946,507.

F. D. GREEN.

WOOD MOLDING MACHINE.

APPLICATION FILED JAN. 8, 1908.

Patented Jan. 11, 1910.

6 SHEETS—SHEET 1.

Fig. 1.

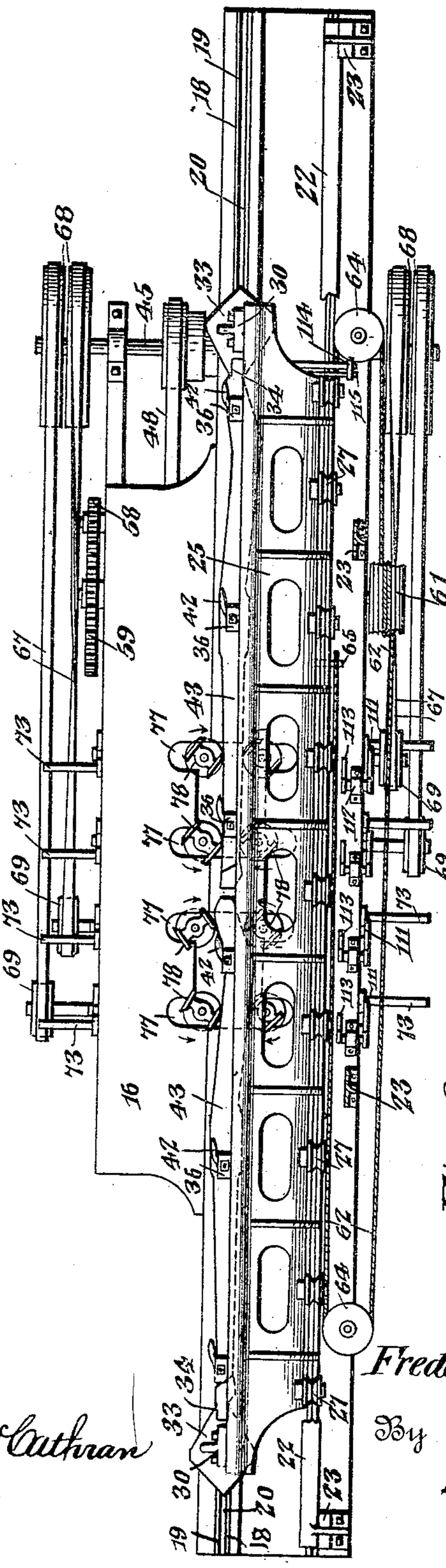


Fig. 7.

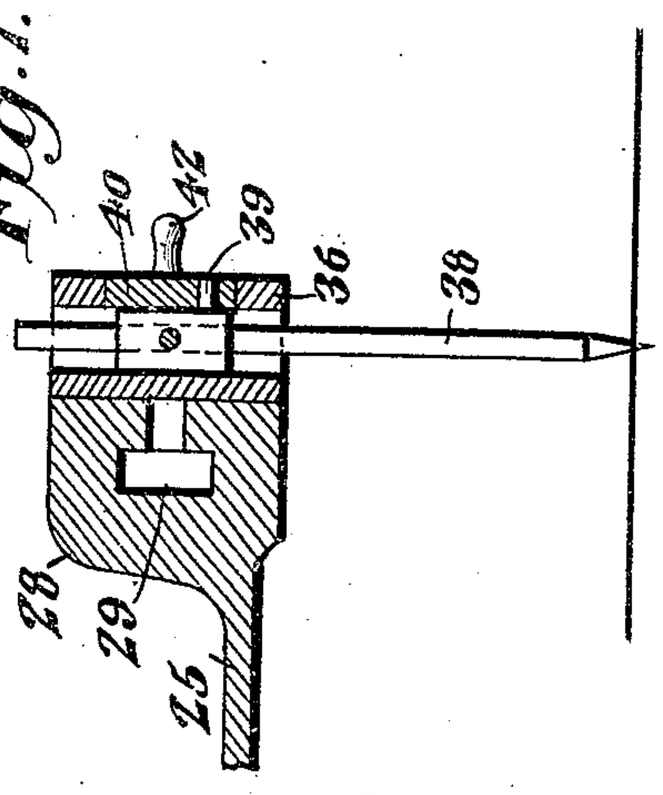


Fig. 8.

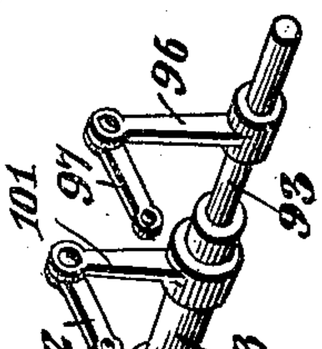
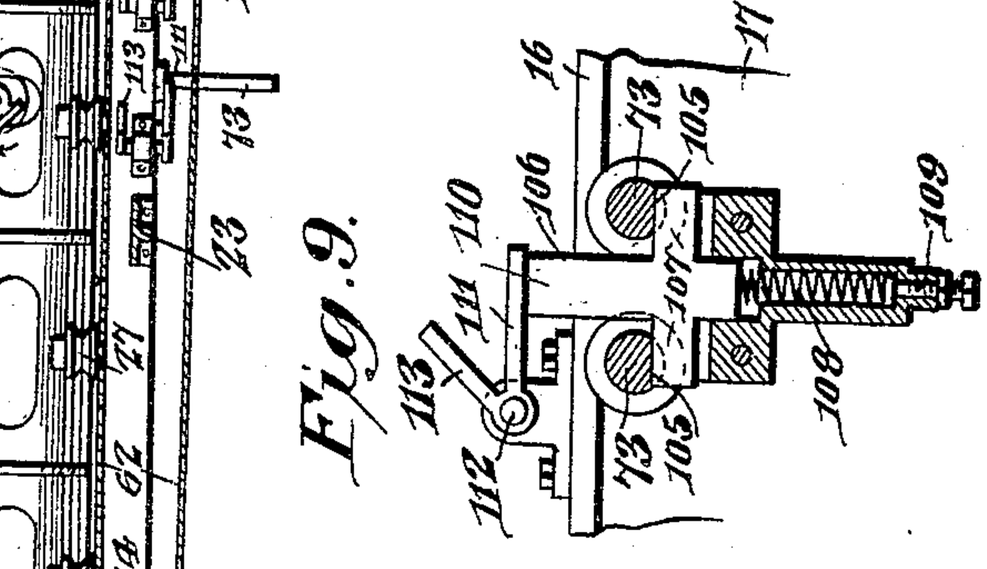


Fig. 9.



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6 SHEETS—SHEET 2.

Fig. 2.

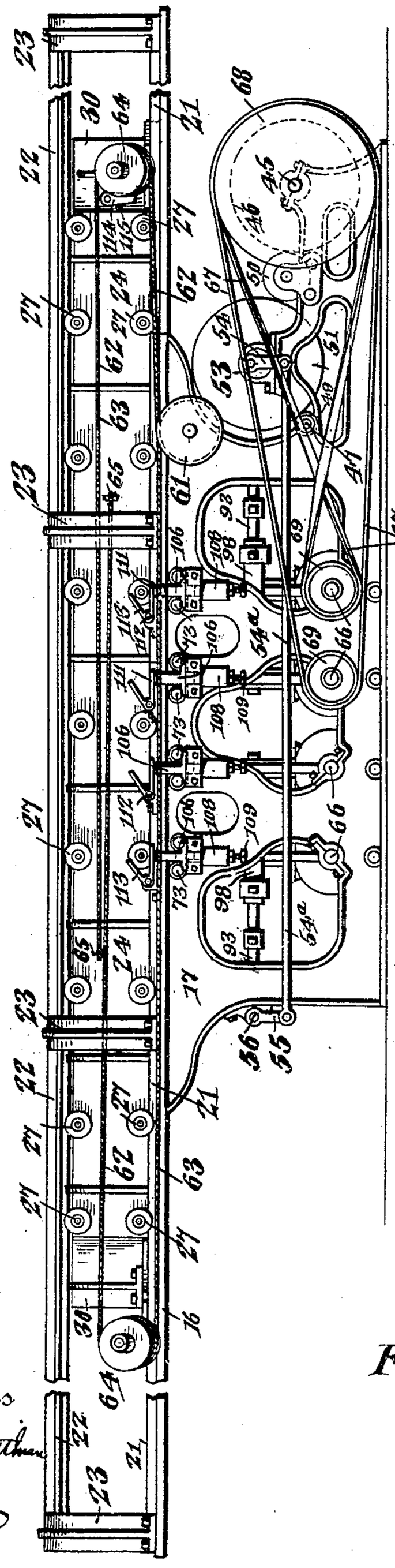
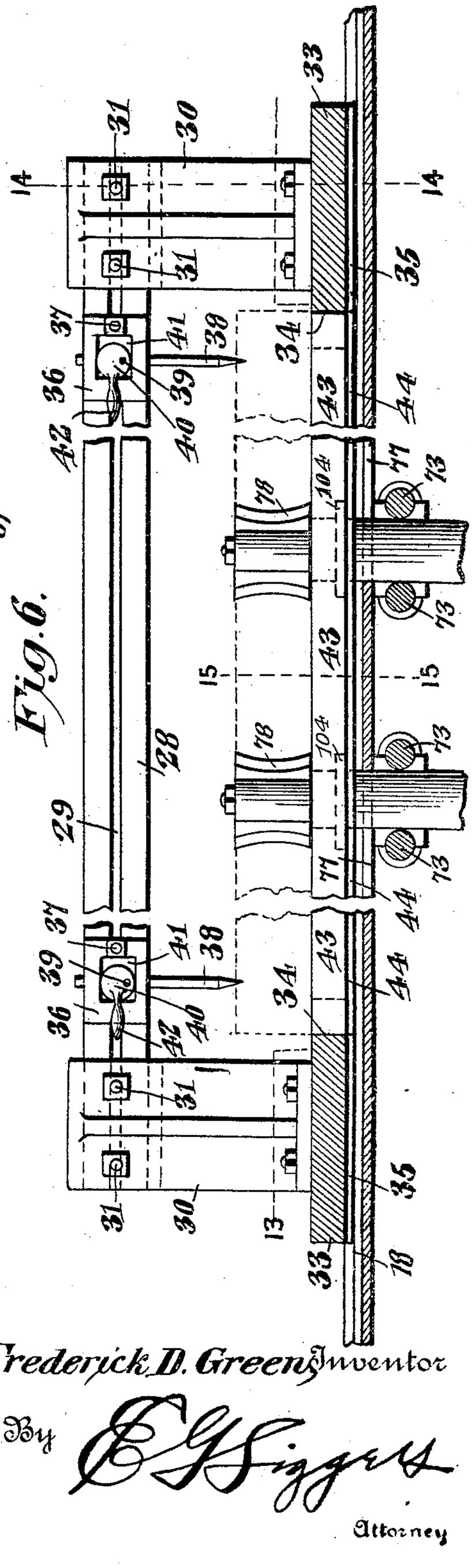


Fig. 6.



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6 SHEETS—SHEET 3.

Fig. 3.

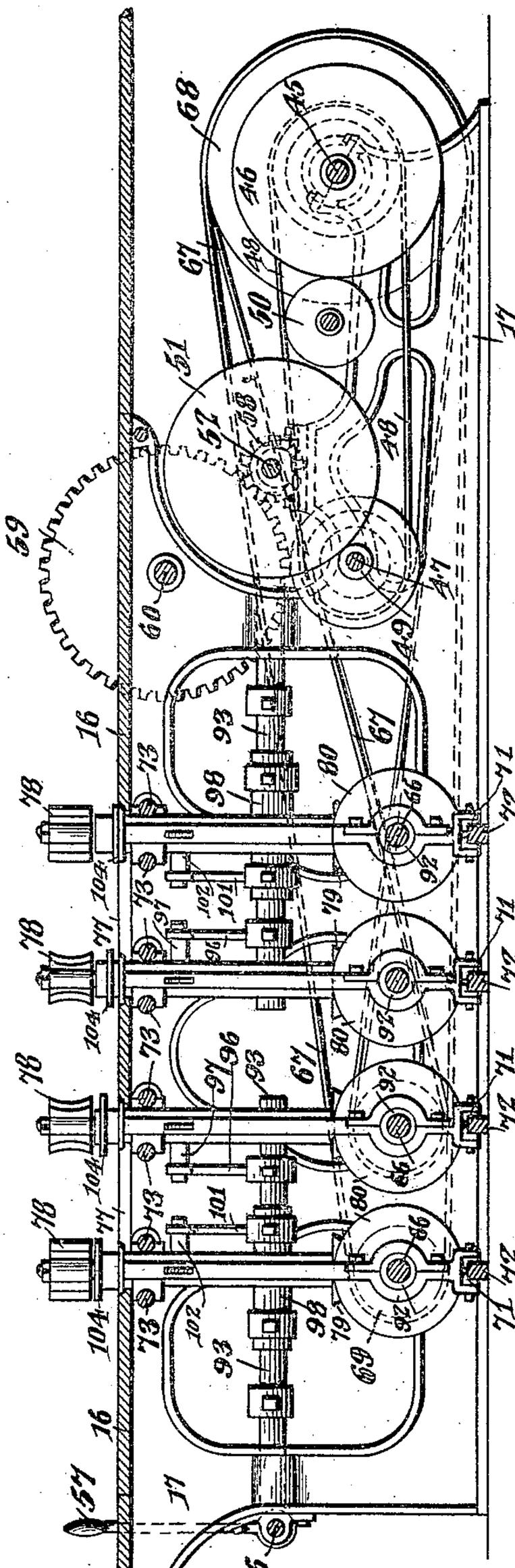
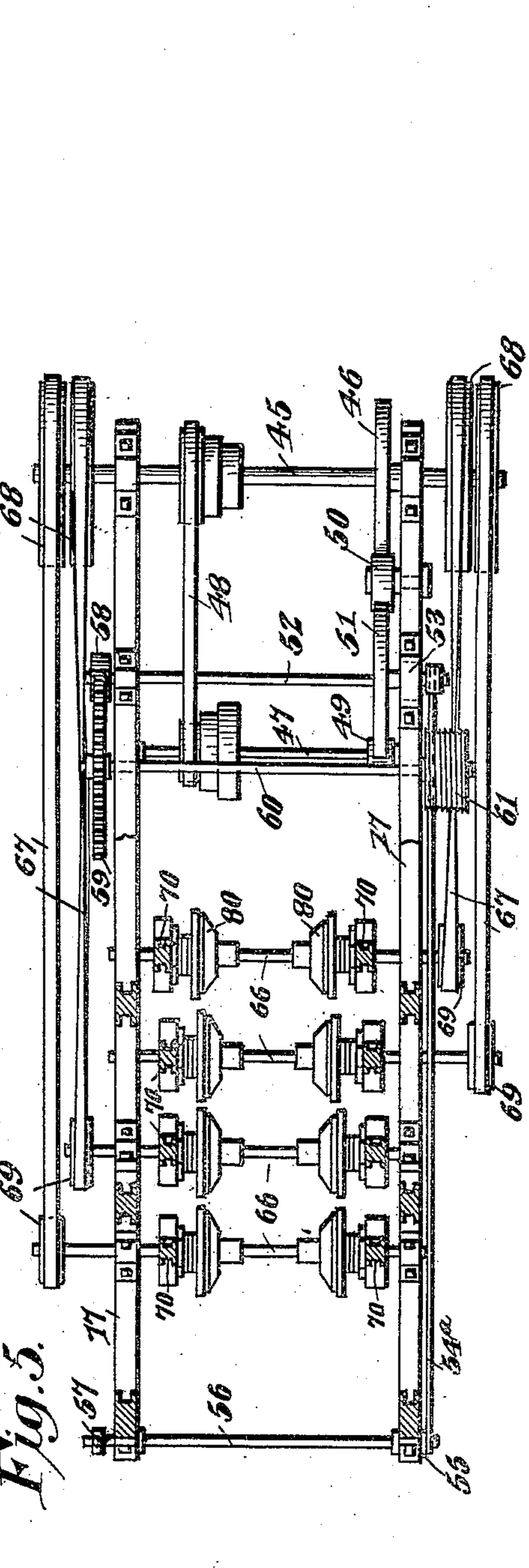


Fig. 5.



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6 SHEETS—SHEET 4.

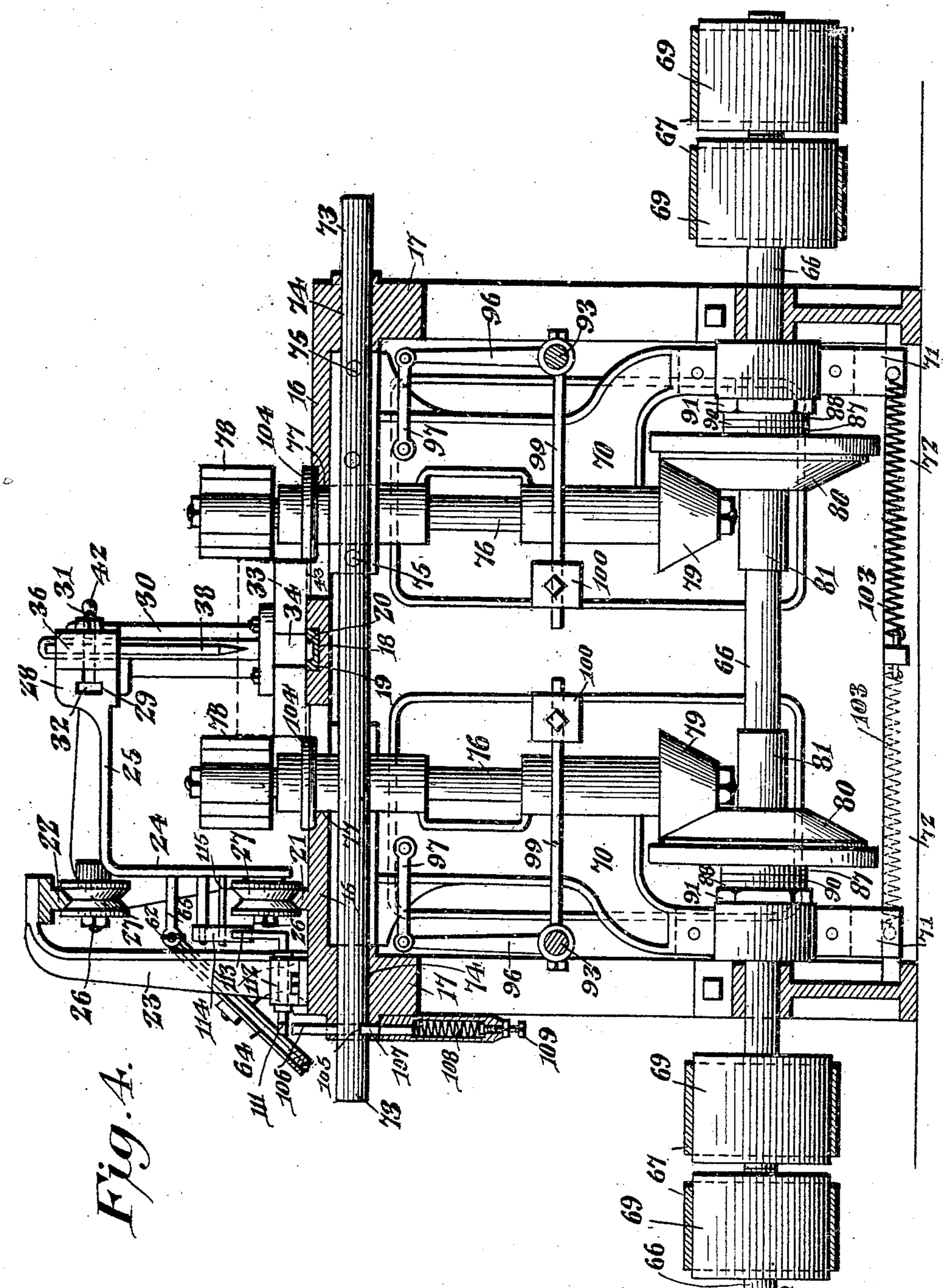

Fig. A.

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6 SHEETS—SHEET 5.

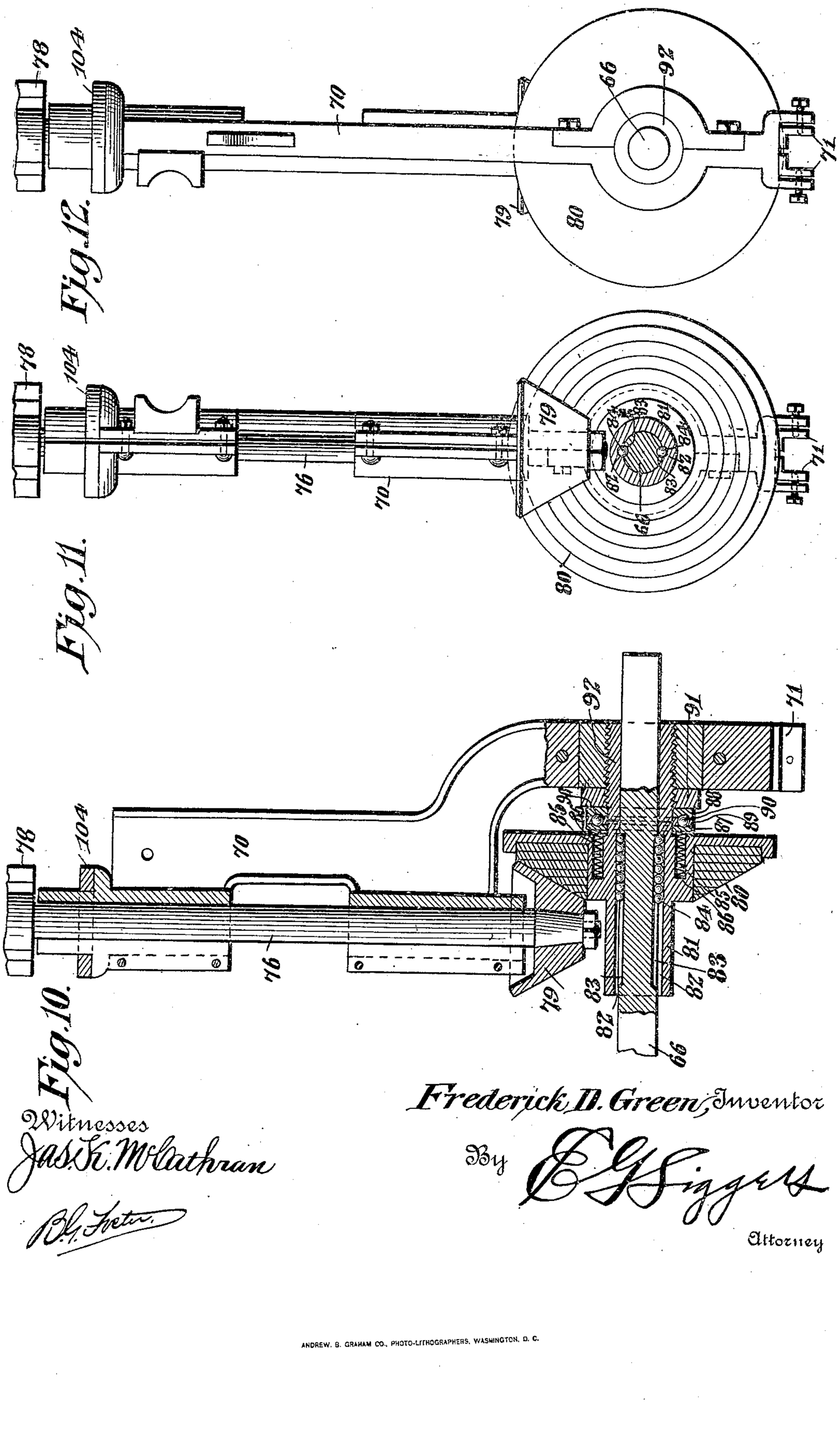

Fig. 12.

Fig. 11.

Fig. 10.

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6 SHEETS—SHEET 6.

Fig. 15.

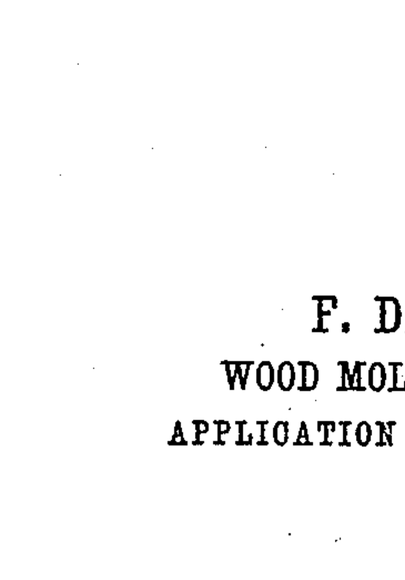


Fig. 14.

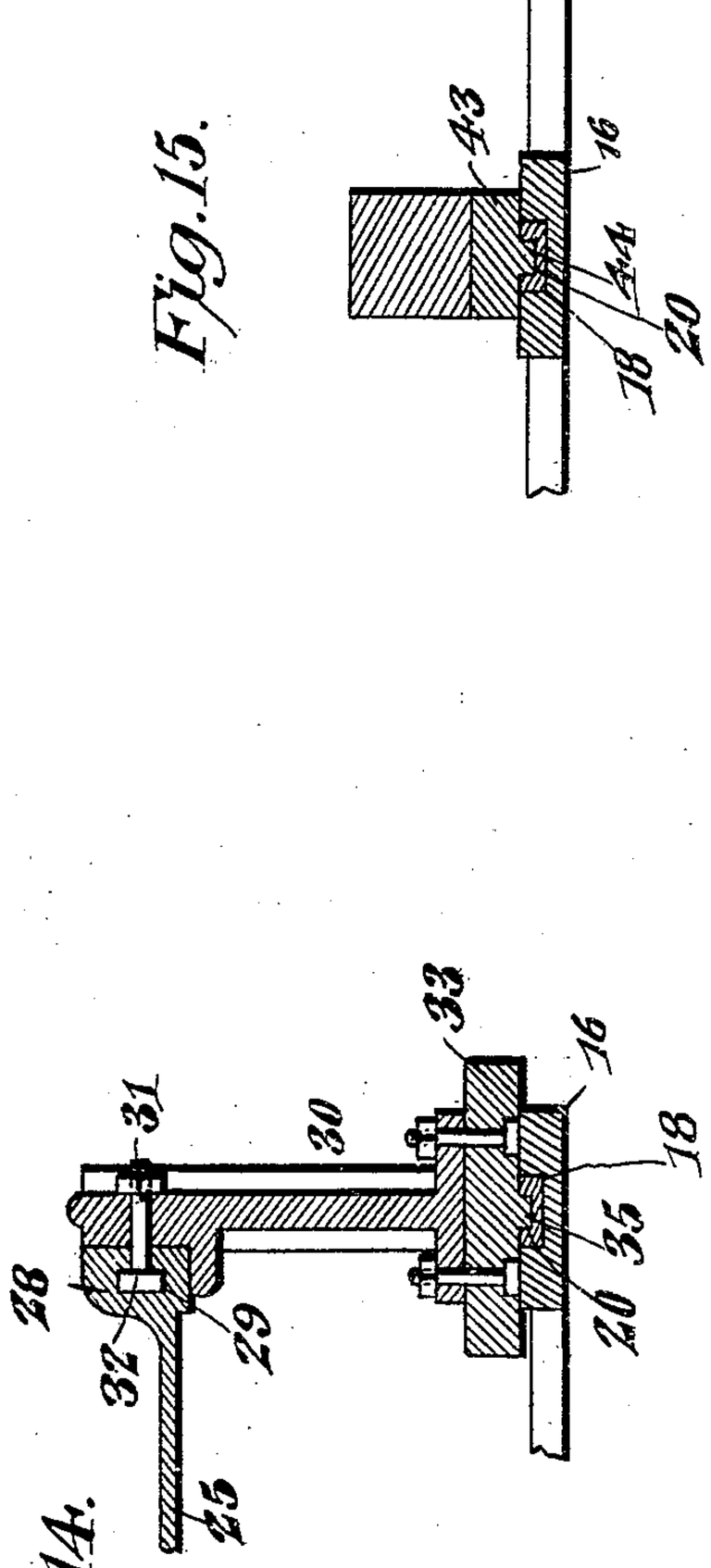
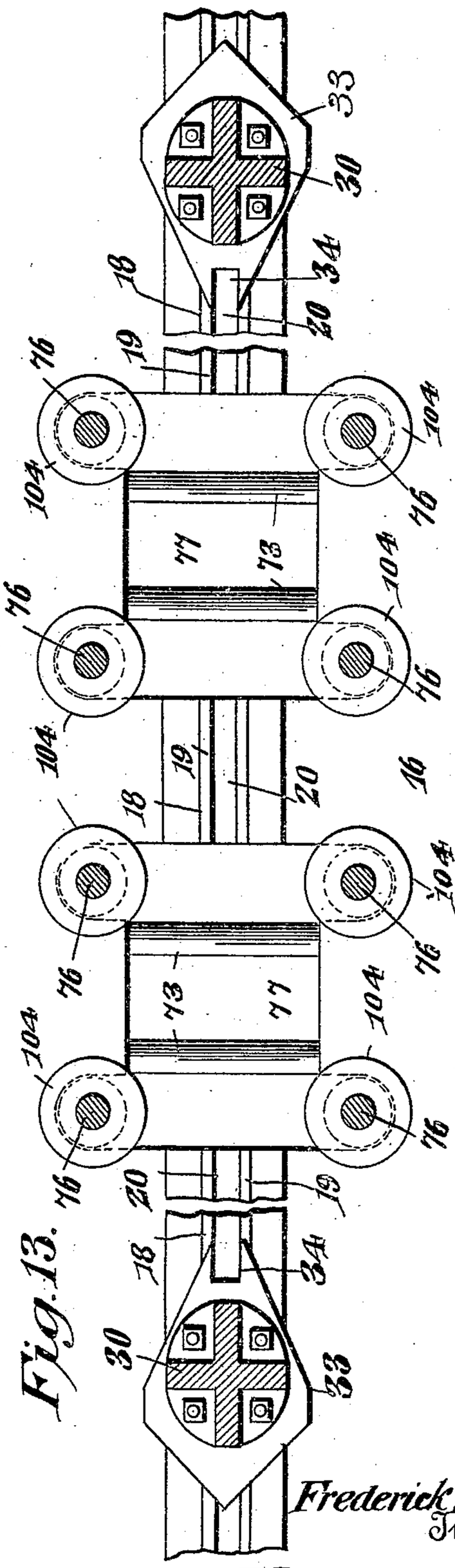


Fig. 13.



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UNITED STATES PATENT OFFICE.

FREDERICK D. GREEN, OF FLORENCE, ALABAMA, ASSIGNOR OF ONE-HALF TO WILLIAM T. ADAMS, OF CORINTH, MISSISSIPPI.

WOOD-MOLDING MACHINE.

946,507. Specification of Letters Patent. **Patented Jan. 11, 1910.**

Application filed January 8, 1908. Serial No. 409,879.

To all whom it may concern:

Be it known that I, FREDERICK D. GREEN, a citizen of the United States, residing at Florence, in the county of Lauderdale and State of Alabama, have invented a new and useful Wood-Molding Machine, of which the following is a specification.

This invention relates more particularly to improvements in means for shaping irregular articles, and in one aspect, is an improvement on the structure disclosed in a co-pending application, Serial No. 229,065, filed Aug. 3, 1906.

One of the primary objects of the present invention is to provide novel driving means for the cutters, whereby frictional resistance is greatly reduced, and the cutters can be driven at a very high rate of speed and with effective force.

Another object is to provide novel means for securing the cutters in an inoperative position during the passage of the work holding means in one direction past the same, and for releasing said cutters to permit them to operate on the work when the holder moves in an opposite direction.

A still further and important object is to provide effective work holding means and mechanism for properly operating the same.

The preferred embodiment of the invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a top plan view of the machine. Fig. 2 is a side elevation of the same. Fig. 3 is a vertical longitudinal sectional view therethrough. Fig. 4 is a vertical cross sectional view on an enlarged scale. Fig. 5 is a horizontal sectional view. Fig. 6 is a detail longitudinal sectional view through the work holder. Fig. 7 is a vertical cross sectional view through the same. Fig. 8 is a detail perspective view of a portion of the actuating means for the carriages. Fig. 9 is a detail vertical sectional view through one of the carriage holding latches. Fig. 10 is a vertical sectional view through one of the carriages, showing the driving means for a cutter. Fig. 11 is a front elevation of the same. Fig. 12 is a rear elevation. Fig. 13 is a sectional view on the line 13—13 of Fig. 6. Fig. 14 is a detail sectional view on the line 14—14 of Fig. 6. Fig. 15 is a vertical sectional view on the line 15—15 of Fig. 6.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

In the embodiment illustrated, a support is employed in the form of a table having a top 16 and sides 17. The top is provided with a central longitudinally disposed channel 18 in which is a wear strip 19 having a guiding groove 20. The top at one side is provided with a longitudinally disposed upstanding track 21 and a depending track 22 overhanging the upstanding track is supported by suitable standards 23 secured to the table. A work and pattern holder is employed that comprises a frame of angularly disposed leaves 24 and 25, the vertical leaf having rearwardly extending studs 26 secured thereto and constituting gudgeons on which upper and lower sets of grooved rollers 27 are journaled. These rollers respectively engage the under and upper sides of the upper and lower tracks 21 and 22. Thus it will be observed that the frame is capable of a reciprocatory movement longitudinally over the table top. The outstanding or overhanging portion 25 terminates in a clamping bar 28 that is provided with a longitudinally disposed T-shaped groove 29 opening through one side of the bar. From this bar is adjustably suspended the pattern holding means and work clamping devices.

As shown, particularly in Figs. 6, 13, 14 and 15, hangers 30 have their upper ends located against the outer face of the bar 28, and are secured thereto by bolts 31 having heads 32 located in the slot 29. These hangers carry at their lower ends diamond shaped guides 33, the outer ends of which are tapered, the inner ends being provided with work and pattern receiving sockets 34. Said guides also are preferably provided on their under sides with ribs 35 that move in the groove or channel 20. Work clamping devices are also secured to the bar 28. As shown, particularly in Figs. 6 and 7, these devices, each comprise a head 36 located against the outer face of the bar and adjustably fastened to said bar by bolts 37 having

heads engaged in the slot 29. Vertical work engaging pins 38 are slidably mounted in the heads, and have outstanding pins 39 engaged by eccentrics 40 rotatably mounted in recesses 41 formed in the heads and having offset handles 42. It will be understood that as many of these clamping devices may be employed, as desired. The patterns, one of which is shown at 43, are placed between the guiding devices 33 with their ends located in the sockets 34, and these patterns furthermore have longitudinal ribs 44 on their under sides that slidably engage in the guiding groove or channel 20. The work to be shaped, is placed upon the pattern, as indicated in dotted lines in Fig. 6, and is clamped by the pins 38, the eccentrics 40 being rotated to raise and lower said pins, and thus clamp the work in place.

For the purpose of reciprocating the work holder, the following mechanism is preferably employed. A main driving shaft 45 is journaled upon one end of the frame, and carries a friction wheel 46. A countershaft 47, journaled in the table, is belted, as shown at 48 to said main driving shaft. This countershaft has a friction wheel 49. An idler 50, journaled on a stud on the frame of the machine, is engaged with the wheel 46, and between the wheel 49 and the idler 50 is located a friction wheel 51 carried by a shaft 52. The end of the shaft that carries the friction wheel 51 is journaled in an eccentric bearing 53, and this eccentric bearing as shown in Fig. 2, is provided with a depending arm 54 having a link connection 54^a with a crank arm 55 on a rock shaft 56. The rock shaft is located at the opposite end of the machine and is provided with an upstanding hand lever 57. It will thus be evident that by operating the lever 57, the eccentric bearing 53 may be turned so that the friction wheel 51 can be carried into engagement either with the friction wheel 49 or the idler 50. Thus said friction wheel 51, and consequently the shaft 52 can be driven in opposite directions and at different speeds. Now the shaft 52 is provided at the end opposite the wheel 51 with a pinion 58, and this pinion is in mesh with a gear wheel 59 carried by another shaft 60. The latter shaft is provided at its opposite end with a drum 61, and wrapped upon said drum is a cable 62. The cable has opposite stretches 63 extending around idlers 64 at the ends of the table, and the end portion of these opposite stretches are disposed in overlapping relation, and secured at their ends and at separated points to the table, as shown at 65 in Fig. 2. With this arrangement, it will be evident that by operating the lever therefore the drum can be rotated in opposite directions, and the cable thus drawn in opposite directions. This therefore will cause the reciprocation of the work carrier, its movement in one direction being at a greater speed than its movement in an opposite direction.

A plurality of driving shafts, preferably four or more are journaled in the table transversely beneath the top, and are designated 66. These shafts are rotated in opposite directions by suitable belts 67 operating around pulleys 68 on the main driving shaft 45 and around other pulleys 69 on said driving shafts. Associated with each of the driving shafts 66 is a pair of carriages, said carriages being designated 70. The carriages are movable longitudinally of the shafts 66, and consequently toward and from the path of movement of the work carrier. They are in the form of upright frames, their lower ends having guide-ways 71 operating on transversely disposed fixed guides 72 secured to the lower portion of the table. The upper ends of the carriages of each pair are located between and engage a pair of transversely disposed guide rods 73 that are capable of reciprocation, and are slidably mounted, as shown at 74 in the sides 17 of the table. One of the carriages is fastened, as shown at 75 to one of the guides, and consequently slides on the other, while the other carriage is fastened to said other guide and slides on the first mentioned guide.

Journaled on each carriage is an upright countershaft 76 that projects through an opening 77 in the top 16 of the table, and carries at its upper end a suitable cutter head 78. The lower end of each countershaft has a beveled friction gear 79 that cooperates with another friction gear 80 slidably mounted on the adjacent drive shaft 66. The detail construction of this gearing is shown more particularly in Figs. 10, 11 and 12. It will be observed that the gear wheel 80 is provided with a head 81 having opposite slots 82 that register with corresponding slots 83 formed in the shaft 66. The wheel 80 is feathered to the shaft, and the feather consists of sets of balls 84 located in the registered slots, and thus prevent the relative rotation of the shaft and wheel or gear while permitting the longitudinal movement of the latter upon the former. Thus each drive gear 80 is movable longitudinally with the carriage, and it also is capable of a limited movement with respect thereto. To this end, coiled springs 85 are seated in sockets 86 formed in the hub of the wheel 80 and gear against a plate 87 constituting one of the end plates of a ball bearing, said ball bearing also having another end plate 88 and a ball cage 89 in which an annular series of balls 90 are located. This ball bearing is interposed between the wheel 80 and the adjacent portion of the frame, and the springs 85 bear against one side of the same, as shown in Fig. 10. A tension varying device, in the form of a nut 91, bears against

the opposite side of the ball bearing, and is threaded upon a stem or sleeve 92 that is screwed into the carriage, and constitutes the bearing for the shaft 66. It will be observed that by this arrangement, the springs 85 hold the gears in frictional contact, and the tension of said springs can be varied by screwing the nut 91 in one direction or the other, so that wear may be taken up and the proper frictional engagement at all times maintained without material frictional resistance. For the purpose of urging the carriages and consequently the cutters toward the work holder, bell cranks are employed that are connected to said carriages.

As illustrated in Figs. 4 and 8, rock shafts 93 are employed having inwardly extending arms 94 on which weights 95 are adjustably mounted. The rock shafts also have upstanding arms 96 connected by links 97 with certain of the carriages. These rock shafts also constitute supports for rock sleeves 98 that are journaled thereon, and have inwardly extending arms 99 provided with weights 100, the sleeves being provided with upstanding arms 101 that are connected by links 102 with other of the carriages. Thus the weights serve to urge the carriages and cutters inwardly toward the center of the table, and if desired, springs 103 may also be employed for moving said carriages inwardly. The positions of the cutters and carriages are, however, controlled by the pattern or templet, as is well understood, and for this purpose rollers 104 are journaled on upstanding portions of the carriages, and are located on opposite sides of the work holder, these rollers being disposed at different heights, as illustrated in Fig. 3, in order that they will engage different portions of the pattern.

In order to hold the carriages in their outermost positions with the cutters out of action, locking mechanism is employed, preferably constructed as follows. The guide rods 73 of each pair are provided in one end with a notch, seat or shoulder 105, and a vertically movable latch 106, shown in Fig. 9, has a cross head 107 that engages in both notches or seats. The latch is urged upwardly by a spring 108, the tension of which may be varied by a screw 109 bearing against its lower end. The notches 105 are so located that the cross head 107 will engage therein when the carriages have been forced to their outermost positions by the widest portions of the diamond shaped guides 33. The latches are automatically operated, however, to release the carriages, and to this end, said latches are provided with upwardly extending stems 110 upon which the lower arms 111 of bell cranks 112 bear. These bell cranks are pivoted on the table top, and have upstanding arms 113. A swinging actuating device 114 is pivoted upon the rear side of the reciprocating work carrier frame, and the upstanding arms 113 are located in the path of movement of the lower end of this device, as will be evident by reference to Fig. 2. The device 114 is capable of free swinging movement in one direction, but it is held against swinging movement beyond a vertical position in an opposite direction by a stop pin 115. Thus it will be evident that when the work carrier moves in one direction, the actuating device 114 will swing freely over the upstanding arms 113 of the bell cranks, but when moved in an opposite direction, it will cause said bell cranks to move downwardly, thus successively depressing the latches and releasing the guides 73 therefrom. The guides being released, the carriages will move inwardly under the action of the weights 95 and 100, as will be evident.

With the above description of the structure, the operation is substantially as follows. Properly shaped cutters having been secured to the cutter heads, the desired pattern is placed in position, and the work to be operated upon, is secured in the holder, said holder being located at one end of the machine. The operator then swings the lever 57 to a position to cause the drum 61 to be rotated at the slower or feed speed. The carriages are locked in their outermost positions, but as the work holder progresses through the machine, the actuating device 114 will successively operate the latches to release said carriage. Immediately their weights or the weight and springs together will cause the carriages to move inwardly and guided by the rollers 104 operated against the pattern, the cutters will be permitted to operate upon the work or held out of engagement therewith, accordingly as the different cuts are to be made. Thus in the present embodiment, the machine is designed to operate on wagon hounds and straight and concaved cutters are therefore employed. A pair of straight cutters, rotating in one direction, are allowed to come into operation, as long as they will cut with the grain, but as soon as the curve changes to bring them against the grain, they are moved outwardly by the pattern, and the opposite set of rotating straight cutters moves into action. In like manner, the oppositely rotating concaved cutters are allowed to move into operation as long as they will cut with the grain. It will therefore be seen that the article is completely shaped during its passage through the machine, and that but one machine is required. In actual practice, it has been found entirely practicable to clamp two hounds, and operate upon them successively during the passage of the work holder once through the machine. As said work holder reaches the opposite end

of the machine, the rollers 104, engaging the rear diamond shaped guide are forced outwardly, thus moving said carriages outwardly to a position to permit the latches to reëngage the guide rods 73 and relock said carriages in their outermost positions. When this has occurred, the operator reverses the lever 57, thereby reversing the direction of rotation of the drum 61, and causing the work holder to return at a greater rate of speed. During this return movement, the actuating device 114 passes idly over the arms 113 of the bell cranks 112, and the latches will therefore not be operated. When the front end of the machine is again reached, the lever 57 is thrown into an intermediate position, which stops the carriage, permitting the finished work to be removed and a new piece to be positioned.

From the foregoing, it is thought that the construction, operation, and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction may be restored to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. In a machine of the character set forth, the combination of a table having a longitudinal guideway, a track at one side of the guideway supported on the table, a work carriage mounted for reciprocation on the track and having laterally-extending arms formed with depending extremities, means on the extremities for engaging a pattern, a pattern slidable in the said guideway and engaged by the said means, means carried by the arms for clamping the work on the pattern, and cutting means coacting with the pattern for shaping the work.

2. In a machine of the character set forth, the combination of a work table, a reciprocatory work holder arranged to hold a pattern to slide on the table and to hold the work on the pattern, a cutting means coacting with the pattern for shaping the work, and a device on the holder for moving the cutting means to inoperative position at the end of the cutting stroke of the holder.

3. In a machine of the character set forth, the combination of a support, a reciprocatory work holder, a plurality of carriages movably mounted on the support along the path of movement of the work holder, a cutter on each carriage for engaging the work in the said holder, a rock shaft extending parallel with the carriages, a sleeve supported on and rotatable independently of the rock shaft, independent connections between the carriages and the rock shaft and sleeve, means movable with the work holder for moving the carriages away from the work, and independent devices connected respectively with the sleeve and rock shaft for yieldingly opposing the movement of the carriage away from the work and automatically restoring the carriages to working position at the beginning of the working stroke of the holder.

4. In a machine of the character set forth, the combination of a work table, a longitudinally-movable work holder thereon, a plurality of carriages movable on the support to and from the work and arranged in longitudinal series, a cutter on each carrier, a rock shaft extending parallel with each series of carriages, a sleeve carried by and independently rotatable on the rock shaft, arms on the rock shaft and sleeve, independent weights on the arms, an arm on the sleeve connected with one of the carriages of one series, and an arm on the rock shaft connected with another carriage of the same series.

5. In a machine of the character set forth, the combination with a support, of a movable work holder movable thereon, a plurality of carriages movable toward and from the path of movement of the work holder, cutters journaled on the carriages, a rock shaft, a sleeve journaled on the rock shaft, weighted arms secured to the rock shaft and sleeve, other arms secured to the rock shaft and sleeve, and connections between the latter arms and the carriages.

6. In a machine of the character set forth, the combination of a support, a longitudinally-movable work holder, a plurality of carriages movably mounted on the support at opposite sides of the work holder in longitudinal series, independent cutter shafts on the carriages, means for moving each series of carriages toward the work, a common device on the work holder for moving all the carriages away from the work, and means for reciprocating the work holder, each of the first-mentioned means comprising rotating members supported one on the other and disposed in parallel relation to the line of travel of the work holder, means for separately connecting the members with the carriages of one series, and means connected with the members for yieldingly urging the carriages toward the work.

7. In mechanism of the character set forth, the combination with a longitudinally reciprocating work holder, of a transversely movable carriage, a cutter mounted thereon, means for forcing the cutter into contact with the work during the movement of the work holder in one direction, means for moving the cutter outward away from the path of the work at the completion of the movement of the work holder in said direction and before the work holder starts to

return, means for holding the cutter out of the path of movement of the work holder while the work holder is returning, and means for releasing said cutter and allowing it to be forced inward into the path of movement of the work holder when the work holder has completed its reciprocation.

8. In mechanism of the character set forth, the combination with a longitudinally reciprocating work holder, of a transversely movable carriage, a cutter mounted thereon, means for forcing the cutter into the path of movement of the work holder and into contact with the work during the movement of the work holder in one direction, a device forming a pattern holder and constituting means for moving the cutter outward away from the path of the work holder upon the completion of the movement of the work holder in said direction, means connected with the cutter and riding on the pattern for shaping the work, means for holding the cutter out of the path of movement of the work holder while the work is returning, and means for releasing said cutter and allowing it to be forced inward into contact with the work when the work holder has completed its reciprocation and is about to start to move in said first-named direction.

9. In a machine of the character set forth, the combination with a table, of a longitudinally reciprocatory work and pattern holder mounted on the table, a carriage movable transversely toward and from the path of movement of the work holder, a cutter mounted on the carriage, a pattern engaging means associated with the cutter, a transversely extending reciprocatory guide attached to the carriage and having a notch, means disposed to strike the pattern engaging means for moving the carriage and cutter laterally beyond the path of the work holder, and a spring latch mounted on the table and movable into the notch in said guide to hold the carriage in its outward position and maintain the cutter out of engagement with the work.

10. In a machine of the character set forth, the combination with a reciprocating work holder, of a pair of opposed carriages carrying cutters, said cutters being arranged on both sides of the path of movement of the work holder, said carriages and cutters being movable in relatively opposite directions toward and from the path of movement of the work holder, and a single locking device common to said carriages holding the same in their outward position and out of engagement with the work.

11. In a machine of the character set forth, the combination with a reciprocating work holder, of pairs of carriages, the carriages of each pair being located opposite to each other and on opposite sides of and movable toward and from the path of movement of the work holder, cutters mounted on the carriages and movable with them into and out of coaction with the work holder, means for forcing the cutters into engagement with the work while the work holder is moving in one direction, means for moving the carriages of each pair of cutters in opposite directions to carry the cutters out of engagement with the work before the work holder moves in its return direction, and a single locking device for maintaining both carriages with the cutters in their outward position.

12. In a machine of the character set forth, the combination with a support, of a work holder movably mounted on the support for longitudinal reciprocation, guides slidably mounted on the support transversely of the path of movement of the work holder, carriages fixed to the guides and movable therewith said carriages operating on opposite sides of the work holder, cutters mounted on the carriages, means for moving the cutters and carriages in opposite directions away from the work and out of the path of movement of the work holder, and a single locking device engaging both guides when the carriages have been moved in their outermost position for maintaining the cutters out of coaction with the work.

13. In a machine of the character set forth, the combination with a table, of a reciprocatory work holder mounted thereon, carriages located on opposite sides of the path of movement of the work holder and movable toward and from said path of movement, reciprocatory guides for the carriages, said guides having portions located at one side of the table and provided with seats, and a latch located on the table and having a cross head that engages in both seats to prevent movement of the carriages.

14. In a machine of the character set forth, the combination of a work holder movable rectilinearly in opposite directions, a carriage movable rectilinearly toward and from the path of movement of the work holder, a cutter on the carriage, means for urging the carriage toward the work as the work holder moves in one direction, means on the work holder for moving the carriage away from the work, means automatically set when the last-mentioned means ceases operating for releasably holding the carriage away from the work during the return movement of the work holder, and a device on the work holder for actuating the releasing means during the initial part of the working stroke to permit the cutter to be moved into engagement with the work by the first-mentioned means.

15. In a machine of the character set forth, the combination with a table, of a longitudinally reciprocatory work holder

mounted thereon, carriages located on opposite sides of the path of movement of the work holder and reciprocally movable toward and from the same, reciprocatory guide rods secured to the carriages, means for urging the carriages toward the path of movement of the work holder, means for moving the carriages outward to carry the cutters out of the path of movement of the work holder when the work holder has reached the end of its reciprocation in one direction, and a spring latch mounted on the table and having a detachable locking engagement with the guide rods for holding the carriages in their outward position while the work holder is returning.

16. In a machine of the character set forth, the combination with a movable work holder, of a carriage movable toward and from its path of movement, a cutter mounted on the carriage, means for urging the cutter into the path of movement of the work holder while the work holder is moving in one direction, means for locking the carriage in its outward position while the work holder is returning, and automatic means for operating the last mentioned means to release the carriage to carry the cutters into coaction with the work after the work holder has returned to its initial position.

17. In a machine of the character set forth, the combination with a reciprocating work holder, of a carriage transversely movable toward and from its path of movement, a cutter mounted on the carriage, means acting to urge the carriage inward toward said path of movement, means on the work holder acting to move the carriage outward to carry the cutter out of the path of movement of the work holder when the work holder has completed its movement in one direction, means for locking the carriage against inward movement while the work holder is returning, and automatic means operated by the work holder for actuating said locking means to release the carriage upon a movement of the work holder in the first-named direction to carry new work through the cutters.

18. In a machine of the character set forth, the combination with a reciprocatory work holder, of a carriage movable toward and from its path of movement, a cutter mounted on the carriage, means for locking the carriage against movement, and automatic means operated by the work holder when moving in one direction for actuating the locking means to release the carriage, said means being inactive when the work holder moves in an opposite direction, means for urging the carriage toward the path of movement of the work holder when said carriage is released, and means for automatically returning the carriage to a position to be locked after its release.

20. In a machine of the character set forth, the combination with a reciprocating work holder, of a carriage transversely movable toward and from its path of movement, a cutter mounted on the carriage, means for automatically moving the carriage outward from the path of the work holder when the work holder has passed the cutters moving in one direction, a lock for holding the carriage in its outward position and away from the path of the work holder, and an actuating device for the lock mounted on and movable with the work holder and adapted to actuate the lock to release the carriage as the work holder passes the same in its return movement.

21. In a machine of the character set forth, the combination with a reciprocating work holder, of a carriage movable toward and from its path of movement, a cutter mounted on the carriage, means on the work holder for moving said carriage laterally out of the path of movement of the work holder after the passage of the work holder in one direction past said cutter, a lock for holding the carriage and cutter in its outward position away from said path of movement, an actuating device for the lock mounted on and movable with the work holder, and a bell crank having one arm engaged with the lock and the other located in the path of movement of the said actuating device, said bell crank being adapted to be operated by a movement of the actuating device with the work holder in one direction but being inoperative on a movement of the actuating device in the other direction.

22. In a machine of the character set forth, the combination with a reciprocating work holder, of a carriage transversely movable toward and from its path of movement, a cutter mounted on the carriage, a lock for holding the carriage in an outward position with its cutter out of the path of movement of the work holder, a swinging actuating device for the lock mounted on the work holder, means for limiting the swinging movement of the actuating device in one direction to cause it to actuate the lock when the work holder moves in one direction, and means permitting said actuating device to be lifted by and moved past the lock when the work holder moves in an opposite direction.

23. In a machine of the character de-

scribed, the combination with a reciprocatory work holder, of a carriage movable transversely toward and from its path of movement, a cutter mounted on the carriage, means for moving the carriage laterally outward to carry the cutter out of the path of movement of the work holder, a lock automatically engaging to hold the carriage when in its outward position, a bell crank having one arm engaged with the lock, a swinging actuating device mounted on the work holder and movable therewith into engagement with the other arm of the bell crank, and means for permitting the swinging movement of the actuating device when the work holder has moved in its return direction and for limiting the swinging movement of the actuating device when the work holder has moved in the opposite direction.

24. In a machine of the character set forth, the combination with a table, of a reciprocatory work holder mounted on the table, a carriage movable toward and from the path of movement of the work holder, a rotary cutter journaled on the carriage, a reciprocatory guide rod for the carriage having a seat, means on the work holder for moving the carriage outward and its cutter out of the path of movement of said work holder, a spring latch mounted on the table and engaging the seat in the guide rod to hold the carriage in its outward position, means for moving the carriage inward when the rod is released, a bell crank journaled on the table having one arm engaged with the latch and adapted, when moved in one direction, to release said latch, and an actuating arm mounted on the work holder and adapted to engage with the bell crank, said arm, when the holder moves in one direction, passing over the bell crank without actuating the same but when the holder moves in a reverse direction engaging with the bell crank to release the carriage.

25. In a machine of the character set forth, the combination with a reciprocating work holder, of a carriage transversely movable toward and from its path of movement, means for urging the carriage toward said path of movement, means on the rear end of said work holder adapted to move said carriage outward with its cutter out of coaction with the work, a lock for holding the carriage when moved to its outward position, and means carried at the forward end of the work holder for releasing the carriage from said lock to permit it to move inward to carry the cutter into contact with the work.

26. In a machine of the character set forth, the combination with a table, of a reciprocatory work holder mounted thereon, a plurality of carriages movable transversely toward and from the path of movement of the work holder, means for urging the carriages toward said path of movement, means on the rear end of said work holder for moving the carriages outward to carry their cutters out of the path of movement of the work, spring latches acting to hold the carriages when moved to their outward position, bell cranks engaged with the spring latches, and means carried by the forward end of the work holder moving over said bell cranks without operating the same when the work holder is on its return movement but engaging with the bell cranks to release the latches when the work holder moves in the other direction.

27. In a machine of the character set forth, the combination with a movable work holder, of a plurality of carriages movable toward and from its path of movement, means for urging said carriages toward said path of movement, a plurality of independent locks for holding the different carriages away from said path of movement, and automatic means operated by the work holder for successively actuating the locks to successively release the carriages.

28. In a machine of the character set forth, the combination with a table, of a reciprocatory work holder movable thereon, a plurality of sets of oppositely disposed reciprocatory carriages coacting with the work holder, cutters journaled on the carriages, a single lock for holding each set of carriages against movement, a bell crank coacting with each lock to operate the same, and an actuating device mounted on the work holder and successively operating the bell cranks.

29. In a machine of the character set forth, the combination with a table, of cutters projecting above the table top and movable toward and from each other transversely of said top, spaced tracks located longitudinally of the table at one side of both cutters, a reciprocatory frame operating on the tracks and having a portion extending over one of the cutters, and work holding means secured to said portion and operating between the cutters, said means including clamping elements located above and below the horizontal paths of the cutters.

30. In a machine of the character set forth, the combination with a table, of cutters projecting above the table top and movable toward and from each other transversely of said top, upper and lower tracks located longitudinally of the table at one side of both cutters, a reciprocatory frame having wheels operating on the tracks and having a portion extending over one of the cutters, pattern holding devices suspended from such portion and operating between the cutters below their horizontal paths of movement, and work holding clamps adjustably mounted on said portion above the pattern holding devices.

31. In a machine of the character set forth, the combination with a support, of a

reciprocatory work holder mounted on the support, a cutter mounted on the support and movable into and out of coaction with the work carried by the work holder, and means operated by the work holder on its movement in one direction for locking the cutter out of engagement with the work and for releasing the cutter to permit it to operate on the work when the work holder moves in the other direction.

32. In a machine of the character set forth, the combination with a support, of a reciprocatory work holder mounted on the support, a cutter mounted on the support and movable into and out of engagement with the work carried by the work holder, a lock for holding the cutter out of engagement with the work, means for operating the lock and releasing the cutter to permit said cutter to operate on the work when the work holder moves in one direction, and means for moving the cutter to a position to be held by the lock on the movement of the work holder in an opposite direction.

33. In a machine of the character set forth, the combination with a table, of a reciprocatory work holder mounted on the table, mechanism for automatically reciprocating the work holder, a cutter mounted on the table and movable into and out of engagement with the work carried by the work holder, a lock for holding the cutter out of engagement with the work, means carried by the work holder for operating the lock and releasing the cutter to permit said cutter to operate on the work when the work holder moves in one direction, and means carried by the work holder for moving the cutter to a position to be held by the lock on the movement of the work holder in an opposite direction.

34. In a machine of the character set forth, the combination with a table, of a plurality of cutters movably mounted thereon, a work holder having a path of movement between the cutters, means for moving the work holder in opposite directions, locks for holding the cutters out of engagement with the work carried by the work holder, a device carried by the work holder for successively operating the locks to release the cutters and permit their movement into engagement with the work, and another device carried by the work holder for successively moving the cutters to positions to be held by the locks.

35. In a machine of the character set forth, the combination with a support, of a reciprocatory work holding frame mounted thereon and including a clamping bar, pattern holding devices and work holding clamps adjustably secured to the bar, and cutters mounted on the support and operating on the work held by said clamps.

36. In a machine of the character set forth, the combination with a support, of an elevated reciprocatory work holding frame mounted thereon and including a clamping bar having a longitudinal T-shaped slot therein, pattern holding devices and work holding clamps adjustably associated with the bar, a clamping bolt for said devices and clamps, having heads located in the slot, and rotary cutters mounted on the support and operating on the work held by the clamps.

37. In a machine of the character set forth, the combination with a table, of an elevated work holding frame movably mounted thereon, work holding clamps adjustably associated with the frame and comprising head blocks, clamping bolts adjustably securing the head blocks to the frame, a work engaging pin slidable in each head, an eccentric for operating the pin, and cutters mounted on the table and operating on the work held by the clamps.

38. In a machine of the character set forth, the combination with a table, of cutters mounted thereon, and a work and pattern holder movably mounted on the table and comprising a cutter guide having a tapered outer end and a work engaging rear end.

39. In a machine of the character set forth, the combination with a table, of cutters mounted thereon, and a work and pattern holder movably mounted on the table and comprising a cutter guide having a tapered outer end and a work receiving socket in its rear end.

40. In a machine of the character set forth, the combination with a table, of cutters mounted thereon, and a work and pattern holder movably mounted on the table and comprising spaced cutter guides having tapered outer ends and work receiving sockets in their inner ends.

41. In a machine of the character set forth, the combination with a table, of rotary cutters mounted thereon, a reciprocatory frame overhanging the table, and depending work and pattern holders adjustably secured to the frame and comprising substantially diamond shaped guides having work receiving sockets in their ends.

42. In a machine of the character set forth, the combination with a table having a central groove and transverse openings on opposite sides of the groove, of carriages movably mounted beneath the table, rotary cutters journaled on the carriages and projecting through the openings, upper and lower tracks mounted on the table, a frame overhanging the table and having rollers journaled on the tracks, said frame including a clamping bar located above the groove, guides adjustably suspended from the bar and having ribs operating in the groove, and work clamps adjustably suspended from the bar.

43. In a machine of the character set forth,

the combination with a table, of upper and lower tracks located above the table, a reciprocatory work carrier operating on the tracks and overhanging the table, transversely disposed drive shafts journaled beneath the table top, carriages operating longitudinally of said shafts and having guides projecting from the sides of the table, rotary cutters journaled on the carriages and projecting above the table top, friction gears connecting the driving shafts and cutters, latches movably mounted on the table and engaging the carriage guides, means for effecting the movement of the carriages toward the path of movement of the work holder when released from the latches, and means operated by the carriage for actuating the latches.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

FREDERICK D. GREEN.

Witnesses:
R. M. MARTIN,
C. E. JORDAN.