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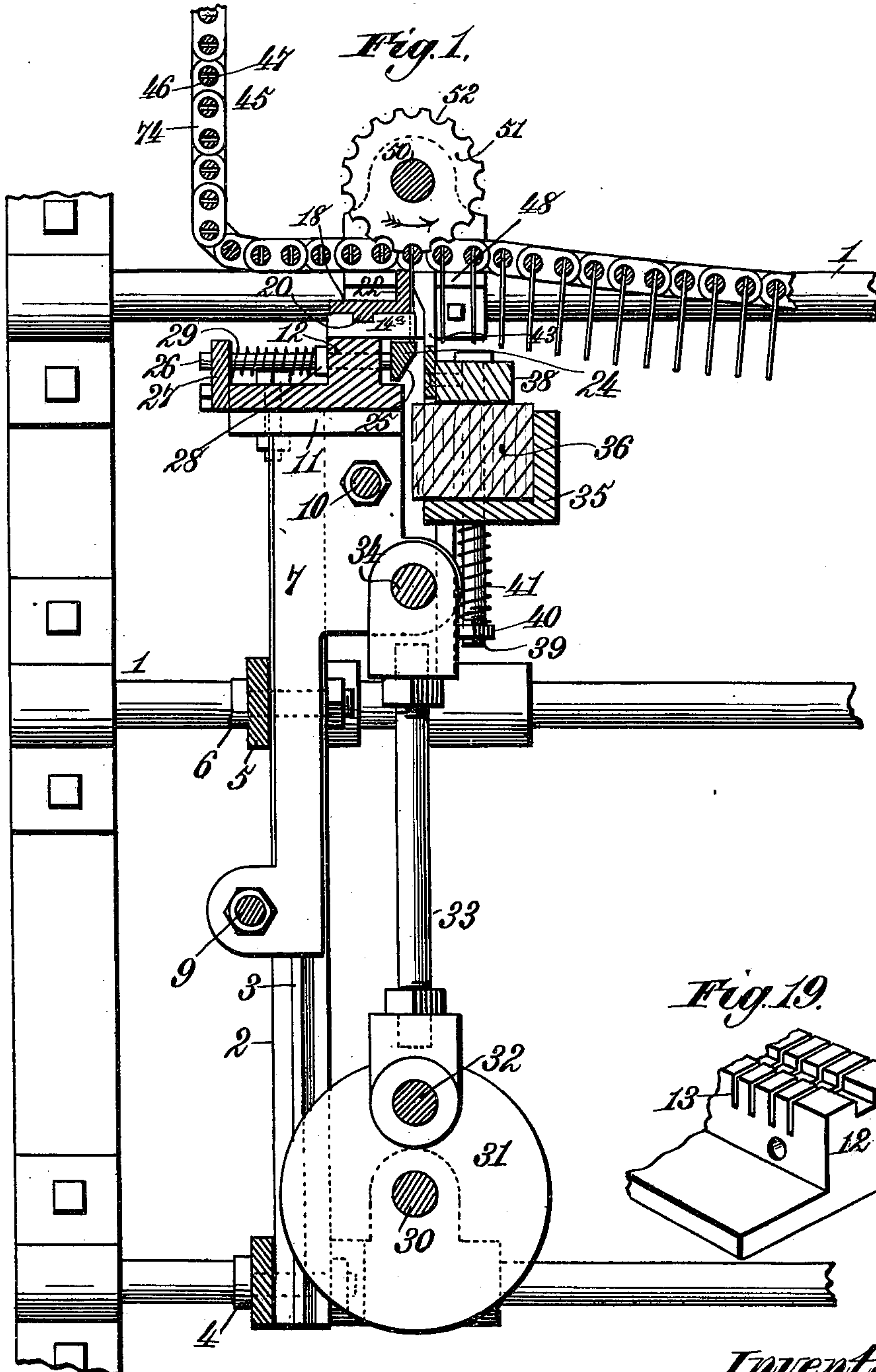
Patented June 4, 1901.

E. H. EISENHART.
MATCH MAKING MACHINE.

(Application filed May 21, 1900.)

(No Model.)

5 Sheets—Sheet 1.



Witnesses.
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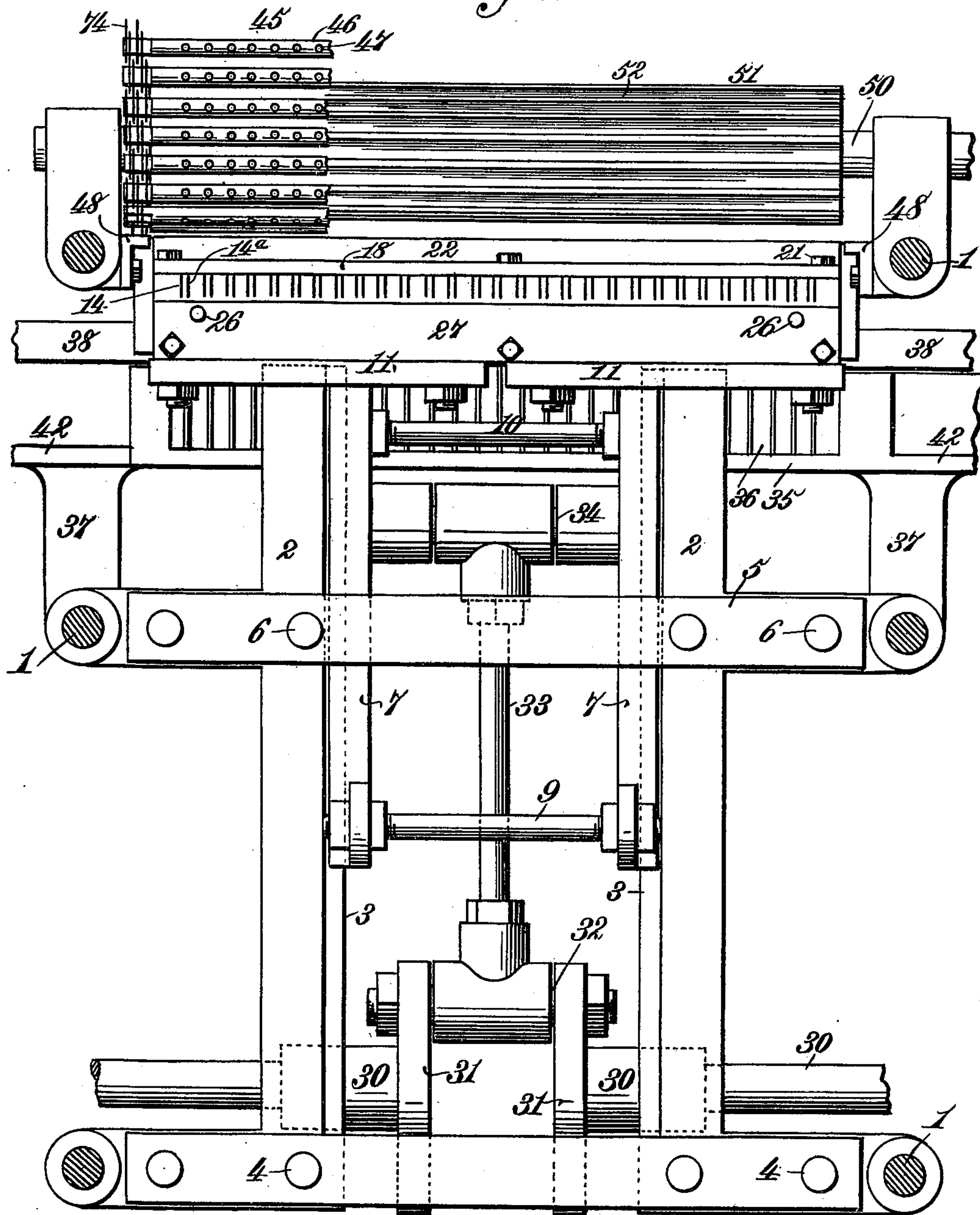
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5 Sheets—Sheet 2.

Fig. 2.



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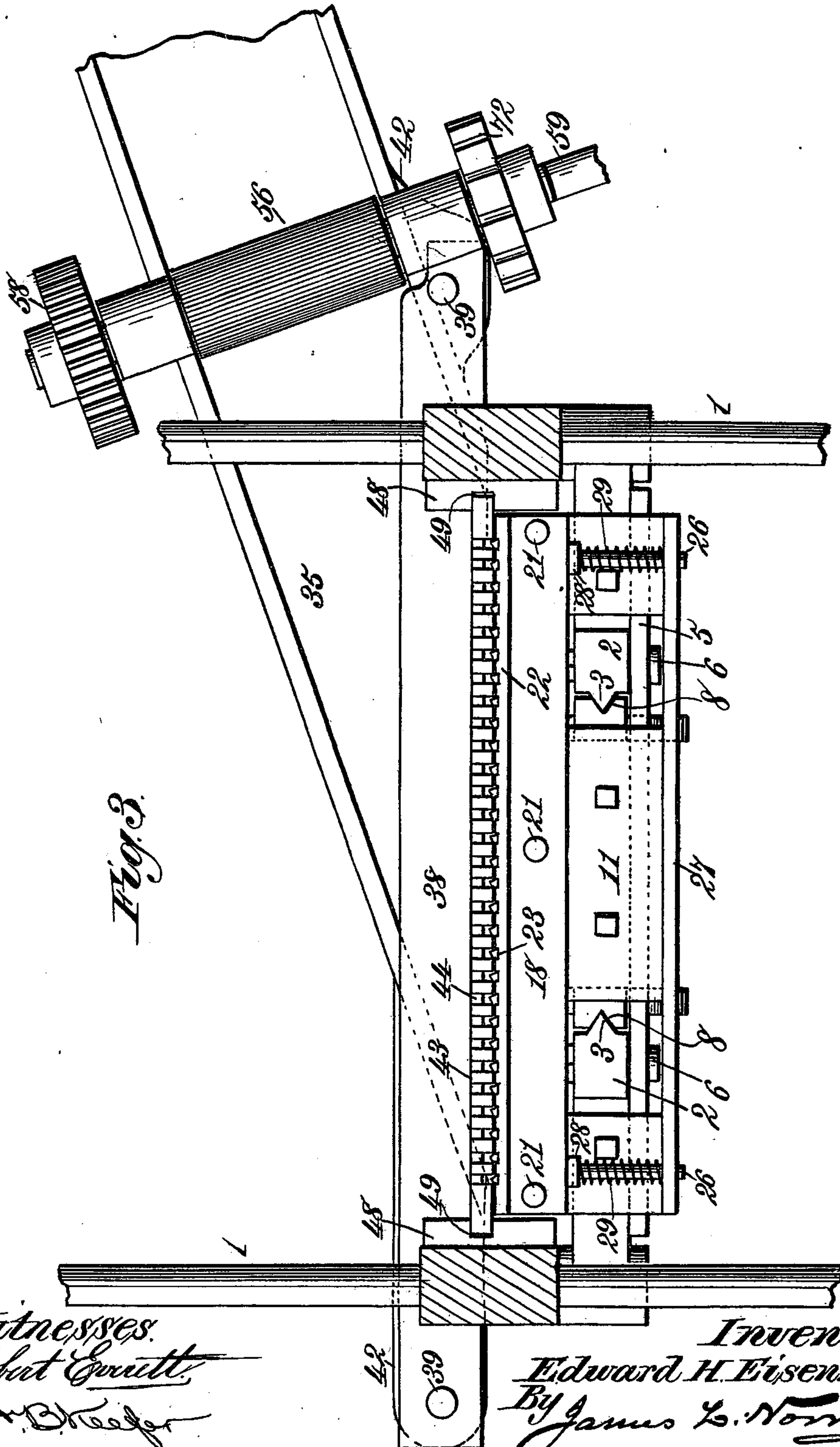
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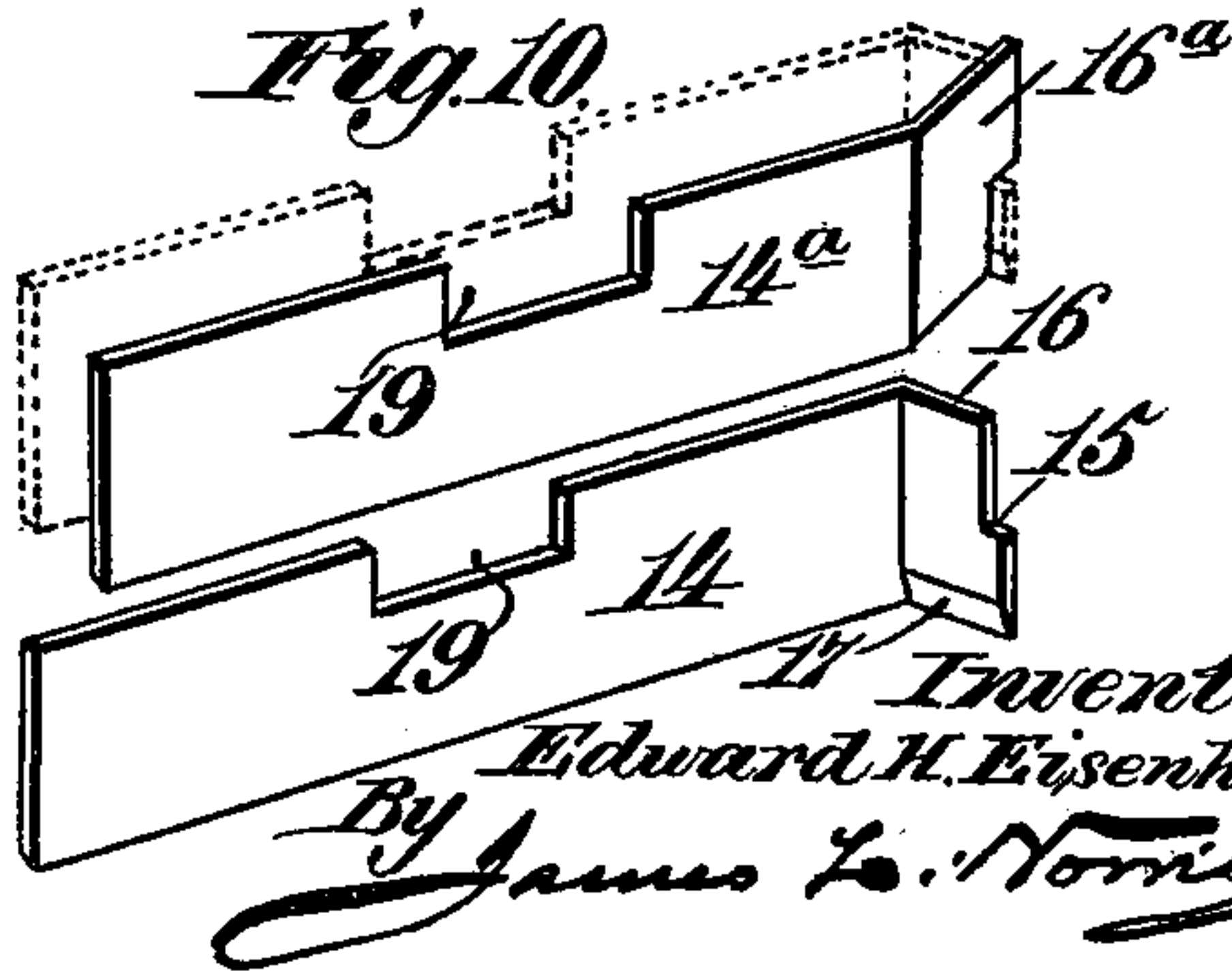
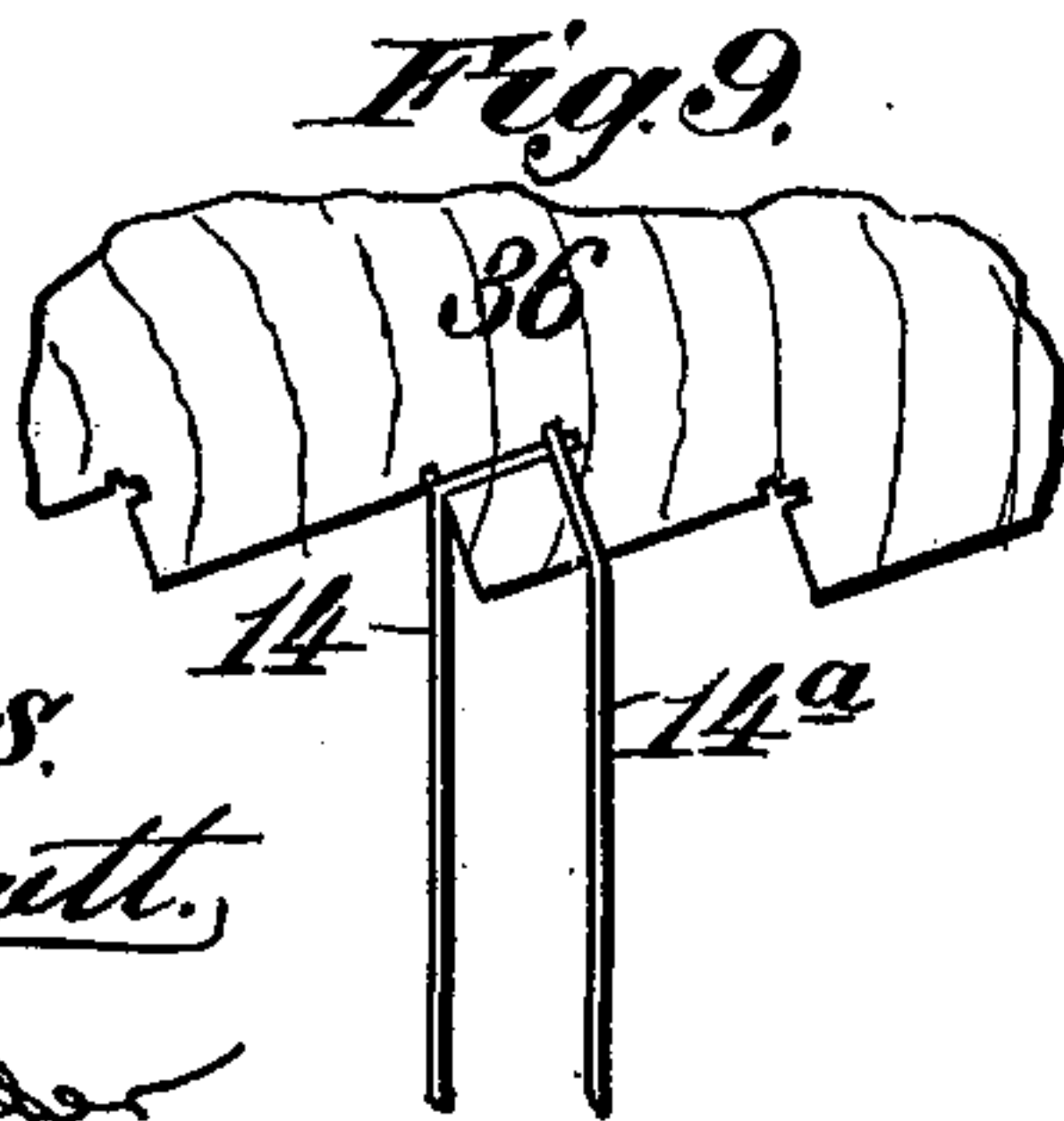
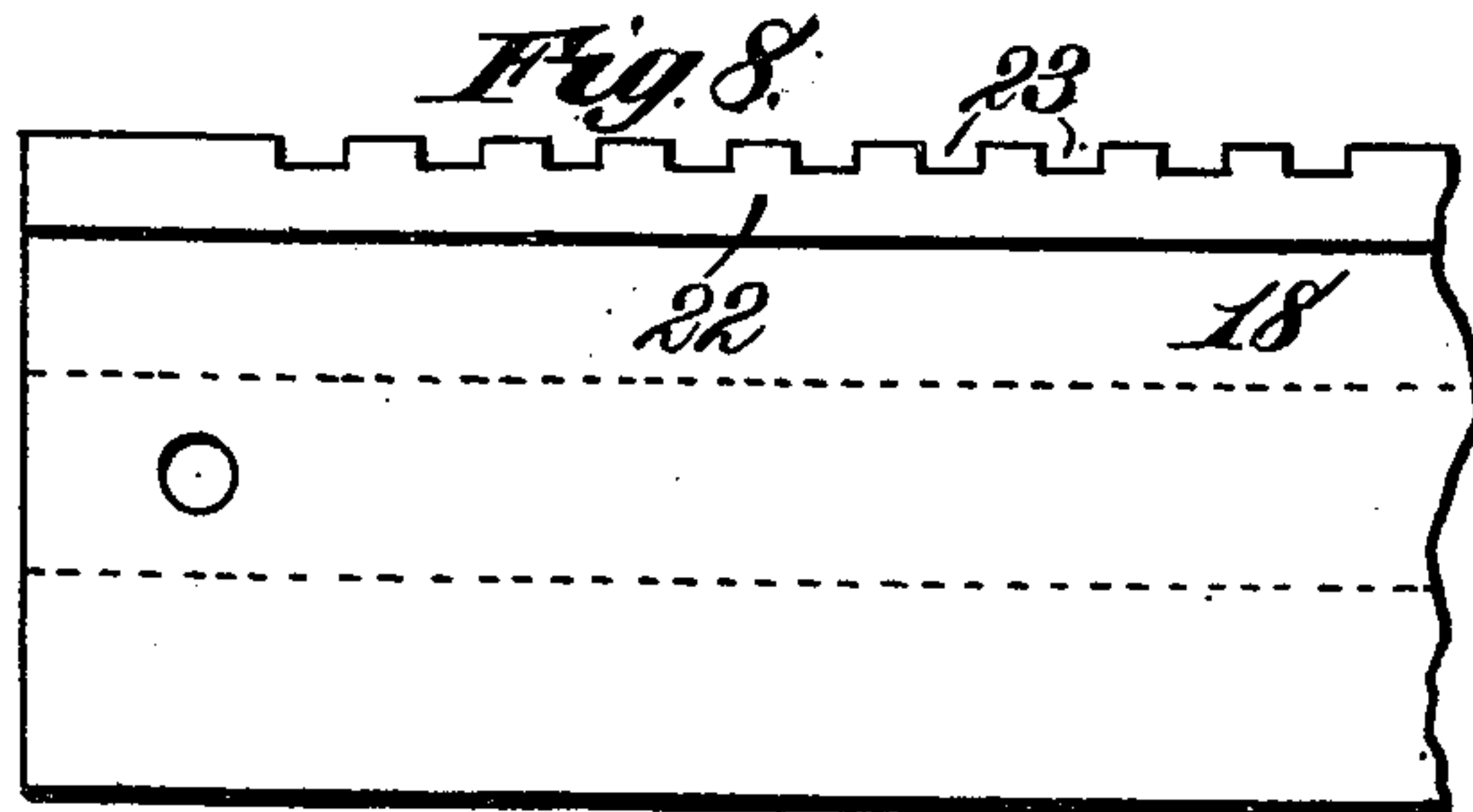
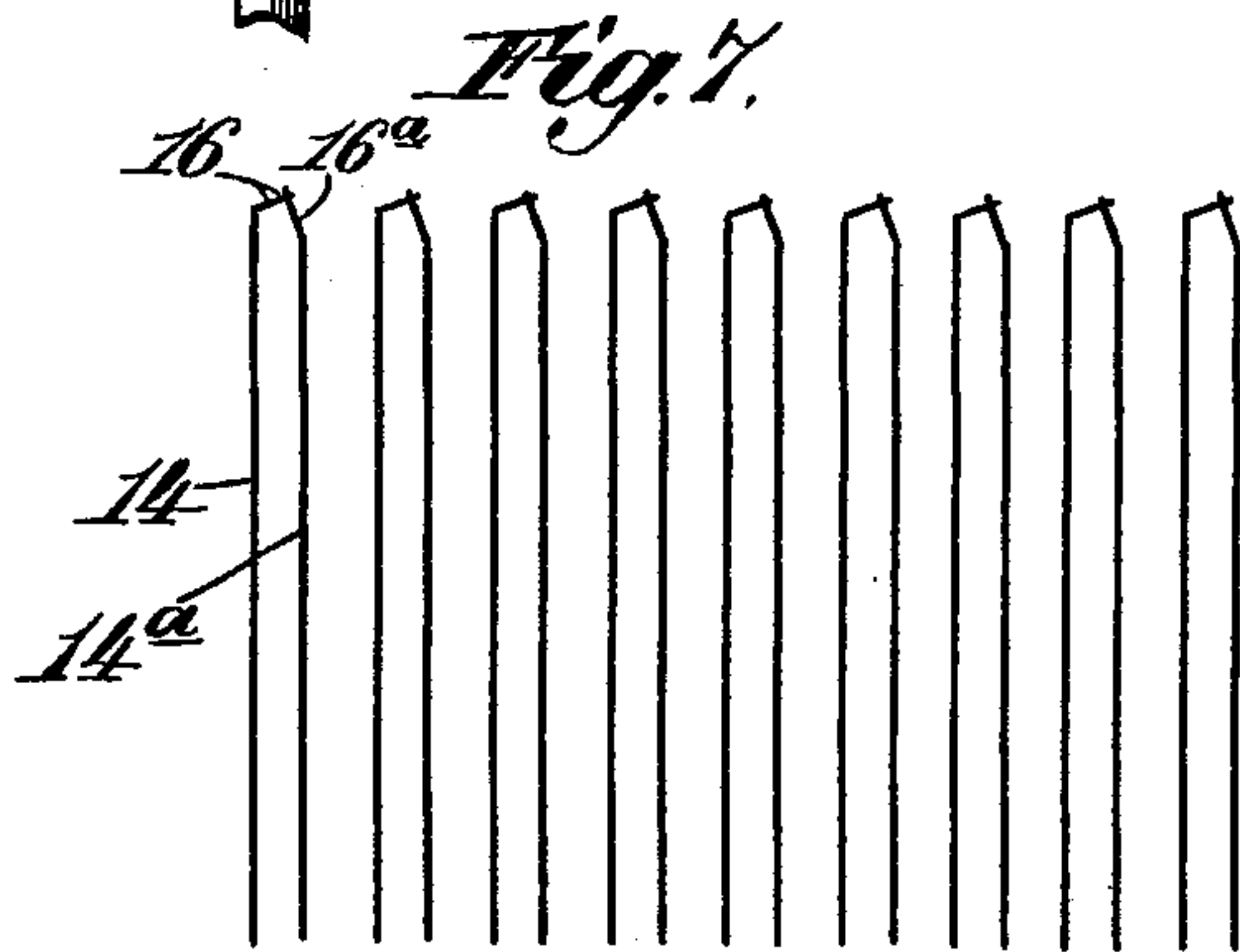
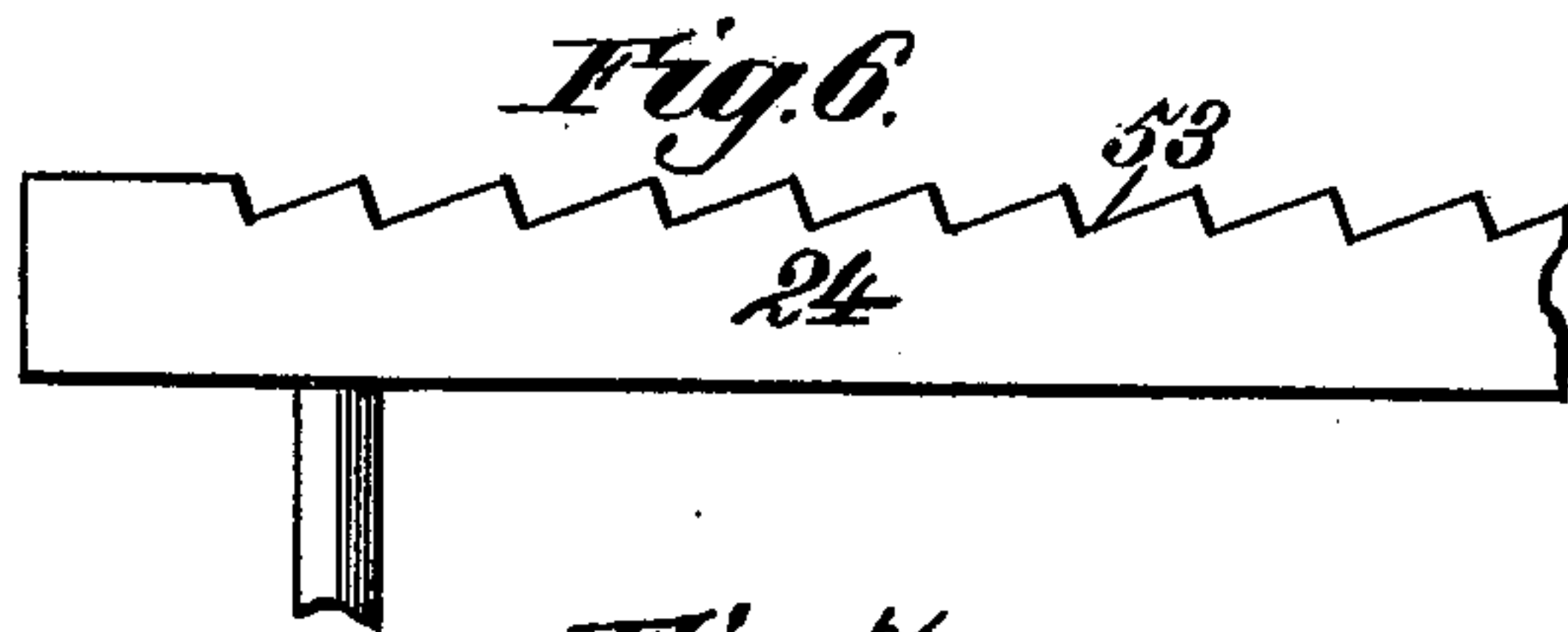
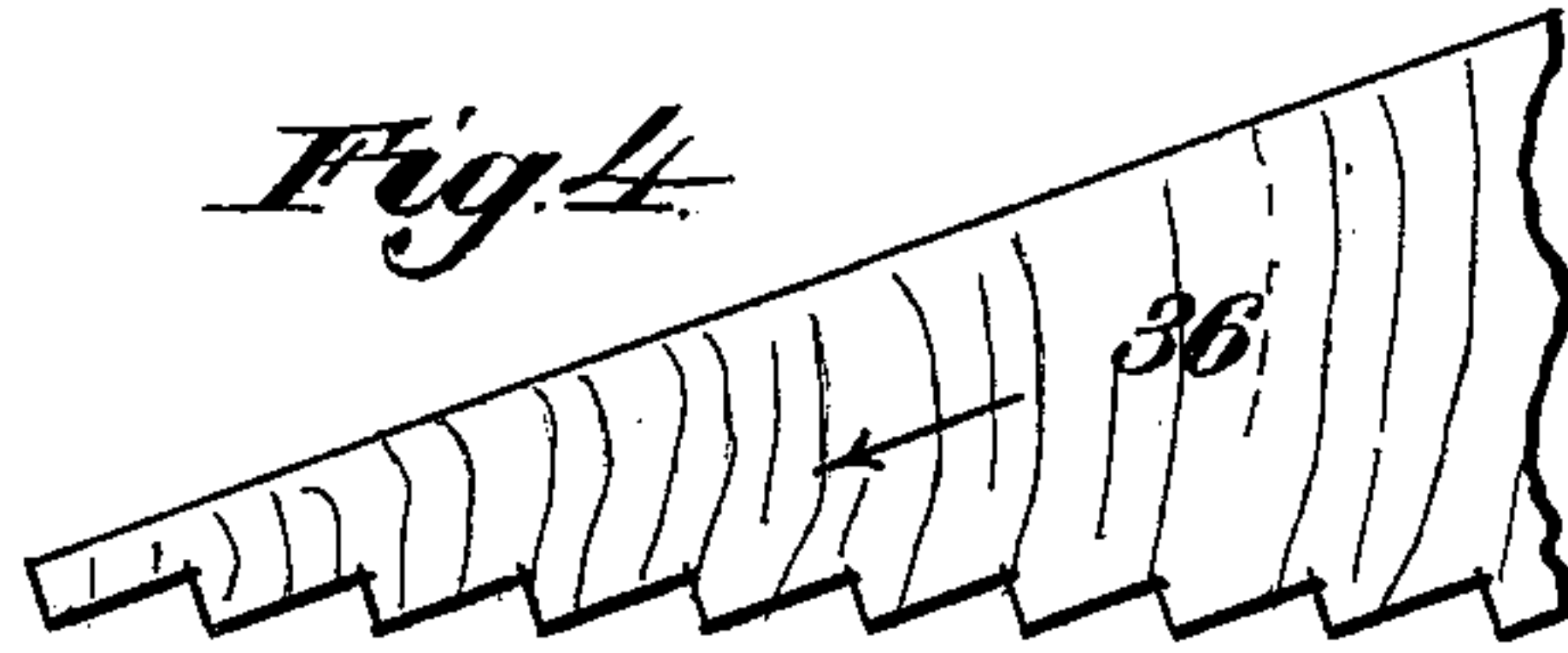
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5 Sheets—Sheet 4.



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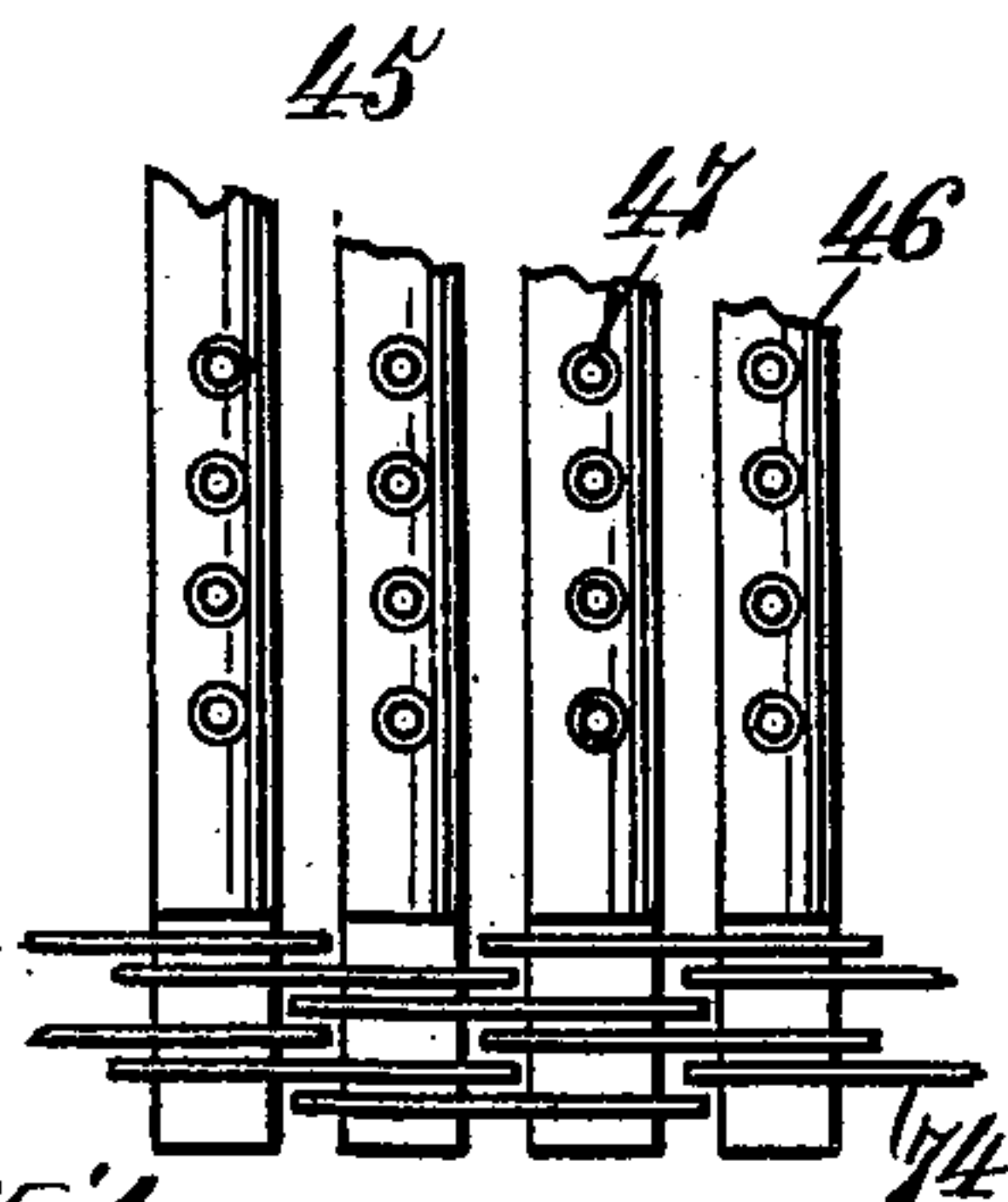
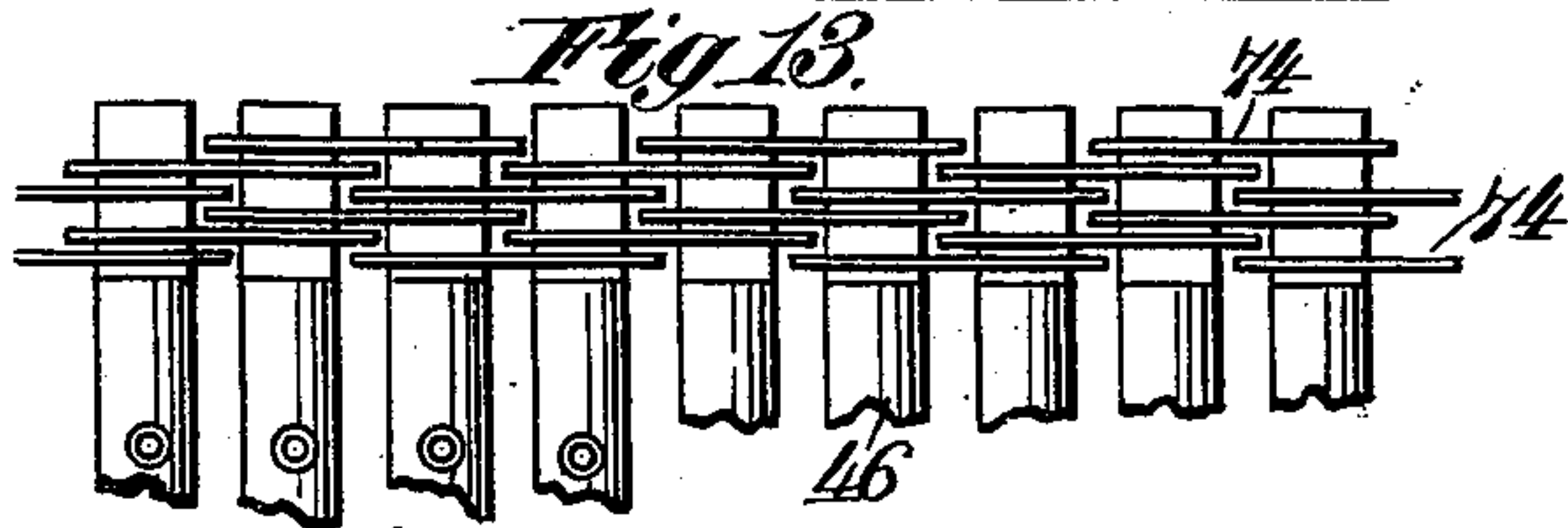
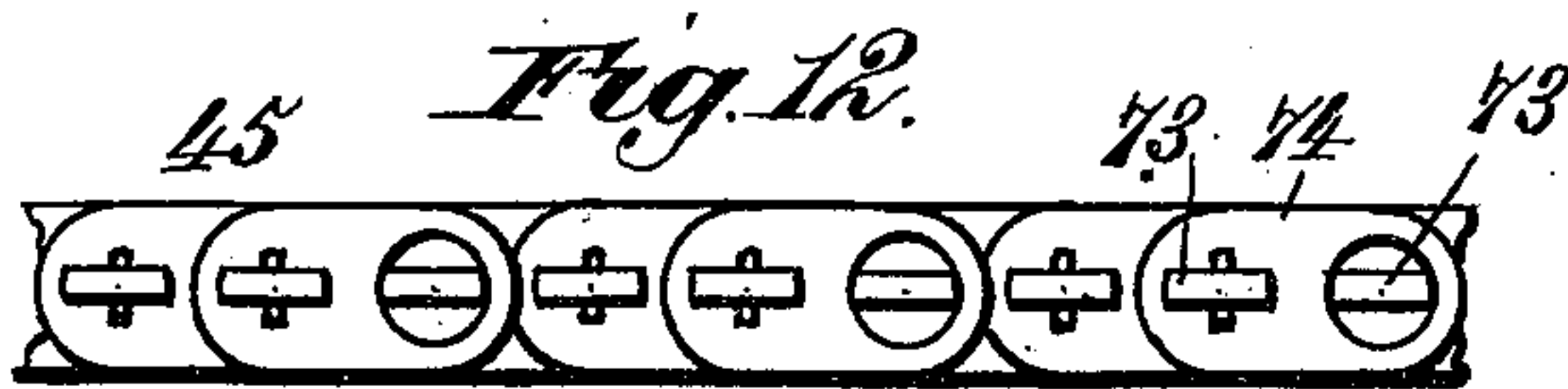
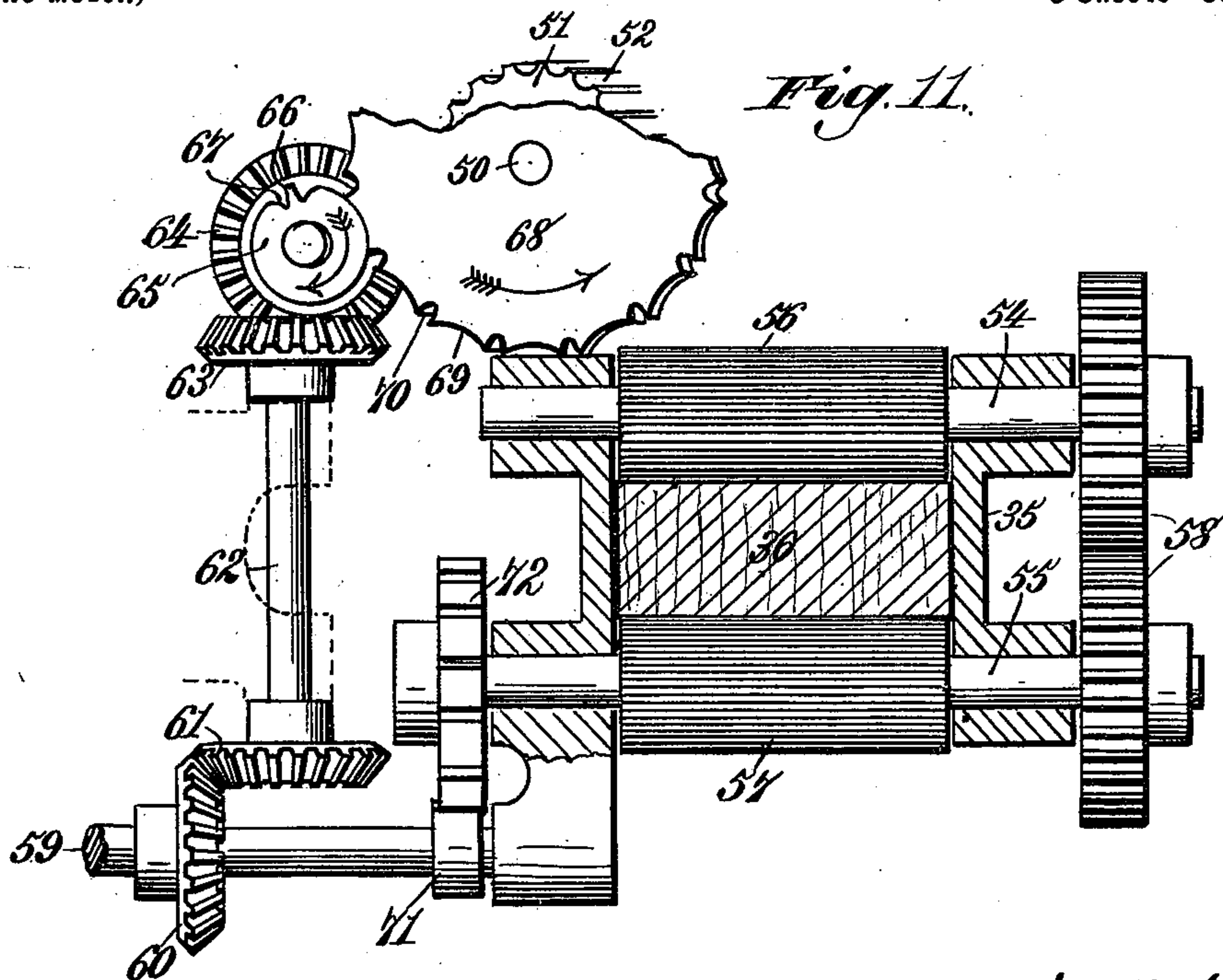
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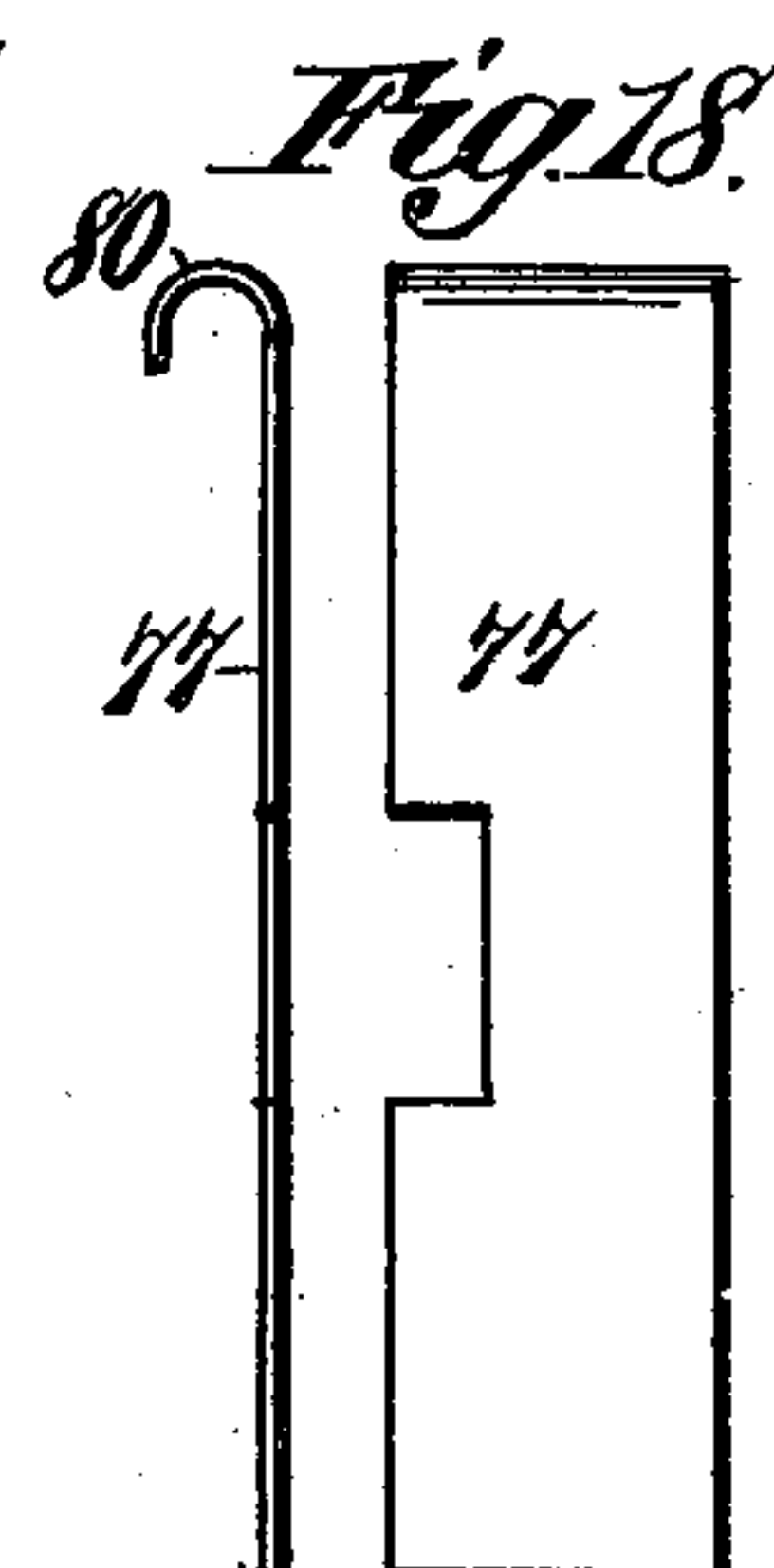
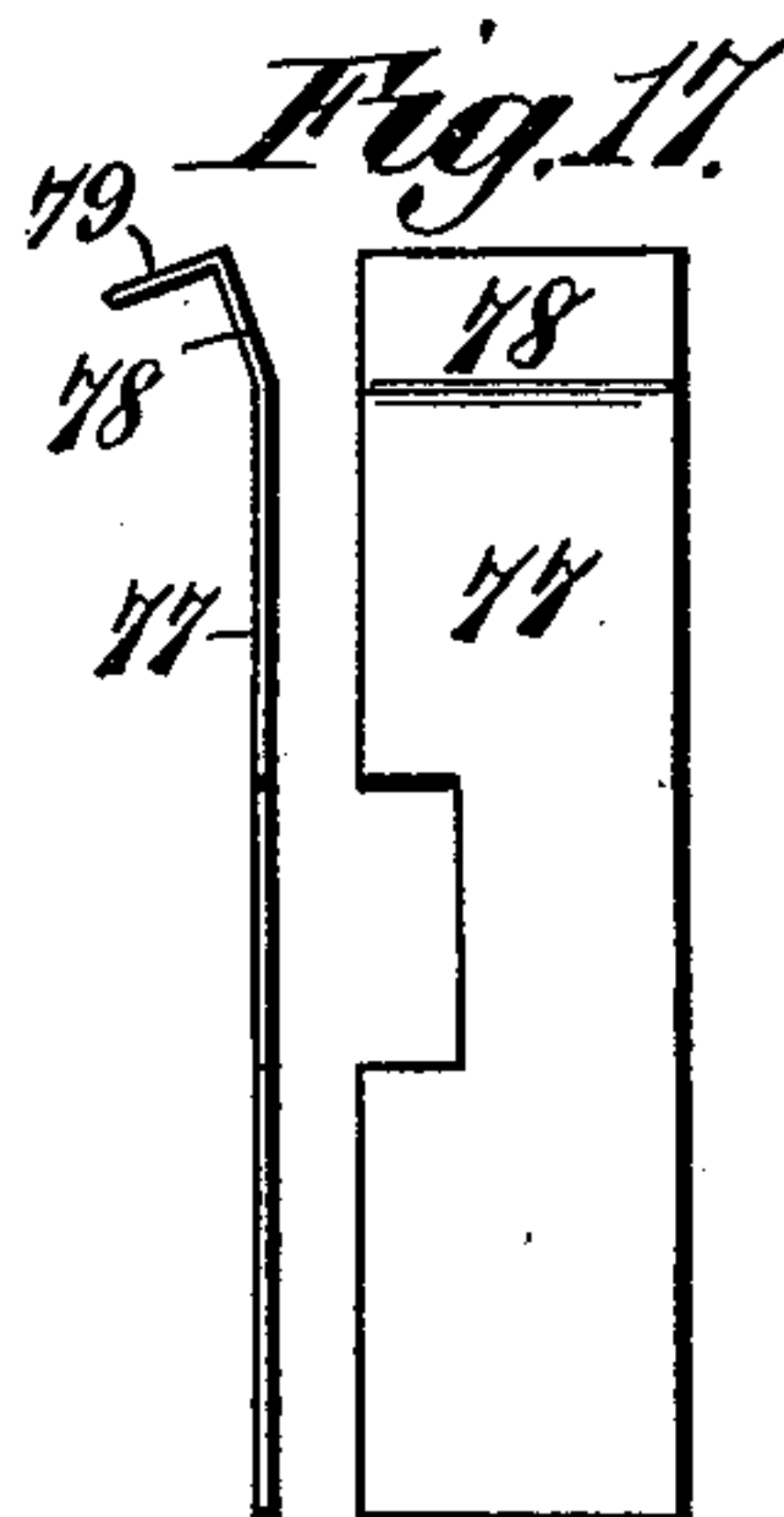
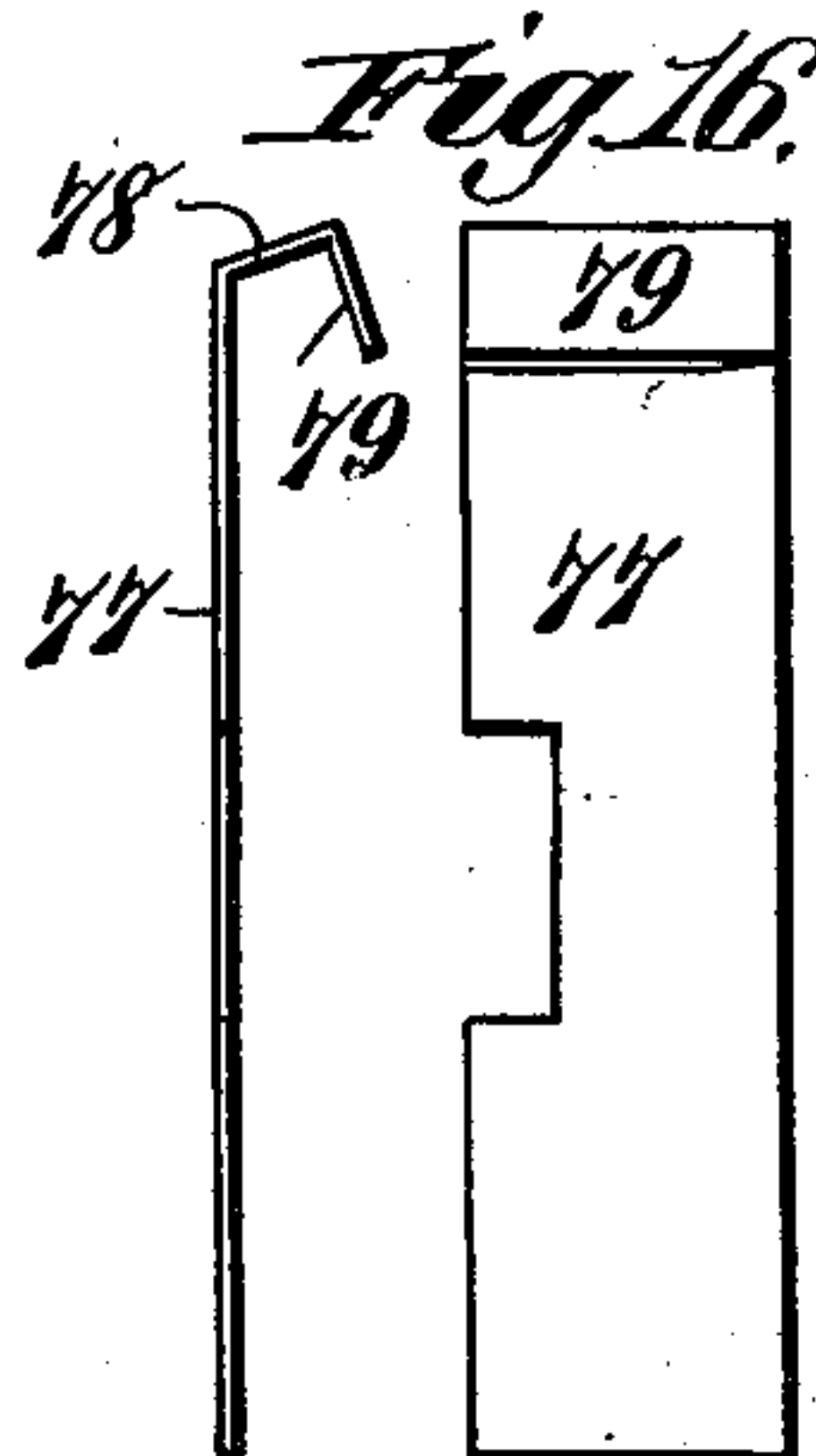
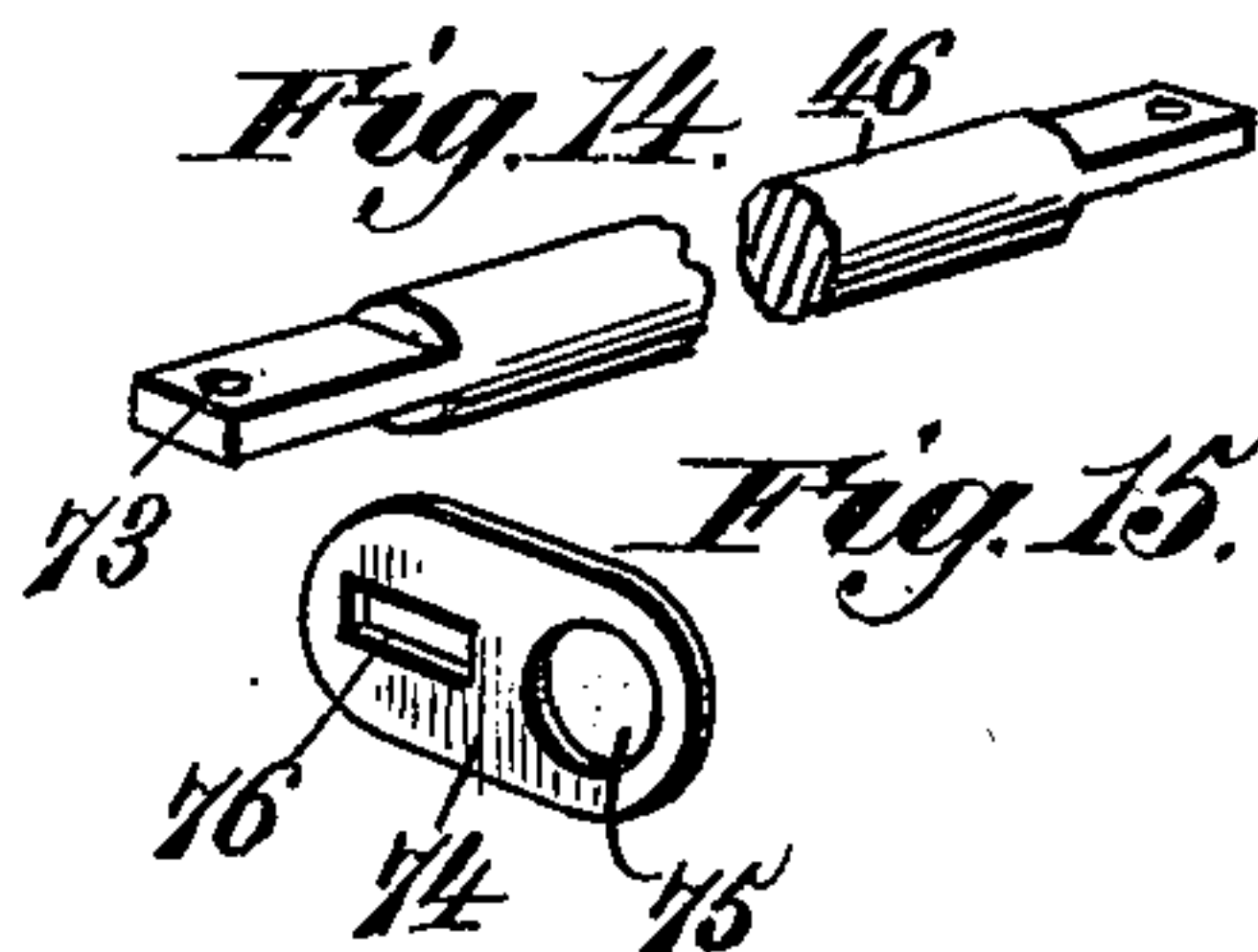
(Application filed May 21, 1900.)

(No Model.)

5 Sheets—Sheet 5.



Witnesses:
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UNITED STATES PATENT OFFICE.

EDWARD H. EISENHART, OF NEW YORK, N. Y.

MATCH-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 675,770, dated June 4, 1901.

Application filed May 21, 1900. Serial No. 17,451. (No model.)

To all whom it may concern:

Be it known that I, EDWARD H. EISENHART, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in Match-Making Machines, of which the following is a specification.

This invention relates to machines for making matches, and especially to that part of such a machine that operates to make the match-splints; and it has for its object to provide improved cutting mechanism for cutting the splints from a prepared block of wood, to provide an improved carrier for receiving and conveying the splints from one part of the machine to the other, and to provide novel and simple mechanism for inserting the splints in the carrier-bars, said mechanisms being arranged, organized, and combined in such manner that the splints are cut, elevated, and inserted in the carrier-bars at one operation.

To these ends my invention consists in the features and in the construction, combination, and arrangement of parts hereinafter described, and particularly pointed out in the claims following the description, reference being had to the accompanying drawings, forming a part of this specification, wherein—

Figure 1 is a vertical sectional view of the splint cutting and inserting mechanism. Fig. 2 is an end elevation of the parts shown in Fig. 1. Fig. 3 is a top plan view of the same parts, partially in section. Fig. 4 is a detail plan view of the block of wood from which the splints are cut. Fig. 5 is a similar view of the slotted bar through which the splints are stripped from the cutting and inserting mechanism. Fig. 6 is a similar view of the lifter-bar. Fig. 7 is a diagrammatic view of a group of the knives. Fig. 8 is a detail top plan view of the bar that operates to hold the knives in place. Fig. 9 is a detail view illustrating the manner in which the knives operate to cut out and detach the splints from the wooden block. Fig. 10 is a detail perspective view of one of the knives. Fig. 11 is a detail view of the gearing for intermittently feeding forward the wooden block or stock from which the splints are cut and the carrier for conveying the splints. Fig. 12 is a detail side elevation of the carrier. Fig. 13 is a detail top plan of the same. Fig. 14 is a detail per-

spective view of one of the carrier-bars. Fig. 15 is a similar view of one of the links. Figs. 16, 17, and 18 are detail views of modified forms of knives. Fig. 19 is a detail perspective view of a portion of the slotted rib or flange in which the knives are seated. Figs. 4, 5, 6, 7, and 8 are arranged in the form of a group, showing diagrammatically the manner in which the splints are held from the time they are severed from the block and until they are inserted in the carrier.

Referring to the drawings, the numeral 1 indicates the frame of the machine, which may be of any approved or preferred construction suitable for supporting in operative position the several parts of the machine. Fixed on one end of the frame are two vertical parallel standards or guide-bars 2, provided on their inner or adjacent faces with vertical V-shaped ribs or splines 3, and between said guide-bars is arranged to vertically reciprocate a cutter-head carrying the match-splint cutting and inserting mechanism, as will hereinafter be described. The standards or guide-bars are rigidly bolted at their lower ends to the frame of the machine by bolts 4, and near their upper ends are in like manner bolted to a cross brace or beam 5, forming a part of the machine-frame, by bolts 6. The cutter-head is arranged to vertically reciprocate between said guide-bars and is provided with two upright slide-bars 7, which are provided on their outer sides with V-shaped grooves 8, into which project the ribs or splines 3 of the guide-bars before referred to and by means of which said slide-bars are caused to reciprocate in a perfectly rectilinear direction. The slide-bars are rigidly connected together and are held in true parallelism by tie-bolts 9 and 10, as most clearly shown in Figs. 1 and 2 of the drawings. Each of the slide-bars is provided at its upper end with a head 11, formed at a right angle to its slide-bar, said heads projecting horizontally toward one another, and are provided on their upper side with a vertical longitudinal rib or flange 12, the forward edge of said flange being disposed, as shown in Fig. 1, a short distance in rear of the forward edges of the heads 11. The upper edge of the rib or flange 12 is transversely grooved, as at 13, as most clearly shown in Fig. 19, and

in each of said grooves is fitted one of the splint-cutting knives, as will now be described. Each knife preferably consists of two thin flat steel blades 14 and 14^a, the operative ends of which are bent or deflected toward one another at suitable angles. In the preferred construction the bent cutting end of each blade is recessed or cut away, as at 15, from a point midway between its upper and lower edges, the recess being formed from the lower edge to the center of the blade 14^a and from the upper edge to the center of the corresponding blade 14, and the two are overlapped one upon the other, as shown in Fig. 10 of the drawings, whereby the shouldered or extended end of one blade rests over and upon the corresponding shouldered and extended end of the other blade. The bent or deflected ends 16 and 16^a of the blades where they overlap are extended or projected one beyond the plane of the other, as shown in Figs. 9 and 10, and the lower edges of said bent or deflected portions of the blades are beveled or sharpened, as at 17. The knives are firmly held in their seats in the grooves by a bar 18, the blades of each knife being centrally provided on their upper edges with rectangular recesses 19, into which fits a longitudinal rib 20, formed on the bottom of the bar 18. The bar 18 is firmly bolted to the heads 11 and flange 12 by bolts 21 and has formed on its forward edge a vertical flange 22, in the forward face of which are formed vertical parallel rectangular grooves 23, for the purpose hereinafter described. As shown in Fig. 1, the ends of the knives project slightly beyond the grooved flange 22 and beyond the forward edge of the heads 11.

Movably disposed in the recess formed by the forward portion of the heads 11, the flanges 12, and the bottoms of the knives is a lifter-bar 24, the lower forward edge portion of which is beveled off or inclined downward and inward, as at 25, for the purpose presently explained. Projecting horizontally from the rear edge of the lifter-bar 24 are rods 26, which loosely pass through perforations formed in the flange 12 and at their ends loosely pass through a perforated plate 27, that is bolted to the rear edges of the heads 11. Coiled springs 29 are arranged on the rods 26, said springs each bearing at one end against the plate 27 and at its other end against a collar 28, fixed on the rod. The springs operate to normally hold the lifter-bar projected forward in the position shown in Fig. 1, in which position the upper edge of the bar will lie directly beneath and wholly cover the cutting edges of the knives.

The cutter-heads carrying the knives and lifter-bar are reciprocated vertically between the guide-bars by the following means:

The numeral 30 indicates two shafts journaled in alinement with each other, one of which is a driven shaft, having fixed on their adjacent ends parallel wheels 31, connected or coupled together by a wrist-pin 32. Piv-

oted on the wrist-pin 32 is one end of a connecting-rod 33, the other end of which is pivoted on a transverse shaft 34, connected at its opposite ends to the slide-bars 7, carrying the cutter-heads.

The numeral 35 indicates the work-table for holding the block of wood 36, from which the splints are to be cut, and comprises a trough-shaped guide disposed obliquely or at an angle to the row of knives, as shown. The forward edge of the table is beveled off or cut at an angle, so that it will lie in approximately the same vertical plane with but beneath the forward ends of the knives, as most clearly shown in Figs. 1 and 3 of the drawings. The work-table is provided with two pendent rigid arms 37, that are firmly fixed on the frame of the machine, and the block 36 is held firmly to its seat on the table by a presser-bar 38, that rests transversely on the upper side of the block. Passing through the opposite ends of the presser-bar are headed bolts 39, on the lower ends of which are fixed nuts 40, and on said bolts are disposed coiled springs 41, the lower ends of which rest on the nuts 40 and their upper ends bear against extensions 42, projecting laterally from the sides of the work-table. The springs operate to draw the bolts vertically downward, and thus hold the presser-bar on the block 36 with a yielding pressure, which, while it permits the block to be fed forward, will at the same time prevent the block from being lifted from its seat on the work-table. To the edge of the presser-bar is bolted a plate 43, that projects vertically in front of the lifter-bar, the knives, and the grooved plate 22 when the latter are in their elevated position, and said plate is vertically slotted from a point intermediate its lower and upper edges, as at 44, and entirely through the latter, the slots being formed to register with the grooves 23 in the plate 22 when the latter is raised.

The numeral 45 indicates an endless splint-carrier consisting of a number of transverse parallel bars 46, flexibly connected together at their opposite ends in the novel manner hereinafter described and each provided with a number of parallel perforations 47, that extend entirely through said bars, said perforations being preferably countersunk or made flaring at their opposite ends, as shown, to permit of the ready insertion and ejection of the splints. The endless carrier is designed to receive and convey the splints from one part to another of the match-making machine (not herein shown) in a well-known manner. The links connecting the opposite ends of the carrier-bars together are arranged to travel over rigid angle-bars 48, that are firmly bolted to the frame of the machine at each end of the slotted bar 43, said angle-bars being slotted or recessed at 49 to receive the ends of said slotted bar, as most clearly shown in Figs. 2 and 3. The angle-bars operate as a table or support for the

endless carrier, and journaled in fixed bearings above the angle-bars is a shaft 50, on which is mounted a longitudinally fluted or corrugated feed-roll 51, the corrugations 52 of which are suitably spaced apart to successively engage the carrier-bars of the endless carrier. The feed-roll 51 is intermittently rotated by means of suitable driving mechanism, hereinafter described, and operates to feed the endless carrier forward with a step-by-step movement.

The operation of my improved machine as thus far described is as follows: Motion being communicated to the shafts 30 or one of them, the cutter-heads carrying the knives and lifter-bar are alternately reciprocated in an upward and downward direction between their guide-bars. Let it be assumed that the parts are in the position shown in Fig. 1 of the drawings and that the cutter-heads are about to descend. Then the edge of the block of wood 36 will be projected into the path of the knives, as shown. As the cutter-heads descend the beveled face of the lifter-bar will first engage the edge of the block and will be forced rearwardly. The cutting end of the knives will then engage the projecting edge of the wooden block and will cut therefrom a series or row of splints in the form of successive or symmetrical steps, as most clearly shown in Fig. 4. As long as the lifter-bar is in contact with the face of the block it will manifestly be forced back or held in its retracted position, and in order to permit it to conform to the face of the block its edge is serrated, as at 53, to correspond to the serrations formed in the block by the knives. When, however, the lifter-bar has descended to such a point that it clears the lower edge of the block, the springs 29 immediately force the serrated teeth of said lifter-bar directly underneath the splints which the knives at this time have finished cutting, and the lifter-bar and knives immediately commence their upward movement. As they ascend the lower ends of the splints that have been severed from the blocks by the knives rest upon the upper side of the serrated teeth of the lifter-bar 24 and are held thereon by the bent ends 16 and 16^a of the knives. The upper ends of the splints partially rest in the grooves 23 of the flange or plate 22 and as they are elevated rest partially also within the slotted portions of the plate 43, whereby the splints are held vertically upon a firm base or support. As the splints are elevated the lifter-bar operates to force them upward, and the grooves 23 and slots 44 operate to receive and embrace the splints and hold them in a perfectly perpendicular position, so as to enable them to be accurately inserted into the perforations in the carrier-bars. As the parts approach the position shown in Fig. 1 the upper ends of the splints are guided into perforations of the carrier-bars by the means described, and the lifter-bar forcibly thrusts

them into said perforations, wherein they will be firmly held until they are forced out by suitable ejecting mechanism, which forms no part of the present invention and is not therefore shown. The cutting mechanism again descends to cut another row of splints, and during its descent the endless carrier is moved along the distance between two carrier-bars to bring the succeeding carrier-bar into position to receive a row of splints, and as the knives ascend after having cut a row of splints and the splints are being inserted in the carrier-bar the block 36 is fed forward on the work-table. The mechanism for effecting these intermittent movements will now be described.

Journaled one above the other in the sides of the work-table are two shafts 54 and 55, on which are fixed two longitudinally-corrugated feed-rolls 56 and 57, the former of which rotates in contact with the upper side of the block 36, while the roll 57 projects through a suitable opening in the bottom of the work-table and rotates in contact with the under side of the block. The shafts are geared together to rotate in unison by means of gear-wheels 58, fixed on said shafts at one end. The shaft 55 and the shaft 50 of the carrier-feed roll are given an intermittent rotary motion by the following means:

The numeral 59 indicates a driving-shaft on which is fixed a beveled gear-wheel 60, and the latter gears with a corresponding beveled gear-wheel 61, fixed on the lower end of a vertical shaft 62. On the upper end of the shaft 62 is fixed a beveled gear-wheel 63, which gears with a corresponding gear-wheel 64, and fixed on the axis of the gear-wheel 64 is a single-tooth gear 65, provided on its periphery with a single radially-projecting tooth 66, the remainder of the periphery of said gear being smooth. Notches or recesses 67 are formed in the edge of the gear, as shown in Fig. 11 and for the purpose hereinafter explained. Fixed on one end of the shaft 50 of the carrier feed-roll 51 is a gear-wheel 68, provided on its periphery with a plurality of segmental concave faces 69, each corresponding to the curvature of the periphery of the single-tooth gear 65 and arranged to successively contact with the latter, said concave faces being separated from one another by notches or recesses 70, adapted to successively receive the tooth 66 of the single-tooth gear. As is well known by those skilled in mechanics, as long as the smooth periphery of the single-tooth gear rotates in contact with one of the concave faces 69, as shown in Fig. 11, the gear-wheel 68 can have no movement; but when the tooth 66 enters one of the notches or recesses 70 the gear-wheel 68 will rotate in unison with the single-tooth gear 65 until said tooth leaves the notch or recess, when the smooth periphery of the single-tooth gear will again rotate in contact with one of the concave faces 69 and the gear-wheel 68 will again be held mo-

tionless. The gear-wheel 68 in practice will be so set on the shaft 50 of the carrier feed-roll that movement will be communicated to the latter at the same time the knives are descending to cut the splints. On the shaft 59 is fixed a single-tooth gear 71, which gears with a gear-wheel 72, fixed on the shaft 55, the arrangement being identically the same as that just above described, whereby an intermittent rotary movement is given to the shaft 55, and as said shaft and the shaft 54 are geared together to rotate in unison the feed-rolls 56 and 57 will be given an intermittent rotary movement to feed forward the block 36 with a step-by-step movement, the gearing being so arranged that the block will be fed forward during the latter part of the ascent of the knives and while the carrier feed-roll is at rest.

As before explained, the endless carrier 45 consists of a series of parallel transverse perforated carrier-bars 46, flexibly united at their opposite ends by links. The construction of this part of the carrier is most clearly shown in Figs. 12 to 15 of the drawings. Referring to said figures, the numeral 46 indicates the carrier-bars, the ends of which are flattened on their opposite sides, as shown, to form flat journals or extensions 73.

The numeral 74 indicates the links, each consisting, as shown, of a thin metallic plate provided at one end with a round opening or perforation 75 and at its other end with a longitudinal slot 76. The length of the slot 76 is exactly equal to the diameter of the perforation 75. The carrier-bars are disposed with their flat journals or extensions 73 in alinement, and the links are placed in position thereon by placing the slotted end of a link over the flat journal of one bar and its perforated end over the flat journal of the next succeeding bar. Then the slotted end of another link is next placed over the flat journal of the last-named bar and its perforated end over the flat journal of the next succeeding bar. This operation is repeated as often as necessary, the preferred arrangement being such that there will be four links arranged on each flat journal, two of the links having their slotted ends arranged thereon and the other two their perforated ends. From such an arrangement it will be obvious that each bar can rotate in the links which connect it with the bar immediately preceding it, but that the links which connect it with the next succeeding bar are immovable thereon. By these means of connecting the carrier-bars the carrier is rendered flexible, so as to permit it to pass around feed-rollers, guide-pulleys, curves, &c., but the carrier-bars are prevented from having any movement, whereby the perforations in the carrier-bars will always be accurately presented to the ends of the splints for the reception of the latter, and the splints carried by one bar will be held in parallelism with the adjacent bar.

In Figs. 9 and 10 I have shown the preferred form of knife; but in Figs. 16 to 18 I have illustrated three modified forms of knives.

Referring to Fig. 16, the numeral 77 indicates the blade of the knife, a single blade only being employed in each knife. The cutting end of the blade is bent to the right at an obtuse angle to form a cutting portion 78, and is thence bent rearwardly at a right angle to form a cutting portion 79. In Fig. 17 of the drawings I have shown substantially the same form of knife excepting that the blade at its cutting edge is first bent at an obtuse angle to the left to form a cutting portion 78 and then bent at a right angle to form a cutting portion 79. Both these forms of knives are practically the same excepting that they are arranged the reverse of one another. Fig. 18 illustrates the same form of blade excepting that instead of the cutting end of the knife-blade being bent angularly, as shown in Fig. 17, it is bent approximately in the form of a semicircle, as at 80.

The operation of all the different forms of knives illustrated is substantially the same; but the duplex form of knife (illustrated in Figs. 9 and 10) is preferred, owing to the ease with which its cutting edges can be sharpened, as the two blades of each knife may be separated and taken apart and each blade separately sharpened. It will also be noted that the overlapping ends of the duplex blades form right-angular extended kerfs in the edge of the wooden block or stock, which permits the knives to form each succeeding row of splints with a clean even cut without liability of splintered edges and with less resistance to the entrance of the knives.

The several modified forms of knives are each provided on their upper edges with rectangular notches or recesses similar to the notches or recesses 19, described as being formed in the knife shown in Fig. 10, and said notches when the knives are arranged in the rib or flange 12 of the cutter-head register with the longitudinal channel 81, formed in the upper side of the rib or flange and receive the rib 20 of the cover-plate 18 in the manner and for the purpose before described.

Having described my invention, what I claim is—

1. In a match-machine, the combination with a work-table and a vertically-reciprocating cutter-head arranged to reciprocate in front of the table, of a gang of cutters carried by the cutter-head, a reciprocating lifter-bar having a serrated front edge carried by the cutter-head and disposed beneath the cutters, said lifter-bar being movable toward and from the work-table in a horizontal plane, means for projecting the lifter-bar into contact with the edge of the work, and beneath the latter at the end of the downward movement of the cutter-head, and an endless carrier arranged to travel above the cutter-head, substantially as described.

2. In a match-machine, the combination

with a work-table and a vertically-reciprocating cutter-head arranged to reciprocate in front of the table, of a gang of cutters carried by the cutter-head, a lifter-bar carried by the
 5 cutter-head and disposed beneath the cutters, said lifter-bar being movable toward and from the work-table and provided with a serrated edge corresponding to the cuts produced by the knives means for projecting the lifter-
 10 bar into contact with the edge of the work, and beneath the latter at the end of the downward movement of the cutter-head, and an endless carrier arranged to travel above the cutter-head, substantially as described.

15 3. In a match-machine, the combination with a work-table and a vertically-reciprocating cutter-head arranged to reciprocate in front of the table, of a gang of cutters carried by the cutter-head comprising flat blades set
 20 upon edge on the cutter-head, a vertically-grooved plate arranged above the cutters and slightly in rear of the cutting ends of the latter, a fixed vertically-slotted plate arranged above the edge of the work-table and in close
 25 juxtaposition to the line of travel of said grooved plate, a lifter-bar carried by the cutter-head and disposed beneath the cutters, means for projecting said lifter-bar beneath and retracting it from under the cutting ends
 30 of the knives, and an endless carrier arranged to travel above the cutter-head, substantially as described.

4. In a match-machine, the combination with a work-table, of a vertically-reciprocating cutter-head arranged to reciprocate in
 35 front of the table and provided with a vertical rib or flange, said rib or flange being longitudinally channeled on its upper side and provided with a series of transverse grooves, knives fitted in said grooves and provided on
 40 their upper edges with notches or recesses registering with the longitudinal channel in the rib or flange, and a longitudinally-ribbed bar fitted on the upper notched edges of the
 45 knives and bolted to the cutter-head, substantially as described.

5. In a match-machine, the combination with a work-table, of a vertically-reciprocating cutter-head arranged to reciprocate in
 50 front of the table and carrying a gang of splint-cutting knives, of a horizontally-movable lifter-bar disposed beneath the knives and provided with a beveled and serrated front edge arranged to engage the edge of the work and
 55 thrust the lifter-bar from beneath the cutting ends of the knives, springs arranged to force the lifter-bar forward beneath the cutting ends of the knives, and an endless carrier arranged to travel above the cutter-head,
 60 substantially as described.

6. In a match-machine, the combination with a work-table, of a vertically-reciprocating cutter-head arranged to reciprocate in front of the work-table and carrying a gang of
 65 splint-cutting knives, of a horizontally-movable lifter-bar disposed beneath the knives and provided with a beveled front edge ar-

ranged to engage the edge of the work and thrust the lifter-bar from beneath the cutting ends of the knives, horizontal rearwardly-projecting rods connected to said lifter-bar and
 70 loosely fitted in bearings on the cutter-head, coiled springs arranged on said rods and operating to thrust the lifter-bar forward, and an endless carrier arranged to travel above the
 75 cutter-head, substantially as described.

7. In a match-machine, the combination with a work-table, of a vertically-reciprocating cutter-head arranged to reciprocate in front of the work-table and carrying a gang of
 80 splint-cutting knives, a reciprocating lifter-bar having a serrated front edge disposed beneath the knives and provided with a beveled front edge arranged to engage the edge of the work and thrust the lifter-bar horizontally
 85 from beneath the cutting ends of the knives, means for lowering the lifter-bar beneath the horizontal plane of the under side of the work, and means for thrusting said lifter-bar under-
 90 neath the under edge of the work, substantially as described.

8. In a match-machine, the combination with a work-table, of a vertically-reciprocating cutter-head arranged to reciprocate in front of the work-table and carrying a gang of
 95 splint-cutting knives, a horizontally-movable lifter-bar disposed beneath the knives and provided with a serrated front edge corresponding to the cut of the knives and having a wedge-shaped face arranged to engage the
 100 edge of the work and thrust the lifter-bar from beneath the cutting ends of the knives, means for lowering the lifter-bar beneath the horizontal plane of the under side of the work, and means for thrusting said lifter-bar under-
 105 neath the under edge of the work, substantially as described.

9. In a match-machine, the combination with a vertically-reciprocating cutter-head provided with a gang of splint-cutting knives
 110 comprising flat blades set upon edge on the cutter-head, of a work-table arranged in front of the cutter-head, feed-rolls for feeding the work over the table into the path of the knives, an endless splint-carrier comprising
 115 a plurality of perforated bars flexibly connected together and arranged to travel over the cutter-head, means for lifting and guiding the splints into the carrier-bars, a support over which the carrier travels, a corru-
 120 gated roller arranged above the carrier and engaging the carrier-bars, and intermittent gearing for feeding the carrier forward with a step-by-step movement as the cutter-head descends and feeding the work forward as the
 125 knives ascend, substantially as described.

10. A match-splint-cutting knife constructed to cut a complete match-splint, comprising two flat parallel blades set upon edge bent inwardly at an angle toward one another at
 130 their ends and sharpened on their lower edges, substantially as described.

11. A match-splint-cutting knife, comprising two flat parallel blades bent inwardly at

an angle at their ends and overlapping one another, said bent ends being sharpened on their lower edges, substantially as described.

12. A match-splint-cutting knife, comprising two flat parallel blades bent inwardly at an angle at their ends, the extreme bent ends of said blades being each provided with an extension overlapping a correspondingly-recessed portion of the end of the other blade, the bent ends of said blades being sharpened on their lower edges, substantially as described.

13. A match-splint carrier comprising a series of parallel perforated carrier-bars each provided at both its ends with flat journals or extensions, the flat journals on each bar lying in the same plane, and links flexibly connecting the flat journals of said bars, each of said links consisting of a thin plate perforated at one end and slotted at the other, the links being so disposed on the flat journals that all their slotted ends point in the same direction, each carrier-bar having fitted on both its flat journals an equal number of both the slotted and perforated ends of the links, substantially as described.

14. A match-splint carrier comprising a series of parallel perforated carrier-bars each provided at both its ends with flat journals or extensions, the flat journals on each bar lying in the same plane, and links flexibly connecting the flat journals of said bars, each of said links consisting of a thin plate perforated at one end and slotted at the other, the perforations in the links being of a diameter approximately equal to the width of the flat journals to form bearings in which said journals turn, the links being so disposed on the flat journals that all their slotted ends point in the same direction, each carrier-bar having fitted on both its flat journals an equal number of both the slotted and perforated ends of the links, and the combined length of each carrier-bar and its journals being equal to that of each adjacent carrier-bar and its journals, substantially as described.

15. As a new article of manufacture a match-splint-cutting knife, comprising a flat blade bent or deflected laterally at one end to form a crook and sharpened on its lower edge, said crook or deflected portion extending sufficiently far rearward to cut a complete match-splint, substantially as described.

16. In a match-making machine, the combination of a reciprocating cutter-head, a lifter-bar carried thereby and disposed beneath the cutters, said lifter-bar having a serrated front edge and means for moving the lifter-bar underneath the severed splints at the finish of the downstroke of the cutter-head, substantially as described.

17. A match-machine comprising an endless match-carrier consisting of a plurality of transverse perforated bars flexibly connected together at their ends by links, a longitudinally-corrugated feed-roll inside the links, a reciprocating cutter-head, a lifter-bar dis-

posed beneath the cutters and having a serrated front edge, and means for moving the lifter-bar horizontally underneath the severed splints at the finish of the downstroke of the cutter-head, substantially as described.

18. In a match-machine, the combination with a vertically-reciprocating cutter-head provided with a gang of cutters, comprising flat blades set up on edge on the cutter-head, a lifter-bar having a serrated front edge disposed beneath the cutters, and means for moving said lifter-bar underneath the severed splints at the finish of the downstroke of the cutter-head, of a work-table arranged in front of the cutter-head, and a presser-bar arranged to bear on the work with a yielding pressure, substantially as described.

19. In a match-making machine, the combination of a reciprocating cutter-head, cutters comprising flat blades set up on edge on the cutter-head, a lifter-bar carried by the cutter-head and disposed beneath the cutters, and means for moving the lifter-bar underneath the severed splints at the finish of the downstroke of the cutter-head, substantially as described.

20. A match-splint-cutting knife to cut a complete match-splint, said knife comprising a flat blade bent inwardly and thence rearwardly at one end and sharpened on its lower edge to cut two of the four sides of a match-splint, substantially as described.

21. In a match-making machine a match-splint carrier comprising a series of parallel perforated carrier-bars each provided at its opposite ends with flat journals or extensions, and links flexibly connecting the said journals or extensions, each of said links consisting of a thin plate perforated at one end and slotted at the other, all the slotted ends pointing in one direction, the flat journals being fitted in an equal number of both the slotted and perforated ends of the links, in combination with a reciprocating cutter-head, a lifter-bar carried thereby and disposed beneath the cutters, said lifter-bar having a serrated front edge, and means for moving the lifter-bar underneath the severed splints at the finish of the downstroke of the cutter-head, substantially as described.

22. In a match-making machine, the combination of a match-splint carrier comprising a series of parallel perforated carrier-bars each provided at its opposite ends with flat journals or extensions, and links flexibly connecting the ends of said carrier-bars, each of said links consisting of a thin plate perforated at one end and slotted at the other, all the slotted ends pointing in one direction, the flat journals being fitted in an equal number of both the slotted and perforated ends of the links, a support over which the carrier travels, a corrugated roller disposed between the links above the carrier and engaging the carrier-bars, and intermitting gearing for feeding the carrier forward with a step-by-step movement, substantially as described.

23. A match-splint carrier comprising a series of parallel perforated carrier-bars each provided at its opposite ends with journals or extensions angular in cross-section, and
5 links flexibly connecting the ends of said carrier-bars, each of said links consisting of a flat plate provided at one end with a round perforation and at its other end with an angular aperture, the maximum diameter of
10 the angular aperture being equal to the diameter of the round perforation, the angular aperture and round perforation of each link being respectively fitted over the angular extensions of two adjacent carrier-bars, and

each of the carrier-bars having a set of said 15 links fitted at their perforated ends on its angular extensions and a corresponding set fitted at their angularly-apertured ends on said extensions, all the angularly-apertured ends of the links extending in the same direction, 20 substantially as described.

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

EDWARD H. EISENHART.

Witnesses:

C. J. CASE,

LEWIS B. CARTER.