No. 701,963. Patented June 10, 1902.

E. H. TAYLOR.

MACHINE FOR MITERING AND CORNERING BOX BLANKS.

(Application filed Jan. 10, 1900.)

(No Model.)

5 Sheets—Sheet 1.

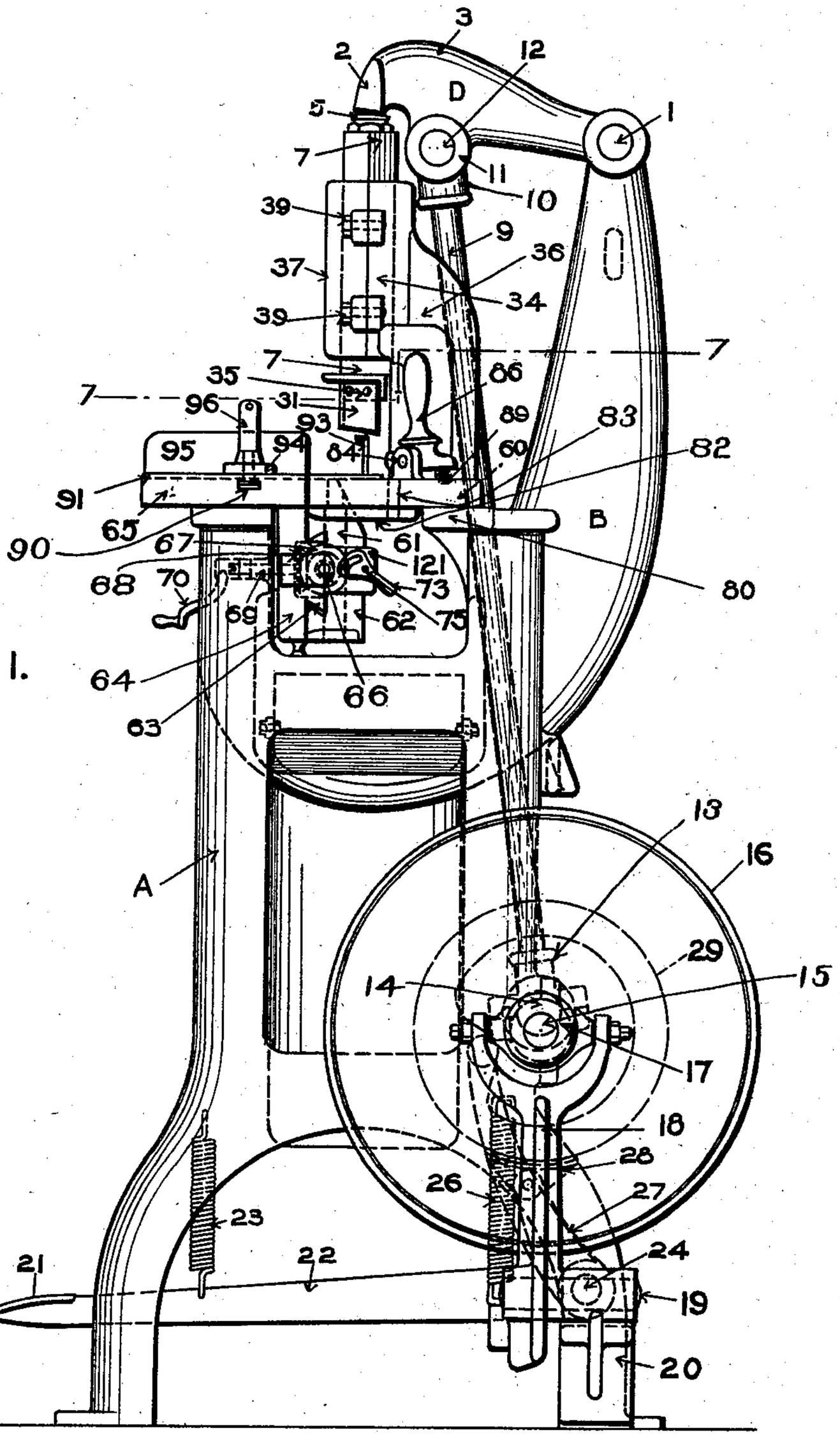

Fig. 1.

Witnesses

Oscar F. Hill

Alice H. Morrison

Inventor

Eugene H. Taylor

By his Attorneys

Macleod Calver & Randall

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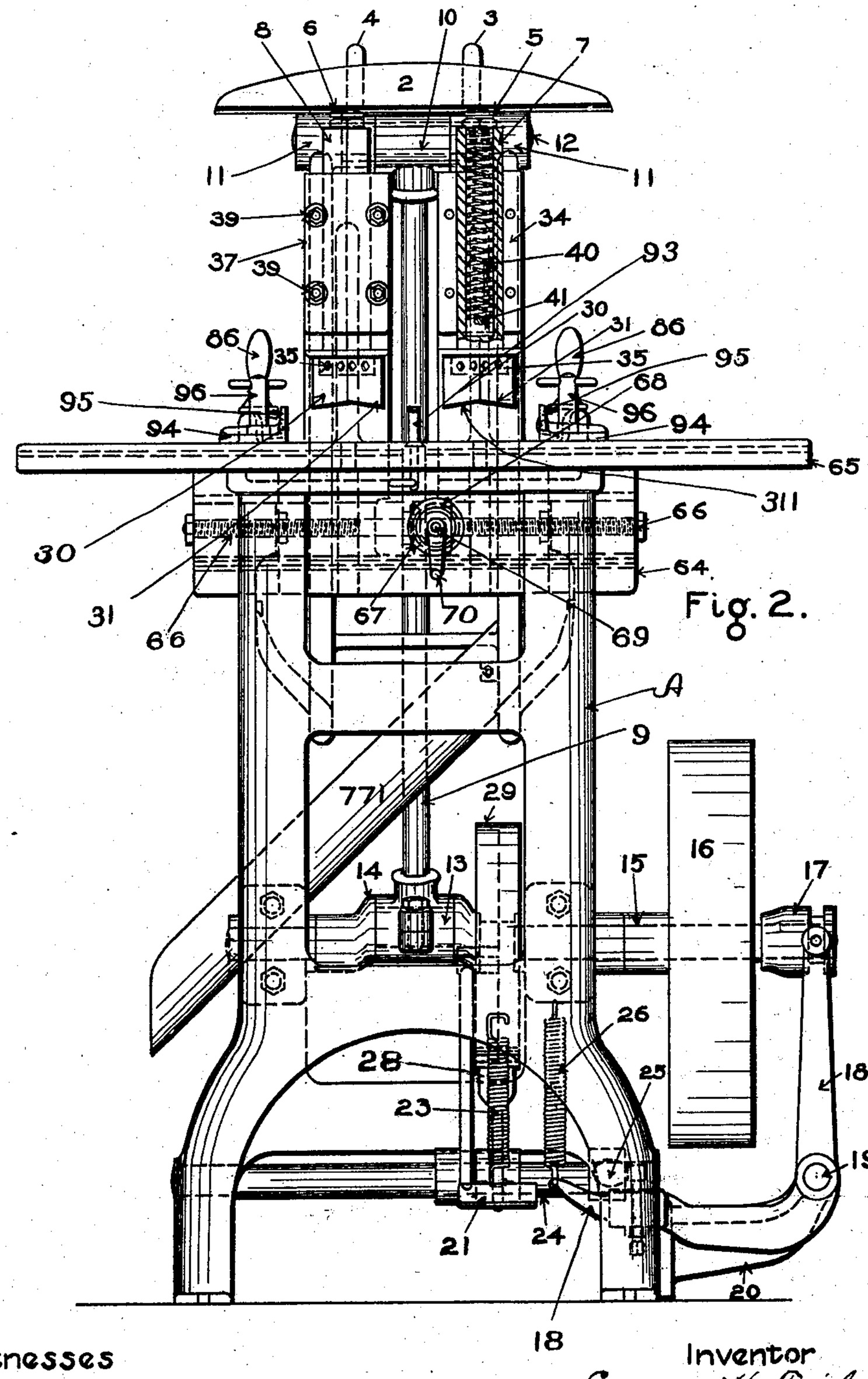

Fig. 2.

Witnesses

Oscar F. Hill

Alice H. Morrison

Inventor

Eugene H. Taylor

By his Attorneys

Macleod Calver & Randall

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(No Model.) 5 Sheets—Sheet 3.

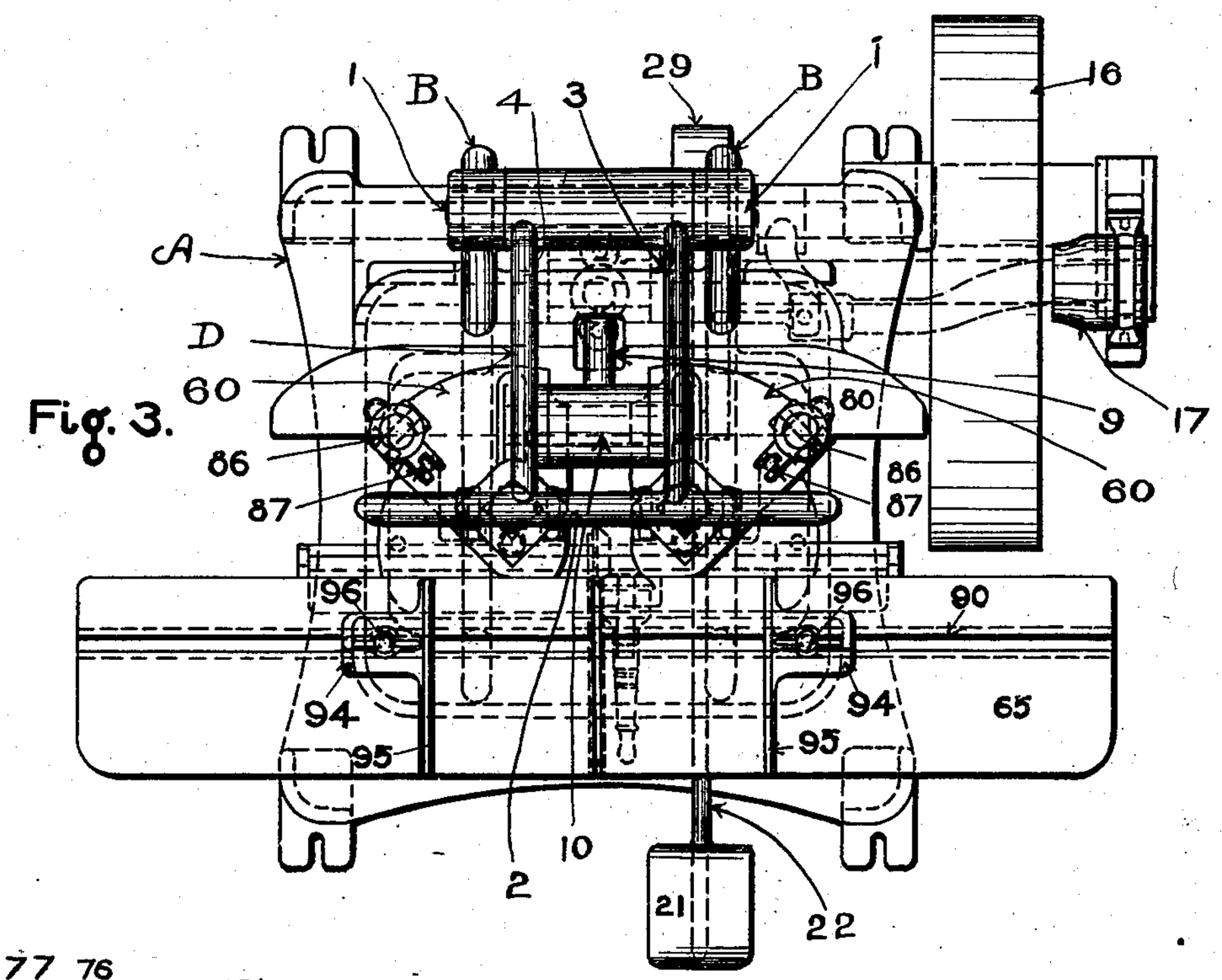

Fig. 3.

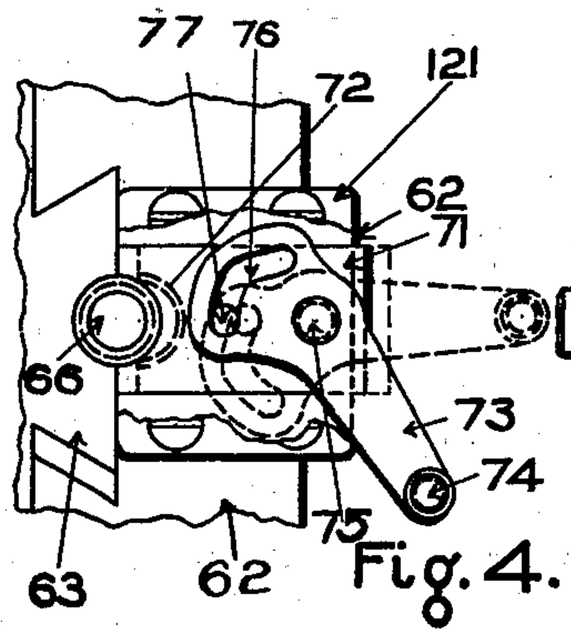

Fig. 4.

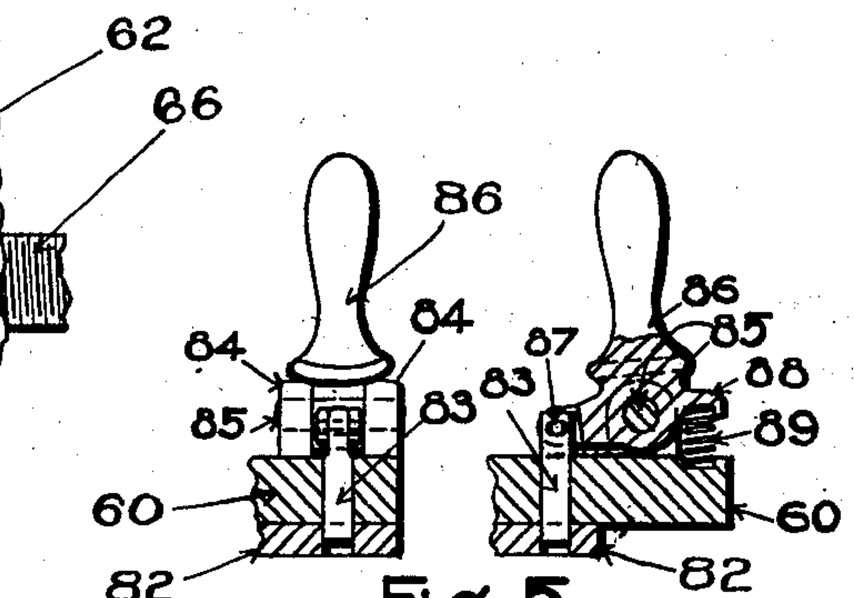

Fig. 5.

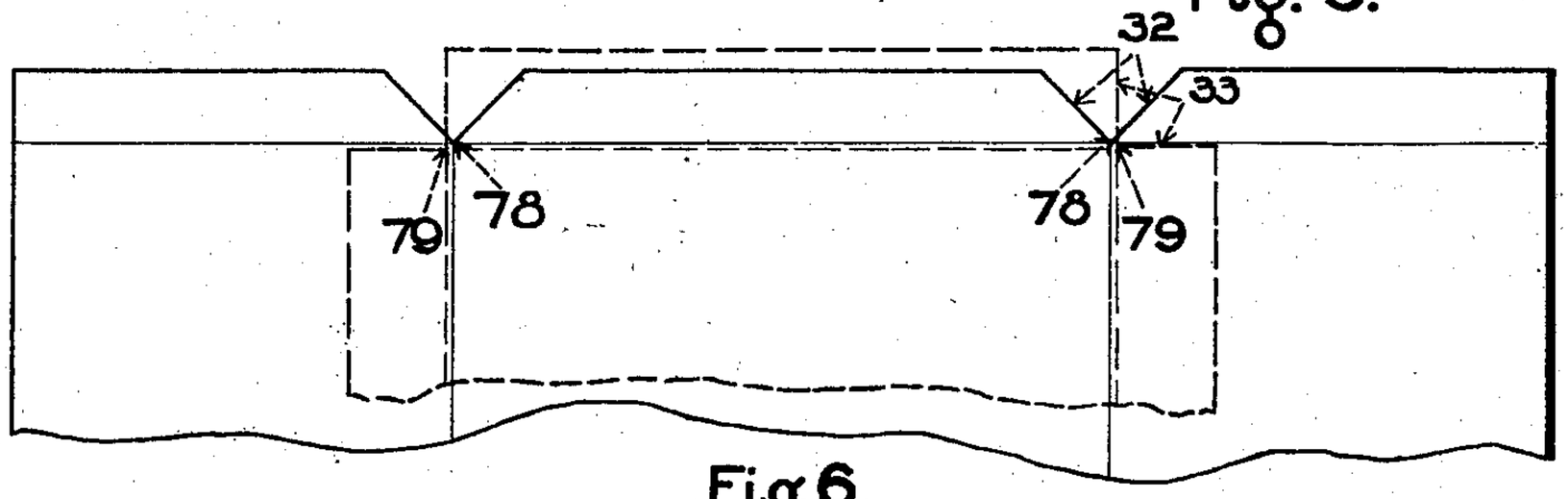

Fig. 6.

Witnesses
Oscar F. Hill
Alice H. Morrison

Inventor
Eugene H. Taylor
By his Attorneys
Macleod Calver & Randall

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(No Model.) 5 Sheets—Sheet 4.

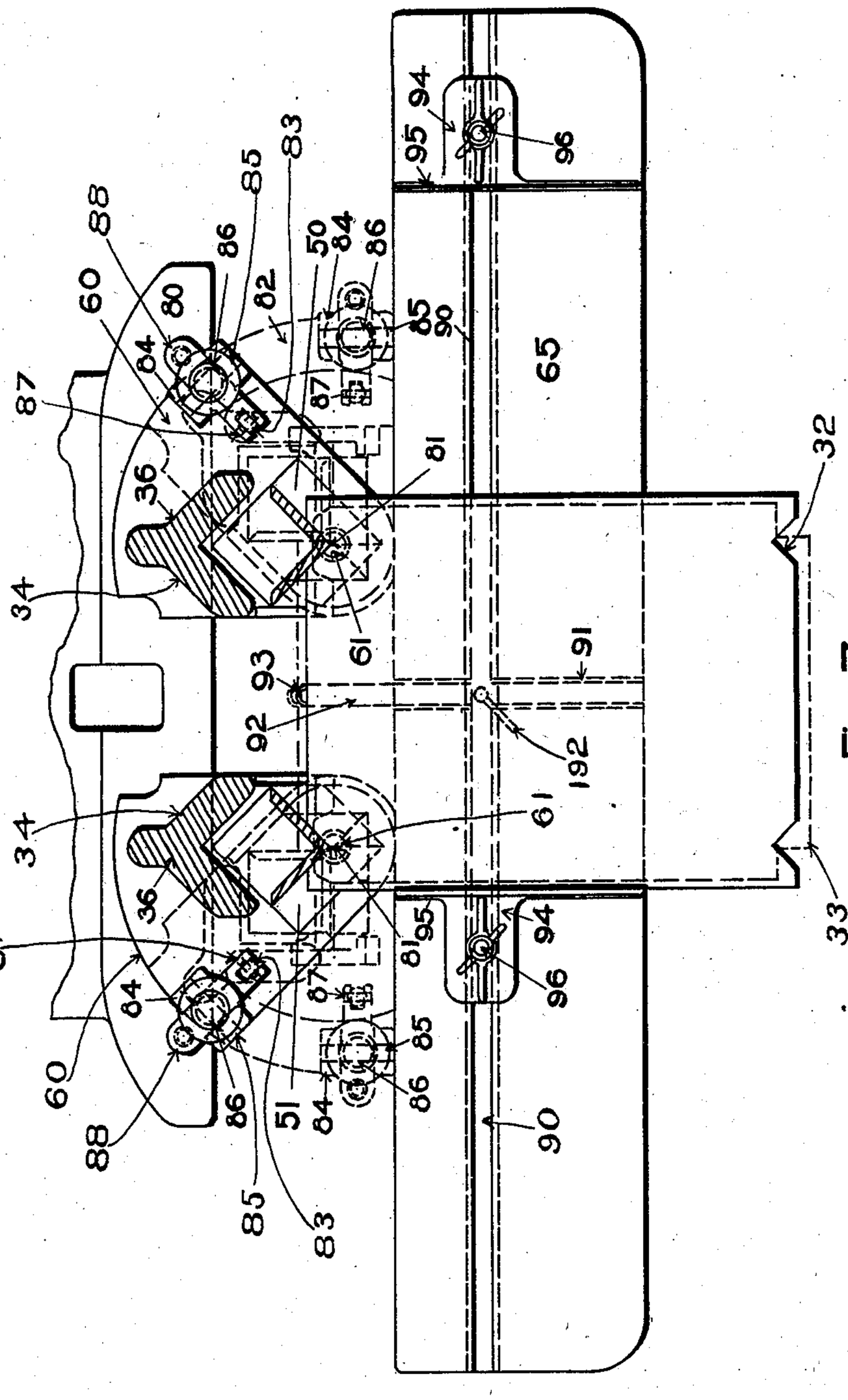

Fig. 7.

Witnesses

Oscar F. Hall.

Alice H. Morrison

Inventor

Eugene H. Taylor

By his Attorneys

Macleod Calver & Randall

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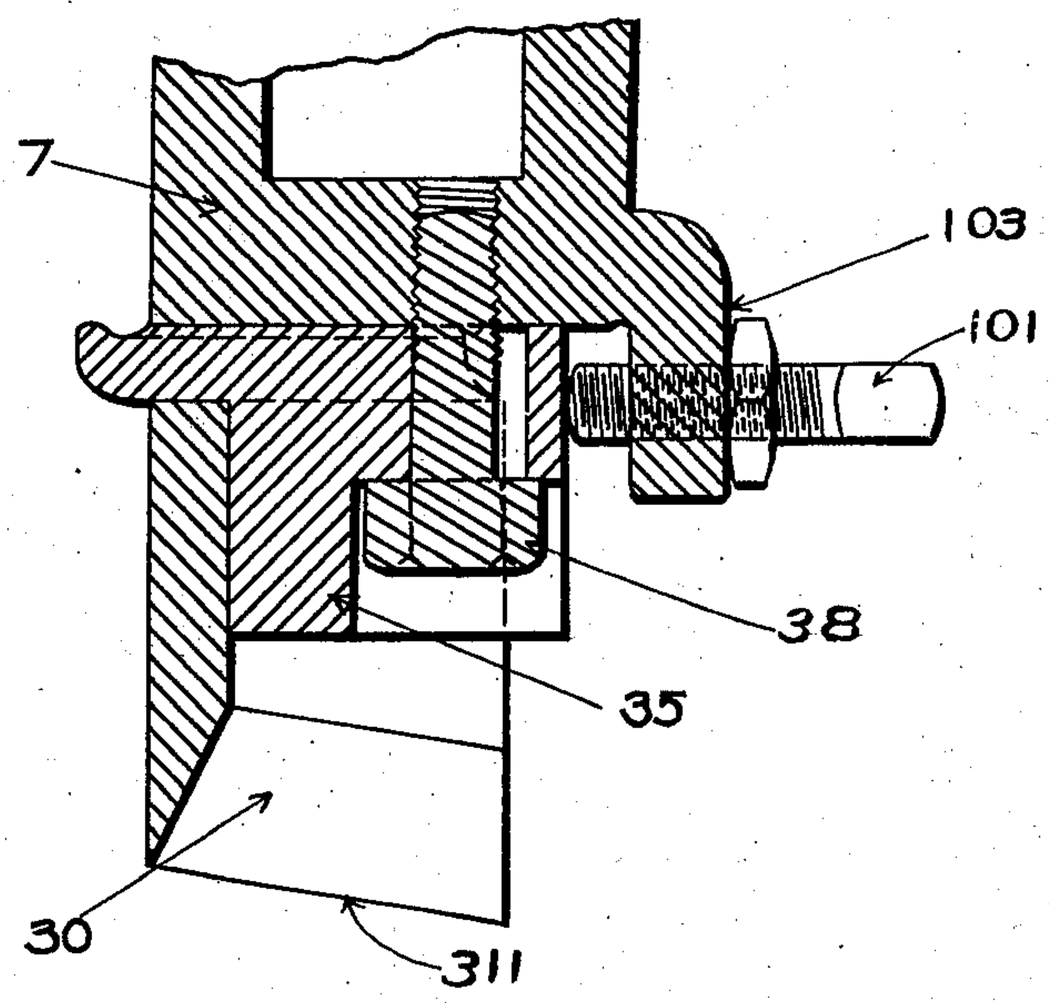

Fig. 9.

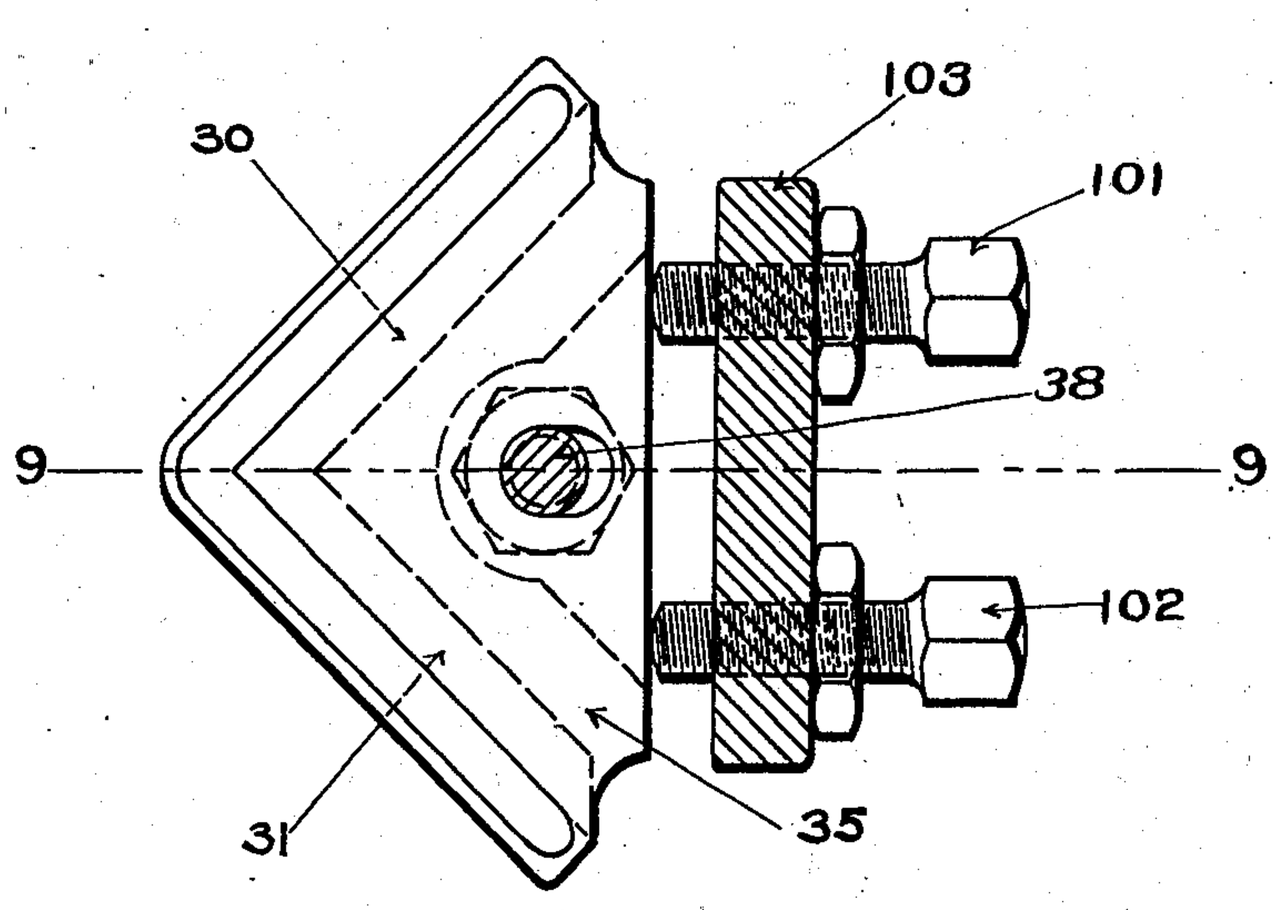

Fig. 8.

Witnesses
Oscar F. Hill
Alice H. Morrison

Inventor
Eugene H. Taylor,
By his Attorneys
Macleod Calver & Randall

UNITED STATES PATENT OFFICE.

EUGENE H. TAYLOR, OF LYNN, MASSACHUSETTS.

MACHINE FOR MITERING AND CORNERING BOX-BLANKS.

SPECIFICATION forming part of Letters Patent No. 701,963, dated June 10, 1902.

Application filed January 10, 1900. Serial No. 937. (No model.)

To all whom it may concern:

Be it known that I, EUGENE H. TAYLOR, a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have invented a certain new and useful Improvement in Machines for Mitering and Cornering Box-Blanks, of which the following is a specification, reference being had therein to the accompanying drawings.

In the manufacture of paper boxes a sheet of strawboard or other paper material is first cut to the required size and then scored along the lines on which it is to be folded or bent. After these operations are performed it is "mitered," if it be a body-blank, or "cornered," if a cover-blank—that is to say, at the points which are to form the corners of the box-body or box-cover a small piece of the board is cut out to permit the proper folding or bending of the blank to shape.

My invention has for its object to provide a machine for thus mitering and cornering box-blanks which shall be accurate and efficient in operation, easily operated, capable of speedy and accurate adjustment, and which may be quickly changed from the position of adjustment necessary in mitering box-bodies to that necessary in cornering box-covers, or vice versa.

In the accompanying drawings I have shown the best embodiment of my invention now known to me, and the same is fully set forth in the following description.

The novel features of my invention are pointed out and clearly defined in the claims at the close of this specification.

Having reference to the drawings, Figure 1 is a side elevation of a machine embodying my invention. Fig. 2 is front elevation thereof, some of the parts being removed to more clearly show the construction. Fig. 3 is a plan view thereof. Fig. 4 is an end and side elevation of the mechanism by means of which the sliding carriage which carries the cutters at each side of the machine may be thrown into or out of engagement with its operating-screw. Fig. 5 is a front and side elevation, the latter being partly in section, of a locking-pin and its operating-handle hereinafter referred to. Fig. 6 is a plan view of one end of a box-body blank which has been mitered, showing also in dotted lines a similar view of a box-cover blank which has been cornered. Fig. 7 is a plan view, partly in section, looking down from the line 7 7, Fig. 1, the rear portion of the machine being broken away. Fig. 8 is a plan view of the cutter-block and showing also the adjusting-screws by means of which the upper cutters are adjusted relatively to the lower cutters. Fig. 9 is a vertical central section on line 9 9 of Fig. 8, showing the cutter-block and its securing and adjusting screws, as also the lower end of the cutter-bar.

A designates the frame of the machine. At the rear upper portion of the frame are two upwardly-projecting portions B, to the upper ends of which is pivoted at 1 the presser-frame D. The presser-frame D comprises a cross-head 2 and two rearwardly-projecting arms 3 and 4, the rear ends of which are, as above stated, pivoted, respectively, to the upper ends of the two upwardly-projecting frame portions B. The lower face of the cross-head 2 bears upon the tops of the adjustable screw-plugs 5 and 6, which are set in the upper ends of the vertically-reciprocating cutter-bars 7 and 8, respectively. By turning the said plugs 5 and 6 the path of movement of the upper cutters may be varied. The cutters are forced through the strawboard in the operation of mitering or cornering a blank by means of the downward pressure exerted by the cross-head 2 as the frame D swings downwardly on the pivots 1. The said frame D is reciprocated by means of a connecting-rod 9, the upper end of which is secured to the boss or bearing 10, which is pivoted between lugs or projections 11, which are on the arms 3 and 4, by means of the pin 12. (See Figs. 1 and 2.) The lower end of the connecting-rod 9 is provided with a similar boss 13, which is journaled on the crank 14 of the main shaft 15. The shaft 15 is journaled in suitable bearings in the lower portion of the frame, at the rear thereof, as will be clear from the drawings.

16 is a belt-pulley by means of which the shaft may be driven.

17 is a clutch member of usual construction by means of which the pulley 16 may be made fast on the shaft when it is desired to operate the machine.

18 is a shipper-lever which is pivoted at 19

to an arm 20, secured to the frame of the machine. The shipper 18 is operated by means of a treadle 21 and treadle-lever 22, the said treadle 21 being located in convenient proximity to the foot of the operator. A spring 23 is provided for raising the treadle-lever when the foot of the operator is removed from the treadle. The treadle-lever is fast to a rock-shaft 24, journaled in the frame-supports at the lower rear portion of the machine. An arm 25 on the rock-shaft 24 engages the shipper-lever 18, so that when the treadle is depressed the shipper is moved, throwing the clutch mechanism into engagement and starting the machine. The reverse movement of the shipper-lever is occasioned by the spring 26, which is fast at its upper end to a projection on the inside of the frame and at its lower end to the end of the shipper-lever. An arm 27 on the rock-shaft 24 is provided at its upper end with a brake-shoe 28, which bears against the periphery of the wheel 29, which is mounted on the main shaft 15 inside the frame, as shown, Fig. 2. The depression of the treadle 21 rocks the shaft 24, swinging the arm 27 downwardly and freeing the brake-shoe 28 from contact with the periphery of the wheel 29, while the reverse movement of the treadle applies the brake to the periphery of the said wheel. By this means when the clutch mechanism is unshipped the brake 28 is applied and the machine stopped.

The treadle, brake, and clutch mechanism above described is of well-known construction. The precise form thereof is not essential to my invention. Many well-known forms may be employed, although I prefer that which is shown herewith.

The cutting mechanism proper is in duplicate and embraces a pair of vertically-movable cutters 30 and 31 and a pair of coöperating cutters 50 and 51. (See Fig. 7.) These latter are located below the movable cutters and are stationary when the machine is in operation, but are movable horizontally with the upper or vertically-movable cutters to permit the machine to be changed from mitering to cornering. As the cutting mechanism on one side of the machine is the counterpart of that on the opposite side, I will confine my description to one cutting mechanism embracing a pair of cutters consisting of an upper or movable cutter and a lower or stationary cutter. The movable cutter 30 comprises two blades, which are placed at right angles to each other to make a right-angled cut, such as is required in mitering or cornering box-blanks. A mitering cut is shown by the full lines 32 and a cornering cut is shown by the dotted lines 33, Fig. 6. The blades of the cutter 30 are formed with slightly beveled or inclined edges, as shown at 311, Fig. 2, to insure a shearing cut and are secured by means of bolts to a block or form 35. The block 35 is fitted and secured by means of a screw-bolt 38 to the lower end of the cutter-bar 7, said bolt 38 passing through a slot in the said block 35. By this arrangement the cutter may be readily removed from the bar 7 by removing the bolt 38 without interfering in any way with the adjustment of the blades of the cutter relatively to each other or with the securing-bolts by which said blades are secured to the block 35, and the cutters may also thereby be adjusted relatively to the cutting edges of the lower cutter to compensate for wear. This latter adjustment is effected by two screws 101 102, which are set in a downwardly-projecting portion 103 of the cutter-bar and bear against the rear edge of the cutter-block 35. (See Figs. 8 and 9.) The cutter-bar 7 is preferably square in cross-section and is hollow to receive the spiral spring 40. The bar is mounted in a support 34, having a V-shaped guideway in the face thereof of sufficient depth to receive one half of the bar while the other half is received in a V-shaped groove formed in a cap 37, which forms the front of the guideway and is secured to the part 34 by means of screw-bolts 39, which pass through the cap 37 at each side of the cutter-bar 7, as will be clear from Figs. 1 and 2. The upper end of the spring 40 inside the cutter-bar is in contact with the inner end of the screw-plug 5, and the lower end of said spring rests upon a screw-bolt 41, which passes through the cap 37, through a vertical slot in the front wall of the cutter-bar 7, across the interior space of the cutter-bar below the spring 40, through another vertical slot on the opposite wall of the cutter-bar, and into a threaded hole in the face of the guideway in the support 34. As the cutter is forced downwardly by the cross-head 2 the spring 40 is compressed, and as the cross-head 2 rises the cutter-bar is forced upwardly by the spring 40, the screw-plug 5 at the upper end of the cutter being always in contact with the cross-head 2. The support 34 is provided with a stem or shank portion 36, preferably of the shape shown in cross-section, Fig. 7, to give increased strength and firmness, which is secured to and is supported by a sector-shaped table 60. The said table is secured by means of a pivot 61 to a carriage 62, which latter is dovetailed, as shown at 63, to the rear face of the downwardly-projecting portion 64 of the table 65. The carriage 62 is moved horizontally on the dovetail 63 by means of a right and left hand screw 66, (see Figs. 1, 2, and 4,) which is placed in a hole or opening formed partly in the rear face of the dovetail and partly in the adjacent face of the carriage. Midway of the length of said screw a beveled pinion 67 is secured which is in mesh with a beveled gear 68 on the short shaft 69, which is journaled in the front frame of the machine at right angles to the said screw 66. (See Figs. 1 and 2.) On the end of the shaft 69 a crank 70 is secured by means of which the shaft 69 and the right and left hand screw 66 may be rotated. At the outer end of the carriage 62

(see Fig. 4) I provide a slide-plate 71, at one end of which is a half-circular threaded recess 72, corresponding in size and thread with the diameter and thread of the right and left hand screw 66. If the threaded recess 72 is in engagement with the screw 66 when the latter is revolving, the carriage 62 will be caused to slide on the dovetail 63, as will be clear. If for any reason it is desired to disconnect the carriage, so that it will not move on the dovetail while the shaft 66 is rotating, the slide-plate 71 may be moved rearwardly, disengaging the recess 72 from the screw 66. For the purpose of moving the slide-plate 71 I provide a lever 73, having a handle 74, by means of which the lever may be moved. The lever 73 is pivoted at 75 to a stationary plate 121, fastened on carriage 62, and the forward end of the lever 73 has formed therein a cam-slot 76 of the shape shown, Fig. 4. A pin 77, fast to the slide-plate or half-nut 71 in the end of the carriage 62, projects through a horizontal slot in the stationary plate 121 into the cam-slot 76. As the free end of the lever 73 is raised or lowered by means of the handle 74 the slide-plate is moved into or out of engagement with the screw 66. To set the said cutter at a given distance from the center of the machine, it is only necessary, if the slide-plate 71 is in engagement with the screw, to turn the crank 70, thus causing the carriage 62 to slide on the dovetail 63. As the carriage 62 supports the sector-shaped table 60, which carries the entire cutting mechanism of the pair of cutters on that side of the machine, the cutters may be readily adjusted to miter or corner a blank of any given size. As the screw 66 is a right and left hand screw and is in engagement at its opposite end with the carriage which carries the cutting mechanism at that side of the machine, the two sets of cutting mechanism will be moved by rotating the screw 66 away from or toward the center of the machine simultaneously and to exactly the same extent.

The lower or stationary cutter 50 comprises two blades, the cutting edges of which are at right angles to each other and correspond exactly with the upper or movable cutter. These cutter-blades lie horizontally and are securely fastened to the top of the sector-shaped table 60. At the rear of the cutting edges of the said lower or stationary cutter the table 60 is cut away, so that the waste piece cut from the sheet of strawboard will drop through the table 60 into a diagonally-placed chute 771, (see Fig. 2,) which serves to conduct the waste pieces falling from both pairs of cutters into a proper receptacle at one side of the machine.

In the operation of mitering a body-blank a right-angled piece is cut out of the edge of the blank which is to form the box-body, while in the operation of cornering a right-angled piece, which is usually square, is cut out of the corner of the blank which is to form the box-cover. This is clearly shown by the full and dotted lines, Fig. 6, the latter representing the outline of a blank for a box-cover. It will be clear that the same cutters may be employed in the operation of cornering which are employed in mitering, provided they can be moved or swung into the proper position; but it is to be noted that cutters which are set for mitering a box-body for a box of a given size cannot be adjusted to corner a box-blank for a cover to fit that same size of box if the cutters are merely swung through one-eighth of a circle upon a center represented by the corner or angle-point where the two faces of the cutter meet, because the cover requires to be somewhat larger than the box, and the cover-blank must therefore be "cornered" with this fact in view. After the operation of mitering the cutters must not only be swung through an eighth of a circle, but the cutters on one side of the machine must be moved slightly farther away from those on the opposite side. This will be clear upon reference to Fig. 6, in which what I have termed above the "corner" or "vertex" of the cutter when the cutters are adjusted for mitering is shown at 78, while when the cutters are adjusted for cornering this same point must be at 79. In other words, referring to said Fig. 6, the two points designated 79 are enough farther apart to provide for the difference in size required to allow the box-cover to fit over the top of the box. I do not confine myself to the variation mentioned here—that is, the allowance made for a cover in a given machine. In the machine from which the drawings were made I have made an allowance of one-eighth of an inch, which is sufficient for the thickness of boards most commonly used. I can construct a machine, as will be obvious, to make any allowance necessary, it being only necessary to properly locate the point or corner or vertex of the cutters relatively to the center of the vertical pivot on which the cutter supporting the table 60 swings.

My machine is adapted to be quickly and accurately changed by an unskilled person from the mitering position to the cornering position, or vice versa. The means by which this change is effected comprises the mounting of the sector-shaped table 60 so that it may swing on the pivot 61, as above described. The said table 60 carries both members of the cutting mechanism, and while it is chiefly supported by the pivot 61 or the carriage 62, through which the pivot passes, its rear portion overlies the shelf 80, which is on the top of the rear portion of the frame (see Figs. 1, 3, and 7) and may be in contact with said shelf or so closely in contact therewith that when any pressure or weight is applied to the said table the latter will be supported by the said shelf. The cutters are so mounted upon the table 60 that the corner or vertex thereof where the two blades of each pair of cutters join, which is designated 81, (see Fig. 7,) is slightly at the rear of the center of the pivot

61 and slightly to one side thereof. If now the sector-table be swung through one-eighth of a circle—that is, from the full-line position to the dotted-line position, Fig. 7—the said corner or vertex 81 will be moved farther to the right of the center of the pivot 61. In other words, the eccentric location of the said corner where the cutter-blades join relatively to the center of the pivot 61, upon which the table 60 swings, is sufficient to properly locate the cutters in the mitering and cornering positions and to provide for an increase in size of the cover-blank.

Between the shelf 80 at the rear of the machine and the table at the front of the machine, which latter supports the work, I place a supporting-piece 82, which projects between the said shelf and the table and also serves as a support for the rear end of the swinging sector-shaped table 60. Near the rear edge of the table 60 I place a vertical locking-pin 83, (see Fig. 5,) arranged to project through the said table 60 and into the support beneath the table. This pin serves to lock the table either in the mitering or the cornering position, there being two holes, properly placed in the support, with which the said locking-pin 83 may engage. For the purpose of conveniently withdrawing the locking-pin 83 and swinging the table 60 I provide on the table 60 near the said pin projecting lugs 84, between which is pivoted at 85 the lever or handle 86, the upwardly-projecting end of which serves as a handle by which the lever may be grasped. A projection is provided at the rear end of the lever, which projection is slotted to receive the upper end of the locking-pin 83, which latter is pivoted at 87 in said slot. At the opposite side of the pivot 85 of the lever or handle 86 I provide a projection 88 on said lever 86, between which and the surface of the table 60 I place a spring 89, which serves to tilt the lever 86 and press the locking-pin 83 downwardly into engagement with the hole in the support beneath said table. To move the table 60 and change the cutters from their mitering position to their cornering position, or vice versa, it is only necessary to seize the handle of the lever 86, swing it on the pivot 85, withdrawing the locking-pin 83, and then by means of the handle of the lever 86 swinging the sector-shaped table 60 into the desired position.

The work-supporting table is provided with dovetailed or undercut grooves 90 and 91, which cross each other at right angles at the center of the table. In the groove 91 I place a slide-piece 92, the rear end 93 of which is turned upwardly to serve as a stop or gage for the rear edge of the sheet of board which is to be mitered or cornered, as will be clear from Fig. 7. A set-screw 192 underneath the work-support serves to secure the gage or slide-piece 92 in any desired position in the groove 91. In the slot 90 I place at each side of the center of the table a gage of well-known construction, comprising a body portion 94 and a straight upwardly-projecting edge 95, extending across the table. The portion 94 is provided with a screw clamping device 96 of well-known construction, by means of which the gage may be firmly set or secured in the required position.

What I claim is—

1. In a box mitering and cornering machine, in combination, a work-support, an angular cutter transversely adjustable about a center located eccentrically and exteriorly with relation to the vertex of the angle of the cutter, and means to support and actuate the said cutter, substantially as described.

2. In a box mitering and cornering machine, in combination, a work-support, a pair of coacting angular cutters transversely adjustable about a center located eccentrically and exteriorly with relation to the vertex of the angle of the cutter, and means to support and actuate the said cutter, substantially as described.

3. In a box mitering and cornering machine, in combination, a work-support, an angular cutter, and means to adjust the same from its mitering position to its cornering position, and vice versa, and simultaneously therewith shift transversely the vertex of the said cutter to correspond with the required difference in the positions of the respective cuts, substantially as described.

4. In a box mitering and cornering machine, in combination oppositely-disposed angular cutters, each transversely adjustable about a center located eccentrically and exteriorly with relation to the vertex of the angle of such cutter, means to support and actuate the respective cutters, movable projecting handles by which to swing the cutters about their centers of adjustment, and locking devices controlled by the said handles and serving to retain the cutters in the opposite positions of adjustment, substantially as described.

5. In a box mitering and cornering machine, in combination, oppositely-located cutting devices, a support on which the said cutting devices are mounted with capacity for movement toward and from each other, means to actuate the movable cutters, means to effect simultaneous adjustment of the respective cutting devices in opposite directions, and devices whereby the respective cutting devices may be placed at will in and out of operative connection with the said adjusting means, substantially as described.

6. In a box mitering and cornering machine, in combination, oppositely-located cutting devices, a support on which the said cutting devices are mounted with capacity for movement toward and from each other, means to actuate the movable cutters, a right and left screw and means to rotate the same when desired, half-nuts to engage with the respective threads of the said screw, and devices whereby the respective half-nuts may be placed at will in and out of engagement with

the corresponding threads of the said screw, substantially as described.

7. In a box mitering and cornering machine, in combination, a work-support, an angular cutter comprising a stationary and a movable member, supporting means for the latter, comprising a cutter-block to which the blades of the cutter are secured, a cutter-bar, a securing-bolt passing through a slot in said cutter-block, and adjusting-screws engaging the rear face of the said cutter-block to adjust the said block laterally, substantially as described.

8. In a box mitering and cornering machine, in combination, a work-support, an angular cutter comprising a stationary and a movable member, a cutter-bar carrying the movable member, a reciprocating cross-head above the bar, a spring for holding the bar in contact with the cross-head, and an adjustable plug intermediate the bar and the cross-head.

9. In a box mitering and cornering machine, in combination a work-support, a pair of coacting angular cutters, a carriage for each of said cutters, a right and left hand screw for adjusting said carriages laterally toward and from each other, a shaft at right angles to said screw and connected therewith by beveled gears and means to rotate said shaft to adjust the said carriages, substantially as described.

10. In a box mitering and cornering machine, in combination a work-support, an angular cutter, supporting means for said cutter comprising a sliding carriage and actuating means therefor, a table pivotally secured thereon, the pivot of the table being located eccentrically and exteriorly with relation to the vertex of the angle of the cutter, substantially as described.

11. In a box mitering and cornering machine, in combination a work-support, an angular cutter, supporting means therefor, comprising a carriage adjustable relatively to said work-support, a table pivoted on said carriage, a locking-pin on said table, a spring-actuated dog controlling said pin, said dog being provided with a handle whereby to release the locking-pin and move the table, substantially as described.

12. In a box mitering and cornering machine, in combination, a work-support, an angular cutter, means for supporting and actuating the cutter comprising a sliding carriage, an actuating-screw therefor, a sliding half-nut 71 to engage the screw, a pin 77, and cam-lever 73 for throwing the half-nut 71 into or out of engagement with the said actuating-screw, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

EUGENE H. TAYLOR.

Witnesses:

WM. A. MACLEOD,

ALICE H. MORRISON.