(No Model.) 4 Sheets—Sheet 1.

W. HOLLINGSWORTH.

MECHANISM FOR PRINTING UPON WOOD.

No. 553,159. Patented Jan. 14,, 1896.

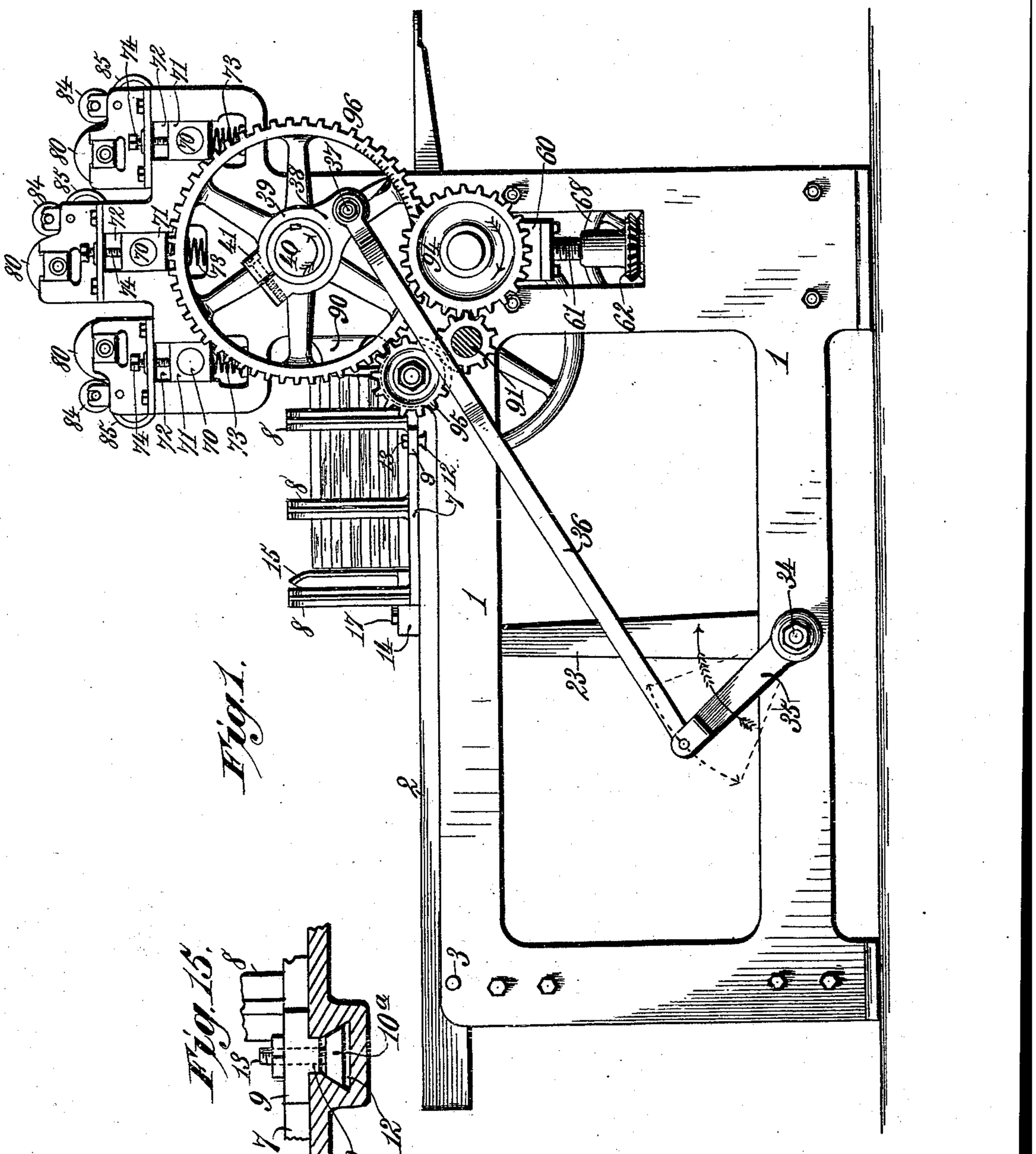


Fig. 1.

Fig. 15.

Witnesses.
Robt Ewett.
G. N. Rea.

Inventor.
William Hollingsworth.
By James L. Norris
Atty.

(No Model.) 4 Sheets—Sheet 2.

W. HOLLINGSWORTH.

MECHANISM FOR PRINTING UPON WOOD.

No. 553,159. Patented Jan. 14, 1896.

Fig. 2.

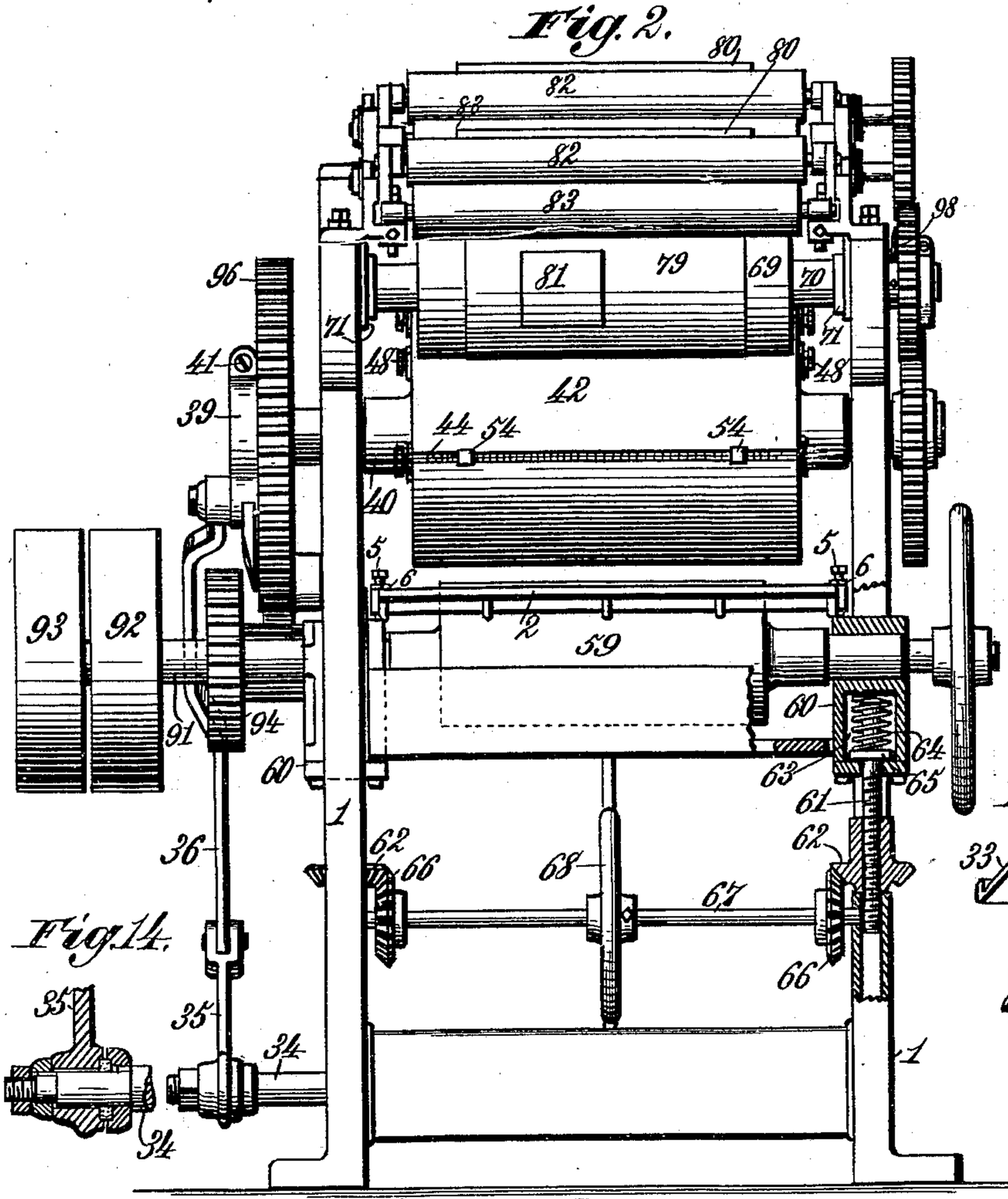


Fig. 8.

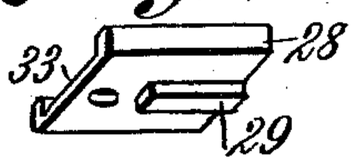


Fig. 6

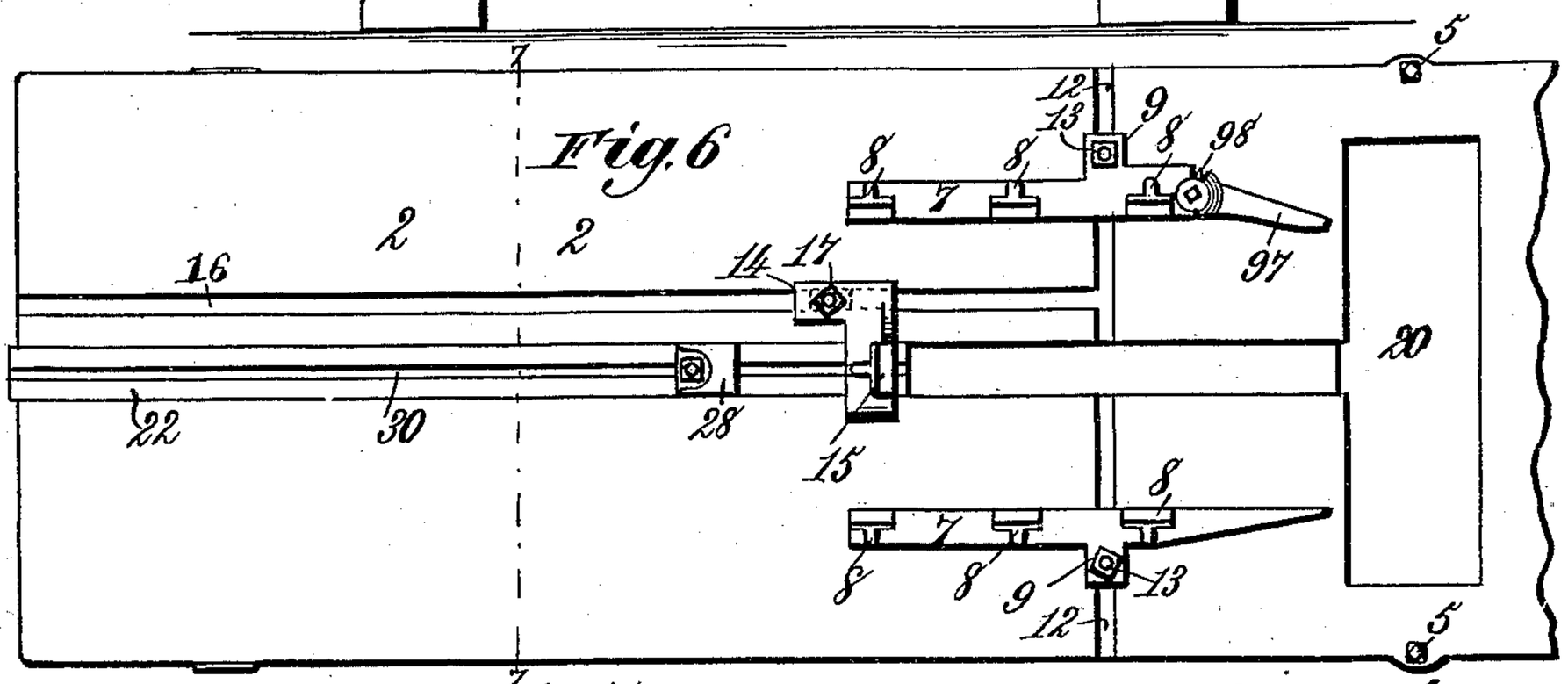
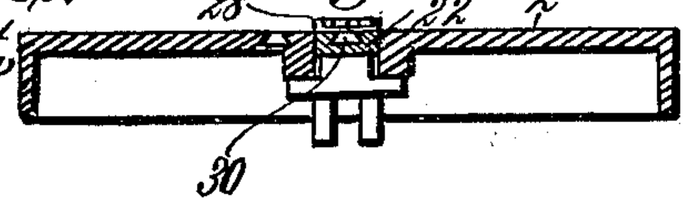


Fig. 7.



Witnesses.
Robt Ewatt,
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(No Model.) 4 Sheets—Sheet 3.

W. HOLLINGSWORTH.

MECHANISM FOR PRINTING UPON WOOD.

No. 553,159. Patented Jan. 14, 1896.

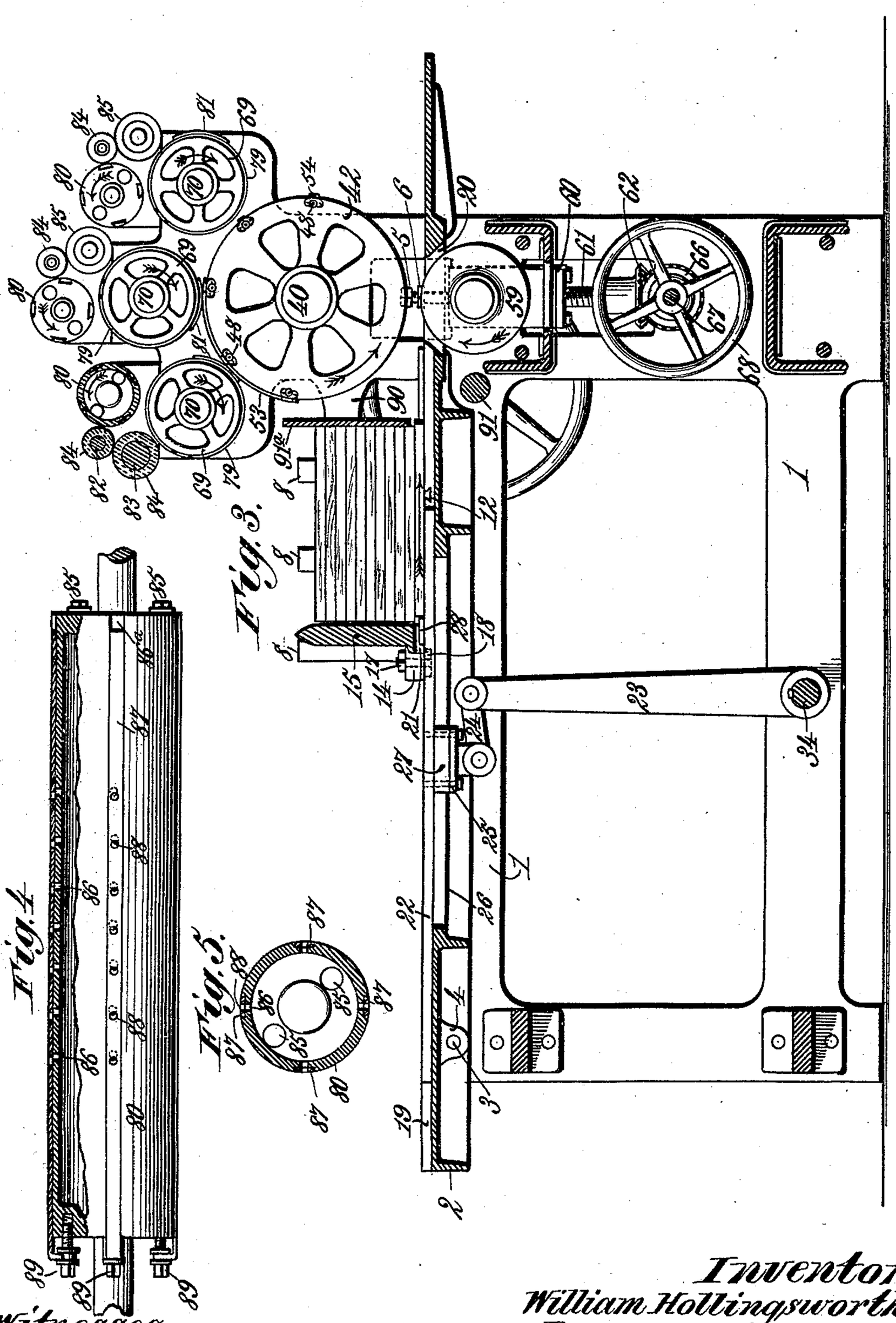

Fig. 1.

Fig. 4.

Fig. 5.

Witnesses.
Robert Ewett.
G. W. Rea

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(No Model.) 4 Sheets—Sheet 4.

W. HOLLINGSWORTH.

MECHANISM FOR PRINTING UPON WOOD.

No. 553,159. Patented Jan. 14, 1896.

Fig. 9.

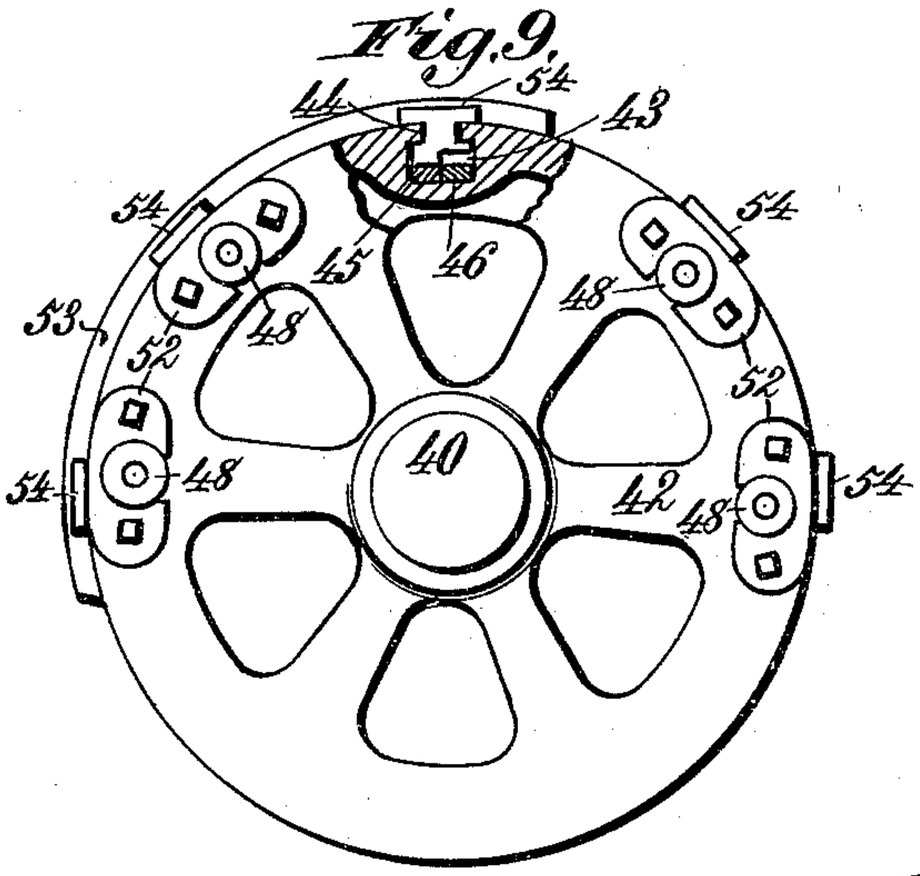


Fig. 11.

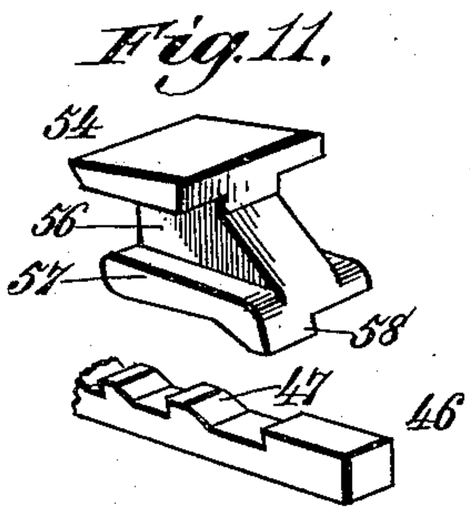


Fig. 10.

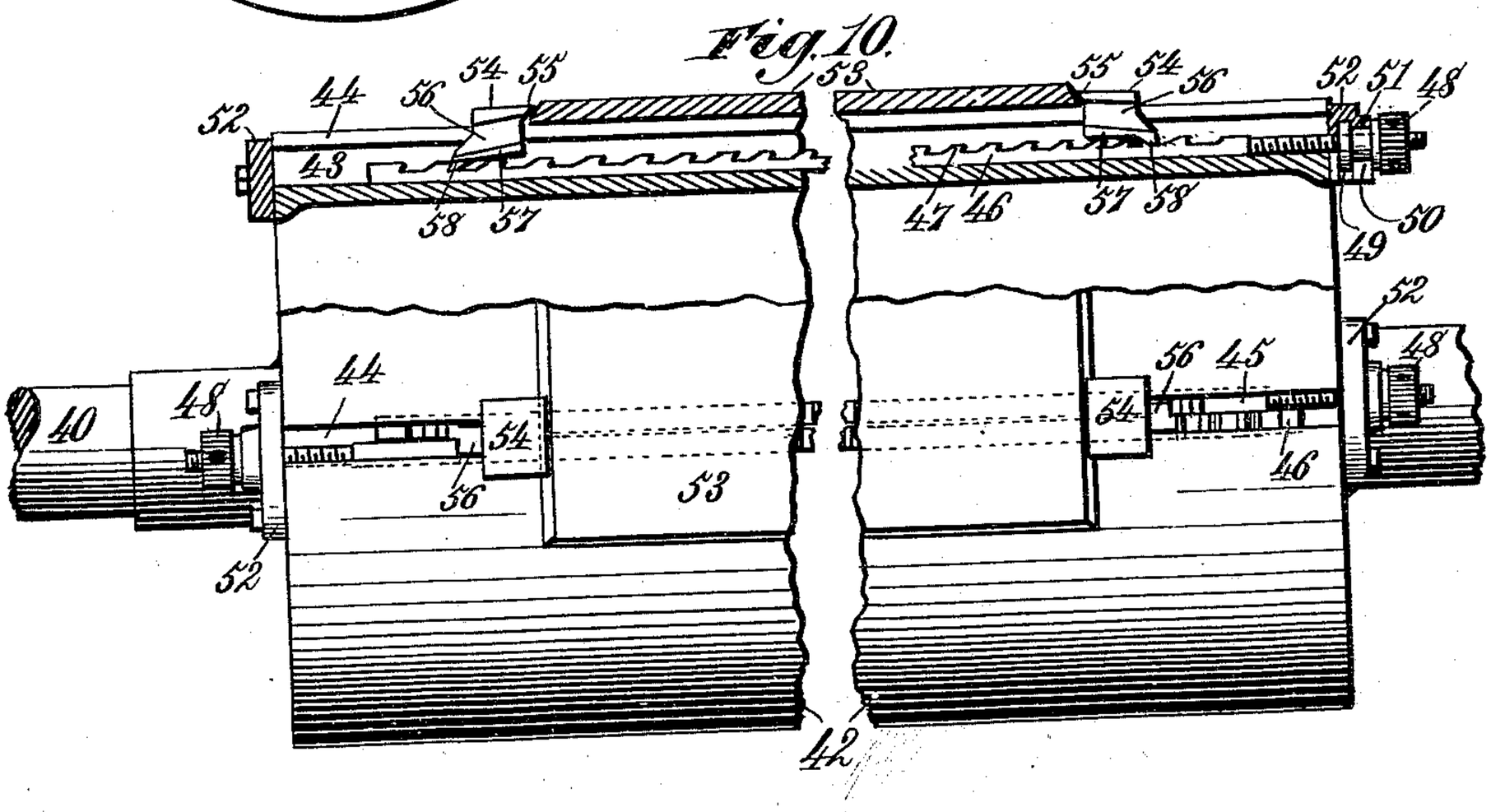


Fig. 12.

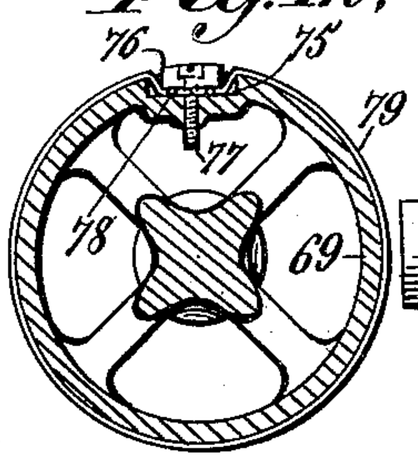
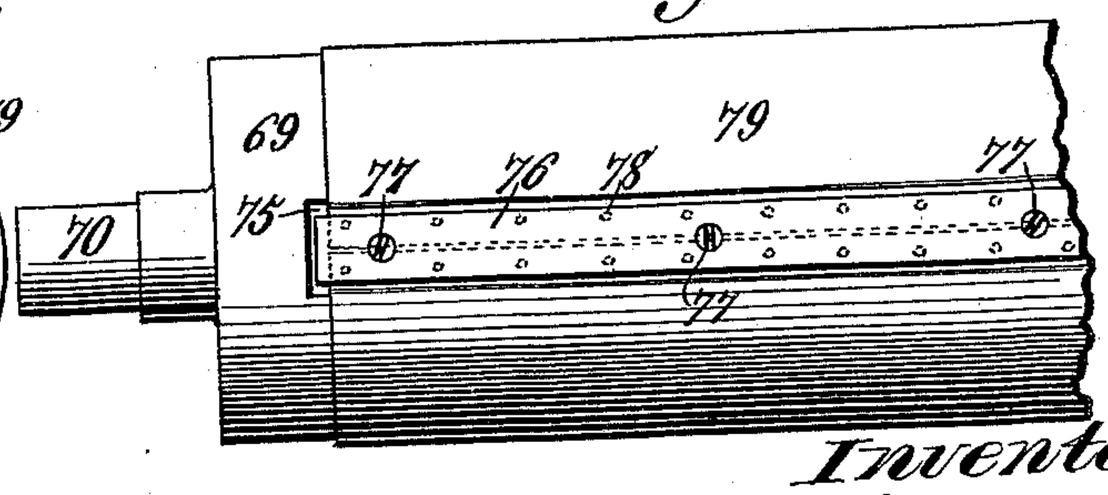


Fig. 13.



Witnesses.
Robt Ewett.
Geo. W. Rea

Inventor.
William Hollingsworth.
By James L. Norris.
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM HOLLINGSWORTH, OF BALTIMORE, MARYLAND.

MECHANISM FOR PRINTING UPON WOOD.

SPECIFICATION forming part of Letters Patent No. 553,159, dated January 14, 1896.

Application filed October 9, 1894. Serial No. 525,424. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HOLLINGSWORTH, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented new and useful Improvements in Mechanism for Printing upon Wood, of which the following is a specification.

My invention relates to mechanism for printing on wood, being particularly designed for printing the ends or other portions of wooden boxes. It has long been customary to place thereon the name of the manufacturer or dealer, together with the name of the article or the particular class of goods contained in the box, with or without other matter, ornamental or otherwise.

It is the purpose of my invention to provide a novel and simple mechanism for printing upon the ends or other portions of wooden boxes, to reduce the cost of such mechanism, and to render this operation rapid, certain and accurate.

The invention consists in the novel features of construction and in the parts and combinations of parts hereinafter fully explained, and then particularly pointed out in the claims which conclude this specification.

To enable others skilled in the art to which my invention pertains to fully understand and practice the same, I will proceed to describe said invention in detail, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a machine constructed in accordance with said invention. Fig. 2 is an elevation taken from the front end of the machine, a part being in vertical section. Fig. 3 is a vertical longitudinal section of the same. Fig. 4 is a detail elevation, partly in section, showing one of the ink-founts. Fig. 5 is a transverse section of the ink-founts shown in Fig. 4. Fig. 6 is a plan view of the table, side gages, and feed-head, the other parts being omitted. Fig. 7 is a transverse section of the same upon the line 7 7 in Fig. 6. Fig. 8 is a detail perspective of the feed-head and its attaching-bolt. Fig. 9 is an end elevation of the form-cylinder, part being broken away to show one of the clamps holding the forms. Fig. 10 is a side elevation of the same partly in longitudinal section. Fig. 11 is a detail perspective of one of the dogs or clamps by which the form is secured to the form-cylinder, said figure also showing a portion of one of the rack-bars by which the dog is controlled. Fig. 12 is a transverse section of one of the inking-rolls, showing the ink-transferring sheet and its clamp. Fig. 13 is a face view of part of the roll, showing the clamping and stretching bar in arrangement with the ink-transferring sheet. Fig. 14 is a detail section of the end of the rock-shaft and lever-arm operating the feed devices. Fig. 15 is a detail section of a portion of the table, showing the fastening for one of the side gages.

The reference-numeral 1 in said drawings indicates the frame of the machine, which may be of any suitable form capable of supporting the operative parts. Upon the frame is mounted a table 2, having pivotal support at one end by means of trunnions 3 on the machine-frame, which project inwardly and engage lugs 4 on the under side of the table. At a little distance from its other end the table has support by means of bolts 5, tapped through and near its edge, as shown in Figs. 2, 3 and 6, and resting upon the journal-boxes of the impression-cylinder, as described in detail hereinafter. Jam-nuts 6 are provided upon the bolts 5, whereby they may be locked at any point to which they are adjusted, the purpose of the adjustment being fully explained at the proper point hereinafter. Upon the table are arranged side gages, consisting of base-pieces 7, parallel with the longitudinal line of the table and upon opposite sides of the central line thereof. From these pieces rise uprights 8, their inner faces flush with the base-pieces and perpendicular to the surface of the table. Projecting from the back of each of said base-pieces, at a point between its extremities, is an extension 9, having a lug 10 below its under surface, which lies in transverse channel 12 in the table, Figs. 1 and 6, by which the guides may be separated or caused to approach each other in a right line, to accommodate boards of different width or length, as the case may be. Through the lug 10 extends a bolt 13, having a beveled head 10^a lying in a similarly-formed channel in the table, so that by turning the nut on the upper end of the bolt 13

the side guide may be moved in the channel 12 to any desired point, and clamped by turning the nut in the opposite direction. The channels 12 in the table are preferably cut through the edges thereof to facilitate the removal of dirt and render them in effect self-cleansing by the travel of the lugs 10 and the beveled heads 10^a of the bolt. This independent movement of the side gages permits their ready adjustment to suit any size of boards, as well as for the purpose of allowing the impression to be made at any desired point upon said boards.

Between the rearward ends of the side gages is a support or rear gage for the edges of the boards to bring them into vertical alignment. This support consists of an adjustable bracket 14, substantially L-shaped, upon which is formed or mounted a perpendicular post 15, against which the edges of the boards rest. The short arm of the L-shaped bracket overlies a channel 16 in the table, parallel with the longitudinal line of the latter, and extending from the rearward end of the table onto one of the transverse channels 12. This channel 16 is beveled or widened downwardly and the short arm of the bracket 14 has a bolt 17 lying vertically therein, and having its beveled head lying in the similarly-formed channel 16, the construction and function being similar to that already described in connection with the side gages.

The long arm of the L-shaped bracket 14 crosses a longitudinal channel 19, which is substantially in the central line of the table and extended from the pivotally-supported end of the latter into a transverse opening 20, located near the other end. The bracket is arched over this channel 19, Figs. 3 and 6, to form an opening or space 21 between its lower face and the surface of the table. In the channel 19 lies a slide 22, flush with the table-top and capable of reciprocation in said channel. This reciprocation is effected by means of a lever-arm 23, connected by link 24 to a feed-head secured to the slide 22. The feed-head consists of a plate 25 lying beneath and crossing the channel 19, its edges lying against ribs 26, projecting from the lower side of the table and upon opposite sides of the channel 19. Forming part of the plate 25 is a block 27, lying in a slot beneath the channel 19 and bolted to the slide. Upon the upper face of the latter is mounted an adjustable feed-lug 28. (Shown in detail in Fig. 8.) Said feed-lug is provided on its lower face with a block 29, which lies in a channel 30, cut centrally and longitudinally in the slide 22. Near the rearward edge of the feed-lug a bolt 31 is passed through it, the head 32 of said bolt being rectangular and beveled to conform to the shape of the beveled channel in which it lies. A nut is turned on the upper end of the bolt 31, a countersunk recess 33 being formed to receive said nut and enable both it and the end of the bolt to lie a little below the upper face of the feed-lug. The height of the latter above the surface of the slide and table is somewhat less than the thickness of the thinnest board printed. The lever-arm 23 is mounted on a rock-shaft 34 in the lower part of the machine-frame, on one side of which the shaft projects, Figs. 1 and 2, its end being provided with an arm 35, which is mounted on the shaft by a slip-bearing or in such manner as to permit it to slip on the shaft should the feed of the board be accidentally arrested. In the forked end of this arm is pivoted the end of a pitman 36, which is operated by a crank-pin 37, carried by a projection 38, which forms part of a sleeve 39. This sleeve is divided at a point opposite the projection 38, and is slipped upon the hub of a gear carried by the shaft 40, as seen in Fig. 1, and is clamped by a bolt 41, which passes through one of the parts of the sleeve and is tapped into the other part. This construction enables the crank-pin to be set at any point in its circle of revolution with relation to the form-cylinder, which is carried by the shaft operating the pitman. Said shaft and its connections will be described in detail in their order.

The shaft 40 carries the form-cylinder 42, which is rigidly mounted on said shaft. This cylinder, which is shown in detail in Figs. 9 and 10, consists of a drum of such diameter as to enable it to carry the different sizes of forms used. In the cylindrical face, at suitably intervals, are formed channels 43, parallel with the axis of the shaft 40, and communicating with the exterior by slots 44 of less width than the channel 43. In each channel are inserted two strips or bars 45 and 46, lying side by side, one end of each strip having a threaded portion which projects beyond the end of the cylinder. Each strip is provided with teeth 47, those upon one strip having a pitch opposite those on the other. On the threaded end of each strip is turned a milled nut 48, having a collar 49, between which and the nut is a channel 50, in which lies a rib 51 forming part of a plate 52, bolted to the end of the cylinder. The rotary movement of the milled nut thus produces longitudinal displacement of the strip on which it is mounted in either direction.

The form by which the printing is done consists of a plate 53, curved in a line struck with a radius equal to that of the exterior of the cylinder. It may extend over any portion of the latter according to the size and character of the impression to be made. Its parallel curved edges are beveled, as shown in Fig. 10, and it is locked, released, and adjusted in position by the following means:

The numeral 54 indicates a dog consisting of a plate of substantially rectangular form, one of its edges being projected to form a lip 55. Connected to said plate by a strong web 56 is a second plate 57, lying at a small angle with the first, and of such width as to extend across but move freely in one of the channels 43. Beneath the lip 55 the edge of the web is at a right angle with the plate having

such lip; but upon the opposite edge the web is inclined to the point of union with the edge of the plate 57, and upon said edge of the latter plate is formed a lip 58, extending about half the width of the plate and projected nearly at a right angle to its face. The web 56 is of such width that it will enter the slot 44, and the construction described enables the lip 58 to engage the teeth upon one of the strips lying in the channel 43, while the lip 55 will engage the beveled edge of the form, as seen in Fig. 10. The lip 58 on the plate 57 will thus engage the square faces of the teeth on one of the strips, these faces being turned toward or in the direction of the form, and by moving this strip inward in the channel 43 the lip 55 may be made to clamp the edge of the form with considerable force. The adjustment of the strip is made by means of the milled nut 48, and a like adjustment of the other strip and dog confines the form between two of said dogs lying in each one of the channels 43 crossed by the form. If it is necessary to adjust or remove the latter, the nuts 48 are simply turned far enough to relieve the strain from the dogs and permit the lips 55 to be lifted out of the teeth of the two strips 45 and 46, after which the lips may be raised free of the teeth and moved in either direction in the slots 44. It is evident that the clamping devices described are adapted for a variety of uses other than that specified and without limitation to a cylinder or any other special form of device in which the channels 43 are formed.

Directly beneath the form-cylinder is the impression-cylinder 59, lying in the opening 20 in the table and rising slightly above the plane of the surface of the latter. The journals of this cylinder have support in boxes 60, which are arranged in vertical channels in the opposite sides of the frame, and said boxes are sustained by vertical shafts 61, which are threaded through the hubs of bevel-gears 62, resting on the side of the frame. These shafts rise into chambers 63 in the lower part of the journal-boxes, in which are springs 64 coiled around the shafts and resting at one end on collars 65 rigidly mounted on the shafts and lying in the chambers 63, their upper ends abutting against the boxes. The springs 64 are of considerable strength, being so adjusted as to tension that the pressure exerted will drive the ink from the form into the wood and form a slightly-indented imprint, the surface of which will be uniform, smooth and hard, owing to the force with which the pressure is made. This indentation also prevents the ink from running at the edges of the letters or other outlines of the impression and soaking into the wood by capillary attraction. The power of the springs may be modified by the threaded shafts, the bevel-gears thereon being meshed with similar gears 66 on a horizontal shaft 67, the latter being turned by a hand-wheel 68. The boxes 60 support the bolts tapped through the edges of the table, the latter being thus adjusted independently of the impression-cylinder.

The form is provided with printing-surfaces in relief which are inked by ink-cylinders 69, each carried by a shaft 70, its journal lying in boxes 71, which have vertical adjustment in ways 72 in the sides of the frame. The boxes are sustained by springs 73, and are adjustable downward against the tension of said springs by means of bolts 74. As these cylinders are arranged at intervals above the form-cylinder and are substantially similar one to another, a description of one will be sufficient for all. Each ink cylinder or drum is plane-surfaced, as shown in Figs. 12 and 13, save for a longitudinal channel 75 extending nearly from end to end of the same. In this channel is arranged a clamping and stretching bar 76, through which bolts 77 are passed at suitable intervals and tapped through the wall of the cylinder. From the face of the bar adjacent to the cylinder project two series of spurs or points 78 arranged at short intervals near its parallel edges. The bar is of slightly less width than the channel in which it lies, and its outer face is convex to form a flush surface with the cylinder. The ink-transferring sheet 79, which consists of any suitable material, is drawn around the cylinder and its edges are brought over the channel 75 and under the spurs upon the bar 76. As the latter is pressed into the channel the spurs draw the ends of the sheet toward the center of the cylinder far enough to place it under proper tension and produce a perfectly smooth exterior surface.

The colored inks are supplied from founts 80 journaled above the ink-cylinders and removed from contact with the ink-transferring sheets, the colors being transferred by spreading-rolls to inking-pads 81, which are applied in any suitable manner to the outer faces of the ink-transferring sheets, on which they lie in such relief that they will receive ink at each revolution from the spreading-rolls. Two of the latter are arranged between each fount and each ink-cylinder. One of the spreading-rolls 82 is in direct contact with the founts and is preferably of less diameter than the second 83, which transfers the ink from the first roll to the inking-pad. Both these rolls have a composition face 84 and are driven by surface contact.

Each ink-fount consists of a hollow drum 80, having filling-openings in its ends, closed by plugs 85. At suitable intervals of separation, as shown in Fig. 5, the drum is provided with small perforations 86 formed in lines parallel with its axis and cut through its wall. These perforations open into channels 86^a countersunk in the outer face of the drum, in which lie strips 87, provided with apertures 88 at intervals equal to those separating the perforations 86. Said strips are dovetailed into the channels 86^a and at one end they are bent at a right angle toward the axis

of the drum, their ends lying in the grooved heads of bolts 89, tapped into the end of the drum. By turning these bolts the strips may be adjusted with great accuracy and in such manner as to regulate the size of the discharge-openings and the exact quantity of ink required.

From each of the side portions of the frame supporting the form-cylinder extend arms 90, on which is mounted a gage-plate 91ª, lying in front of the boards, which are piled between the side gages. The lower edge of this gage-plate lies at a point above the table, from which it is separated by a space a little greater than the thickness of the board. This space is regulated by the vertical adjustment of the table by means of the bolts 5.

Power is communicated to the shaft of the impression-cylinder from a shaft 91, which is provided with a fast and loose pulley 92 and 93. It is communicated from said shaft through a gear 94 to the shaft of the impression-cylinder and through an intermediate 95 to a large gear 96 on the shaft of the form-cylinder. Thence from the other side of the machine the shaft 40 is geared to each of the ink-cylinders, and from the latter to each of the ink-founts.

To insure accuracy in the feed of the boards by the action of the slide 22, I provide one of the base-pieces 7 of the side gages with a spring-pressed extremity 97, hinged or pivoted to the end of the base-piece and pressed by a spring 98 toward the opposite side gage. The action of this extremity will be upon the edge of the board which rests on the surface of the table, and its tendency will be to guide each board straight and cause each to be properly registered with the form on the form-cylinder and the impression-cylinder.

The gear 96 is graduated on its outer face with reference to a pointer of the crank projection 38, which forms part of the split sleeve 39. This enables the feed to be adjusted by loosening the bolt 41 and turning the split sleeve on the hub of the gear 96.

What I claim is—

1. In a mechanism for printing upon wood, the combination with a form-cylinder of a table pivotally supported at one end, an impression-cylinder arranged at or near the other end, means for giving vertically adjustable support to the journal-boxes of said impression-cylinder, and vertically adjustable supports for the cylinder end of the table resting on the said journal-boxes, substantially as described.

2. In a mechanism for printing upon wood, the combination with a table pivotally supported at one end of a form-cylinder journaled in rigid boxes above its other end, an impression-cylinder lying in an opening in said table below the form-cylinder, threaded shafts supporting springs which sustain the journal-boxes of said impression-cylinder, bevel-gears through which the shafts are tapped, means for operating said bevel-gears in unison, and bolts tapped through the table and resting on the adjustable boxes of the impression-cylinder substantially as described.

3. In a machine for printing on wood, the combination with a form-cylinder having its journals supported in rigid bearings, an impression-cylinder, vertically adjustable, elastic supports for the journal-boxes of the impression-cylinder, a table supported at one end on a horizontal pivot and provided at its opposite end with a transverse opening for the impression-cylinder, a vertically adjustable support for the cylinder-end of said table, an ink-cylinder having an ink-transfer sheet which is provided with forms in relief, an ink fount and a spreading-roll to transfer ink from said fount to the inking-forms, substantially as described.

4. In a machine for printing upon wood, the combination with a form-cylinder having its journals supported in rigid bearings, of an impression-cylinder, vertically adjustable, elastic supports for the journal-boxes of the impression-cylinder, a table supported at one end upon a horizontal pivot and provided at its opposite end with a transverse opening for the impression-cylinder, a vertically adjustable support for the cylinder end of said table, a plurality of ink-cylinders each having an ink-transfer sheet, a series of inking-forms detachably mounted in relief upon said sheets and timed to act in succession on different parts of the form, and ink-founts supplying inks of different colors to said forms, substantially as described.

5. In a machine for printing on wood, the combination with a form-cylinder, of an ink-cylinder having an ink-transfer sheet, a bar lying in a channel in the face of the cylinder, said bar having spurs which engage the ends of the sheet, and bolts to draw the bar into said channel, substantially as described.

6. In a machine for printing on wood the combination with an ink-fount consisting of a hollow drum having perforations arranged at intervals in a line parallel with its axis, of a strip lying in a countersunk channel in the face of the drum and provided with apertures which are capable of registering with those in the drum, and means for adjusting said strips longitudinally, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM HOLLINGSWORTH.

Witnesses:
FELIX R. SULLIVAN,
G. DAVIS NEAVITT.