

No. 620,743.

Patented Mar. 7, 1899.

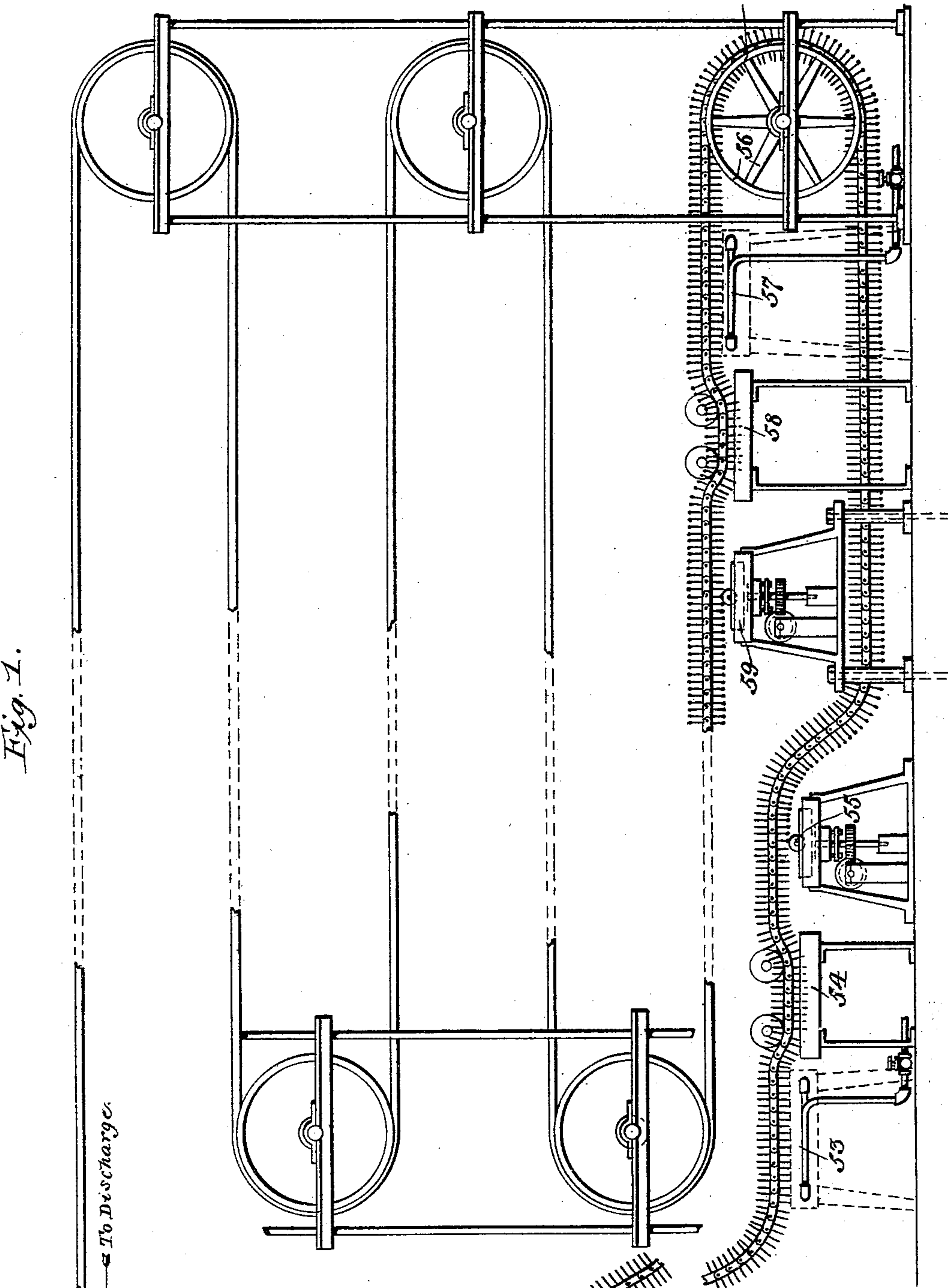
W. E. COOK.
MATCH MACHINE.

(Application filed Nov. 23, 1898.)

(No Model.)

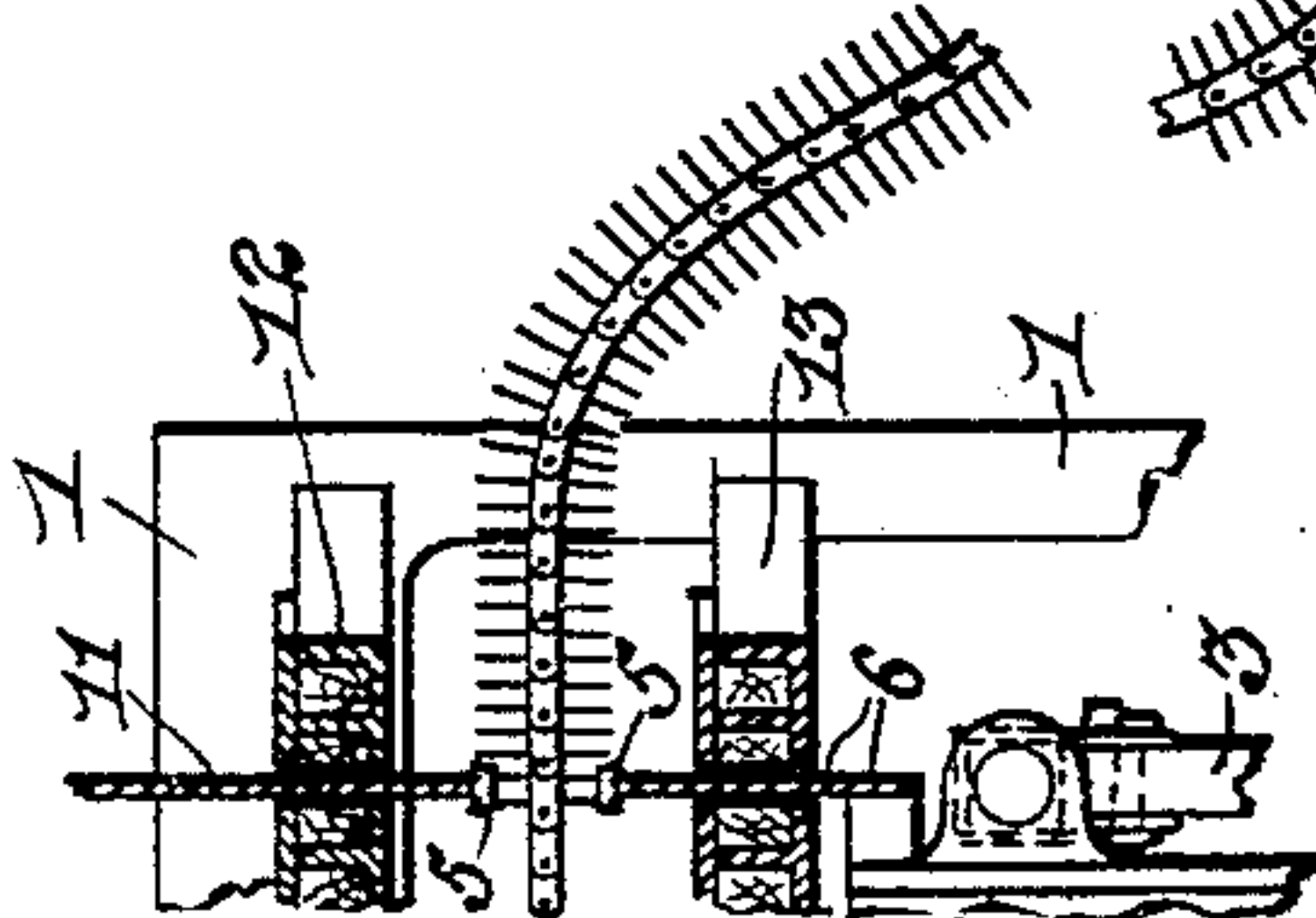
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Fig. 1.



WITNESSES

Everance
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Mary T. Cook

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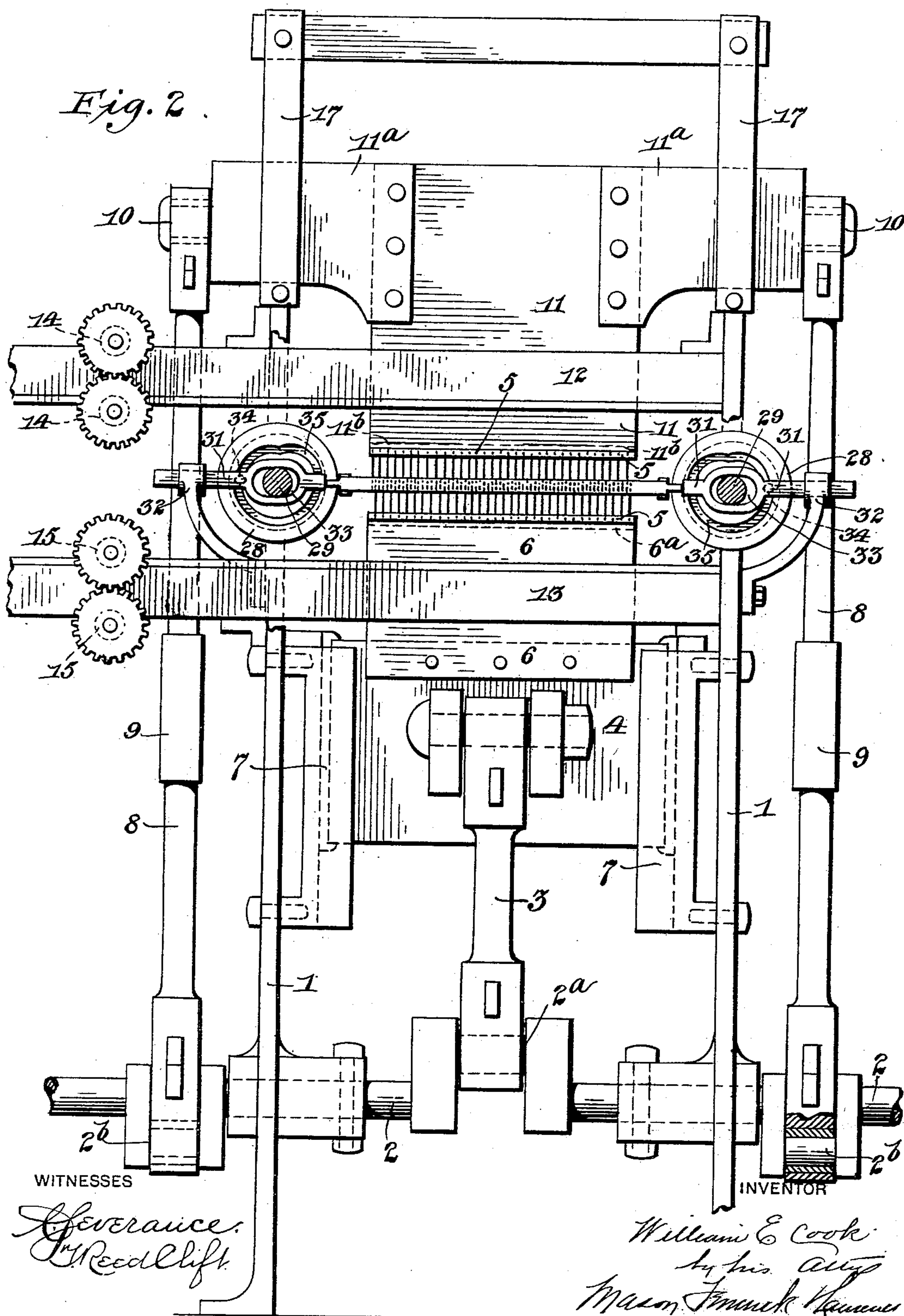
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Fig. 3.

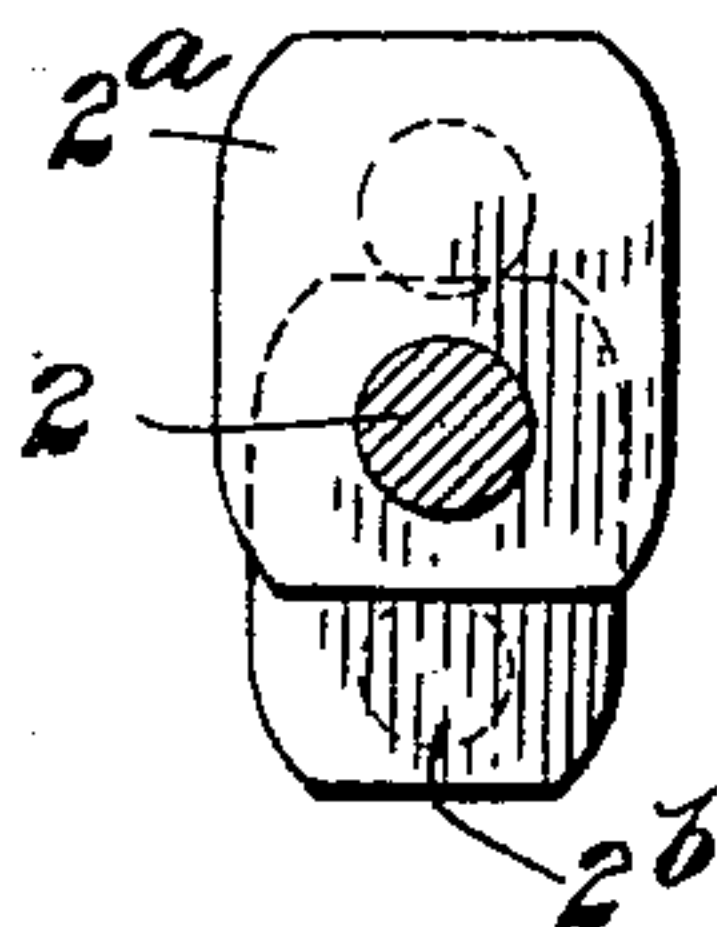


Fig. 6.

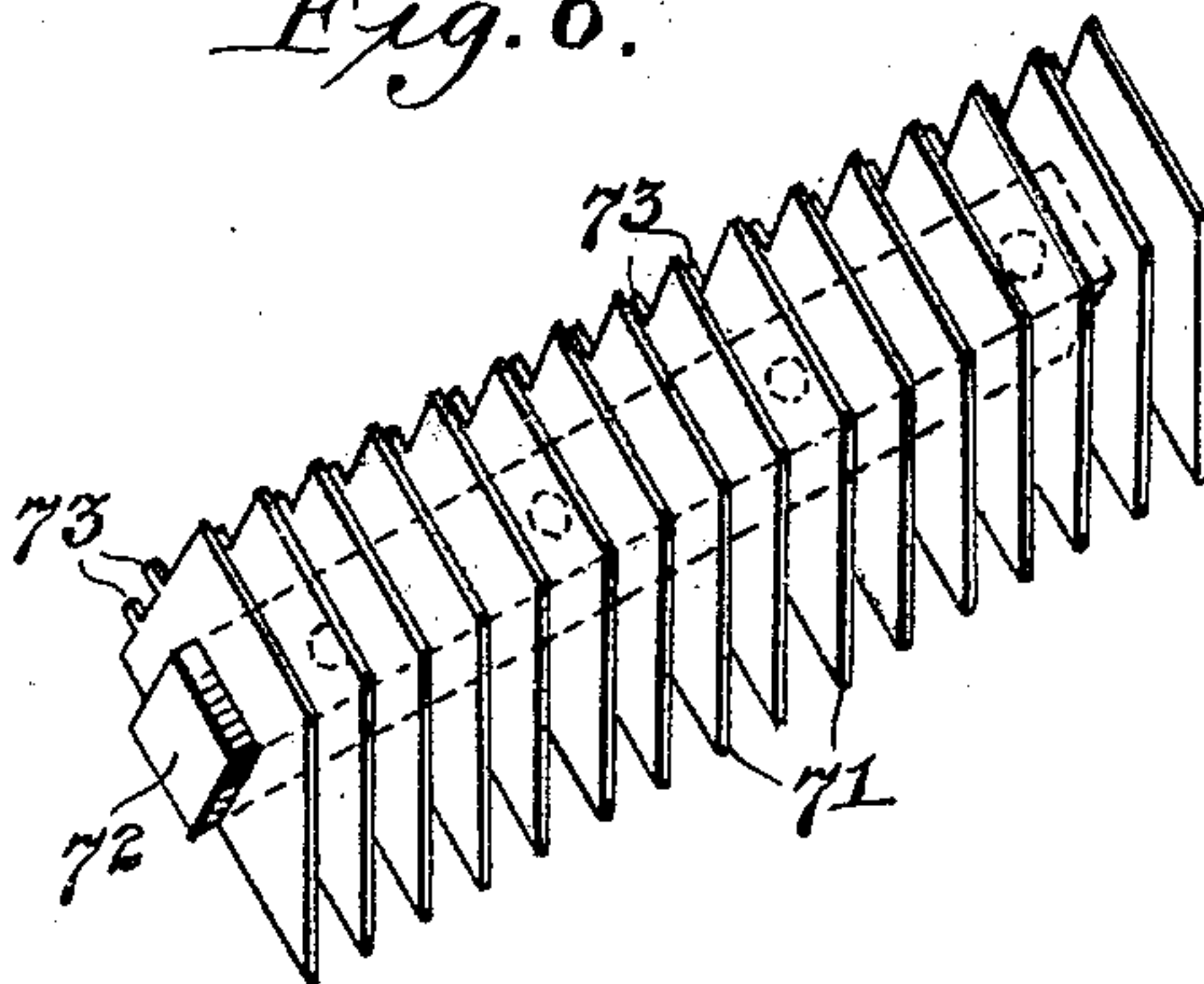


Fig. 10.

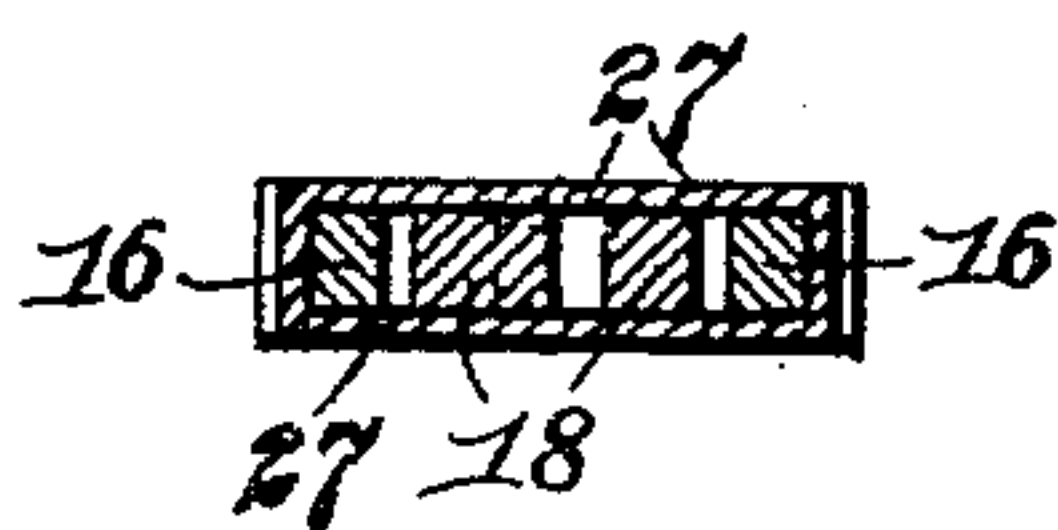


Fig. 11.

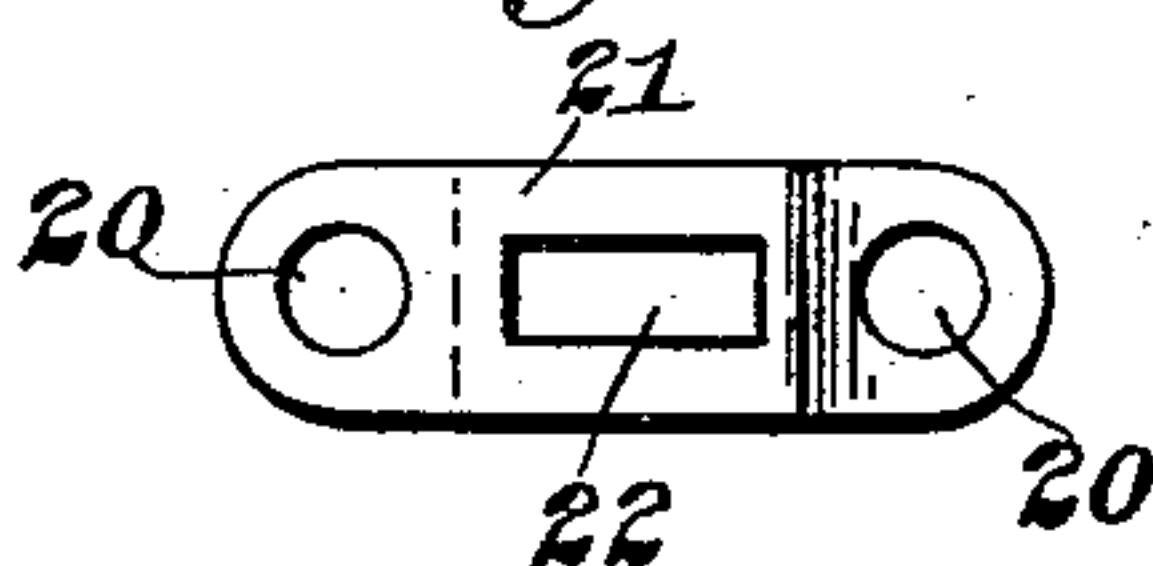


Fig. 12.

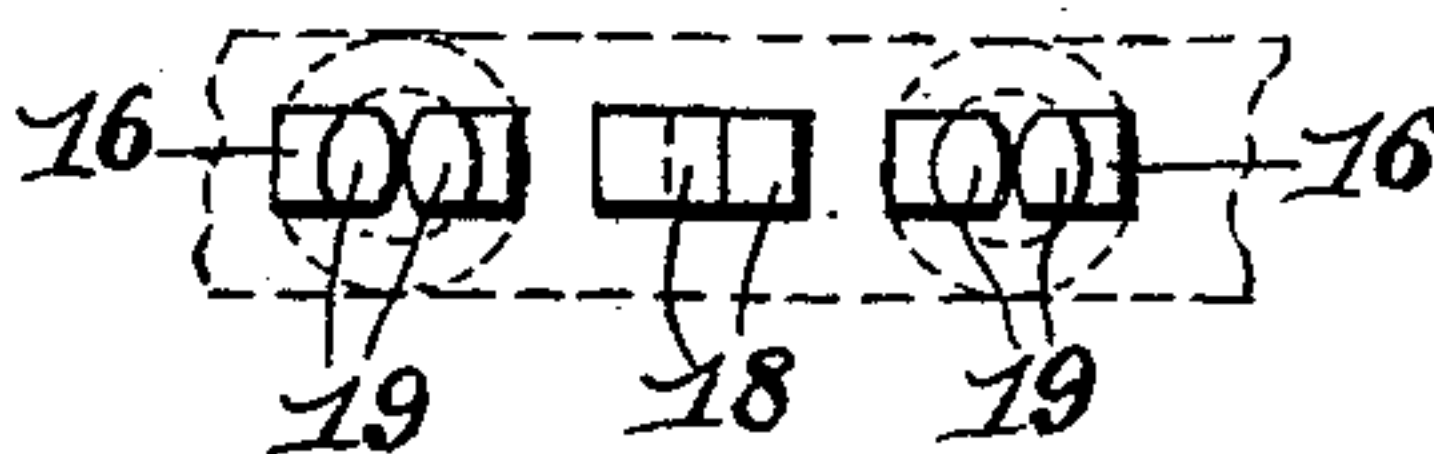


Fig. 13.

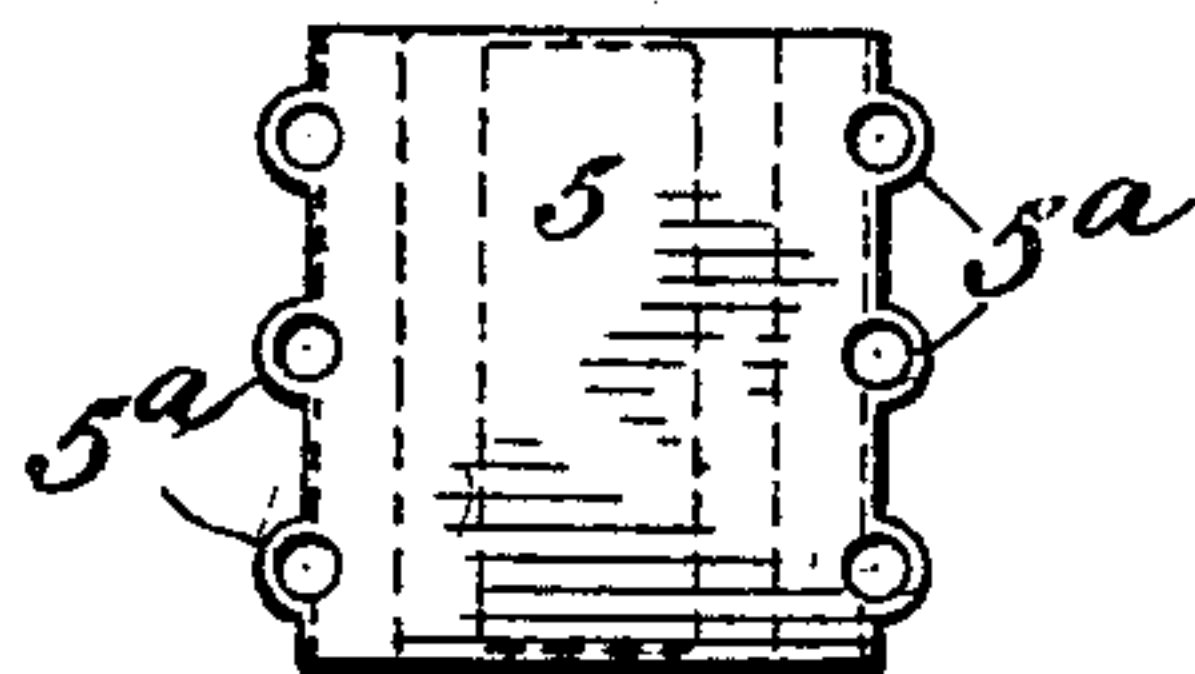
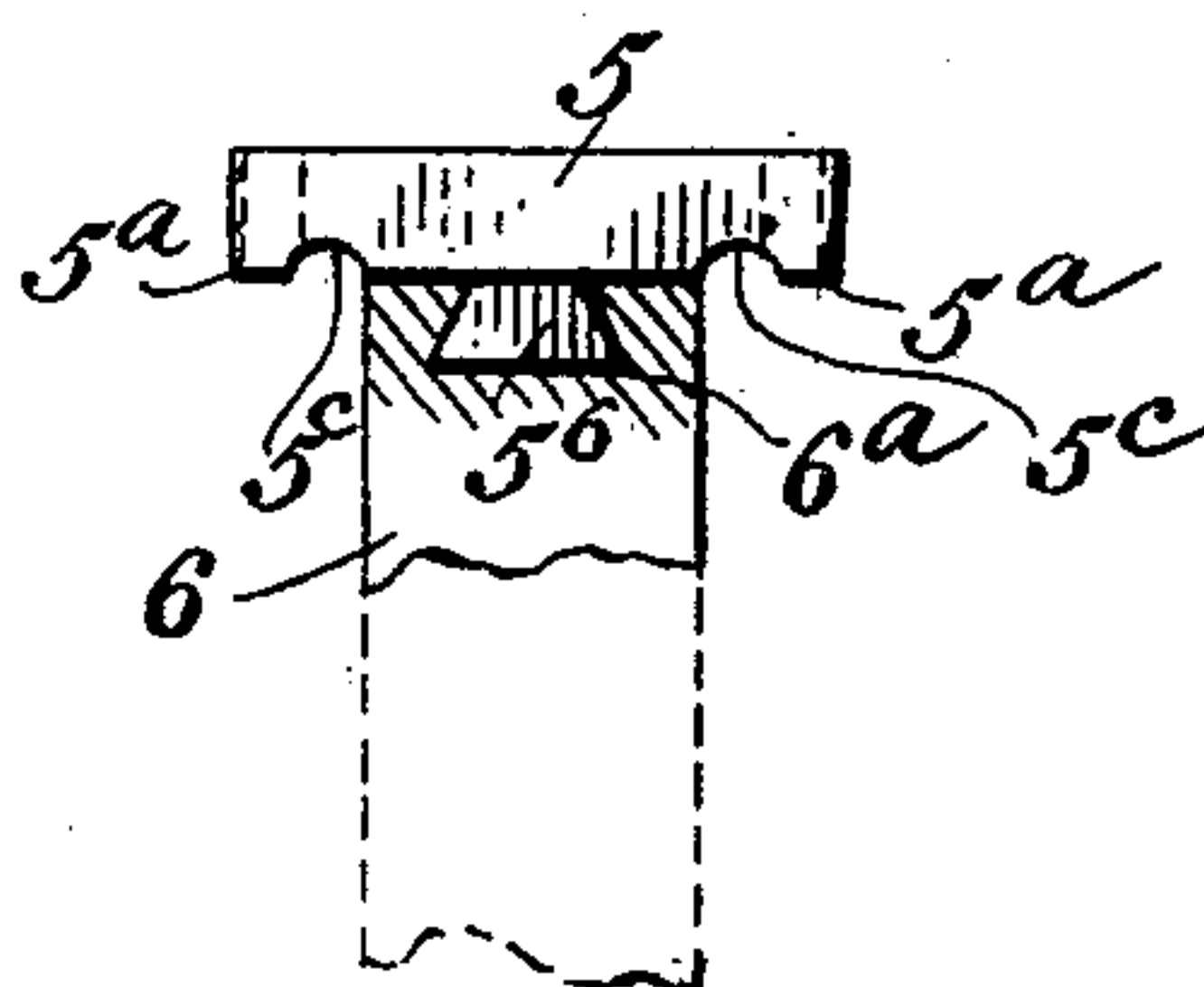


Fig. 14.



WITNESSES

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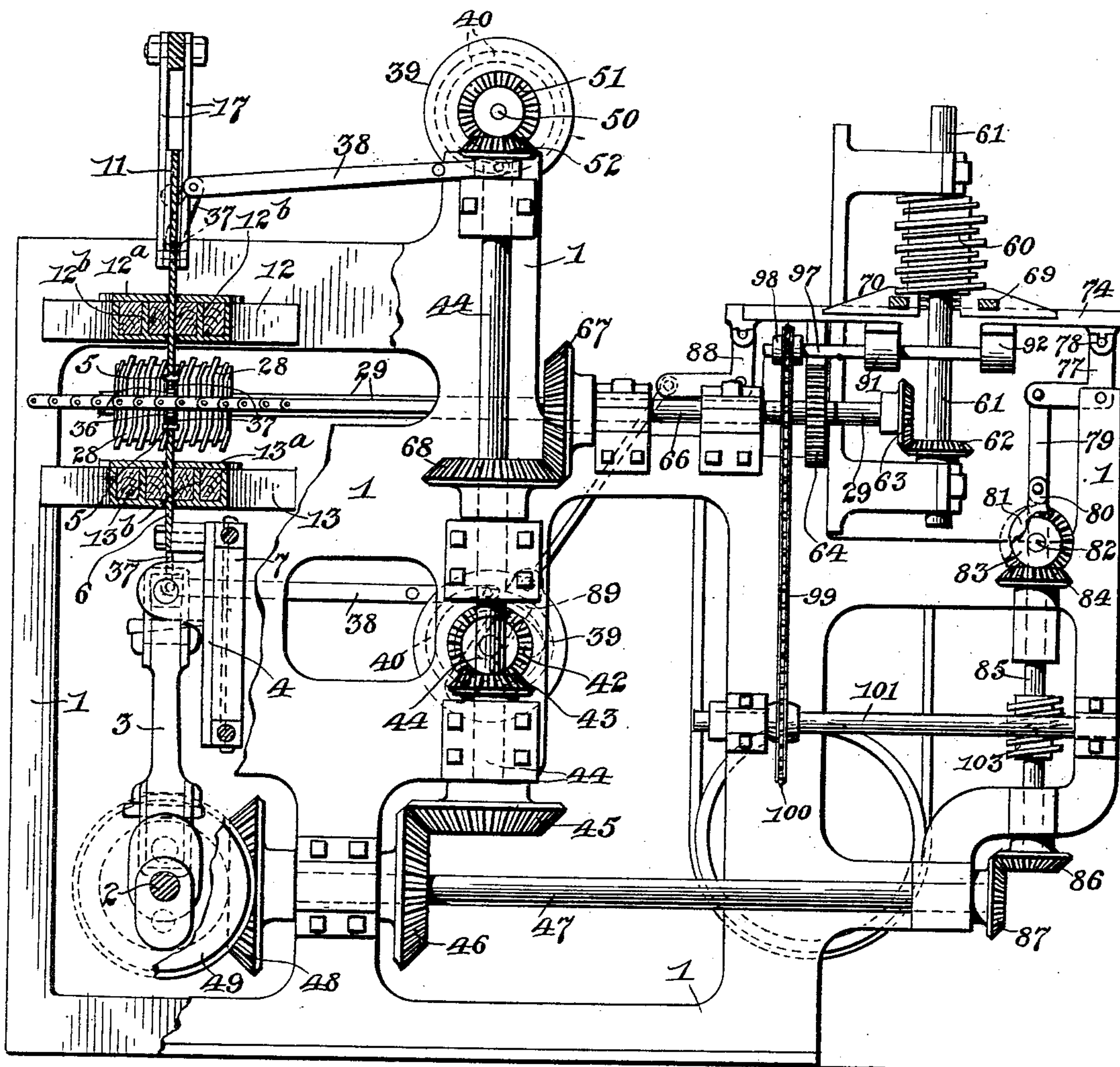
W. E. COOK.
MATCH MACHINE.

(No Model.)

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Fig. 4.



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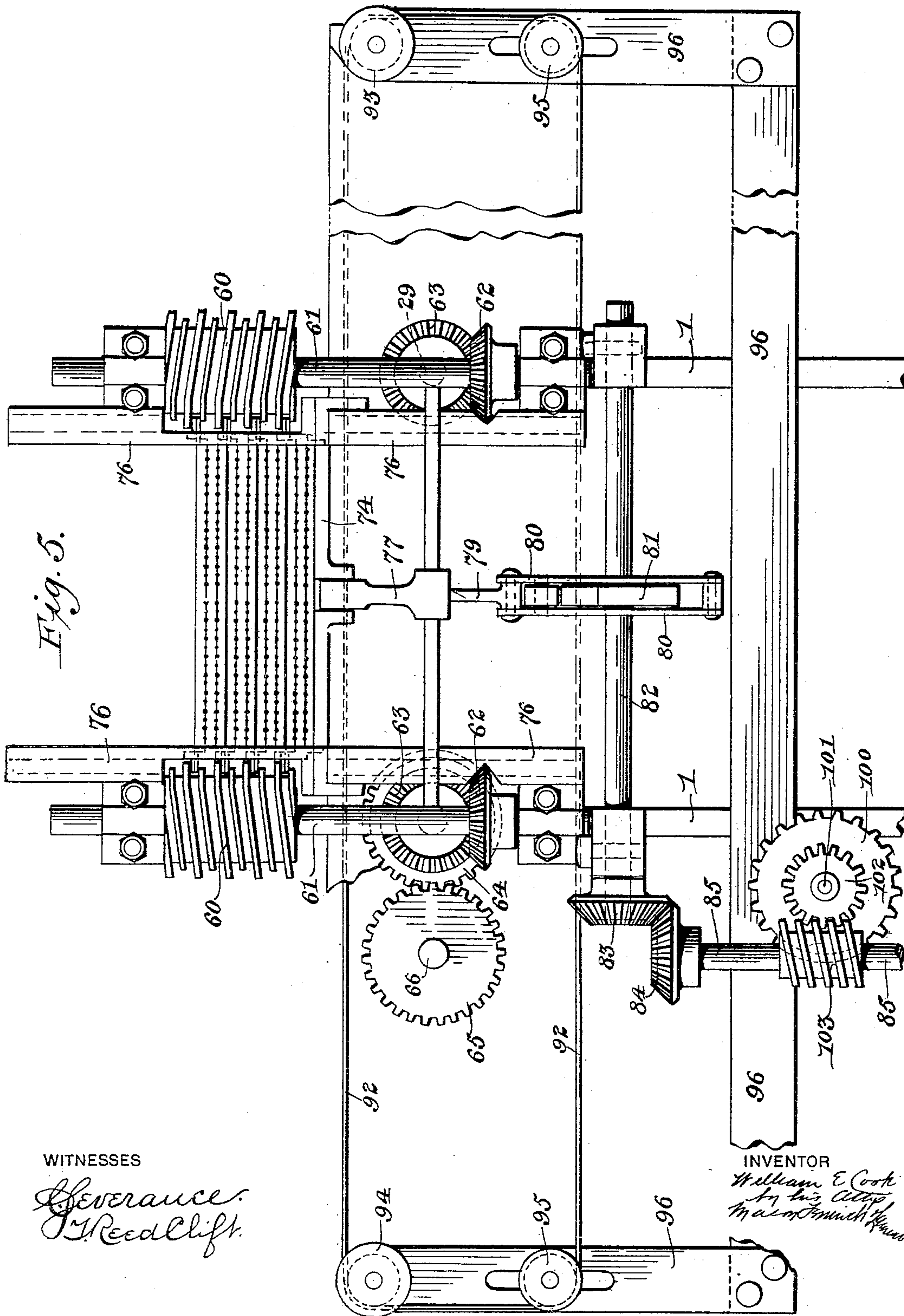
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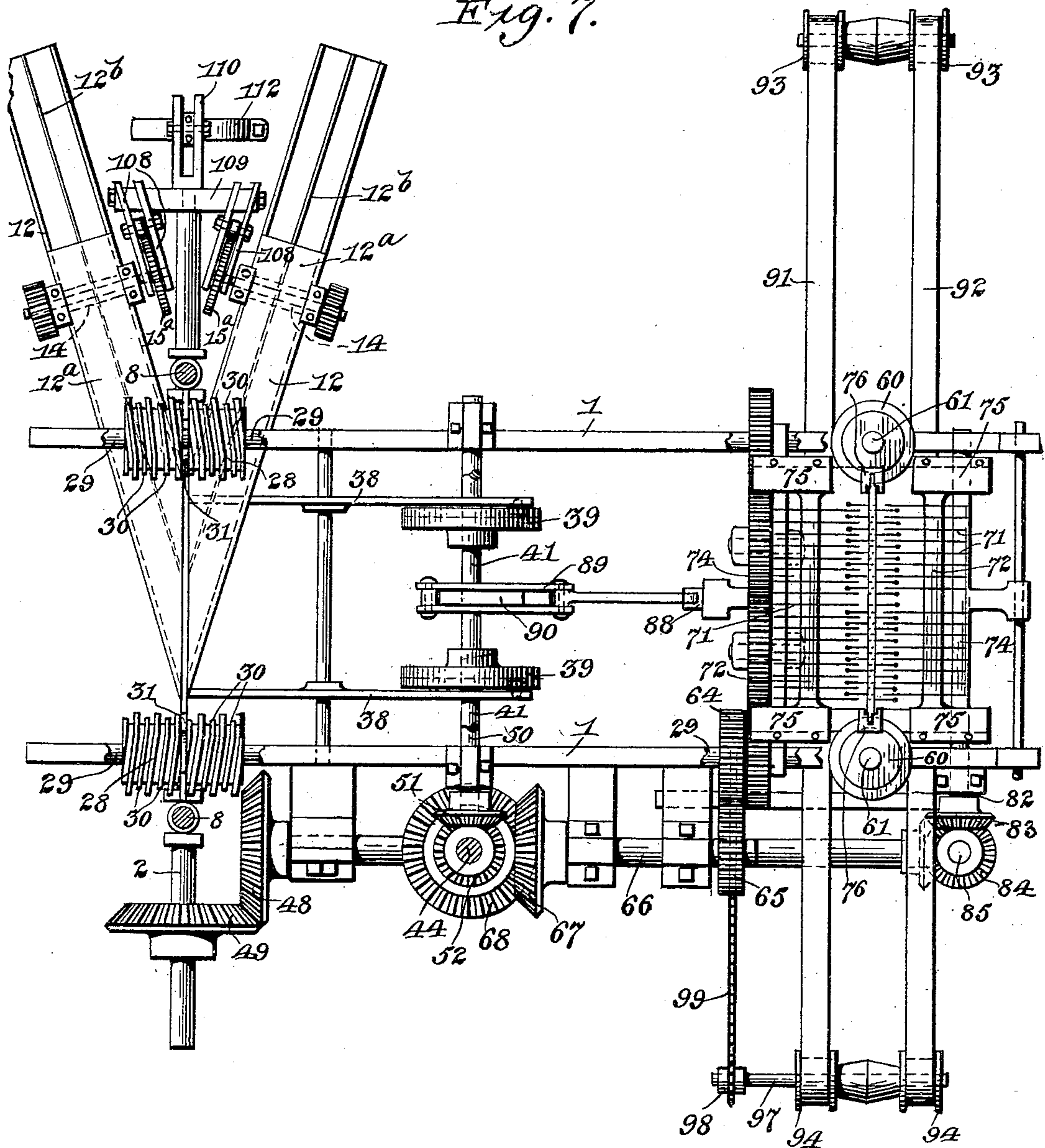
W. E. COOK.
MATCH MACHINE.

(Application filed Nov. 23, 1898.)

(No Model.)

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Fig. 7.



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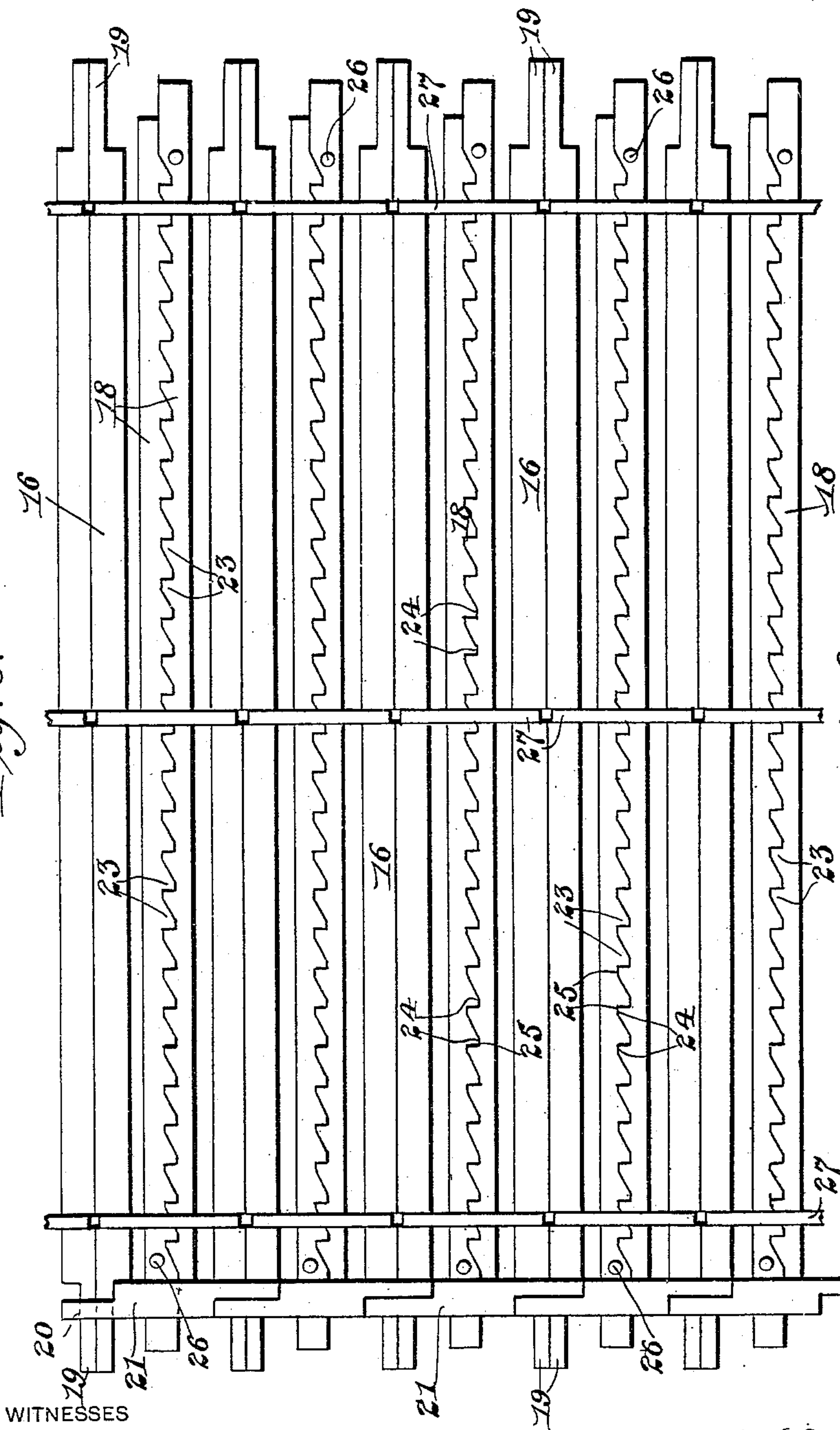
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MATCH MACHINE.

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(No Model.)

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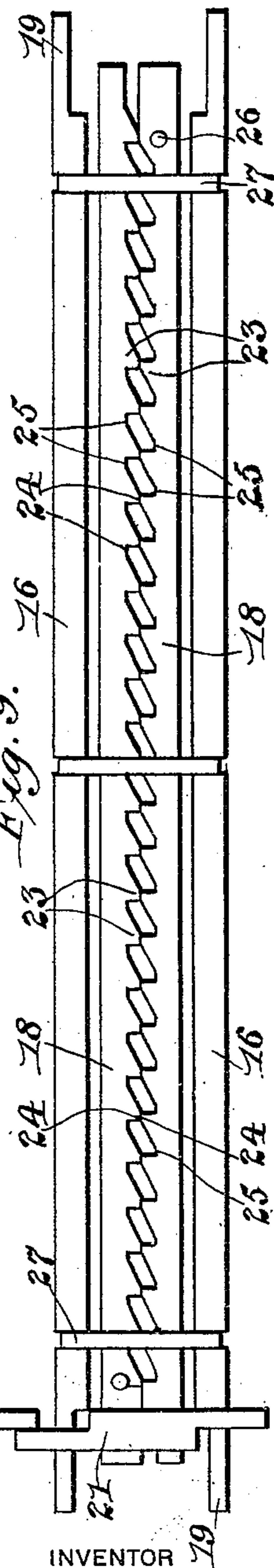
Fig. 8.



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Fig. 9.



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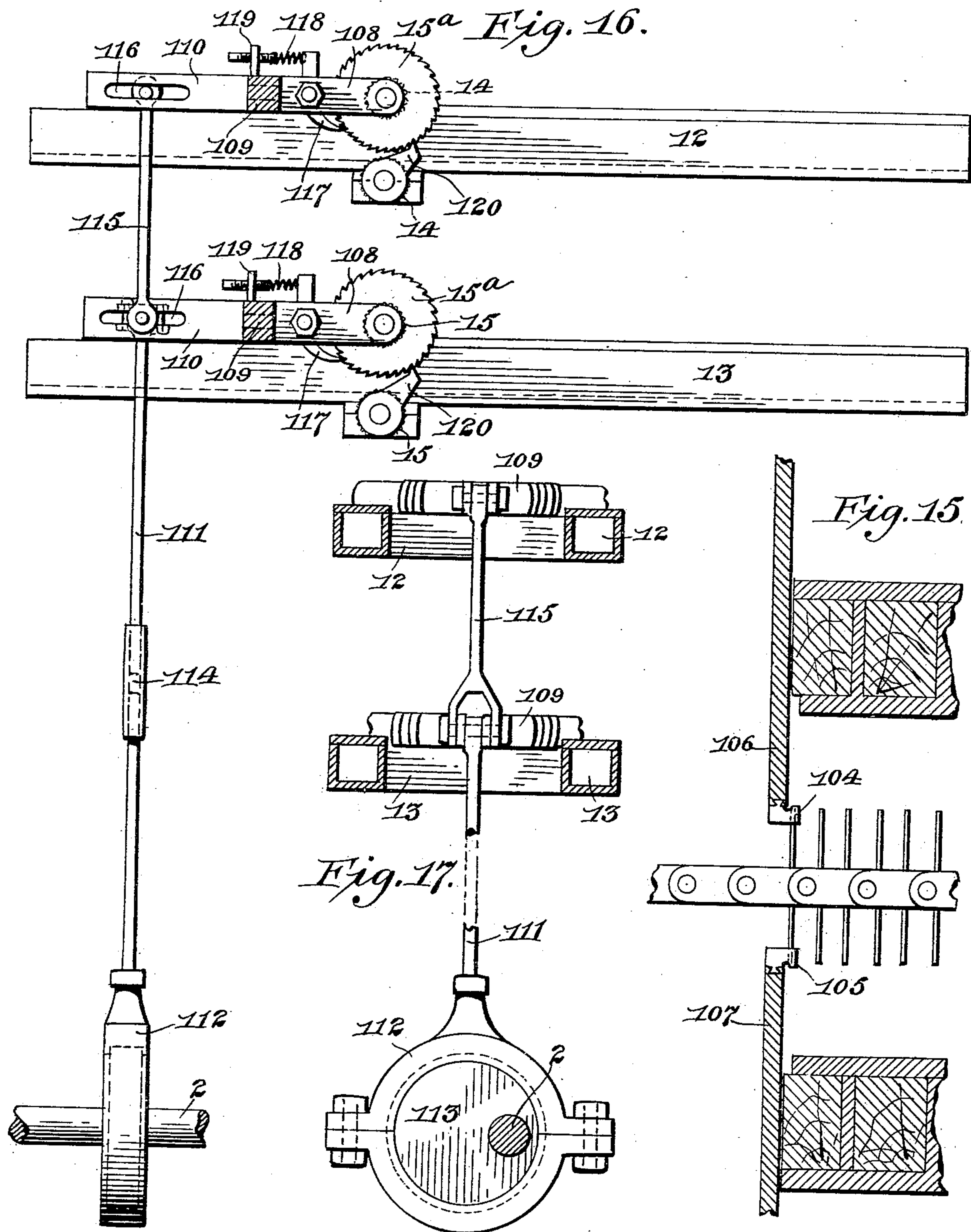
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(No Model.)

(Application filed Nov. 23, 1898.)

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WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM E. COOK, OF OGDENSBURG, NEW YORK.

MATCH-MACHINE.

SPECIFICATION forming part of Letters Patent No. 620,743, dated March 7, 1899.

Application filed November 23, 1898. Serial No. 697,252. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. COOK, a subject of the Queen of Great Britain, residing at Ogdensburg, in the county of St. Lawrence and State of New York, have invented certain new and useful Improvements in Match-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in match-machines, and particularly to that class of match-machines which are adapted to cut splints from blocks of wood by means of suitable cutters and place them in carrier-chains for supplying the igniting-heads to them and drying them.

It consists in the combination, with a carrier-chain, of a crank-shaft having cranks in opposite positions to each other and two cross-heads connected with the oppositely-arranged cranks, whereby the cutters carried by the cross-heads are caused to approach each other and recede at each revolution of the crank-shaft.

It also consists in a machine for cutting splints and a conveyer adapted to receive the splints upon its opposite sides, the splint-cutting mechanism operating to cut the splints and place them in said conveyer from each side thereof.

It also consists in a match-machine having oppositely-moving cutter-heads and cutters carried thereby adapted to cut two rows of splints at a time and place the same in a suitable carrier or conveyer upon each side thereof.

It further consists in a match-machine having a conveyer for receiving splints from each side thereof and means for passing the said conveyer through two sets of paraffining and heading mechanisms, whereby the splints upon each side of the conveyer are supplied with suitable heads.

It also consists in certain other novel constructions, combinations, and arrangements of parts, as will be hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 represents a side elevation of a match-ma-

chine constructed in accordance with my invention and showing the double set of heating, paraffining, and heading mechanisms, together with a suitable drying-frame. Fig. 2 represents an end elevation of the splint-cutting mechanism. Fig. 3 represents a detail cross-section through the main shaft, showing the relative positions of the cranks formed thereon. Fig. 4 represents a side elevation of the splint-cutting mechanism, parts of the same being broken away and shown in section to better illustrate the device. Fig. 5 represents an elevation of the rear end of the splint-cutting mechanism, showing the manner in which the splints are ejected from the splint-carrier. Fig. 6 represents a detail perspective view of one of the plungers used in ejecting the match-splints. Fig. 7 represents a top plan view of the splint-cutting mechanism. Fig. 8 represents a detail top plan view of a portion of the carrier, illustrating a form of chain which I prefer to use, the slats of the said chain being shown as in position to receive the splints. Fig. 9 represents a detail plan view of a portion of the same, showing the slats in their expanded positions for gripping the splints. Fig. 10 represents a cross-section through the same, illustrating the bands for holding the parts in place. Fig. 11 is a detail view of one of the links for holding the chain together. Fig. 12 represents an end view of the slats forming one section of the chain, showing their beveled edges for facilitating the flexible movement of the chain. Fig. 13 is a top plan view of one of the die-plates used in making up the splint-cutters. Fig. 14 is an end elevation of the same. Fig. 15 represents a detail view showing modified forms of cutters in which dies are used which cut only one row of splints at a time. Fig. 16 represents a detail view, partly in section and partly in elevation, showing the mechanism for operating the feed-rollers in the feed-troughs; and Fig. 17 is a vertical longitudinal section through the same.

My invention is designed to supply a machine capable of cutting a great number of match-splints at a time and placing them in a suitable carrier in closer proximity than has heretofore been done, thus economizing

space in the chain and increasing the output of the machine at each revolution of the main shaft.

In carrying out my invention I mount upon the usual frame 1 a main power-shaft 2 in suitable bearings, the said power-shaft being provided with a central crank, as 2^a, and outside cranks, as 2^b 2^b. The central crank 2^a is connected, by means of a pitman 3, with a cross-head 4. This cross-head is mounted and adapted to move in suitable guideways, as 7, secured to the frame 1, as clearly seen in Fig. 2 of the drawings. To the upper end of the cross-head 4 is bolted or otherwise secured a die-bed or cutter, as 6. The upper edge of the die-bed 6 is provided with a dovetailed groove, as 6^a, adapted to receive and hold the die-plates 5, forming the completed cutters. The cross-head 4 and the die-bed 6 form the lower cutter-head of my improved match-machine. I also employ an upper cutter-head comprising a die-bed 11, bolted or otherwise secured to a cross-head, as 11^a. This cross-head is mounted in suitable guides, as 17, secured upon the upper part of the frame 1, the said guides being connected at their top by a suitable cross-bar for holding them in true. The ends of the cutter-head 11^a project outside each of the guides 17 and are provided with wrist-pins, as 10, which are connected, by means of suitable pitmen 8 8, with the outside cranks 2^b of the shaft 2. In order to adjust these pitmen to give the upper cutter-head the right throw, turn-buckles, as 9, are interposed in the length of each. The lower edge of the die-bed 11 is also provided with a dovetailed groove, as 11^b, in which the die-plates 5 are adapted to be secured for forming the upper cutter. It will be seen that by arranging the cranks of the main shaft as described and shown each revolution of the shaft 2 will cause the cutters to approach each other and then to recede, thus enabling each to cut two rows of splints and insert them into a suitable carrier borne between them. The die-plates forming the cutters are preferably constructed with cutting edges or dies upon each side thereof, as at 5^a 5^a, the said cutting edges being adapted to project beyond each side of the die-beds 6 and 11. Each of the die-plates 5 is provided with a dovetailed tenon, as 5^b, adapted to slide into a socket 6^a or 11^b of the lower and upper die-beds, respectively. By slipping the die-plates into these dovetailed slots and placing a number of dies side by side cutters are formed upon the edges of the die-beds, which are capable of cutting two rows of splints, one upon each side of the die-plates. An important feature of the die-plates 5 is the grooving of the under side of the same, as at 5^c 5^c, the said grooves forming a series of cutting edges between the cylindrical splint cutters or dies. These cutting edges operate to trim the slight ribs left upon the blocks after each reciprocation of the cutter, thereby rendering it smooth and ready for the cutting

of the next row of splints. It will be apparent that by constructing the die-plates with a dovetailed connecting portion they may be readily taken out and replaced should they become dull or injured in any way. It will appear from this description that the double oppositely-moving cutter-heads carrying the double-edged cutters are capable of cutting four rows of splints at a time. Blocks of wood may be fed to these cutters in any suitable manner; but I prefer to accomplish this by means of the troughs 12 and 13, arranged above and below the splint-carrier and in suitable proximity to the die-plates to permit of the splint-cutting operation. These troughs are preferably four in number, extending to each side of the die-plates above and below the said splint-carrier. Both the upper troughs 12 and the lower troughs 13 are preferably placed at an angle to the cutter and converge to a common line, as seen in Fig. 7, so that one attendant can easily reach all four troughs. As the troughs approach the cutter they are preferably provided with closing top portions, as at 12^a and 13^a, thus completely inclosing the blocks of wood fed through them, as will appear from an examination of Fig. 4. The troughs are also preferably provided with longitudinally-arranged division walls or plates 12^b 13^b, so that smaller blocks of wood may be used for supplying the splints. The blocks of wood are preferably fed forward in the troughs by means of fluted or corrugated rollers, as 14 and 15, the rollers being arranged so as to engage the upper and lower surfaces of the wood. The shafts of these rollers project beyond the troughs and are provided with operating-ratchets, as 15^a, connected with any suitable operating mechanism. The upper and lower rollers in each trough are connected by means of suitable gearing to make them operate simultaneously.

Any suitable carrier may be employed in connection with my improved cutting device, it only being necessary to provide the proper number of apertures to receive the splints cut and to so support the carrier in the frame that it may receive the splints from both sides. It will thus be apparent that a carrier formed of small plates having perforations therein may be employed. So, also, chains composed of spring-pressed slats and adapted to be fed and opened by means of cams in the common and well-known manner may be employed in connection with my cutting device. However, I prefer to employ a carrier constructed as illustrated in Figs. 8, 9, 10, 11, and 12 of the drawings. In this style of carrier it will be seen that I employ outer slats, as 16, and inner expanding slats 18. The outer slats 16 are provided with reduced ends, as 19, which are adapted to project into bearings, as 20, formed in connecting-links 21. These connecting-links, as seen in Figs. 8 and 9, join the sections of the chain at their ends so as to produce an endless flexible carrier-chain. The links 21 are provided centrally with a slot, as

22, through which the ends of the intermediate expanding slats 18 may project. These slots 22 are made of sufficient length to accommodate the movement of the expanding slats. In order to operate the expanding slats, they are preferably provided upon their adjacent edges with a series of teeth or projections, as 23, said teeth being provided with flattened points, as 24, and the sockets between them having short straight faces, as 25. When the slats 18 are in position to receive the charge of splints, as seen in Fig. 8, the projections or teeth of one slat occupy the spaces between the teeth of the adjacent slat, so that wide spaces are left between the expanding slats and the outer slats 16 for receiving the splints. After the splints have been inserted in these spaces the projecting ends of the expanding slats 18 are forced inwardly, as seen in Fig. 9, causing the teeth to ride up upon each other and separate the said expanding slats so as to grip the splints between them and the other slats. When in this position, the flat faces 24 of the projections 23 are brought into engagement with each other, as seen in Fig. 9, so that the slats will remain in their expanded positions until the splints are ejected. Each of the expanding slats is preferably provided with a stud, as 26, which is adapted to engage any suitable projection upon the machine-frame to return the inner slats to their collapsed position before receiving a new charge of splints. Bands, as 27, preferably surround the slats of each section, holding them in proper place. These bands are preferably countersunk in the surface of the slats, so as to offer no obstruction to the movement of the same.

The carrier-chain is preferably fed forward in the machine by means of suitable cams, as 28 28, which are mounted upon shafts, as 29, suitably connected with the operating parts of the machine. The cams 28 are provided with straight portions for holding the carrier stationary upon receiving the charge of matches and inclined portions for feeding the chain forward after receiving each charge. The projecting ends 19 of the slats 16 extend sufficiently far beyond the links 21 to engage the ribs of the cams. In order to hold the chain in a properly-centered position over the cutter, the cams may be provided with intermediate ribs, as 30, which prevent the chain from moving too far forward.

In connection with the feeding mechanism I also employ a device for expanding the inner slats, the said device comprising bolts or plungers, as 31, having their outer ends guided in bearings, as 32, while their inner ends are provided with loops or slots, as 33, which surround the cam-shafts 29. Antifriction-rollers, as 34, are secured to the plungers 31 and engage cam-paths, as 35, formed in the face of one of the cams 28 upon each side of the machine. The cam-paths are so timed with respect to the movement of the cutter that when the splints have been brought between

the open slats of the carrier the plungers 31 will be forced forward against the ends of the expanding bars 18 and force them inwardly, thus causing their wedges or projections to spread apart or expand the inner slats against the ends of the match-splints. The plungers are immediately retracted by the shape of the cam-paths, so that the chain can be fed forward.

I preferably employ guides for directing the match-splints into the carrier. These guides consist of separating-bars, as 36, carried by vertical rods, as 37. These guides are preferably made and operate in the same manner as the guides illustrated in my previous application for a patent upon a match-machine, filed June 1, 1898, Serial No. 682,269, in which it will be noted that the rods carrying the guides are connected with levers, as 38, which engage cams, as 39, having cam-paths 40. As described in my previous application, these cam-paths are so shaped and arranged with respect to the movement of the cutters that the guides are borne between each new charge of splints and then carried along with the same until within a short distance of the carrier, where they stop, and after the splints have been gripped by the carrier recede at once. In connecting up this device in my present machine the cams 39 for the lower guide are mounted upon a shaft, as 41, arranged transversely in the frame 1 and having a beveled gear, as 42, at one end meshing with a corresponding gear 43 upon the upper end of a shaft 44. The lower end of the shaft 44 carries a gear 45, meshing with the gear 46 upon the shaft 47. This shaft in turn receives its motion through the bevel-gears 48 and 49 from the main power-shaft 2 of the machine. The cams 39 for operating the upper guide are mounted upon a shaft, as 50, supported by the upper part of the frame 1, the said shaft having at one end a bevel-gear 51, meshing with a corresponding bevel-gear 52, also secured to the shaft 44, just described. By this means both guides will be operated at the proper time to direct the splints from the upper and lower cutters into each side of the splint-carrier. After receiving its charge of match-splints the chain passes from the cutting mechanism to a suitable heater, as 53, thence to a paraffining mechanism, as 54, whence the carrier guides the splints to a composition-vat, as 55, whereby the splints upon the under side of the chain receive their igniting-heads. The carrier is then directed forward to a suitable pulley, as 56, and returns over a second heating device 57 and paraffining-pan 58 to another composition-vat 59, from the rollers of which the splints upon the other side of the carrier receive their igniting-heads. The splints having thus been all provided with suitable heads, the conveyer carries them back and forth through the drying-frame, of suitable construction, finally returning them to the frame 1 of the splint-cutting mechanism, where the

splints are to be ejected from the carrier. The carrier preferably approaches the ejecting mechanism from above, descending between vertical feeding-cams, as 60, which are
 5 constructed in the same manner as the cams 28 at the forward end of the machine. These cams 60 are mounted upon vertical shafts, as 61, which are connected by means of bevel-gearing, as 62 63, with the shafts 29 of the
 10 cams 28. The shafts 29 are connected by means of gear-wheels 64 65 with counter-shafts 66, the said counter-shafts receiving motion from the vertical shafts 44 through bevel-gearing 67 and 68. The cams 60 thus
 15 receive the same impulse that is imparted to the cams 28 and revolve in unison therewith.

It will be noted that in using a carrier in which matches have been inserted from opposite sides it is necessary to provide ejecting-plungers adapted to operate from each side of the chain. This ejecting mechanism forms an important part of my improved match-machine and comprises oppositely-moving plungers, as 69 and 70, carrying suitable means for pushing the matches from the carrier. Each of these plungers comprises a series of plates, as 71, mounted upon a carrier-bar, as 72, the plates being spaced apart the proper distance to coincide with the ends of
 25 the match-splints upon the opposite side of the splint-carrier. The splints, it will be remembered, were placed in the sections of the splint-carrier two rows at a time on each side thereof, and in order to eject both rows at
 30 once each of the plates 71 is provided with two projections, as 73 73, arranged opposite the ends of the match-splints. As clearly seen in Fig. 7 of the drawings, the splints are arranged alternately upon opposite sides of
 40 the carrier, and the plates of the plungers 69 and 70 are therefore arranged each opposite to the spaces between the plates of the other. When the plungers are brought simultaneously toward the carrier, the projections 73
 45 of each encounter the ends of the splints opposite them and push them out of the carrier in opposite directions at the same time. The carrier-bars 72 of the plungers are bolted or otherwise secured to suitable followers,
 50 as 74, which move in guide-bearings 75, arranged upon each side of the machine. As the carrier-chain descends to the cams 60, they preferably enter guides, as 76, so that they are brought accurately opposite and
 55 half-way between the inner ends of the plunger-plates 71. An end view of the guide 76 appears in Fig 7 of the drawings. In Fig. 5 it will be seen that the guides 76 are partially cut away opposite the cams 60, so that the
 60 said cams may engage the ends of the slats composing the carrier-chain. In order to operate the plungers 71 at the proper time, they are also connected with the power-shaft 2 by suitable gearing. For reciprocating the
 65 plungers 69 a bell-crank lever 77 is pivotally mounted upon the frame 1 and is provided with a bifurcated end, as 78, engaging a pin

upon the under side of the follower 74. The other end of the bell-crank lever 77 is connected by a link 79 with a cam-engaging loop 70
 80. This loop is operated by means of a cam, as 81, secured to the shaft 82, arranged transversely of the frame 1 and receiving its motion through the bevel-gearing 83 and 84 from the vertical shaft 85, which in turn is actuated through the bevel-gearing 86 and 87 by
 75 means of the shaft 47. The plunger 70, upon the other hand, is also operated by a bell-crank lever 88, engaging a pin on its follower and connected by suitable links with
 80 a cam-engaging loop 89. This loop engages a cam 90, secured to the shaft 41, which receives its motion as heretofore described. These cams 81 and 90 are so timed with respect to the operation of the conveyer or carrier chain that the plungers 69 and 70 will be
 85 simultaneously brought toward each other for ejecting the splints from both sides of the carrier-chain at once. The particular structure of plunger, with its ejecting-plate, is
 90 especially well adapted for the purpose described, for it will be noted that each completed match-passes between the plates of the plungers, as clearly seen in Fig. 7. These
 95 plates therefore when the matches are ejected serve as guides to keep the matches straight after leaving the carrier. The carrier-bars 72 also being arranged opposite the ends of the matches retard the movement of the ejected matches somewhat, so that they are not
 100 thrown quite as far as they would be otherwise. The movement of the plungers, however, is such that the said bars 72 offer a yielding retarding mechanism, because they are moving away from the carrier at this time.
 105 When the matches are ejected, they are preferably received upon belts, as 91 and 92, which are arranged upon each side of the carrier. These belts are supported upon pulleys, as 93 and 94, and pass around adjusting-pulleys, as 95, so that any slack in the said belts may be taken up. All of the belt-pulleys thus described are supported upon an auxiliary frame 96, mounted upon the main frame 1 and extending laterally with respect to the
 115 same. The belts receive their movement from the actuating-pulleys 94 94, which are secured to a shaft 97, carrying a sprocket-wheel 98. A sprocket-chain, as 99, connects this sprocket-wheel with a sprocket-wheel, as 100, upon a
 120 shaft, as 101, carrying a worm-wheel 102, which engages a worm, as 103, upon the shaft 85, from which it receives its motion. It will thus be seen that the belts receive their movement through suitable gearing from the main
 125 shaft 2 of the machine. By means of these belts the completed matches can be collected and carried to any suitable point, where they may be placed in boxes either by hand or machinery, as may be desired.
 130

While I have described and shown my splint-cutting mechanism as employing cutters adapted to cut rows of splints upon each side of the cutter-heads, yet it will be appar-

ent that I may employ single cutters—that is, cutters adapted to cut splints upon only one side of the cutter-head or die-plate—without departing in the least from the spirit of my invention. It will be apparent by reference to Fig. 15, in which single cutters, as 104 and 105, are secured upon the die-plates 106 and 107, that a machine constructed in this manner can be operated in the same way as heretofore described with respect to the double cutter.

Although, as stated above, I may employ any suitable ratchet mechanism for operating the feed-rollers in the troughs, yet I prefer to use mechanism illustrated in Figs. 16 and 17 of the drawings, a top plan view of the same being shown in Fig. 7 of the drawings. This mechanism comprises arms or levers, as 108, which preferably are formed of two pieces bolted together and extending on either side of the ratchet-wheels 15^a 15^b. These arms extend to one side of the ratchet-wheels and are joined by a cross-bar, as 109. Secured about centrally of the cross-bar 109 is an outwardly-extending arm 110, which is preferably bifurcated at its outer end. The upper end of a pitman, as 111, is secured between the bifurcated ends of the lower arm 110, as shown in Figs. 16 and 17. To the lower end of the pitman is secured an eccentric-strap, as 112, which surrounds and engages an eccentric, as 113, secured upon the main power-shaft 2 of the machine, so that the revolution of the said power-shaft will operate to move the ratchet mechanisms up and down and impart a feed movement to the rollers. A turnbuckle, as 114, may be inserted between the ends of the pitman to adjust its length. A connecting-link, as 115, joins the arms 110 of the upper and lower feed-troughs, so that both are moved simultaneously by means of the eccentric 113. The bolts which secure the pitman and the connecting-link to the arms 110 are preferably passed through elongated slots, as 116, formed in the ends of the arms 110. In order to engage the ratchet-wheels 15^a, pawls, as 117, are pivotally secured between the side portions of each of the arms 108 and are held in engagement with the said ratchets preferably by means of springs, as 118, secured to any suitable standard, as 119, mounted on the frame of the ratchet mechanism. In order to prevent any retrograde movement of the ratchet-wheels, dogs, as 120, are pivotally mounted upon the axles of the lower feed-rollers to engage the peripheries of the ratchet-wheels. Inasmuch as the arms 108 operate upon shafts whose axes are at an angle to each other, a little leeway is left between them and the ratchet-wheels in order to avoid any binding of the parts. The up-and-down motion of the mechanism is very slight, however, so that there would be practically very little binding action, if any. It will be apparent that this mechanism affords a simple and effective means of producing a continued feed of

the blocks of wood in the troughs when the cutting mechanism is being operated.

While I have shown in the drawings my die-plate as moving in a vertical plane and above and below the carrier-chain, yet it will be apparent that they may move horizontally, if desired, or at any angle that may be required without changing the spirit of this invention.

From the above description it will be seen that I am enabled to produce a match-machine which is very compact and which is capable of cutting a great number of match-splints at a time and inserting them into a carrier-chain with a very economical use of space. The arrangement of the device enables me to place a great number of splints in a chain in close proximity to each other. The ejecting mechanism also is of very novel construction and is capable of performing its work perfectly, notwithstanding the closeness with which the splints are arranged in the carrier. All the parts of the mechanism are compactly arranged and receive their motion from the central power-shaft.

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

1. In a match-machine, a splint-cutting mechanism, comprising cross-heads carrying the splint-cutters, the said cutters being mounted opposite to each other and arranged so as to cut splints when they recede from each other and to deliver the splints when they approach each other, and a shaft having cranks arranged diametrically opposite for moving the cross-heads toward and away from each other at each revolution of the crank-shaft, substantially as described.

2. In a match-machine, the combination with a suitable conveyer for receiving match-splints, of a splint-cutting mechanism adapted to cut splints and place them in the said carrier from opposite sides thereof, substantially as described.

3. In a match-machine, the combination with a conveyer of a splint-cutting mechanism comprising oppositely-moving cross-heads carrying cutters and arranged upon opposite sides of the said conveyer, means for reciprocating the said cross-heads toward and away from each other for cutting the splints and inserting them upon opposite sides of the conveyer, substantially as described.

4. In a match-machine, the combination with a suitable carrier, of reciprocating splint-cutting cross-heads arranged upon opposite sides thereof, a shaft having oppositely-arranged cranks connected with the said cross-heads, whereby they are caused to approach each other in cutting match-splints and deposit the said splints in a carrier upon each side thereof and will both simultaneously recede for the next cut, substantially as described.

5. In a match-machine, the combination with a suitable splint-carrier, of a cutting

mechanism comprising cross-heads, die-beds secured to the said cross-heads and plates mounted upon the said die-beds, the said cross-heads being arranged upon opposite sides of the said carrier whereby upon the reciprocation of the cross-heads, the cutters will cut the match-splints and place them upon opposite sides of the carrier, substantially as described.

6. In a match-machine, the combination with a suitable carrier, of a cutter for cutting match-splints, said cutter comprising a die-bed having a dovetailed groove formed upon its outer supporting-face, and die-plates having cutting edges, the said plates also having dovetailed tenons adapted to engage the said dovetailed groove for securing the die-plates to the die-bed, substantially as described.

7. In a match-machine, the combination with a carrier, of a cutter for cutting splints and inserting them therein, comprising a die-bed having a dovetailed groove formed in its supporting-face, a series of die-plates having dovetailed projections adapted to engage said groove, whereby the die-plates may be secured upon the plate for forming a continuous row of cutters, substantially as described.

8. In a match-machine, the combination with a suitable carrier, of a cutter for placing splints therein comprising a die-bed having a groove formed in its supporting-face, die-plates provided with dovetailed projections for engaging the said groove, whereby the die-plates are centrally supported upon the die-bed, and dies or cutting edges formed upon each end of the die-plates projecting beyond the opposite sides of the die-bed, whereby the cutter is adapted to cut two rows of splints, one upon each side of the die-bed simultaneously, substantially as described.

9. In a match-machine, the combination with a carrier, of reciprocating cutters mounted in the same plane and upon opposite sides of the said carrier, the said cutters comprising die-beds, and die-plates centrally supported upon the supporting-face of each of the said beds and having dies or cutting edges projecting upon opposite sides of the said beds, whereby each cutter is adapted to cut two rows of splints simultaneously and place them in the opposite sides of the carrier, substantially as described.

10. In a match-machine, the combination with a suitable frame, of an upper and lower cross-head mounted therein and moving in suitable guides, a main shaft mounted below said cross-heads, the lower cross-head being connected with the shaft by means of a pitman and crank, wrist-pins formed upon the outer ends of the upper cross-head and pitmen connecting the said wrist-pins with cranks upon the power-shaft, the latter cranks being arranged oppositely to the former crank, the construction being such that as the main shaft revolves the cross-heads will be caused to simultaneously approach each other and recede, and cutters secured to the

said cross-heads for cutting the match-splints, substantially as described.

11. In a match-machine, the combination with a carrier, of cutters adapted to cut match-splints and place them in the opposite sides of the said carrier, feed-troughs extending upon either side of the carrier and adapted to supply blocks of wood to each of the cutters, whereby the splints may be simultaneously cut and placed upon the opposite sides of the carrier, substantially as described.

12. In a match-machine, the combination with a carrier, of reciprocating cutters mounted upon each side thereof, said cutters being adapted to cut rows of splints upon each side of their cutter-heads simultaneously, and converging troughs leading to each side of each of the cutters, whereby blocks of wood may be supplied for cutting four rows of match-splints at a time and inserting them in a carrier, substantially as described.

13. In a match-machine, the combination with reciprocating cutters for cutting match-splints, of a carrier located between them, feed-troughs for feeding blocks of wood to each side of the said carrier, each comprising a longitudinal box or trough having a suitable floor for supporting the blocks, a partition dividing the troughs into two parts longitudinally, feed-rollers adapted to engage the blocks above and below for forcing them toward the cutters, means for rotating the said feed-rollers, and covers arranged upon the troughs in proximity to the cutters, whereby the blocks of wood are inclosed upon all sides and firmly held in place, substantially as described.

14. In a match-machine, the combination with a suitable carrier, of reciprocating cutters adapted to place splints therein from opposite sides, guides for directing the splints into the carrier mounted in proximity to each cutter, and means for moving the said guides oppositely with respect to each other and each in unison with its own cutter, substantially as described.

15. In a match-machine, the combination with reciprocating cutters, of a carrier adapted to pass between them, means for feeding the carrier forward, said cutters being provided with cutting edges upon each side of the cutter-heads, whereby they cut two rows of splints at a time, guides for directing the splints into a carrier interposed between each of the rows of splints cut by the two cutters, rods supporting the said guides, levers for operating the said rods, cams adapted to move the guides to correspond with the movement of the cutters, and gearing connecting the said cams with the main power-shaft of the machine for rotating them, substantially as described.

16. In a match-machine, the combination with reciprocating cutters, of a carrier adapted to pass between them, means for feeding the carrier forward to receive charges of match-splints, guides for directing the splints from each cutter into the carrier, one guide

being provided for each cutter, cams connected with said guides and mounted upon shafts arranged upon each side of the carrier, a single shaft connected with each of the cam-shafts by means of gearing, whereby they are both rotated simultaneously, and gearing connecting the said single shaft with the main power-shaft of the machine, substantially as described.

17. In a match-machine, the combination with a suitable carrier and means for feeding the same forward, of cutters arranged upon opposite sides thereof and adapted to insert match-splints in the carrier from each side, means for supplying heads to the said matches, and ejecting means mounted upon each side of the said carrier adapted to eject the completed matches from each side of the carrier simultaneously, substantially as described.

18. In a match-machine, the combination with a suitable carrier, of means for placing splints in the said carrier from opposite sides, means for ejecting the completed matches from each side of the carrier-chain, comprising plungers mounted upon opposite sides of the carrier, and means for reciprocating the said plungers toward and away from each other simultaneously to eject the matches from both sides at once, substantially as described.

19. In a match-machine, the combination with a suitable carrier, of means for placing splints in the opposite sides thereof, an ejecting mechanism comprising plungers mounted upon the opposite sides of the said carrier, the said plungers carrying a series of plates adapted to engage the matches, said plates being arranged alternately with respect to each other, and means for reciprocating the plungers, whereby they are caused to eject matches from the opposite sides of the carrier at the same time, substantially as described.

20. In a match-machine, the combination with a splint-carrier, of means for inserting splints upon each side thereof, ejecting means comprising oppositely-reciprocating plungers carrying a series of plates arranged opposite to the matches in the carrier, each of the said plates being provided with projections which coincide with the ends of the matches, and means for reciprocating the said plungers, whereby the projections are caused to push the completed matches from the chain upon both sides thereof, substantially as described.

21. In a match-machine, the combination with a carrier-chain, of means for inserting splints in opposite sides thereof, an ejecting means comprising oppositely-reciprocating plungers each made up of a carrier-bar and a series of plates mounted thereon, guides for directing the movement of the said carrier-bars, projections formed upon the said plates and coinciding with the ends of the match-splints, the plates of one ejector being arranged opposite the spaces between the plates of the other ejector, whereby the completed matches will be forced out of the carrier be-

tween the plates upon each side of the said carrier simultaneously, and means for reciprocating the said plungers, substantially as described.

22. In a match-machine, the combination with a carrier-chain, of cams for feeding the same forward, means for placing the splints in opposite sides thereof, guides directing the said carrier to the ejecting mechanism, ejecting-plungers mounted upon opposite sides of the said carrier, carrier-bars moving in said guides, plates mounted upon the said carrier-bars and having projections coinciding with the matches, and means for reciprocating the plungers toward and away from each other, the construction being such that when the plungers approach the carrier, they will each force the completed matches out of the carrier between the plates of the opposite plunger, the carrier-bars acting as cushions for preventing the matches from going too far, and plates guiding the matches so as to fall in approximately the same plane in which they were ejected, substantially as described.

23. In a match-machine, the combination with a suitable carrier, of means for inserting matches therein, ejectors arranged on opposite sides of the carrier for knocking the completed matches out of the same from each side and comprising reciprocating plungers, bell-crank levers engaging the said plungers for reciprocating them, links connecting the said bell-crank levers with cams for actuating the said levers, and gearing connecting the said cams with the main shaft of the machine, substantially as described.

24. In a match-machine, the combination with a carrier for receiving match-splints in its opposite sides, of means for ejecting the said splints from each side simultaneously, belts adapted to receive the matches from each side of the carrier, the said belts being mounted upon fixed pulleys and adjustable pulleys, the said adjustable pulleys being provided with means for taking up the slack of the belt, sprocket-gearing connecting the fixed pulleys with the shaft upon the frame of the machine, and worm-gearing connecting the said shafts with the power-shaft of the match-machine, whereby movement is imparted therefrom to the said belts, substantially as described.

25. In a match-machine, the combination with a splint-cutting mechanism adapted to place splints in opposite sides of a carrier, a carrier for receiving the said splints, a heating, paraffining and heading mechanism for supplying the splints upon one side of the carrier with igniting-heads, a second heater, paraffining-pan and composition-vat arranged upon a different plane for placing heads upon the match-splints on the other side of the said carrier, means for directing the chain in the plane of one heading mechanism and then to the plane of the other, and means for drying and ejecting the completed matches substantially as described.

26. In a match-machine, the combination with a carrier, of means for placing match-splints in each side thereof, a heating, paraffining and heading mechanism for placing
 5 heads upon the splints on one side of the carrier, means for guiding the said chain to another heading mechanism comprising a heating device, a paraffining-pan and a composition-vat located upon a different plane from
 10 the other heading mechanism so as to place heads on the other splints on the other side of the carrier, and a drier-frame for supporting the carrier until the matches have dried, and means for ejecting the completed matches,
 15 substantially as described.

27. In a match-machine, the combination with a cutter, of a carrier comprising outer and inner slats, the inner slats being provided with a series of wedge-faces adapted to correspond with each other, the construction being such that when the inner slats are moved
 20 longitudinally with respect to each other, they will spread apart so as to grip the splints between them and the outer slats, substantially as described.
 25

28. In a match-machine, the combination with a suitable carrier, of a cutter for cutting splints and placing them in a carrier, having cylindrical cutting edges, the said cutters being grooved upon their under surfaces so as to provide straight cutting edges between the
 30 cylindrical cutters for trimming the unevenness left upon the blocks of wood by the cylindrical cutters, substantially as described.

29. A cutter for match-machines comprising a body portion and cylindrical cutting edges, the said body portion having grooves upon its under surfaces forming trimming edges for trimming the unevenness left upon the
 35 blocks of wood by means of the cylindrical cutters, substantially as described.
 40

30. In a match-machine, the combination with a carrier adapted to receive splints upon opposite sides, of a series of cams for feeding
 45 the said carrier having spiral projections or ribs for engaging the sections of the carrier to feed it forward, intermediate auxiliary flanges or ribs of less height than the main ribs for further engaging the sections of the
 50 carrier, whereby they are centered perfectly

for receiving the match-splints, and cutters for cutting the splints and placing them in said carrier, substantially as described.

31. In a match-machine, the combination with upper and lower cutters, of feed-troughs
 55 leading to each, rollers for feeding blocks of wood in said troughs, ratchet-wheels secured to the said rollers, pivoted frames carrying pawls for engaging the said ratchet-wheels, a link connecting the upper and lower pawl-
 60 frames, and a pitman connecting the lower frame with an eccentric upon the main shaft of the machine, whereby the frames will be caused to operate the ratchet-wheel, substantially as described.
 65

32. In a match-machine, the combination with upper and lower cutters, of converging feed-troughs leading to each side of each cutter, feed-rollers mounted in each of said
 70 troughs, ratchet-wheels secured to the rollers in each trough, arms carrying pawls for engaging each ratchet-wheel, cross-bars connecting the said arms, arms or levers secured to the said cross-bars, links connecting the
 75 said arms and a pitman engaging an eccentric on the main power-shaft and connecting it with the said latter arms, and dogs for preventing the ratchet-wheels from rotating in the wrong direction, the whole construction being such that blocks of wood will be fed
 80 forward to the cutters in all four troughs simultaneously, substantially as described.

33. In a match-machine, the combination with a suitable splint-carrier, of means for placing splints in both sides of the same and
 85 means for ejecting the completed matches from both sides of the carrier, belts adapted to receive the splints discharged from each side of the said carrier-chain, the said belts collecting and discharging the completed
 90 matches at any suitable point, and means for operating the belts, substantially as described.

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

WILLIAM E. COOK.

Witnesses:

EDWARD L. STRONG,
 NELLIE G. LAWRENCE.