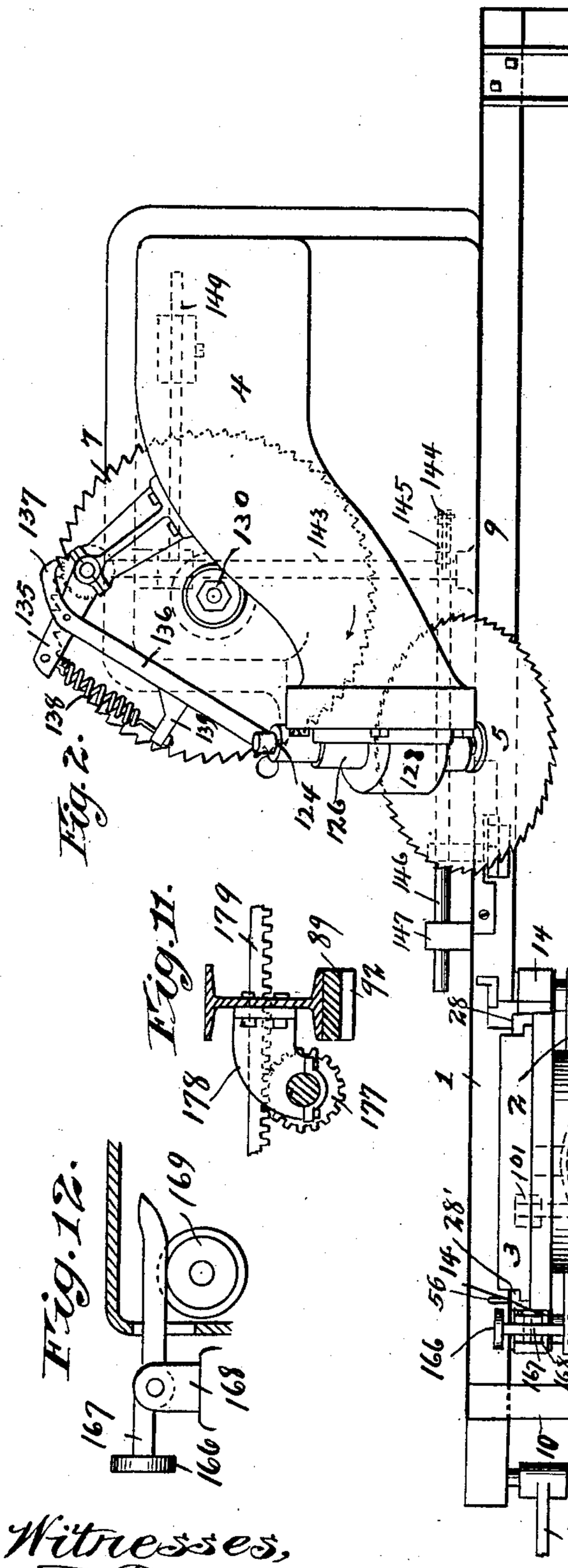

Fig. 2.

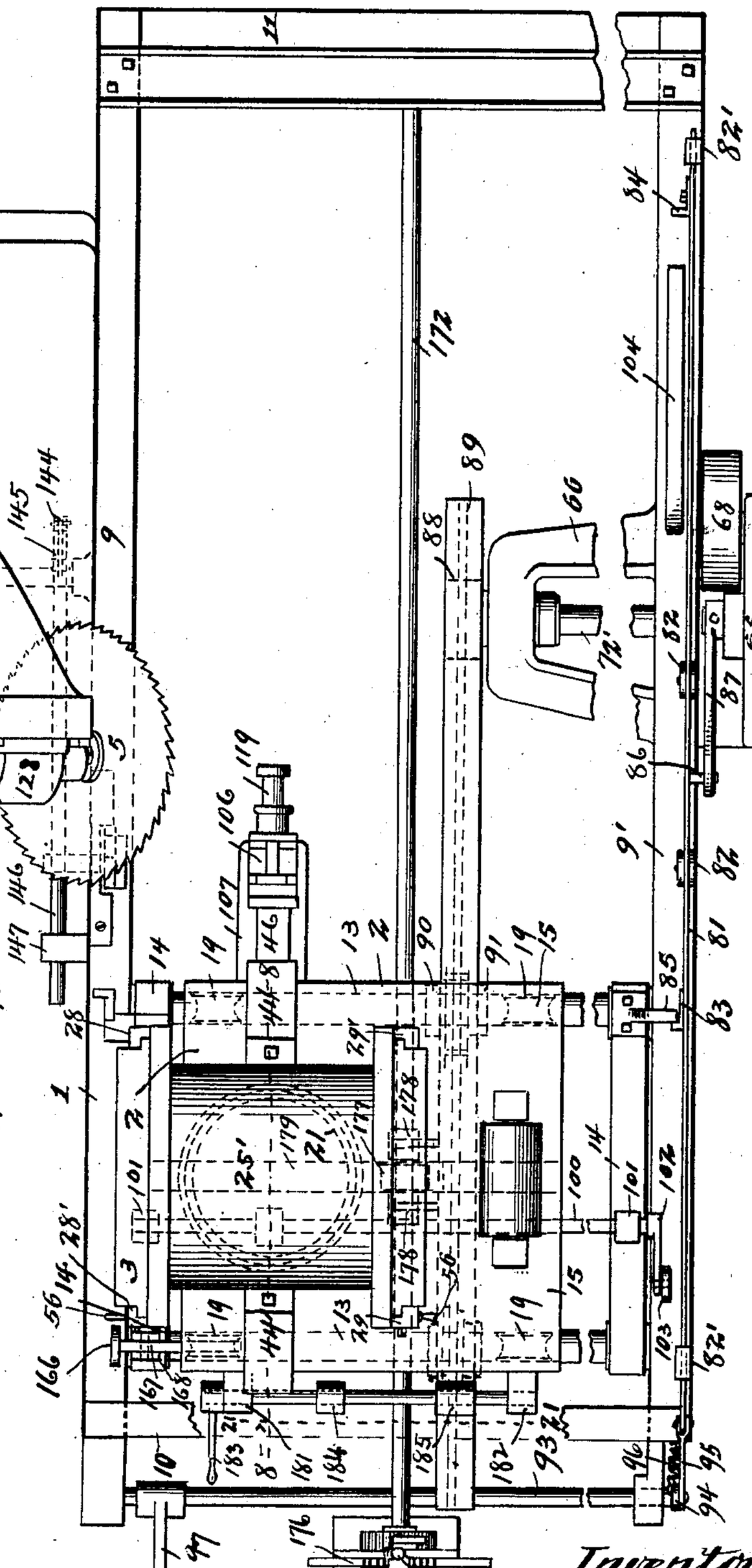

Fig. 11.

Fig. 12.

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NO MODEL. 9 SHEETS—SHEET 3.

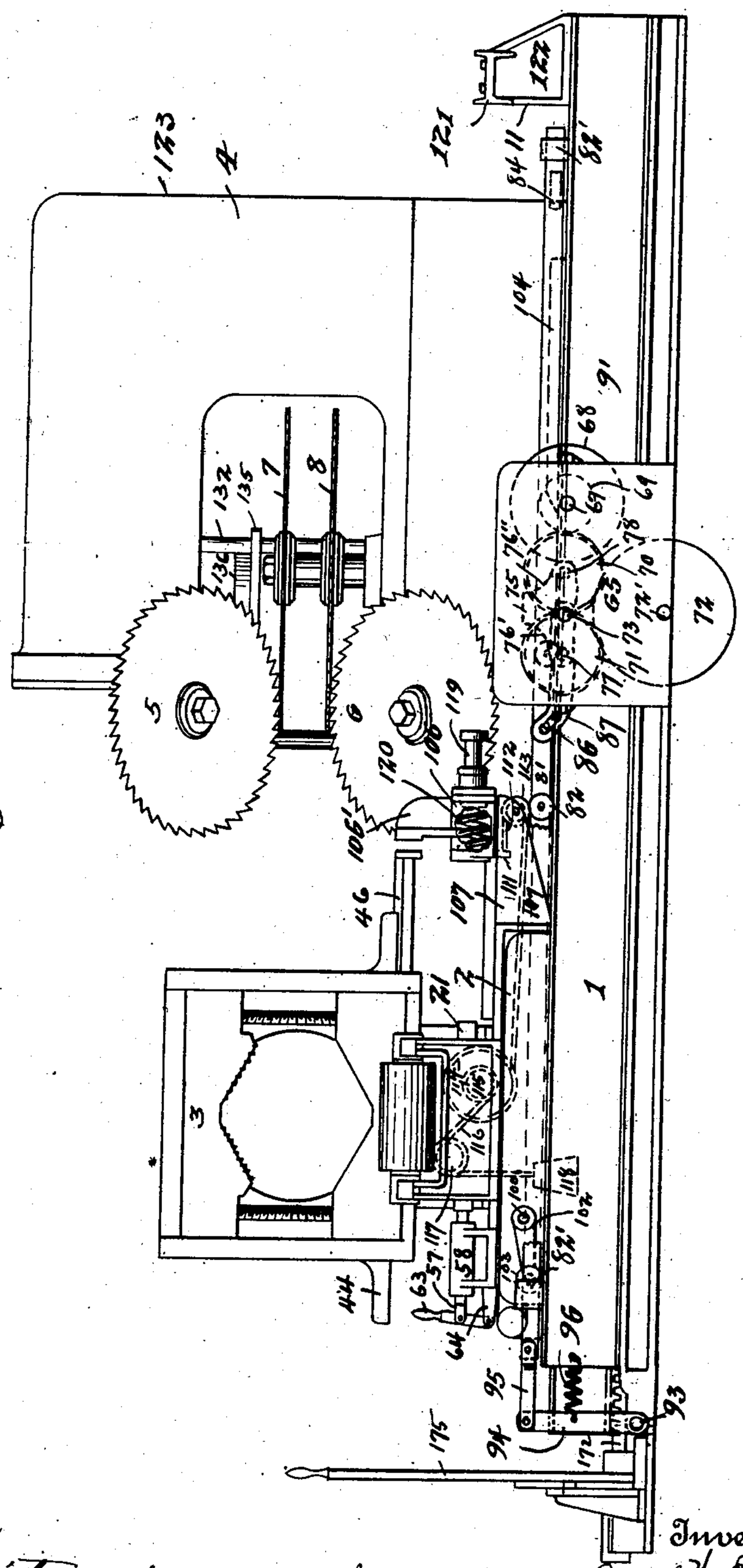

Fig. 3.

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NO MODEL. 9 SHEETS—SHEET 4.

Fig. 4.

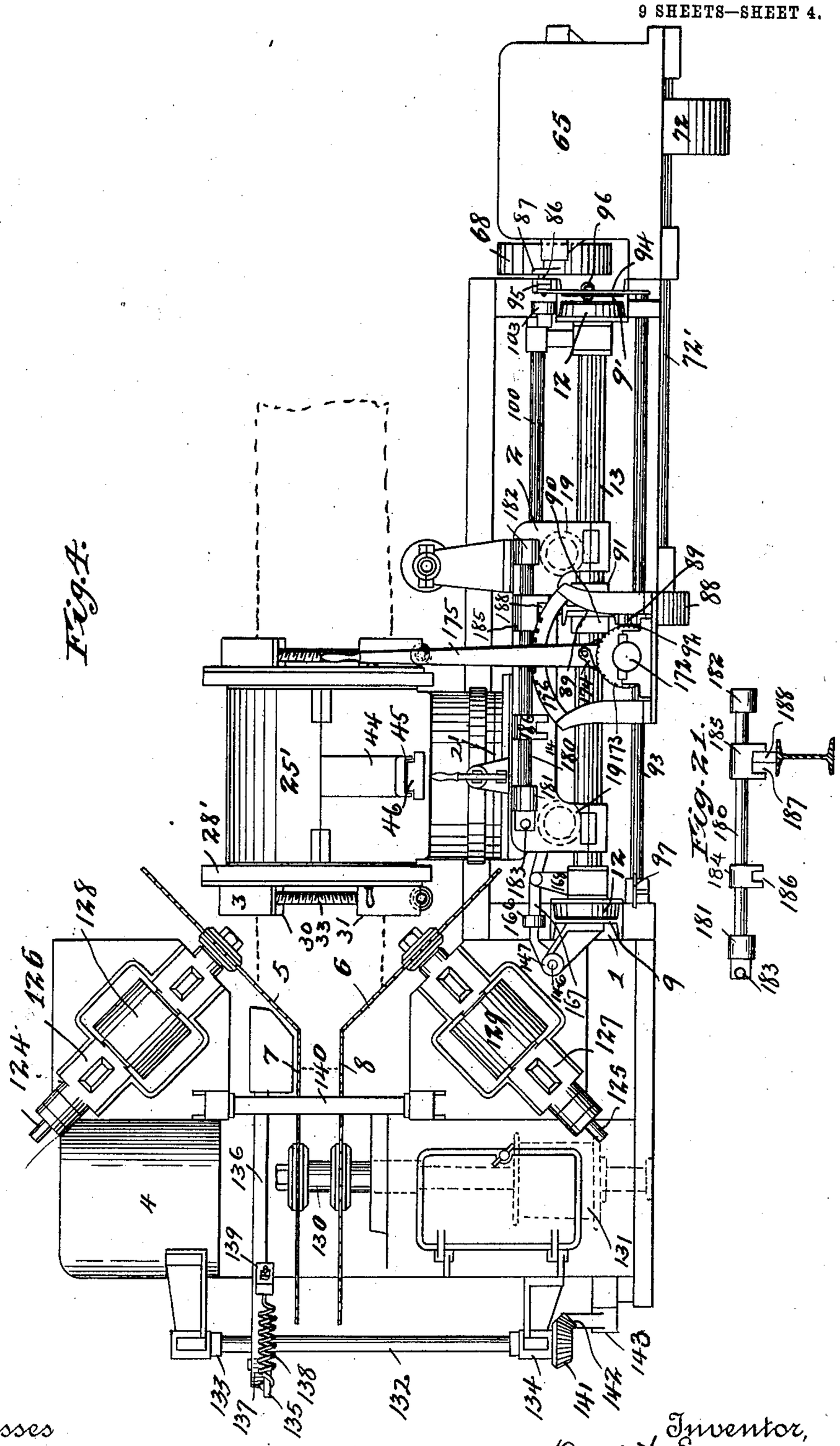

Fig. 21.

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NO MODEL. 9 SHEETS—SHEET 5.

Fig. 5.

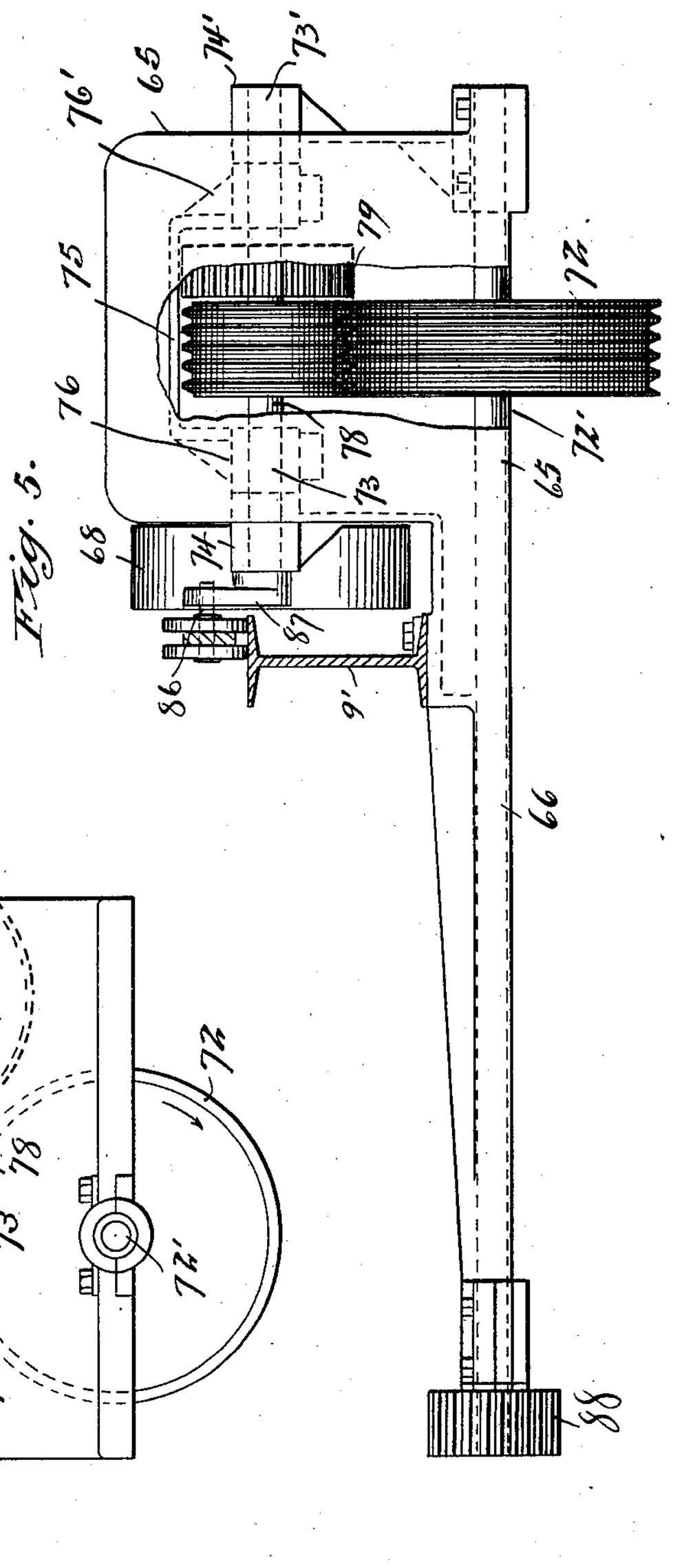
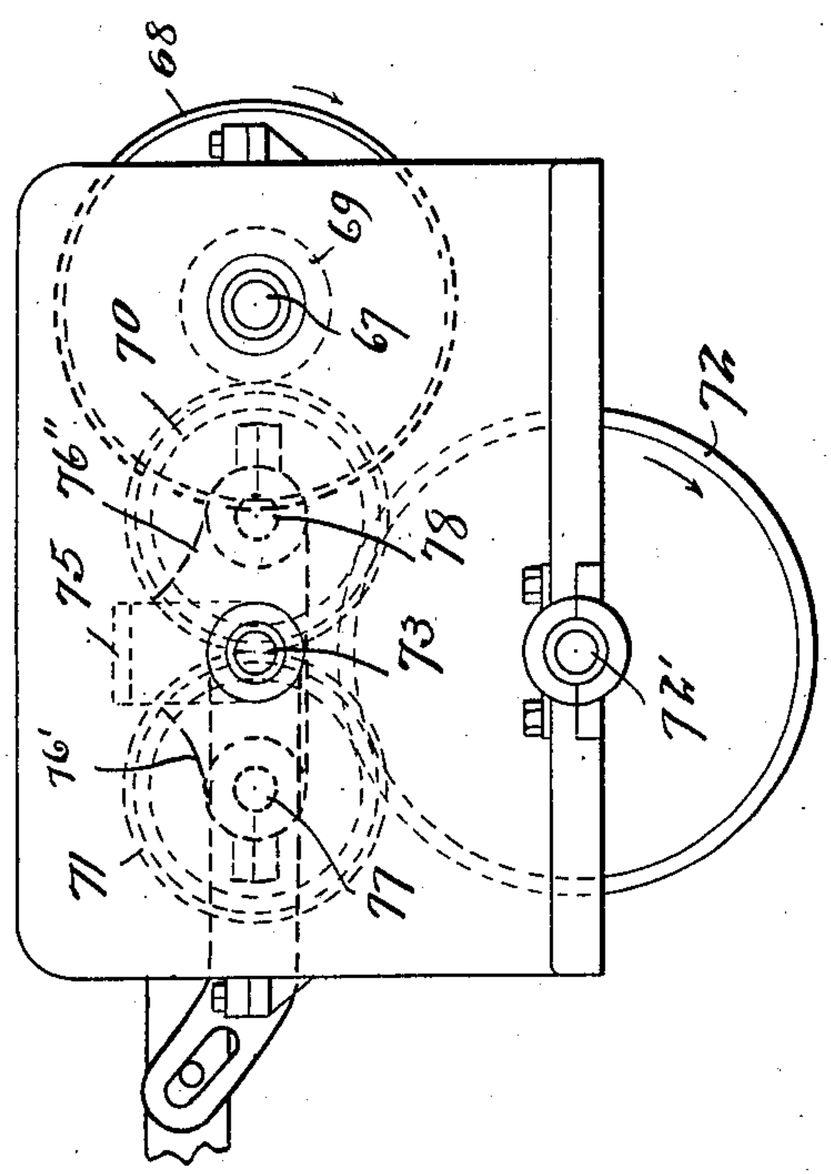


Fig. 6.



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NO MODEL. 9 SHEETS—SHEET 6.

Fig. 1.

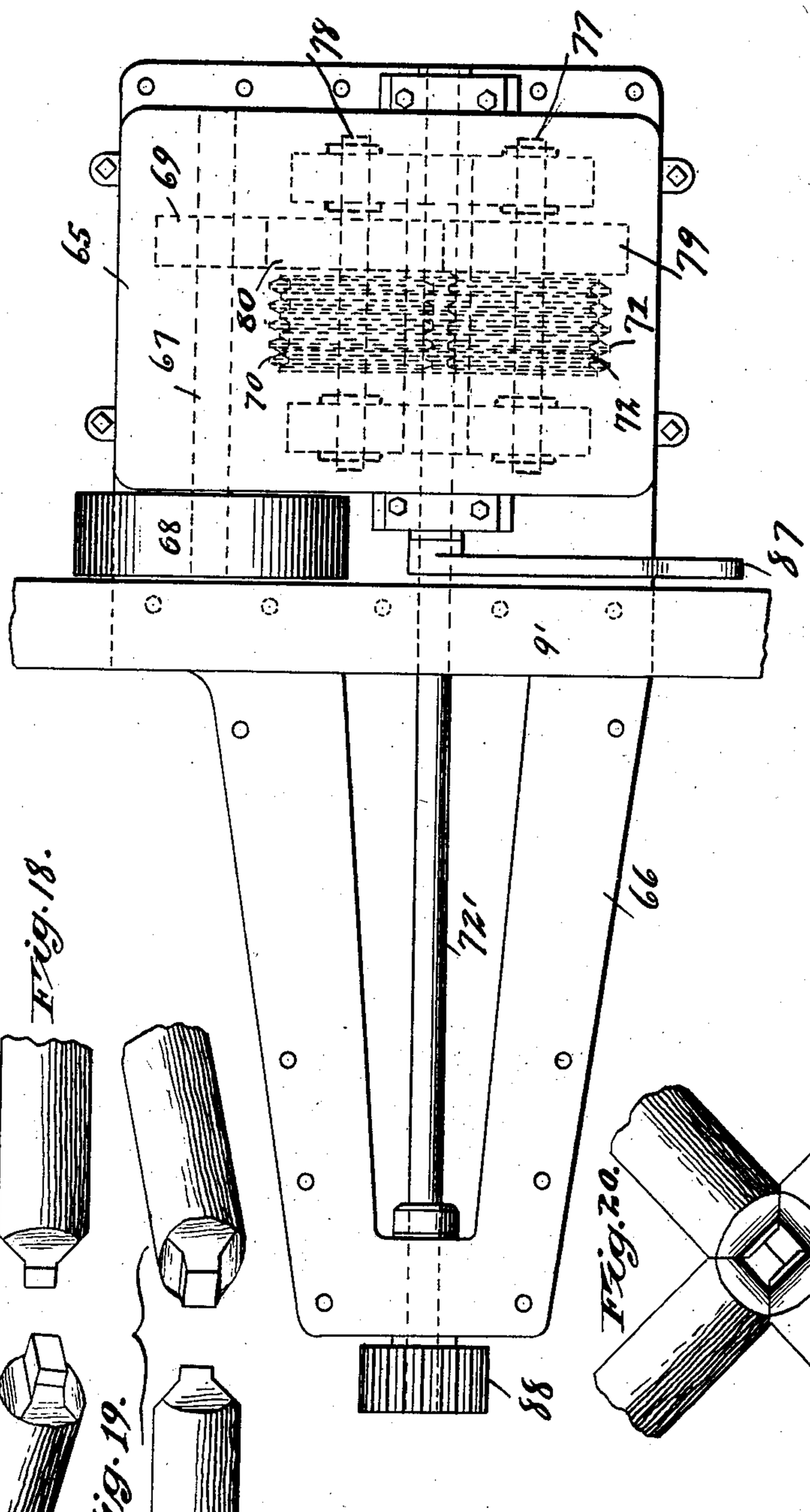

Fig. 17.

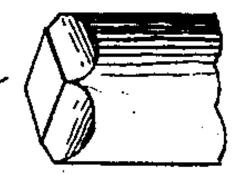

Fig. 18.

Fig. 19.

Fig. 20.

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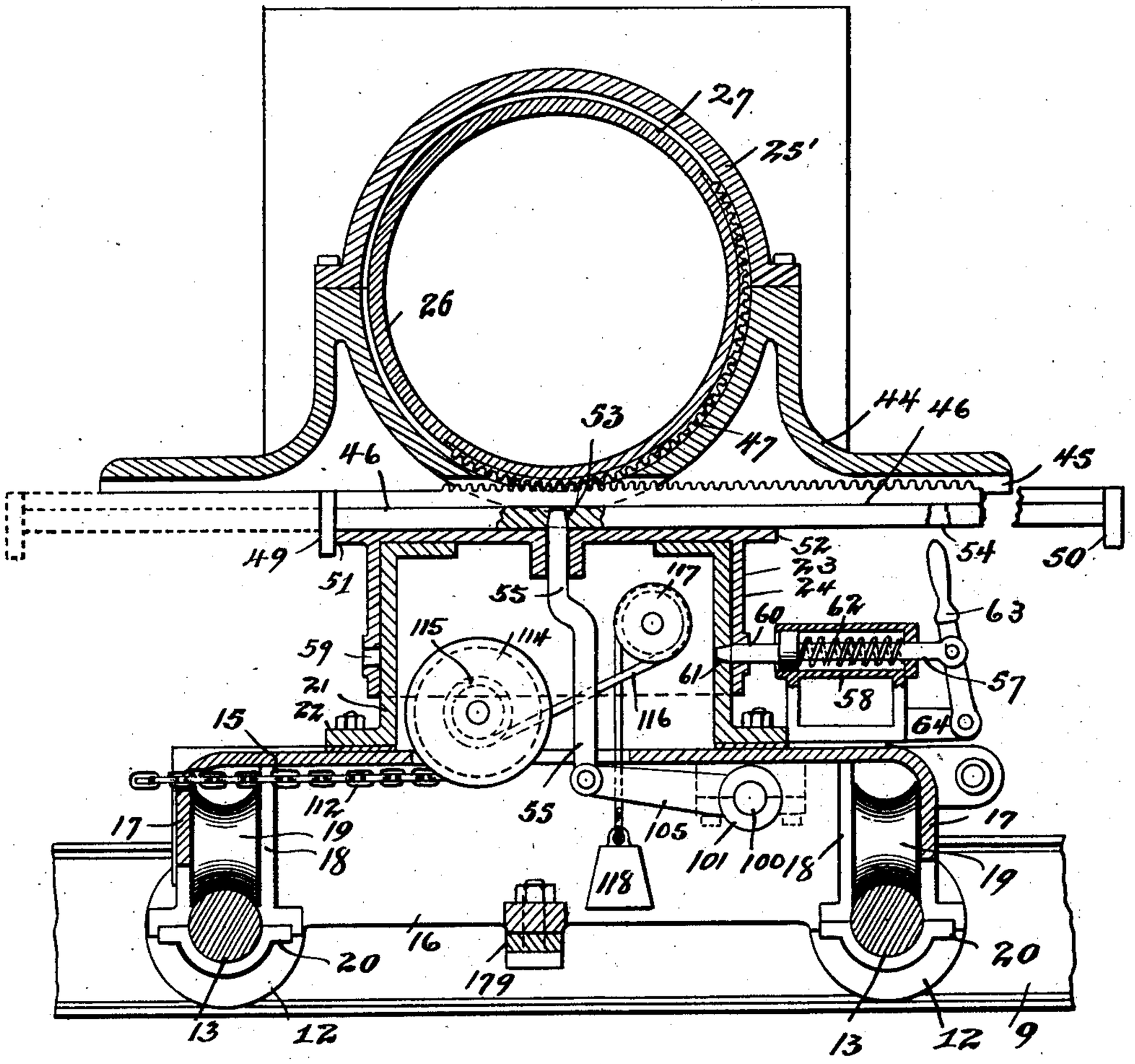
NO MODEL. 9 SHEETS—SHEET 7.

Fig. 8.



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NO MODEL. 9 SHEETS—SHEET 8.

Fig. 9.

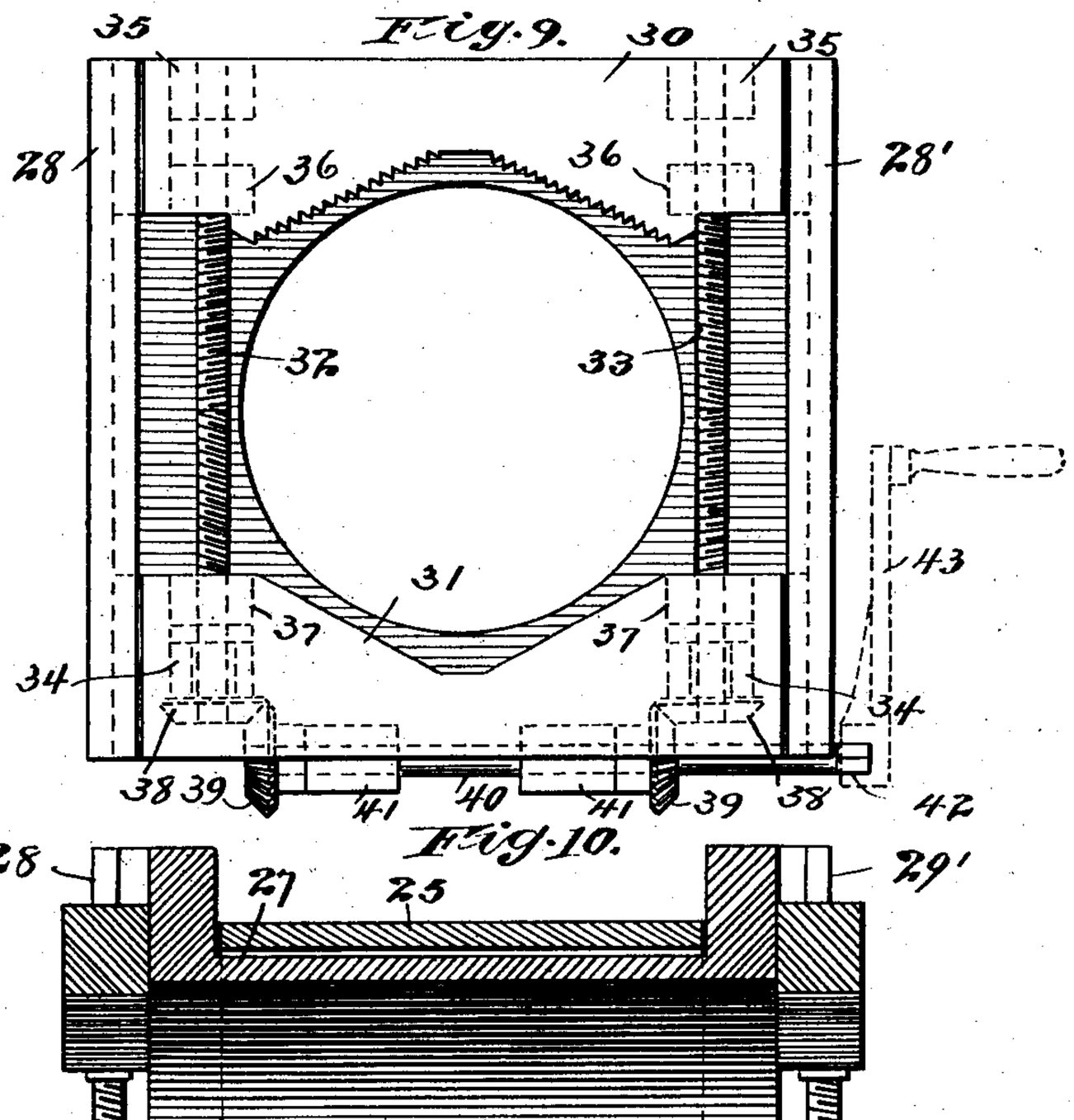
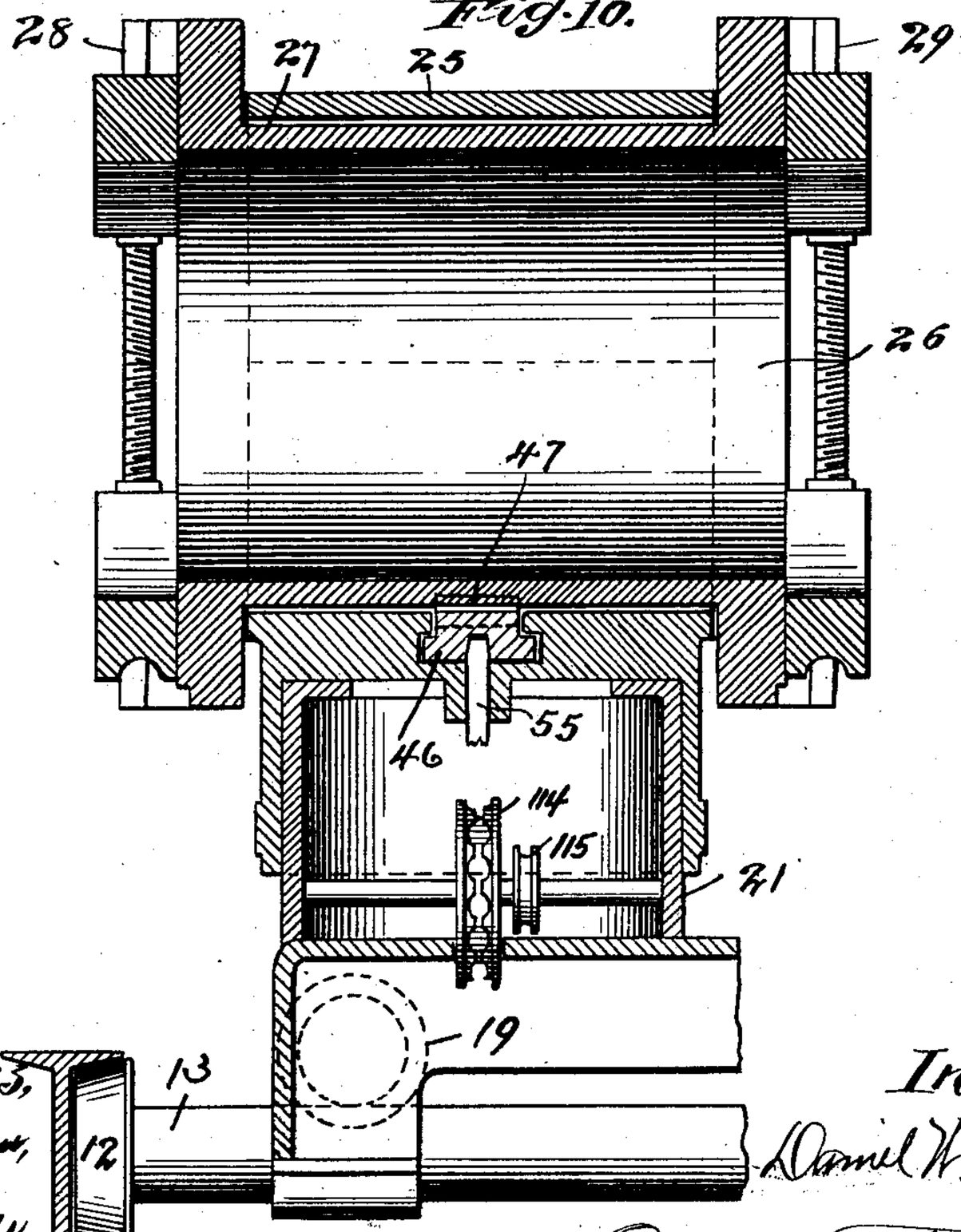


Fig. 10.



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MACHINE FOR SAWING MINING TIMBERS.

APPLICATION FILED FEB. 9, 1903.

NO MODEL. 9 SHEETS—SHEET 9.

Fig. 14.

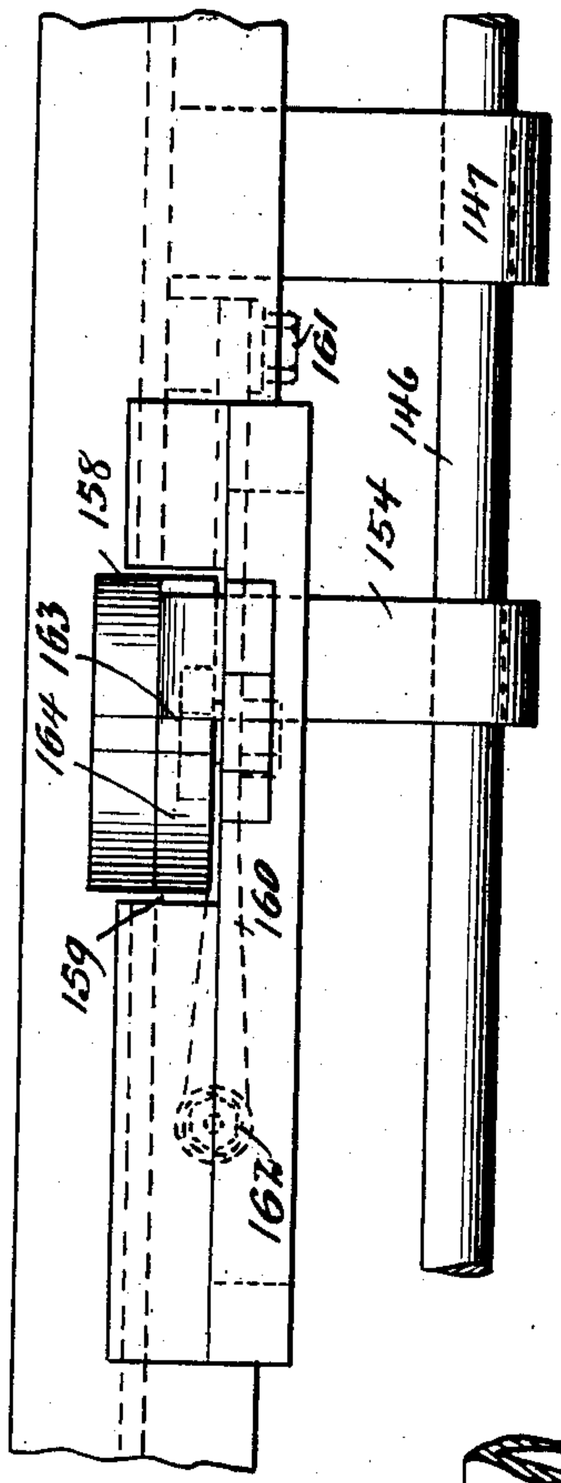


Fig. 15.

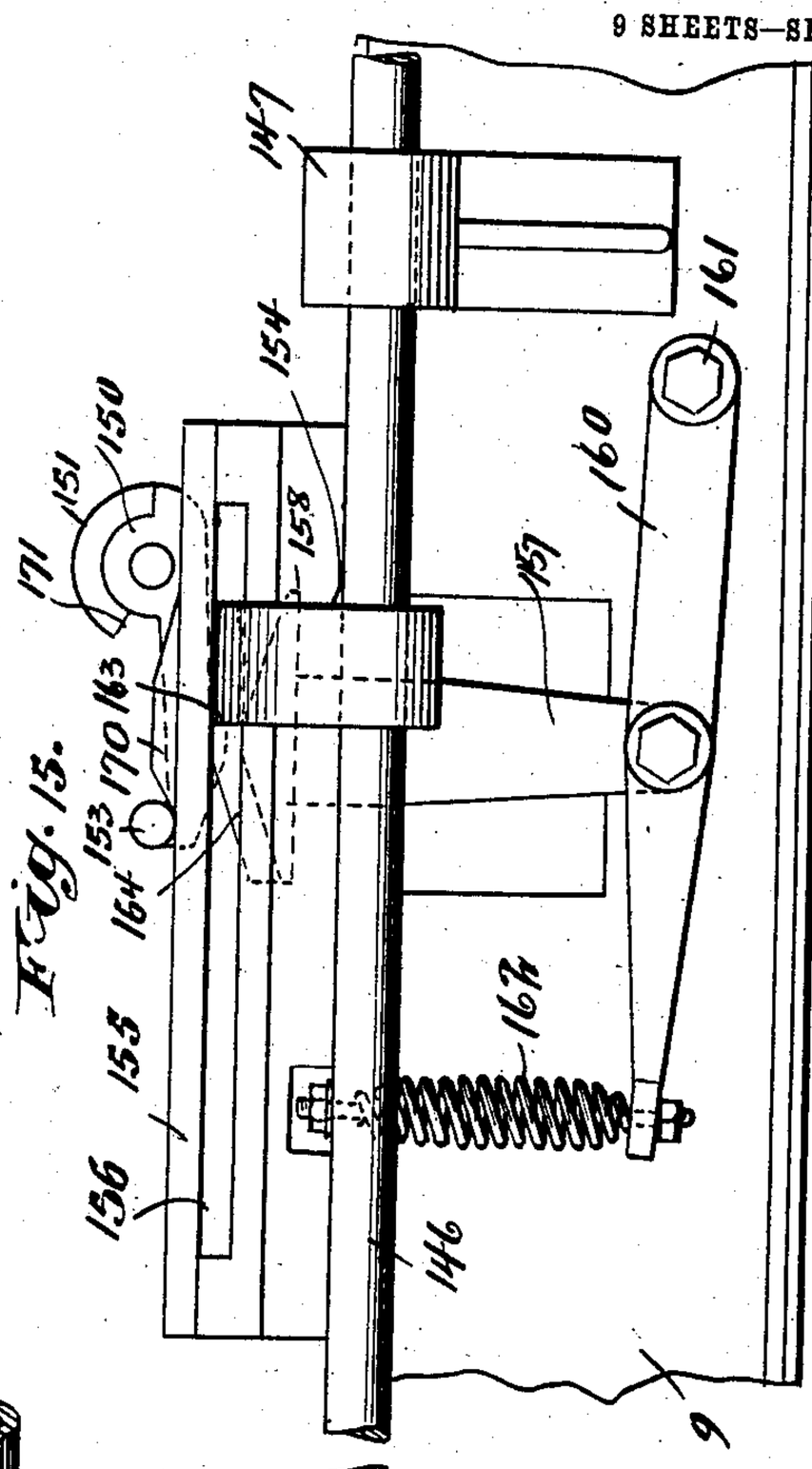
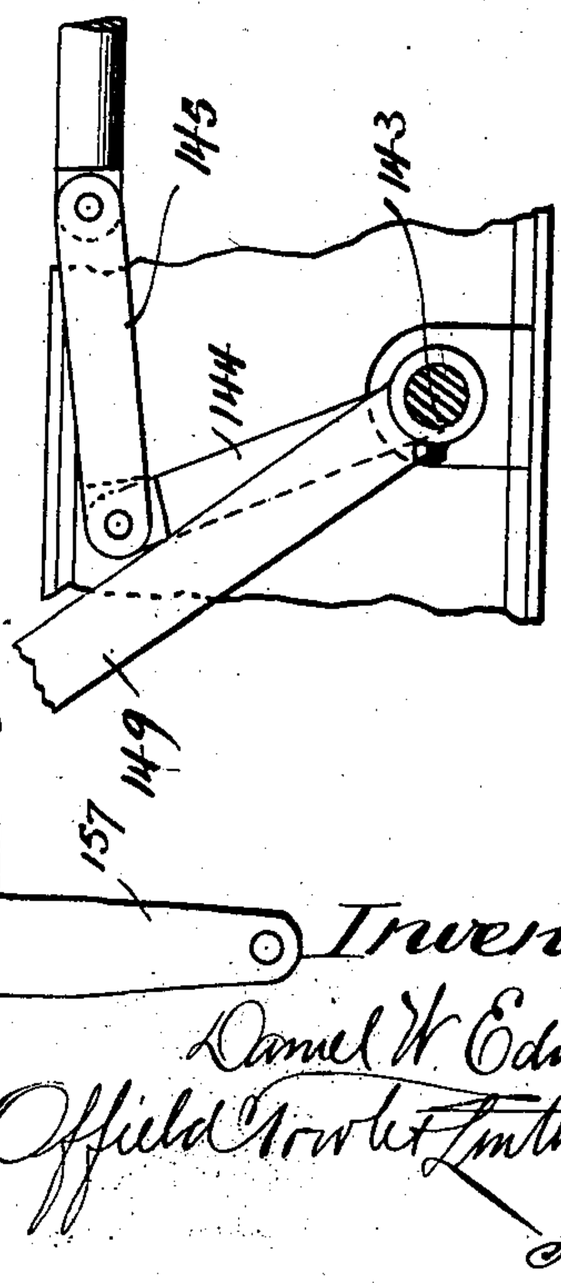


Fig. 13.

Fig. 16.



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No. 753,688. Patented March 1, 1904.

UNITED STATES PATENT OFFICE.

DANIEL W. EDWARDS, OF CHICAGO, ILLINOIS, ASSIGNOR TO GREENLEE BROTHERS & COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

MACHINE FOR SAWING MINING-TIMBERS.

SPECIFICATION forming part of Letters Patent No. 753,688, dated March 1, 1904.

Application filed February 9, 1903. Serial No. 142,474. (No model.)

To all whom it may concern:

Be it known that I, DANIEL W. EDWARDS, a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Sawing Mining-Timbers, of which the following is a specification.

This invention relates to improvements in machines for sawing mining-timbers, and refers more specifically to a machine adapted for imparting the peculiar shapes to mining-timbers, set forth and described in Letters Patent No. 692,111, granted January 28, 1902, to D. W. Brunton.

The salient objects of the invention are to provide a power-driven machine in which the various operations of adjusting the timbers into a suitable chuck and passing them through a set of saws in various positions is rendered to a large extent automatic, but nevertheless under the control of the operator; to provide a machine so organized that the centering of the timber to be treated in the holding device or chuck may be accomplished with great facility and exactness; to provide a construction in which both ends of the timber may be treated without releasing the timber from the chuck; to provide a machine by which the timber may be passed successively through a gang of saws, so as to saw off several sides or angles to produce the shape desired, a simple movement of the chuck upon its bearings sufficing to readjust the timber for successive sawing operations; to provide means whereby the power-driven carriage is automatically and positively arrested at the end of its travel in each direction and in such manner as to insure against overrunning; to provide a machine so organized that it may be rapidly and conveniently adjusted to saw different lengths of timbers and also to produce different kinds of timbers; to provide an improved block-snatching mechanism which operates to remove the blocks cut from the timbers and prevent them from being thrown by the saws; to provide improvements in the details of the driving mechanism whereby the travel of the carriage and its reversal are effected, and, in general, to provide improved details of construction and arrangement which together go to make up a machine capable of rapidly and accurately sawing timber of the character referred to.

To the above ends the invention relates to the matters hereinafter described, and more particularly pointed out in the appended claims, and the same will be more readily understood from the following description by reference to the accompanying drawings, forming a part thereof, and in which—

Figure 1 is a perspective view showing the machine as a whole. Fig. 2 is a plan view of the machine; Fig. 3, a side elevation looking at the back side of the machine as viewed in Fig. 1. Fig. 4 is a right-hand elevation. Fig. 5 is a view from the same direction as Fig. 4 of the carriage-driving mechanism separated from the remainder of the machine. Fig. 6 is a right-hand end elevation of the parts shown in Fig. 5. Fig. 7 is a plan view of the parts shown in Figs. 5 and 6. Fig. 8 is a longitudinal vertical sectional view of the carriage and chuck carried thereby, taken approximately on line 8 8 of Fig. 2. Fig. 9 is an end elevation of the chuck; Fig. 10, an axial vertical sectional view of the chuck and the turret mechanism upon which it is mounted; Fig. 11, a fragmentary detail view of the cross-drive mechanism of the carriage; Fig. 12, a fragmentary detail view of the trip mechanism which is mounted upon the carriage and cooperates with the block-snatching mechanism. Figs. 13, 14, 15, and 16 are details of the latch-tripping mechanism which coöperates with the ejector-arm. Figs. 17 to 20, inclusive, are views of various forms of mining-timbers which may be produced upon the machine, Fig. 17 showing a side perspective end view of a timber having no tenon, Fig. 18 showing a side and perspective end view of a timber having a relatively long tenon, Fig. 19 showing a side and perspective end view of a timber having a short tenon, and Fig. 20 showing the manner in which a set of the timbers are assembled together. Fig. 21 is a fragmentary detail taken in a transverse vertical sectional plane approximately on line 21 21 of Fig. 2 and looking toward the carriage.

A brief outline of the several leading fea-

tures of the machine will contribute to a ready comprehension of the invention and an easier understanding of the details of construction.

In the embodiment shown herein upon a suitable horizontal bed-frame (designated as a whole 1) is mounted to reciprocate a power-driven carriage 2, which carries an interiorly cylindric chuck 3, which is so mounted upon said carriage that it is capable of rotation around a vertical axis, so that the timber may be reversed end for end, and is also capable of rotation about its own longitudinal axis, so that a timber held therein may be turned or rotated on its own longitudinal axis a quarter-revolution. At one end of the horizontal bed-frame 1 and at one side thereof is located a sawing-head, (designated as a whole 4,) which carries a gang of saws comprising a pair of angle-saws 5 and 6 and a pair of parallel saws 7 and 8, these several saws being so set as to act upon the opposite sides of the end of a timber and produce two opposite sides of a tenon having parallel sides and shoulders inclined at angles of forty-five degrees to said sides by passing the timber through the saws a single time in one direction. After the timber has been carried through the gang of saws and before the return of the carriage it is rotated a quarter-turn upon its own longitudinal axis, so that as the carriage returns the other two sides of the tenon are similarly formed. Mechanism is provided for automatically effecting this rotation of the chuck upon its own longitudinal axis as the carriage approaches the end of its travel in one direction. Automatic mechanism is also provided for engaging and snatching away the blocks sawed off by the gang of saws, so as to prevent said blocks from being thrown violently by the saws. Automatic mechanism is provided for reversing the travel of the carriage, so that when the operator has started it toward the gang of saws it travels past the latter, is arrested, the timber given a quarter-turn, and the carriage reversed and returned to the operator's end of the machine automatically. The timber is adjusted in the chuck so as to be grasped by the latter exactly midway of its length (the timbers being cut to exact length before subjected to the tenoning operation) and the rotation of the chuck upon its vertical axis so as to turn the timber end for end is accomplished manually and while the carriage stands at the operator's end of the machine—namely, the right-hand end, as seen in Fig. 1.

Describing now the mechanism in detail, the horizontal bed-frame 1 may be conveniently and is herein shown formed of **I**-beams 9 9′, rigidly united at their ends by suitable cross-frame members 10 and 11. The proximate or inner faces of the **I**-beams 9 9′ form suitable ways or channels to receive and guide the truck-wheels 12 of the carriage. As a preferred construction the truck member of the carriage comprises a pair of transverse axle-rods 13, upon the ends of which are journaled truck-wheels 12 and upon which are rigidly mounted longitudinally-extending side truck-bars 14, desirably located as near the ends of the axle-rods as will admit of the free travel of the truck without interfering with the ways formed by the **I**-beams. The upper part of the carriage is constructed to travel transversely across the truck-frame, so that the chuck carried thereby may be adjusted transversely, and to this end a secondary carriage-frame is provided comprising a bed-plate 15 (best shown in Figs. 2 and 8) and longitudinally-extending side members 16 integrally united with the under side of said bed-plate. At each end of the secondary carriage-frame is provided a pair of yokes formed by the downturned edges 17 of the bed-plate and web-like members 18, formed upon the ends of the side bars 16, to extend inside of and parallel with said downturned portions 17. Within the yokes thus formed are journaled secondary truck-wheels 19, which are arranged to rest and travel upon the axle-bars 13 of the subjacent truck. In order to confine the secondary carriage positively against lifting up, the lower ends of the yokes are extended downwardly, so as to embrace the axle-rods 13, and are provided with detachably-secured caps 20, which embrace the lower sides of said axle-rods, as shown clearly in Fig. 8.

Describing now the mountings of the chuck, 21 designates as a whole a turret-standard of cylindric form and provided with a radial base portion 22, which is securely bolted or otherwise rigidly fastened to the bed-plate 15 of the secondary carriage. Upon the turret-standard is mounted a yoke designated as a whole 23 and comprising a lower turn-table portion which is constructed to fit upon the turret-standard and has depending cylindric sides 24, which telescope over the sides of the turret-standard and form a swiveling connection with the latter. With the upper side of the turn-table portion is integrally united the yoke proper, (designated 25,) which is best shown in Fig. 10, consists of a cylindric ring or shell which encircles the central and smaller portion 27 of the chuck-body, (designated as a whole 26.) In order that the chuck may be assembled within and removed from the yoke readily, the latter is made of two-part construction, the upper half 25′ thereof being made in the form of a semicylindric cap, detachably bolted to the lower part of the yoke, as clearly indicated in Fig. 8.

The chuck 26 is a cylindric shell of suitable internal diameter to accommodate the largest of timbers to be treated and provided at each end with pairs of vertically-disposed parallel cheek-pieces, as 28 28′ and 29 29′, which are bolted or otherwise secured to the ends of the chuck at points radially outside of the cylin-

dric opening thereof. Within each pair of ways thus formed are mounted two jaws, an upper serrated jaw 30 and a coöperating lower jaw 31. The two jaws of each pair are interconnected by means of screw-bolts, so as to simultaneously approach and recede from each other and at uniform rates, so as to operate to center the timber clamped therebetween. To this end two parallel vertical screws, as 32 and 33, are journaled upon each end face of the chuck and have screw-threaded engagement with the respective jaws 30 and 31, the upper and lower half of each screw being oppositely threaded and the respective halves of one screw reversely threaded with reference to those of the other, as clearly indicated in Fig. 9. The screws are journaled in suitable bearings, (indicated in dotted lines at 34 and 35,) so as to be held against endwise movement, while the jaws 30 and 31 have screw-threaded engagement with said screws through inwardly-extending threaded lugs, (indicated in dotted lines at 36 and 37.) Upon the lower end of each screw is fixed a bevel-gear 38, and with these bevel-gears are arranged to mesh two similar bevel or miter gears 39, fixed upon the shaft 40, which is journaled to extend through lugs 41 at the lower side of the end face of the chuck. One end of the shaft 40 is extended out beyond the side of the chuck and squared, as indicated at 42, to receive a crank-handle, (indicated in dotted lines at 43,) whereby the shaft may be rotated to actuate the jaws of the chuck. The construction and arrangement of the jaws at each end of the chuck are or may be identical; but it is to be understood that said jaws at the respective ends are movable independently of each other, so that the timber may be accurately centered notwithstanding it may be tapering in its form. The chuck-body is rotatable within the yoke 25, and in operation it is automatically rotated through an angular distance of ninety degrees by mechanism now to be described. At each side of the yoke, at a point midway of the length of the chuck, are provided integral extensions or arms 44, (best shown in Figs. 1 and 8,) which extensions are provided in their under faces with ways 45, adapted to receive, support, and guide the rack-bar 46. The rack-bar 46 is provided in its upper face with rack-teeth, which are arranged to engage a corresponding circular rack 47 upon the exterior of the chuck-cylinder and extending partially around the latter, as best shown in sectional Fig. 8. The reciprocating rack-bar 46 is provided at each end with a head, as 49 and 50, which are adapted to engage stop-surfaces, as 51 and 52, formed upon the adjacent side of the turn-table, and to thereby positively limit the travel of the rack in the respective directions. Said rack-bar is also provided in its under side with locking-bolt apertures or recesses 53 and 54, which are respectively brought into register with a locking-bolt 55 at the time the rack-bar is at one or the other of its limits of movement. The swiveling movement of the chuck upon the turret-standard is accomplished manually, the chuck-body being to this end provided with handles 56, whereby it may be grasped and whirled around when free. A locking mechanism is provided for locking the chuck in two diametrically opposite positions, comprising in the present instance a locking-bolt 57, mounted to extend through a suitable barrel-like bearing 58, arranged adjacent to the cylindric portion 24 of the turret-standard and in radial relation thereto. The inner end of said locking-bolt is adapted to pass through either one of two diametrical opposite locking-apertures 59 and 60, formed through the cylindric portion 24 of the turn-table and to extend at its inner end into a locking-recess 61, formed in the turret-standard. An expansion-spring 62, arranged within the barrel 58, acts upon said bolt to normally force it into locking engagement, and at its outer end it is connected with a hand-lever 63, pivoted to a bracket 64, whereby it may be withdrawn to release the chuck. That portion of the exterior of the turn-table which extends between the locking-apertures 59 and 60 thereof is made smooth, so that as soon as the locking-bolt has been withdrawn and the turn-table rotated slightly the locking-bolt may be allowed to ride upon said outer surface until the opposite aperture is brought into register, whereupon the locking-bolt will snap into locking engagement automatically.

The driving mechanism whereby the carriage is caused to travel back and forth upon the bed and the automatic rotating and reversing mechanism will now be described.

Referring more particularly to Figs. 3 to 7, inclusive, 65 designates as a whole a gear-case which is rigidly mounted at the rear side of the main bed-frame at a point intermediate the length of the latter, as best shown in Fig. 3, and provided at its lower side with an extension 66, which extends below the bed-frame to a point approximately central of the width of the latter. (See Figs. 4, 5, and 7.) 67 designates a drive-shaft journaled to extend through the gear-case 65 and provided at a point outside of the latter with a drive-pulley 68. At a point within the gear-case said drive-shaft is provided with a spur-gear 69, which is arranged to drive a friction-pulley 70, as hereinafter described. The friction-pulley 70 is one of a pair of identical friction-pulleys, the other being designated 71, which are mounted upon a rocking yoke in the gear-case in such manner that they may be alternately brought into frictional engagement with another larger friction-pulley 72, mounted upon a main driving-shaft 72′.

Referring more particularly to Figs. 5 and 6, 73 and 73′ designate a pair of stub-shafts journaled in suitable sockets 74 74′ at oppo-

site sides of the gear-casing and in axial alinement with each other, and upon the inwardly-projecting ends of said stub-shafts are mounted the two ends 76 and 76′ of the yoke hereinbefore referred to and designated as a whole 75. The journaled ends of the yoke are each provided with lateral extensions 76″, which form journals to support the shafts 77 and 78, which carry the friction-pulleys 71 and 70, respectively, the arrangement being such that the yoke 75, and with it the friction-pulleys 70 and 71, oscillate together upon the trunnion-like bearing formed by the stub-shafts 73 and 73′. The extent of oscillation of the yoke is sufficient to bring either friction-pulley 70 or 71 into frictional bearing with the driven pulley 72, but in alternation. The pair of pulleys 70 and 71 are driven from the spur-gear 69, hereinbefore referred to, and to this end similar spur-gears 79 and 80 are mounted upon the respective shafts 77 and 78 and arranged to intermesh with each other, the gear 80 being in turn arranged to intermesh with the gear 69. It follows that the drive-pulleys 70 and 71 are driven from the shaft 67 in reverse directions, and accordingly the driven pulley 72 may be rotated in either desired direction by oscillating the pulley-frame so as to bring the pulleys 70 or 71 into driving engagement therewith, In order to oscillate said frame, automatic means are employed, which means are actuated from the main carriage 2 and in such manner that as the latter approaches its limit of movement in either direction the pulley-frame will be oscillated from one position toward or to the other, thus arresting and reversing the direction of movement of the carriage. Describing said automatic reversing mechanism and referring to the plan view Fig. 2, 81 designates a shifting bar which, as best shown in Fig. 3, is mounted to extend along the upper edge of the main side frame member 9′ at the rear side of the machine and is provided with antifriction-rollers 82, which travel upon said side member and insure ease of movement of the shifting bar. The end portions of the bar are also arranged to extend through guides 82′. (Shown clearly in Figs. 2 and 3.) At proper points upon said shifting bar are mounted tappet-blocks, as 83 and 84, adapted to be engaged by a lug or finger 85, mounted upon the main carriage 2 as the latter approaches the limit of its movement in the respective directions. Upon the central portion of the shifting bar, at a point near the gear-case 65, is mounted a laterally-projecting stud 86, which takes into a cam-slot formed in a curved lever 87 and operates to oscillate said lever upwardly or downwardly. The end of the lever 87 is rigidly keyed upon the projecting end of the stub-shaft 73, so that the movement of the lever up and down operates to oscillate the pulley-yoke so as to bring one or the other of its pulleys into bearing with the driven pulley 72.

The main driving-shaft 72′, which carries the pulley 72, hereinbefore referred to, is journaled to extend through the gear-case 65 and transversely beneath the main bed-frame to a point approximately central of the width of the bed-frame, the inner end of said shaft being carried in the extension 66 of the gear-case and being provided at its inner end with a spur-gear 88. Said gear 88 engages with a rack 89, rigidly mounted upon the lower truck of the carriage (see Fig. 4) and arranged to extend longitudinally of the bed-frame. As a desirable construction said rack 89 is formed of an **I**-beam having its main web vertically disposed and apertured so as to fit upon the axle-rods 13 (see plan, Fig. 2) and rigidly secured to the latter by means of flanged collars 90 and 91, encircling the axle-rods adjacent to the **I**-beam and embracing the latter between their flanges. (See also Fig. 4.) Upon the under side of the **I**-beam thus mounted is mounted or formed the rack proper, 92, which is downwardly facing and engages the pinion 88, as hereinbefore stated. The rotation of the pinion in opposite directions, therefore, serves to drive the carriage along the bed in one direction or the other.

Means are provided for automatically arresting the carriage at the end of each to-and-fro movement in order that the operator may either remove the timber from the chuck or reverse the timber end for end to saw its opposite end. For this purpose a spring is arranged to act upon the shifter-bar in such manner as to tend to center the latter or shift it to a position intermediate its limits of throw in either direction, and thus hold the driving-pulleys out of driving contact with the driven pulley. Describing this mechanism, 93 designates a rock-shaft journaled in suitable supports to extend between the main side frame members of the bed-frame at the operator's end of the machine and provided with a rigidly-connected upstanding crank-arm 94, which is connected with the end of the shifting-bar by means of a link 95. A spring 96, connected with said crank-arm and an adjacent part of the bed-frame, tends to thrust the shifting-bar toward the remote end of the bed-frame and into an intermediate position. 97 (see Fig. 1) designates a foot-lever rigidly connected with the rock-shaft 93 and which when depressed serves to retract the crank-arm 94, and with it the shifting bar, against the action of the spring 96. When the foot-lever is depressed, the driving mechanism is thrown into gear in such manner as to drive the carriage toward the remote end of the machine, at which end it is reversed by the tappet mechanism and returns, the operator removing his foot when the carriage reverses to return. The carriage is again reversed automatically at the operator's end of the machine and starts to return on a second excursion. The spring 96, however, serves to throw the driv-

ing mechanism out of driving engagement as soon as the carriage is reversed and starts forwardly. The carriage is therefore arrested and remains stationary until the operator again places his foot upon the lever.

Next describing the mechanism whereby the chuck-cylinder is automatically released and rotated a quarter-turn about its own longitudinal axis as the carriage approaches its limits of movement at the end of the machine remote from the operator—*i. e.*, after the timber has been passed through the gang of saws—100 designates a rock-shaft which is journaled in a suitable bearing 101 in the lower carriage or truck frame to extend transversely of the latter (see Figs. 2 and 8) and is provided at one end with a rigid crank-arm 102, which carries a roller 103, arranged to traverse the upper edge of the side bed-frame member 9′. At a point near the remote end of said bed-frame member a raised cam projection 104 is provided upon which the roller 103 rides as the carriage approaches its limit of movement at that end of the machine, and thus operates to oscillate the rock-shaft 100. Upon said rock-shaft at a point in longitudinal alinement with the rack-bar 46 of the carriage is rigidly mounted a second crank-arm 105, the swinging end of which is pivotally connected with the locking-bolt 55, which engages said rack-bar, as hereinbefore described. As the cam-roller 103 engages and rides up upon the cam projection 104 the rack-bar is oscillated in the proper direction to retract the locking-bolt 55, thus releasing the rack 46, so that when it engages the stop at that end of the machine the chuck will be automatically rotated an angular distance of ninety degrees. The weight of the crank-arm 102 and cam-roller thereon is such as to throw the bolt into locking engagement when otherwise unrestrained.

The rack-bar 46 does not directly engage a fixed stop on the frame to force it back, but, on the contrary, it is forced back by means of a buffer-head, (designated 106,) which contacts with the fixed stop on the frame and in turn engages and forces back the rack-bar. Describing this mechanism, 107 designates a longitudinally-extending extension mounted or formed upon the upper carriage-frame, the upper surface of which constitutes a way 108, which is preferably of dovetailed or undercut construction and engages a correspondingly-shaped groove 109, formed in the under surface of the buffer-head. The way 108 is centrally longitudinally divided or slotted, as indicated at 110, and the buffer-head is provided with a depending way or lug 111, extending downwardly within said slot and with which is connected a cable 112, which extends around a guide-pulley 113, located at the forward end of the way, and thence rearwardly or toward the operator beneath the central portion of the carriage, (see Fig. 8,) at which point it is trained around and connected to a drum-wheel 114. The drum-wheel 114 is provided with a concentric smaller drum member rigidly secured or formed upon one side thereof, as indicated at 115, and with which is connected a cable 116, which extends thence around a guide-pulley 117 and has connected with its depending end a weight 118, which tends constantly to rotate the drum 114 in such direction as to wind up the cable 112 and draw forwardly the buffer-head. In order to insure that the rack-bar 46 shall be brought into position to accurately register with the locking-bolt 55 on each movement imparted through the buffer-head, the buffer-head is provided with the usual plunger 119, which acts against a buffer-spring 120, arranged within the barrel of the buffer in the usual manner, thus permitting the carriage to have a travel slightly in excess of the movement of the buffer upon the way 108 and causing the carriage to be arrested gradually after the head 49 or 50 of the rack-bar 46 has been brought into bearing with its seat and the locking aperture therefore into register with the locking-bolt. The forward movement of the buffer under the action of the weight-actuated cable 112 is limited by a suitable stop, (not shown,) and the object of automatically returning the buffer to the outer or forward end of the way 108 is to take the upstanding buffer-arm 106′, which engages the rack-bar, out of the path of the latter when the carriage is swung about its vertical axis in reversing the timber end for end, it being obvious that when the rack-bar 46 has been thrust in by the buffer the opposite end thereof will project a corresponding distance, and were the buffer not returned automatically as the carriage recedes the then projecting end of the rack-bar would encounter the buffer-arm when the carriage was rotated. The fixed stop 121 upon the main bed, which encounters the buffer-plunger 119 and forces the buffer-head back, is in the form of a horizontally and transversely extending beam having its ends supported on suitable brackets 122 and elevated above the upper plane of the way member 107, so that said way member may pass beneath the stop-bar. The stop is made in the form of a bar extending entirely across the machine in order that it may properly encounter the buffer-head regardless of the adjustment of the carriage laterally to accommodate timbers of different length.

Next describing the construction and arrangement of the sawing-head, hereinbefore referred to and designated as a whole 4, the main frame of this head consists of a yoke-shaped member 123, which is rigidly united with the main bed-frame at one side thereof and at the end of the frame remote from the operator, as clearly shown in plan view, Fig. 2, and end elevation, Fig. 4. As best shown

in Figs. 1, 2, and 4, upon the rear side of the yoke 123, or that side toward the operator, are mounted two saw-arbors 124 and 125, respectively, each being conveniently mounted in suitable bracket-like journal members 126 and 127, bolted to the end members of the yoke and arranged to stand at an angle of ninety degrees from each other and with the peripheries of the saws separated a distance equal to the vertical thickness of the tenon to be formed upon the timber. Each arbor is provided with a belt-pulley, as 128 and 129, by means of which it may be driven by belt connections. 130 designates a third arbor, which is journaled vertically in the saw-head yoke and carrying the horizontal saws 7 and 8, hereinbefore referred to, and which saws are spaced apart a distance corresponding to the thickness of the tenon to be formed, as seen clearly in Fig. 4. At a point within the base part of the yoke the arbor 130 is provided with a belt-pulley 131, as indicated clearly in dotted lines in Fig. 4, it being understood that the yoke-casting is a hollow casting and the rear side thereof is open to afford access of the drive-belt which actuates the vertical saw-arbor. The sets of saws are, as usual, driven at high velocity and operate to sever V-shaped blocks of considerable size in forming the tenons upon the timbers. Inasmuch as these blocks would be thrown at great velocity by the saws unless restrained, I provide special means for removing the blocks from the saws when severed in a direction opposite to that in which the saws would tend to throw the same. To this end I provide a vertically-disposed rock-shaft 132, journaled in suitable bearings 133 and 134 upon the outer lateral side of the saw-head yoke, (see Fig. 1,) and upon this rock-shaft is mounted a rigid arm 135. Upon the arm 135 is pivoted an extension-arm 136, which may be flexed inwardly independently, but is limited against outward flexure by having its shorter end curved inwardly to form a tailpiece 137, which contacts with the shaft-engaging portion of arm 135 and renders the two arms rigid with each other against flexure outwardly beyond that position in which the tailpiece engages the arm. A coiled contractile spring 138, connected with the outer end of the arm 135 and with a lug 139 upon the arm 136, tends to hold the tailpiece in bearing with the stop described. The two arms thus united form, in effect, a flexible arm, which for convenience of description will be hereinafter designated as a whole the "ejector-arm."

140 designates a strut-bar which extends between the upper and lower arms of the saw-head yoke and which is so located that when the ejector-arm is in its normal or retracted position (indicated in Fig. 2) its outer or free end will rest in bearing with the strut-bar and will be thereby flexed relatively to the member 135 thereof. The length of the member 136 is such that as the rock-shaft is rotated in a direction opposite that in which the horizontal saws are rotated the outer end of the member 136 will first be projected endwise behind the end of the passage-timber and will thereafter perform an arc approximately coincident with the acting portions of the peripheries of said horizontal saws, the oscillation of the rock-shaft being such as to carry the ejector-arm forward in this ejecting movement a sufficient distance to push the block off from the uppermost saw. The block severed by the power pair of saws will fall away from the latter as soon as severed and drop down and need not, therefore, be guided in its movements.

In order to actuate the rock-shaft 132, which carries the ejector-arm, the rock-shaft is provided at its lower end with a bevel-gear 141, which intermeshes with a segment 142, mounted upon a second horizontal rock-shaft 143, journaled to extend transversely through the base portion of the saw-head yoke and provided adjacent to its inner end with an upstanding rigid crank-arm 144. (Best seen in detail, Fig. 15, but indicated also in dotted lines, Fig. 2.) The arm 144 is connected, by means of a link 145, with a tripping-rod 146, mounted to reciprocate through suitable guides 147 and 148, mounted upon the main bed-frame. The rock-shaft 143 is rotated in a direction to draw the tripping-rod to its rearmost limit of movement by means of a weighted crank-arm 149, mounted thereon, as best shown in Fig. 15 and also indicated clearly in Fig. 2. The tripping-rod 146 is retracted and tripped by parts moving with the main carriage, constructed and arranged as now to be described.

Referring to Figs. 1 and 2 and detail Figs. 13 to 15, inclusive, 150 designates a latch-arm pivotally mounted upon a suitable bracket 151 upon the main frame of the carriage, so as to overhang the upper edge of the side bed-frame member 9. The free end of the latch-arm is provided with a depending hook 152 and also with a cam-stud 153, projecting laterally from the hook. Upon the tripping-rod 146 is rigidly mounted an arm 154, which extends over the upper edge of the frame member 9 and through a confining guide-frame 155, which is longitudinally slotted, as indicated at 156, to accommodate the reciprocatory movements of said arm. The end of the arm projects into the path of the latch-arm and is adapted to be engaged by the hook of the latter and retracted during the return movement of the carriage, the forward end of the latch-hook being beveled, as indicated, so as to ride up over the arm and fall into hooked engagement with the latter during the advance movement of the carriage. The tripping-rod has a length of reciprocation much less than the travel of the carriage, and a detent mechanism is arranged to engage and hold the tripping-rod in its re-

tracted position and at the same time to disengage the latch-arm therefrom, so as to prevent the carriage to continue its return or retracting movement. 157 designates the detent proper, which consists of an upstanding arm provided at its upper end with a generally T-shaped head 158 and mounted to reciprocate vertically through a suitable guide-opening 159, formed in the flange of the bed-frame member 9. The lower end of the detent is pivotally connected with a spring-actuated lever 160 at a point between the ends of the latter, one end of said lever being pivoted to the bed-frame member, as indicated at 161, and the opposite end thereof drawn yieldingly upward by means of a coiled contractile spring 162, attached to the overhanging flange of the frame member, as shown clearly in Fig. 15. The upper end of the detent 157 is of a peculiar conformation, being provided with a vertical shoulder 163, adapted to engage and hold the arm 154, a forwardly and downwardly inclined surface 164 in advance of the shoulder, which surface is engaged by the rear side of the arm 154, and the detent thereby depressed cam fashion during the return movement of the carriage, and a lateral extension having a rearwardly or downwardly inclined cam-surface 165, which is engaged by a roller 166, and the detent thereby depressed during the forward movement of the carriage. The roller 166 is shown in detail, Fig. 12, and is mounted upon a lever-arm 167, pivoted between its ends upon the bracket 168, which bracket, as best seen in plan, Fig. 2, is located at the rear side of the carriage, so that the carriage will have passed the detent 157 in its advance movement before the tripping-rod is released. During certain operations the ejector-arm is unnecessary, and during such operations it is permitted to remain inoperative. This is accomplished by holding the tripping-roller lever 167 rigid when the tripping-rod is to be released and permitting said lever 167 to vibrate freely at other times, and thereby enable it to pass over the detent without depressing the latter and releasing the tripping-rod. To this end a roller 169 is mounted upon the carriage in position to ride under the lever 167 and hold the latter against oscillation when the carriage is adjacent to that side of the bed-frame which carries the tripping-roller; but when the carriage is adjusted in a laterally-retracted position the roller is carried out of the range of the lever. In operation the tripping-roller 166 depresses the detent and releases the latch-arm during the advance movement of the carriage, and upon the return movement the latch-arm engages the arm of the tripping-rod and carries the latter rearwardly until it has been brought into register with the shoulder of the detent. The arm 154 being confined by the slot 156 depresses the detent until it is passed over the shouldered portion of the detent, whereupon the latter under the tension of the spring 162 snaps up behind the arm, thereby engaging the latter and at the same time throwing off the latch-arm, which is thus free to move with the carriage. In order to render the disengagement of the latch-arm from the detent certain, a cam projection 170 is provided on the upper edge of the slotted member 155, which cam projection coöperates with the cam-lug 153 to lift the latch-arm positively in case it should not be thrown off completely by the detent. The bracket 151, which carries the latch-arm, is provided with a stop-shoulder 171, which limits the upward movement of the arm and prevents the latter from being thrown out of operative position.

Figs. 17 to 20, inclusive, illustrate the various forms of timber ends produced by the machine, and it will be noted that the form shown in Fig. 17 is without a tenon. In sawing these tenonless timbers only the bevel-saws are brought into operation, the timber being set back far enough so that the squared end thereof is in vertical alinement with the edges of the horizontal saws, or approximately so. Accordingly the carriage is adjusted back laterally for this purpose. In order to thus adjust the carriage, mechanism is provided as follows: Referring to Figs. 1, 2, 4, 8, and 11, 172 designates a shaft journaled to extend longitudinally of the main bed-frame about midway of the width of the latter. At the rear or operator's end of the machine said shaft is provided with a ratchet-wheel 173, which is acted upon by a set of ratchet-pawls 174, actuated through the medium of a hand-lever 175, which is operatively mounted to sweep over the locking segment-bar 176. Any suitable rocking mechanism which is adapted to rotate the shaft 172 positively in either direction and which serves to lock the latter in any position of adjustment may be used, the mechanism illustrated herein being one in common use, and the details whereof form no part of the present invention. Upon the shaft 172 is splined a spur-gear, 177 (see detail Fig. 11,) which is confined in fixed relation to the carriage-frame by means of a bracket 178, having the usual annular rib-and-groove connection with the spur-gear. 179 designates a rack-bar which is rigidly bolted to and extends across the under side of the secondary carriage-frame, as best seen in Fig. 8, said rack being arranged to intermesh with the spur-pinion 177, so that as the latter is rotated with the shaft 172 the secondary carriage will be adjusted laterally upon the main carriage-frame. The spur-gear being splined upon the shaft 172 and connected so as to move with the carriage in the reciprocations of the latter longitudinally of the bed-frame, it follows that the secondary carriage will be positively held in any position of adjustment, notwithstanding the reciprocation of the main

carriage when the shaft 172 is locked against rotation. A stop-gear mechanism is arranged to coöperate with the carriage and adjusting rock-shaft 172, which is shown in detail in Fig. 21. Referring to said figure and to Fig. 1, 180 designates a rock-shaft journaled in two parallel ears 181 182 upon the main carriage to extend transversely of the latter and provided at one end with a hand-lever 183. Upon said rock-shaft are rigidly keyed two stop-blocks 184 and 185, each of which is provided with a notch or recess 186 and 187, adapted to embrace and engage a stop-lug 188, rigidly mounted upon the upper side of the I-beam or rack member. Referring to Figs. 18, 19, and 20, it will be seen that the two sides of the pinion upon the timber shown in Fig. 18 are of unequal length, the broader side being in practice made one and one-half inches longer than the shorter side. The stop 185 is so located on the rock-bar 180 as to hold the carriage in proper relation to the gang of saws to produce the tenoned timber shown in Fig. 18, and the engaging latch 187 of said block is made of an internal width greater than the width of a stop-lug 188 an amount equal to the difference in the length of the two sides of the tenon—as, for example, one and one-half inches in the instance mentioned. When, therefore, the stop-lug 188 is engaged with the stop-block 185, the extent of rotation of the rock-shaft 172 is determined by means of said stop-block, one side of the tenon being produced on the forward travel of the carriage, while the stop-lug 188 rests in engagement with one side of the recess of the stop-block and the hand-lever 175 being thrown over as far as permitted by the stop-block upon the return movement, thereby producing the other side of the tenon of a different length. The stop-block 184 is suitably located upon the rock-shaft 180 to hold the carriage in position to produce the tenonless timbers shown in Fig. 17, and inasmuch as all sides of these timbers are alike the recess 186 of this stop-block is made to closely fit and embrace the stop-lug 188. As best shown in Fig. 21, the shape of the stop-blocks 184 and 185 is such that when the rock-shaft upon which they are mounted is rotated a partial turn they are carried entirely out of register with the lug 188, and therefore permit the carriage to be adjusted freely. In this connection it may be also mentioned that the construction of the ratchet mechanism 174, which controls the position of the rock-shaft 172, is such as to grip and hold the ratchet-wheel 173 in any position of angular adjustment and without substantially lost motion, to this end a multiple set of pawls being arranged to act in each direction.

The operation of the machine constructed and arranged as described may be briefly restated, as follows: A timber which has previously been sawed to correct length is inserted in the chuck and adjusted so that it is engaged by the chuck exactly midway of its length, whereupon the gripping-jaws are closed upon the timber by rotating the screw-bolts thereof through the medium of a crank applied to the shanks 42. The operator who controls the carriage next places his foot upon the foot-lever 97, thus shifting the bar 81 and throwing the driving-gear into engagement to drive the carriage toward the remote end of the machine. The timber held by the chuck in the manner described passes between the two pairs of saws, thus severing the V-shaped blocks from the upper and lower sides of the timber and producing the two opposite sides of a tenon. At a point in the outward travel of the carriage when the end of the timber being acted upon by the saws has just passed the end of the ejector-arm 136 the detent 157 is depressed by the engagement therewith of the roller 166, mounted upon the carriage-frame, thereby releasing the ejector mechanism, which thereupon begins to move, bringing the end of the ejector-arm into engagement with that part of the forwardly-moving timber which is subsequently severed in the form of a block at the upper side thereof. As soon as the block has been completely severed the weight of the ejector mechanism causes the ejector to perform a rapid advance movement, thus sweeping the block off from the horizontal saw and ejecting it at the opposite side thereof and against the tendency of the saw to throw the block toward the operator's end of the machine. Shortly after the blocks have been severed during the advance movement of the carriage the cam-roller 103, mounted upon the crank-arm 102, engages the raised cam-surface 104, thereby withdrawing the locking-bolt 53 from the rack, which holds the chuck against rotation upon its longitudinal axis, and immediately thereafter the end of the buffer-head 106 engages the stop-bar 121, thus forcing the buffer along the ways 108 upon the carriage and relatively driving the rack rearwardly and rotating the chuck through an angular distance of ninety degrees. Before the rack-bar has ceased to move relatively to the chuck-frame the cam-roller 103 has passed out of engagement with the elevated cam-surface, thereby leaving the locking-bolt 53 free to snap into engagement with the locking-aperture of the rack-bar brought into register by such shifting movement of the rack. It may be noted at this point that the locking-bar 53 will be retracted upon the return movement of the carriage as the cam-roller passes over the elevated cam-surface, but will be again reëngaged before the timber reaches the saws on the return movement and before there is any tendency to move the chuck out of its proper position. When the buffer engages the stop-bar 121, it will first be moved inwardly relatively to the chuck a short distance before it engages the rack-bar and will thereafter carry the rack-

bar positively with it, this movement of the buffer along the ways of the carriage being against the action of the weight 118, which tends to restore the buffer to its outermost position. The buffer-head will finally be positively arrested in its movement along the ways of the carriage by the engagement of its acting-face with the edge of the turn-table, as shown clearly in Fig. 8; but the carriage will be permitted to move a short distance farther by the compression of the spring 120 in the buffer-head, which obviously serves to cushion the arresting of the carriage. The spring 106 will assist in the reversal and starting of the carriage upon its opposite travel, thus relieving the friction driving-gears from unnecessary work. As the carriage approaches its outward limit of movement the tappet-lug 85 thereon engages with the tappet 84 on the shifting bar, and thus effects the reversal of the driving-gear mechanism. Thereupon the carriage starts upon its return movement, and in so returning the remaining two sides of the tenon upon the timber are formed as the timber passes through the gang of saws. As the timber approaches the saws on its return movement its end engages the ejector-arm, which, it will be remembered, was projected forwardly and followed the timber as the latter passed through the saws and forces the latter back until the block which the ejector-arm is now engaging is severed, whereupon the weight 149 of the ejector mechanism causes the ejector-arm to again eject the block. Shortly after this movement of the ejector-arm has terminated the pick-up latch 150 engages the arm 154 of the tripping-rod 146, thereby carrying the tripping-rod, with the carriage, and restoring the ejector mechanism to its normal retracted position. When the carriage has returned a sufficient distance, the arm 154 is brought into register with the detent 157, the arm operating to depress the latter as it passes over the inclined cam-surface 164 thereof. As the detent snaps up into engagement with the arm 154 it throws off the pick-up latch, thereby freeing the carriage to pass on without further retracting the tripping-rod 146. As the carriage approaches the limit of movement at the operator's end of the machine its tappet-stud 85 engages the tappet 83 on the shifting bar, thus again reversing the driving-gear against the tension of the spring 96, which acts upon said shifting bar. Thereupon the carriage starts upon the return outward movement; but as soon as the tappet-stud 85 thereof passes out of engagement with the shifting bar the latter is returned by the spring 96 far enough to throw the driving-gears out of driving engagement, thus arresting the carriage. The operator now manually withdraws the latch or locking bolt 57 by means of the lever 63 and grasps the handle 56 upon the chuck and spins the latter around a half-revolution upon its vertical axis. As the carriage reaches a reversed postion the latch 57 again snaps into engagement with the locking-apertures, thus holding the carriage in exact diametrically opposite position from that previously occupied. This brings the opposite end of the timber in proper relation to be tenoned by a second excursion of the carriage forwardly and return, the various movements hereinbefore described obviously being repeated.

The auxiliary carriage may be adjusted transversely upon the main carriage by means of the rock-shaft 172 and actuating mechanism therefor in the manner hereinbefore fully described.

The machine is used for providing the beveled shoulders on the timbers shown in Fig. 17, which, it will be noted, are unprovided with tenons. When used for this purpose, the carriage is set back transversly farther away from the gang of saws, and in such case it is deemed unnecessary to operate the block-snatch mechanism, since the blocks severed by the oblique saws are not likely to be thrown violently or dangerously. For this purpose the auxiliary carriage is made to serve the purpose of holding the ejector-tripping roller 166 in rigid and operative position when the auxiliary carriage is set for tenoning, but passes out of engagement with the arm 167, carrying said tripping-roller when the carriage is set over, for the purpose of forming the tenonless timbers referred to, the construction and operation of these parts being hereinbefore fully set forth and best illustrated in Fig. 12.

While I have shown and described a preferred embodiment of my invention, yet the details of construction may be varied without departing from the principle of the invention, especially as set forth in the claims of broader scope. I do not, therefore, limit myself to these details of construction except to the extent that they are made the subject of specific claims.

I claim as my invention—

1. In a timber-dressing machine, a main frame, a chuck adapted to grip a timber, and mounted to reciprocate upon said frame, automatic mechanism for rotating said chuck upon an axis concentric with the longitudinal axis of the timber gripped thereby and through an angular distance of ninety degrees and during the reciprocatory travel of the chuck, and rotary cutting-tools supported in the path of the timber carried by the reciprocating chuck and operating upon each passage of the carriage thereby to cut away the end portion of the timber to produce one-half of a tenon having a straight side parallel with the longitudinal axis of the timber, and a contiguous shoulder beveled at an angle of forty-five degrees from the plane of the flat side of the tenon.

2. In a timber-sawing machine, a main

frame, a chuck adapted to grip a timber and mounted to reciprocate upon said frame, means for rotating said chuck upon an axis concentric with the longitudinal axis of the timber gripped thereby and through an angular distance of ninety degrees, automatic stop mechanism operating to arrest the rotation of the chuck at a predetermined point, and saws supported upon the frame in the path of the timber carried by the reciprocating chuck, one of said saws being arranged in a plane parallel with the timber, and another saw at an obtuse angle relative to the first saw.

3. In a timber-dressing machine, the combination of a main frame, a chuck adapted to grip a timber intermediate its length, mounted to reciprocate upon said main frame, means for rotating said chuck about an axis concentric with the longitudinal axis of the timber gripped thereby, means for swiveling said chuck upon an axis perpendicular to the first-mentioned axis of rotation, independently-operating automatic stop mechanism for arresting the rotation of the chuck at predetermined points of its rotation about each of said axes, and rotary cutting-tools mounted adjacent to the path of the timber carried by the chuck.

4. In a timber-sawing machine, a main frame, a chuck adapted to grip a timber intermediate its length and mounted to reciprocate upon said frame, means for rotating said chuck upon an axis concentric with the longitudinal axis of the timber gripped thereby, said means operating automatically during the travel of the chuck, automatic coöperating stop mechanism for holding the chuck positively in each of its positions, and circular saws supported upon the frame in the path of the end of the timber carried by the chuck, one of said saws being arranged in a plane parallel and in alinement with the timber, and another saw at an obtuse angle relatively to the first saw, and with the acting portion of its periphery approximately in a line coincident with the acting periphery of the first saw.

5. In a mining-timber-sawing machine, a main frame, a carriage mounted to reciprocate upon said main frame, a chuck mounted upon said carriage upon swivel-bearings whereby it is enabled to rotate about a vertical axis, snap-action locking mechanism for locking said chuck against rotation upon said swivel-bearings in two diametrically opposite positions, and constructed to permit free rotation of the chuck throughout its movement between limits of movement, and saws supported upon the frame in the path of the end of a timber carried by the chuck, one of said saws being arranged in a plane parallel with the longitudinal axis of the chuck and another saw arranged at an obtuse angle relative to the first saw.

6. In a timber-sawing machine, a main frame, a carriage mounted to reciprocate thereon, a chuck adapted to embrace and grip a timber intermediate its length, mounted upon said carriage and having swiveling connection therewith, the gripping devices of said chuck being also constructed to rotate upon an axis extending longitudinally of the chuck, means for locking the gripping devices of said chuck in two angular positions of adjustment, means for automatically actuating said locking devices, and complementary means operating to automatically rotate the gripping devices of the chuck during the reciprocatory travel of said carriage.

7. In a timber-dressing machine, a main frame, a carriage mounted to reciprocate thereon, a chucking device adapted to hold a timber at a point intermediate its length mounted upon said carriage and journaled thereon to rotate upon an axis parallel with the longitudinal axis of the chuck, a gear-segment rigid with the chuck and concentric with the longitudinal axis of rotation of the latter, a rack-bar operatively engaged with said gear-segment, said rack-bar arranged to extend in alinement with the line of travel of the carriage, and stops upon the main frame located in the path of travel of said rack-bar and at the opposite ends thereof, whereby the rack-bar is engaged and shifted relatively to the chuck during the travel of the carriage in each direction.

8. In a timber-dressing machine, a main frame, a carriage mounted to reciprocate thereon, a chucking device adapted to hold a timber at a point intermediate its length mounted upon said carriage and journaled thereon to rotate upon an axis parallel with the longitudinal axis of the chuck, a gear-segment rigid with the chuck and concentric with the longitudinal axis of rotation of the latter, a rack-bar operatively engaged with said gear-segment, said rack-bar arranged to extend in alinement with the line of travel of the carriage, stops upon the main frame located in the path of travel of said rack-bar and at the opposite ends thereof, whereby the rack-bar is engaged and shifted relatively to the chuck during the travel of the carriage in each direction, and automatic latch mechanism operating to lock the chuck at each limit of its rotated movements.

9. In a timber-dressing machine, the combination with the main frame, a carriage mounted to reciprocate thereon, and cutting-tools mounted adjacent to the path of travel of the said carriage, of a timber-chuck mounted upon said carriage and provided with gripping-jaws mounted to oscillate upon an axis extending longitudinally of the chuck, chuck-actuating mechanism mounted upon the carriage and operatively connected with said gripping-jaws, a relatively fixed stop mounted upon the main frame in the path of travel of the carriage and adapted to engage and operate said chuck-actuating mechanism during the travel of the carriage, an automatic latch

mechanism operating to lock the chuck-jaws positively against rotation in either direction at their two limits of movement upon their oscillatory axis, and mechanism arranged to automatically unlock said latch mechanism in advance of the rotative movement of the chuck in each direction.

10. In a timber-dressing machine, the combination of a main frame provided with carriage-ways, a main carriage mounted to reciprocate upon said ways, cutting-tools mounted adjacent to the path of travel of the said carriage, transverse ways upon said main carriage, an auxiliary carriage mounted upon said transverse ways, an adjusting-rack arranged transversely upon said auxiliary carriage, an actuating-shaft mounted to extend parallel with the carriage-ways of the main frame, a pinion splined to, and arranged to reciprocate upon said actuating-shaft, confining devices connecting said pinion to move with said auxiliary carriage, and holding it in mesh with said transverse adjusting-rack, means for rotating said actuating-shaft and holding it in various positions of angular adjustment, timber-gripping devices mounted upon said auxiliary carriage and having swiveling connection with the latter, and mechanism for locking said gripping devices in diametrically opposite positions of angular adjustment.

11. In a timber-dressing machine, the combination of a main frame provided with carriage-ways, a main carriage mounted to reciprocate upon said ways, cutting-tools mounted adjacent to the path of travel of the said carriage, transverse ways upon said main carriage, an auxiliary carriage mounted upon said transverse ways, an adjusting-rack arranged transversely upon said auxiliary carriage, an actuating-shaft mounted to extend parallel with the carriage-ways of the main frame, a pinion splined to, and arranged to reciprocate upon, said actuating-shaft, confining devices connecting said pinion to move with said auxiliary carriage, and holding it in mesh with said transverse adjusting-rack, means for rotating said actuating-shaft and holding it in various positions of angular adjustment, a turret-standard upon said auxiliary carriage, a chuck rotatably mounted upon said turret-standard, gripping-jaws forming parts of said chuck, mounted to oscillate about an axis extending longitudinally of the chuck, a gear-segment rigid with said jaws and arranged concentric with said longitudinal axis, a rack-bar mounted to reciprocate upon the chuck-frame and operatively engaged with said gear-segment, said rack-bar being arranged to extend parallel with the path of travel of the main carriage, an automatic latch mechanism normally holding said gear-segment locked against rotation, an unlatching mechanism mounted upon, and moving with said carriage, a cam mounted in the path of travel of the carriage and adapted to actuate said unlatching mechanism as the carriage approaches its limit of movement in one direction, and means arranged to engage the end of said rack-bar to shift the latter relatively to the gear-segment following the operation of the unlatching mechanism and during the advance movement of the carriage.

12. In a machine of the character described, the combination with the main frame and carriage mounted to travel thereon, of a chuck mounted upon the carriage, a gear-segment operatively connected with the gripping-jaws of the chuck and mounted to oscillate upon an axis extending longitudinally of the chuck, a rack-bar mounted to reciprocate on the chuck-frame and arranged parallel with the carriage-ways, a sliding buffer mounted to reciprocate upon ways on the carriage parallel with said rack-bar, means normally holding said buffer at the limit of its movement remote from the rack-bar, a latch mechanism arranged to normally hold said gear-segment locked against rotation, operative connections between said buffer and said latch mechanism, and a stop upon the main frame arranged in the path of the buffer.

13. In a machine of the character described, the combination with a reciprocating carriage, of a chuck journaled to rotate upon a vertical axis upon said carriage, gripping-jaws forming a part of said chuck mounted to rotate upon an axis perpendicular to said vertical axis, a gear-segment connected with said gripping-jaws, and rotatable with the gripping-jaws, a rack-bar mounted upon the chuck-frame, operatively engaging said gear-segment and arranged to project beyond the chuck-frame and parallel with the ways upon which the carriage travels, ways upon said carriage arranged parallel with the rack-bar, a buffer mounted to reciprocate upon said latter ways, a weight arranged to normally hold said buffer at its limit of movement remote from the carriage, a stop arranged in the path of movement of said buffer and adapted to positively arrest the latter and thereby cause the buffer to engage and arrest the advance movement of the rack, and locking mechanism for holding said chuck against rotation about its vertical axis in two diametrically opposite positions.

14. In a machine of the character described, the combination with a reciprocating carriage, of a chuck journaled to rotate upon a vertical axis upon said carriage, gripping-jaws forming a part of said chuck mounted to rotate upon an axis perpendicular to said vertical axis, a gear-segment connected with said gripping-jaws, and rotatable with the gripping-jaws, a rack-bar mounted upon the chuck-frame, operatively engaging said gear-segment and arranged to project beyond the chuck-frame and parallel with the ways upon which the carriage travels, ways upon said

carriage arranged parallel with the rack-bar, a buffer mounted to reciprocate upon said latter ways, a weight arranged to normally hold said buffer at its limit of movement remote from the carriage, a stop arranged in the path of movement of said buffer and adapted to positively arrest the latter and thereby cause the buffer to engage and arrest the advance movement of the rack, and locking mechanism for holding said chuck against rotation about its vertical axis in two diametrically opposite positions, the opposite ends of said rack-bar being similar and the shift of the rack-bar in either direction symmetrical relatively to the vertical axis of rotation of the chuck, whereby when the rack-bar has been forced back by said buffer and the chuck thereafter rotated a half-revolution, the opposite end of the rack-bar is brought into operative relation to the buffer for a repeat movement.

15. In a timber-dressing machine, the combination with a traveling carriage, of a chuck movably mounted upon said carriage and comprising a cylindric yoke-frame, a cylindric chuck-shell mounted within said yoke and provided externally with a gear-segment, a rack-bar mounted to reciprocate in said chuck-frame and operatively engaging said gear-segment, means coöperating with said rack-bar to shift the latter relatively to the chuck as the carriage reciprocates, and gripping-jaws mounted upon said rotatable shell.

16. In a timber-dressing machine, the combination with a traveling carriage, of a chuck movably mounted upon said carriage and comprising a cylindric yoke-frame, a cylindric chuck-shell mounted within said yoke and provided externally with a gear-segment, a rack-bar mounted to reciprocate in said chuck-frame and operatively engaging said gear-segment, means for automatically locking and unlocking the rack-bar, and means coöperating with said rack-bar to shift the latter relatively to the chuck as the carriage reciprocates, and a pair of gripping-jaws mounted in diametrically opposite relation to each other upon the end of said cylindric shell, and means for simultaneously and equally approaching and retracting said jaws.

17. In combination, a chuck-body rotatable about an axis extending longitudinally and centrally between the jaws thereof, mechanism for locking the chuck-body in various positions of adjustment, and two pairs of oppositely-disposed gripping-jaws mounted at longitudinally-separate points on the chuck to reciprocate toward and from each other at right angles to the said longitudinal axis of the chuck, and means for simultaneously approaching and retracting said jaws comprising screw-bolts each provided with two portions of right and left and similar pitch arranged to operate said jaws and interlocking gearing.

18. In combination, a chuck-body rotatable about an axis extending longitudinally and centrally between the jaws thereof, mechanism for locking the chuck-body in various positions of adjustment, two pairs of oppositely-disposed V-shaped gripping-jaws mounted upon each end of said chuck-body in diametrically opposite relation and arranged to reciprocate in planes at right angles to the longitudinal axis of the chuck-body, and means for simultaneously and equally approaching and retracting said jaws, comprising screw-bolts having threaded portions of right and left pitch, each arranged to engage both members of a pair of jaws and arranged in parallel relation to each other, miter gears upon said screw-bolts, a cross-shaft provided with corresponding miter-gears engaging those of the screw-bolts, and means for rotating the cross-shaft.

19. In a timber-dressing machine, the combination of a main frame, a chuck-carriage mounted to reciprocate thereon, cutting-tools mounted adjacent to the path of travel of said carriage, and means for automatically reciprocating the latter comprising a rack mounted upon the carriage-frame and arranged to extend parallel with the path of travel of the latter, a drive-shaft provided with a pinion engaging said rack, a friction-gear upon said drive-shaft, oppositely-driven friction-pinions mounted in an oscillatory yoke-frame adjacent to the periphery of the pinion of the drive-shaft and adapted to be alternately brought into driving engagement with the latter, a cam-arm connected with said oscillatory yoke-frame, a shifting bar mounted to reciprocate longitudinally of the main frame, and operatively connected with said cam-arm, and a part upon the carriage adapted to engage and actuate said shifting bar as the carriage approaches its limits of movement in each direction, whereby the driving connections are reversed.

20. In a timber-dressing machine, the combination of a main frame, a chuck-carriage mounted to reciprocate thereon, cutting-tools mounted adjacent to the path of travel of said carriage, and means for automatically reciprocating the latter comprising a rack mounted upon the carriage-frame and arranged to extend parallel with the path of travel of the latter, a drive-shaft provided with a pinion engaging said rack, a friction-gear upon said drive-shaft, oppositely-driven friction-pinions mounted in an oscillatory yoke-frame adjacent to the periphery of the pinion of the drive-shaft and adapted to be alternately brought into driving engagement with the latter, a cam-arm connected with said oscillatory yoke-frame, a shifting bar mounted to reciprocate longitudinally of the main frame, and operatively connected with said cam-arm, and a spring acting upon said reversing mechanism

to shift the latter to an intermediate position and to carry the driving-gears out of driving engagement when the spring is unrestrained.

21. In a timber-dressing machine, the combination of a main frame, a chuck-carriage mounted to reciprocate thereon, cutting-tools mounted adjacent to the path of travel of said carriage, and means for automatically reciprocating the latter comprising a rack mounted upon the carriage frame and arranged to extend parallel with the path of travel of the latter, a drive-shaft provided with a pinion engaging said rack, a friction-gear upon said drive-shaft, oppositely-driven friction-pinions mounted in an oscillatory yoke-frame adjacent to the periphery of the pinion of the drive-shaft and adapted to be alternately brought into driving engagement with the latter, a cam-arm connected with said oscillatory yoke-frame, a shifting bar mounted to reciprocate longitudinally of the main frame, and operatively connected with said cam-arm, a spring acting upon said shift-bar and tending to shift the latter to an intermediate position, and a manually-operable lever mechanism for moving the shifting bar against the action of the spring.

22. In a timber-sawing machine, the combination with a circular saw, and mechanism for carrying material to be severed by said saw, of means for holding the severed portion against the throwing action of the saw, comprising a rock-shaft, an arm operatively connected with said rock-shaft, and timing mechanism whereby the rock-shaft is oscillated to cause the arm to follow the piece of material about to be severed, and apparatus to eject the latter in a direction opposite that in which the saw tends to throw the severed portion.

23. In a timber-sawing machine, the combination with a circular saw, and mechanism for carrying material to be severed by said saw, of means for holding the severed portion against the throwing action of the saw, comprising a rock-shaft mounted to extend perpendicular to the plane of the saw; an ejector-arm mounted upon said rock-shaft comprising two flexible united members, a spring tending to force said members toward a position in alinement with each other, timing mechanism actuating said rock-shaft, and a guide acting upon the outer member of the two members of the ejector-arm, whereby said outer member is first projected longitudinally, and thereafter moved positively in an arc concentric with the rock-shaft, as and for the purpose set forth.

24. In a timber-sawing machine, the combination with a main frame, a carriage mounted to reciprocate thereon, and a gang of saws mounted adjacent to the path of said carriage and operating to sever a block from the piece of material carried by the carriage, one of said saws being arranged in horizontal plane, and a coöperating saw being arranged in a plane intersecting the plane of the horizontal saw, of a block-snatcher mechanism comprising a vertically-disposed rock-shaft, an ejector-arm member rigidly mounted upon said rock-shaft, a second ejector-arm member pivotally connected with the first and arranged to extend at an angle to the latter, a spring tending to flex said ejector-arm members toward a position in line with each other, a stop operating to limit the flexure of said arms under the tension of the spring, a stationary guide operating to direct the movement of the outer ejector-arm member during a part of its operation, and timing mechanism controlled by the travel of the carriage for actuating said block-snatcher mechanism, substantially as described.

25. In a timber-sawing machine, the combination with a main frame, a carriage mounted to reciprocate thereon, and a gang of saws mounted adjacent to the path of said carriage and operating to sever a block from the piece of material carried by the carriage, one of said saws being arranged in horizontal plane, and a coöperating saw being arranged in a plane intersecting the plane of the horizontal saw, of a block-snatcher mechanism comprising a vertically-disposed rock-shaft, an ejector-arm member rigidly mounted upon said rock-shaft, a second ejector-arm member pivotally connected with the first and arranged to extend at an angle to the latter, a spring tending to flex said ejector-arm members toward a position in line with each other, a stop operating to limit the flexure of said arms under the tension of the spring, a stationary guide operating to direct the movement of the outer ejector-arm member during a part of its operation, and timing mechanism controlled by the travel of the carriage for actuating said block-snatcher mechanism, comprising a trip-rod mounted to reciprocate in ways parallel with the path of movement of the carriage, operative connections between said ejector-arm rock-shaft and said trip-rod, a weight operatively connected with said rock-shaft and tending to normally rotate the latter in the direction of ejectment, substantially as described.

26. In a machine of the character described, the combination with a main frame, a carriage mounted to reciprocate thereon, a gang of saws mounted adjacent to the path of said carriage and operating to sever a block from the piece of material carried by the carriage, of a block-snatcher mechanism and means for operating said latter mechanism, comprising a weighted rock-shaft, a trip-shaft operatively connected to actuate said rock-shaft and mounted to reciprocate in ways parallel with the path of movement of the carriage, a latch-arm connected with said tripping-shaft, a pick-up latch adapted to automatically engage with

said latch-arm and retract the trip-rod during the travel of the carriage in one direction, a spring-actuated detent normally projected into the path of the said latch-arm and operating to engage the latter automatically when the latch-arm is brought into register therewith, a part upon said pick-up latch adapted to be engaged by said detent, and whereby the pick-up latch is disengaged as the detent passes into latched engagement with the arm, and means for automatically tripping said detent during the travel of the carriage in a reverse direction.

27. In a mechanism of the character described, the combination with a main frame, a carriage mounted to reciprocate thereon, a gang of saws mounted adjacent to the path of said carriage and operating to sever a block from the piece of material carried by the carriage, of a block-snatcher mechanism, and means for operating said latter mechanism, comprising a weighted rock-shaft, a trip-shaft operatively connected to actuate said rock-shaft and mounted to reciprocate in ways parallel with the path of movement of the carriage, a latch-arm connected with said tripping-shaft, a pick-up latch adapted to automatically engage with said latch-arm and retract the trip-rod during the travel of the carriage in one direction, a spring-actuated detent normally projected into the path of the said latch-arm and operating to engage the latter automatically when the latch-arm is brought into register therewith, a part upon said pick-up latch adapted to be engaged by said detent, and whereby the pick-up latch is disengaged as the detent passes into latched engagement with the arm, and means for automatically tripping said detent, comprising a pivoted cam-lever mounted upon the carriage and means for holding said lever rigid with the carriage or permitting it to oscillate idly, as and for the purpose set forth.

DANIEL W. EDWARDS.

Witnesses:
ALBERT H. GRAVES,
FREDERICK C. GOODWIN.