

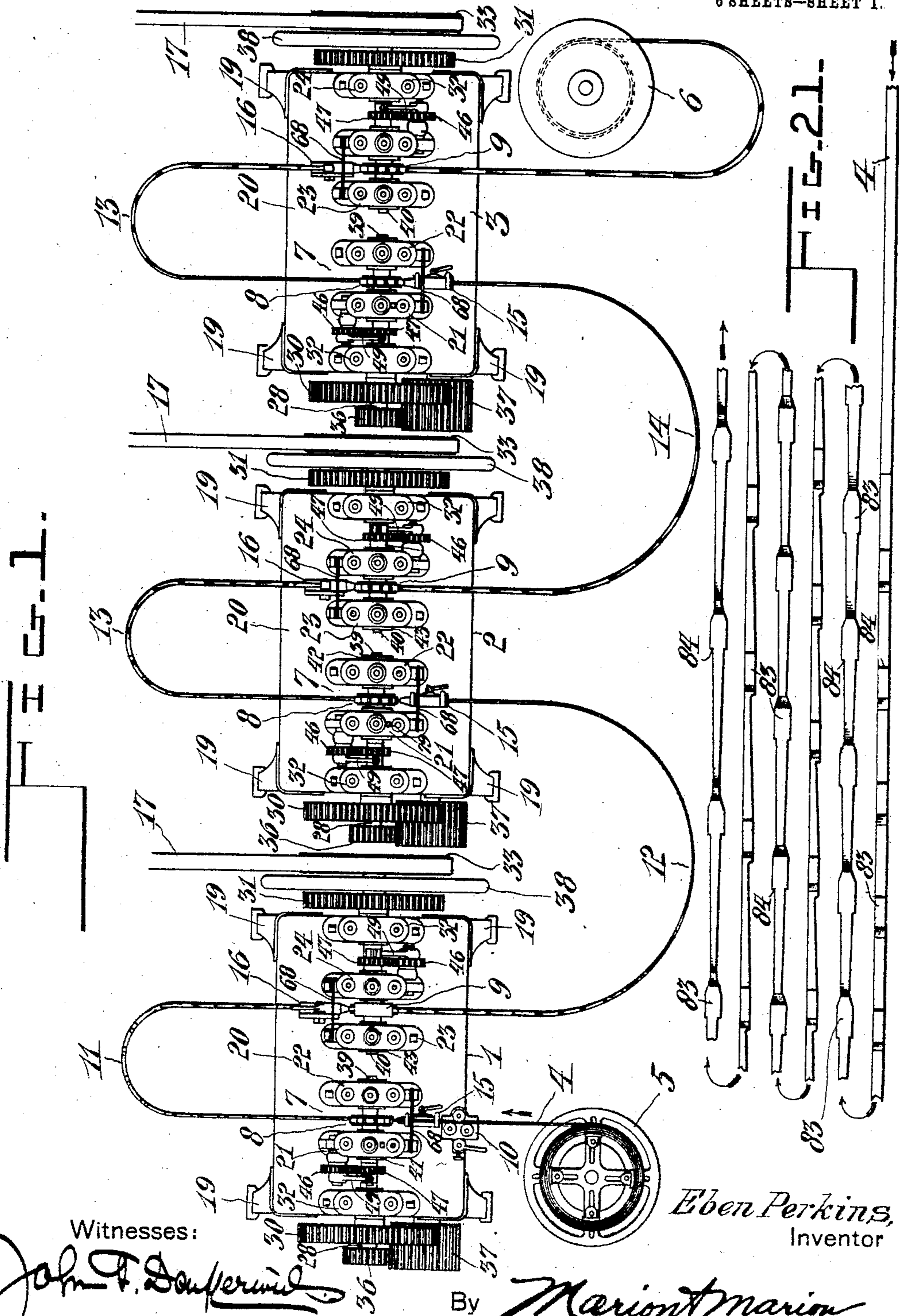
No. 777,917.

PATENTED DEC. 20, 1904.

E. PERKINS.
NAIL MAKING MACHINE.
APPLICATION FILED NOV. 27, 1903.

NO MODEL.

6 SHEETS—SHEET 1.



Witnesses:

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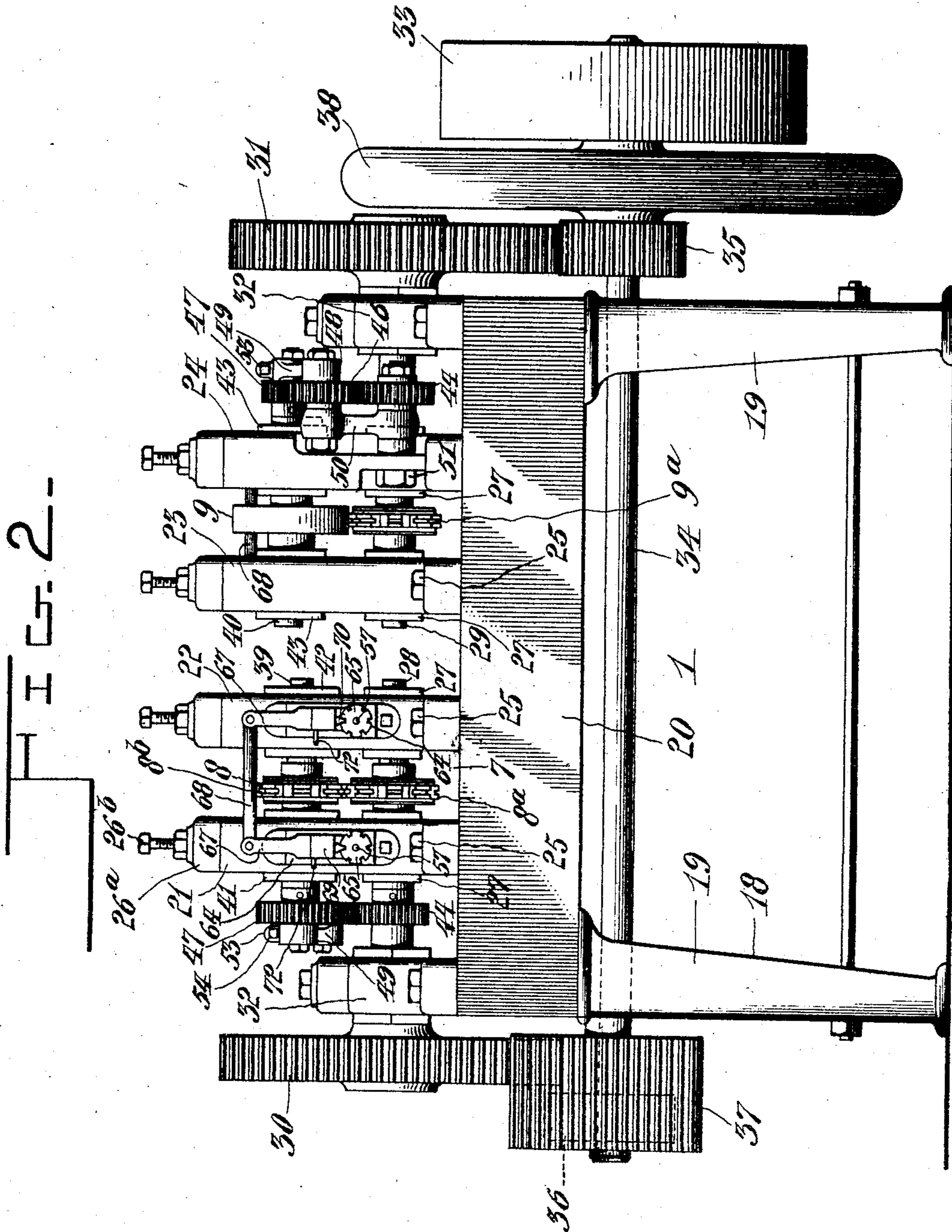
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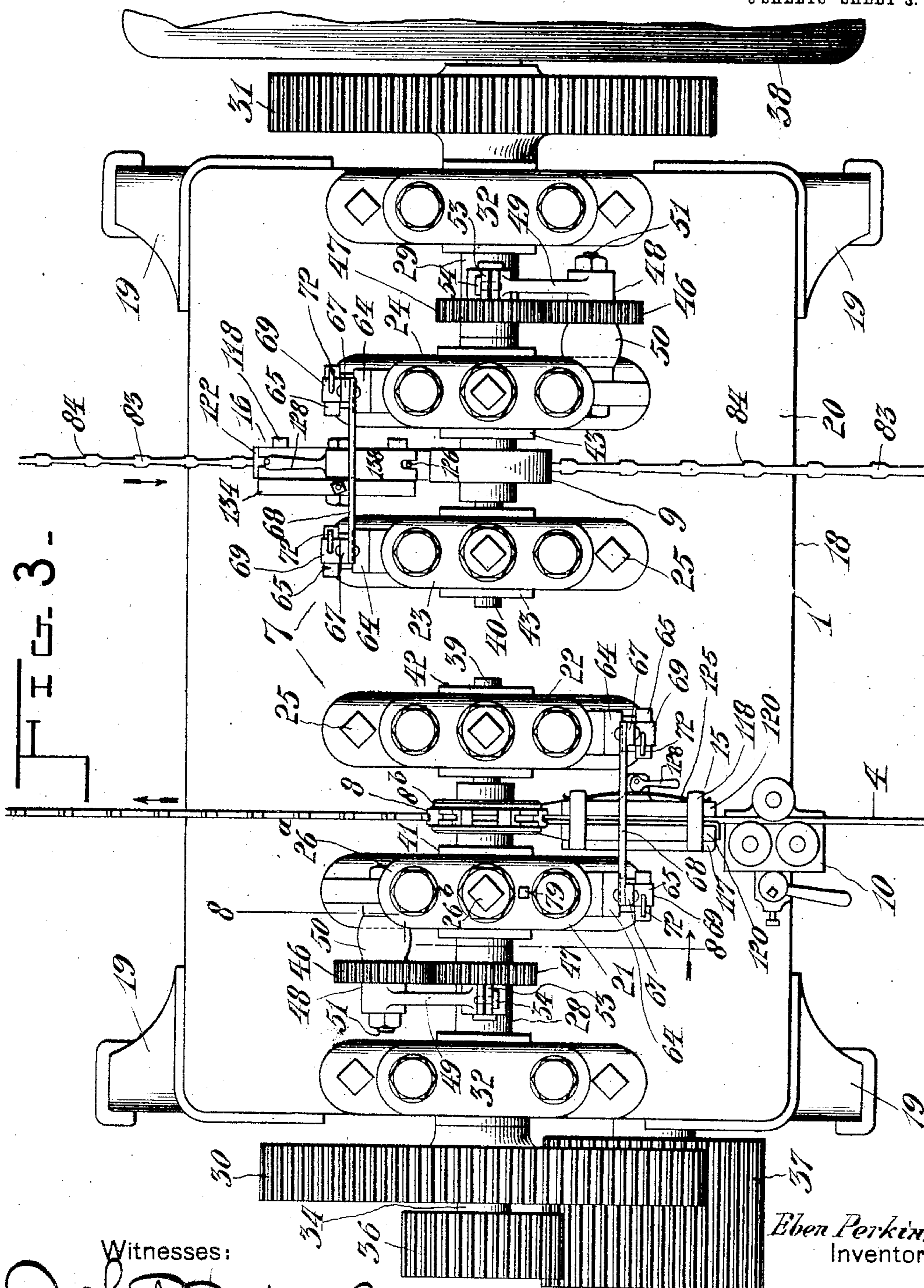
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6 SHEETS—SHEET 3.



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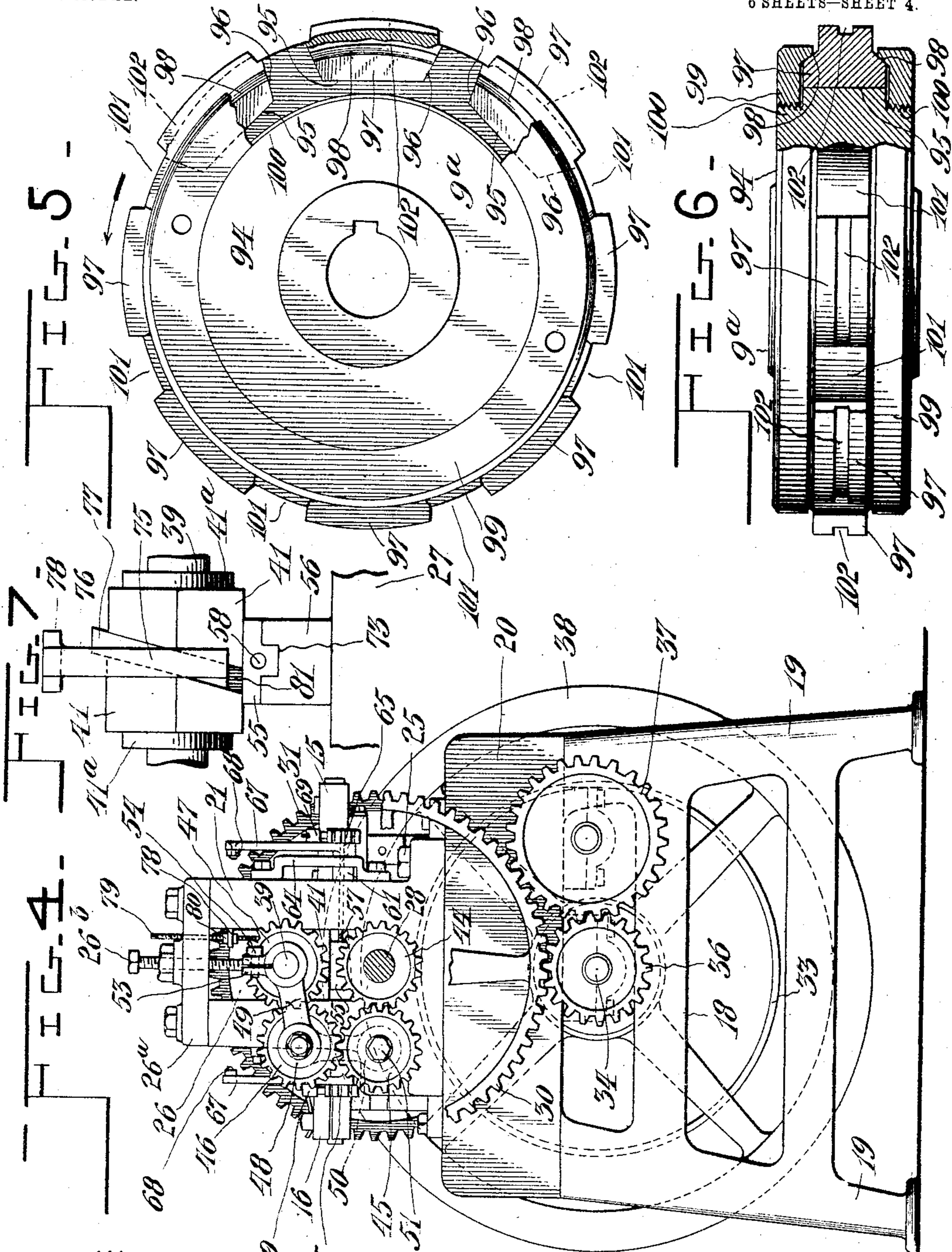
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6 SHEETS—SHEET 4.



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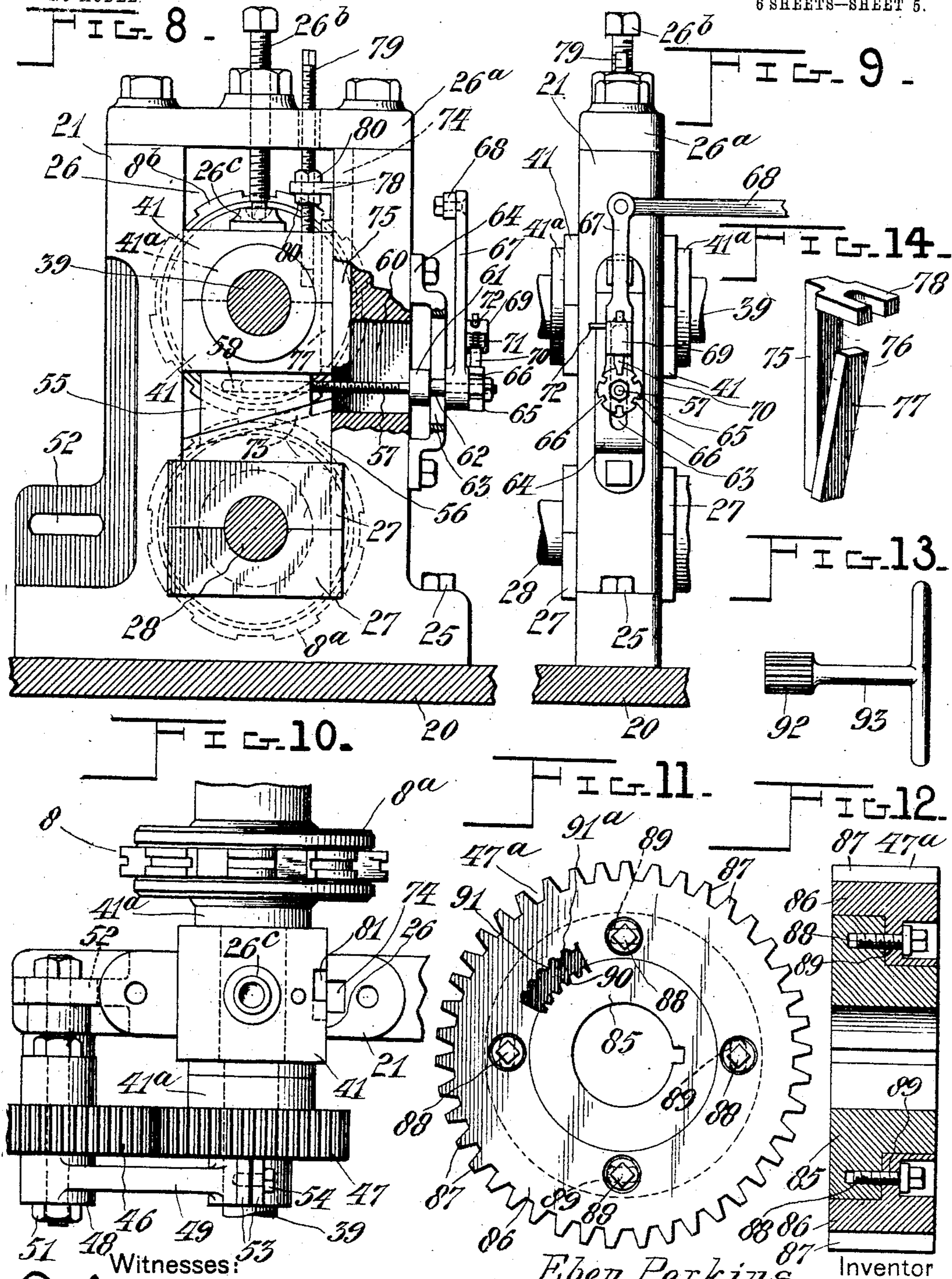
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6 SHEETS—SHEET 5.



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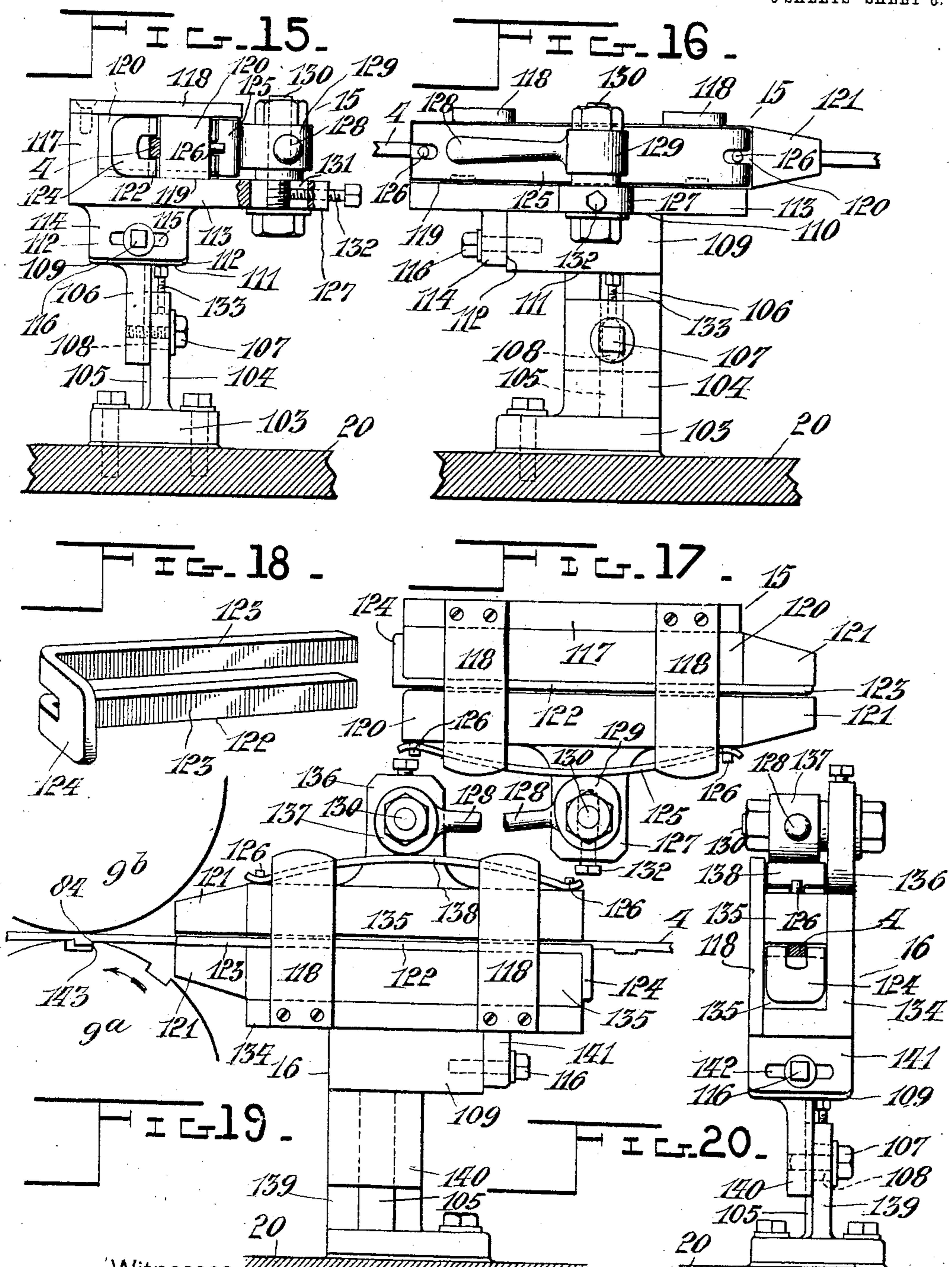
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6 SHEETS—SHEET 6.



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UNITED STATES PATENT OFFICE.

EBEN PERKINS, OF ST. JOHN, CANADA.

NAIL-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 777,917, dated December 20, 1904.

Application filed November 27, 1903. Serial No. 182,932.

To all whom it may concern:

Be it known that I, EBEN PERKINS, a citizen of the United States of America, residing at St. John, county of St. John, in the Province of New Brunswick, Canada, have invented certain new and useful Improvements in Nail-Making Machines; and I do hereby declare that the following is 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.

This invention relates to that class of nail-making machines of which a type is shown in my United States Patent No. 542,739, dated July 16, 1895.

The invention concerns itself especially with the construction and arrangement of rolls which operate successively upon a continuous strip or rod, so as to form the same into a plurality of nail-blanks.

The invention is especially applicable in the manufacture of horseshoe-nails.

The invention contemplates an arrangement for the rolls referred to above whereby the rod or material being worked will pass between the rolls in such a manner that it is operated upon alternately upon its edges and upon its flat faces. In the manufacture of horseshoe-nails only six passes between the rolls are necessary in order to form the strip of substantially finished horseshoe-nail blanks. The rolls are preferably arranged in sets comprising two pairs of rolls, and each set is driven independently of the others. The rod passes through the rolls horizontally and turns back so as to pass in opposite directions through the consecutive rolls, in this manner forming loops, and at each loop a quarter-turn is made, so that the rolls operate alternately upon the edge and the flat of the rod.

The object of the invention is to provide an arrangement whereby the operation of rolling the rod may be carried on simply and effectively and to provide simple arrangements for the purpose of effecting accurate adjustments of the cooperating rolls.

A further object has been to provide an improved construction of roll especially adapted for the purposes of this invention and also to provide an improved form of tension device,

several of which are used at the points where the rod passes between the rolls.

Another object has been to provide an improved arrangement for driving the rolls which constitute each set and for accurately determining the ratio of movement between the pairs of rolls which constitute each set.

The invention consists in the construction and combination of parts to be more fully described hereinafter and definitely set forth in the claims.

In the drawings, which fully illustrate my invention, Figure 1 is a plan representing the mechanism, showing a rod in process of rolling. Fig. 2 is a side elevation showing a portion of the mechanism which is incident to each set of rolls. Fig. 3 is a plan of the mechanism shown in Fig. 2, a portion being broken away, as indicated. Fig. 4 is substantially an end elevation of the machine shown in Fig. 2, certain parts being broken away and shown in section, as will appear. Fig. 5 is substantially a side elevation of one of the rolls, a portion of which is shown in section, as will appear. Fig. 6 is a front elevation of the roll shown in Fig. 5, a portion of this view being in section, as will appear. Fig. 7 is a detail representing certain parts intended for the purpose of effecting the horizontal adjustment of the rolls. This view should be read in connection with Fig. 8, and it may be said that it represents the side face of a box or bearing in connection with an adjusting-key and the contiguous parts. Fig. 8 is a vertical section supposed to be taken substantially on the line 8 8 of Fig. 3, certain parts being broken away and shown in section, as will appear. Fig. 9 is a front elevation of the parts shown in Fig. 8. Fig. 10 is substantially a plan of the parts shown in Fig. 8 with a cap and other parts shown in Fig. 8 represented as removed. This view shows, however, certain parts not shown in Fig. 8 for the purpose of showing how the rolls are driven. Fig. 11 is a side elevation of a gear which is attached to the driving-spindle of one of the individuals of each pair of rolls, showing a special construction intended to facilitate an accurate angular adjustment of the rolls. Fig. 12 is a vertical central section through Fig. 11.

Fig. 13 is a side elevation of a key which is used in effecting the angular adjustment referred to in connection with Fig. 11. Fig. 14 is a perspective of a key the function of which is to effect the horizontal adjustment of the rolls as shown in Figs. 8 and 10. Fig. 15 is a front elevation of one of the tension devices of the form used at the edge-passes, or, in other words, at the points where the rod passes between the rolls which operate upon its edge. In this view a part is broken away to more clearly illustrate the construction. A portion of the frame in this view is represented in section, as will appear. Fig. 16 is a side elevation of the parts shown in Fig. 15. Fig. 17 is substantially a plan of the parts shown in Fig. 16, a portion being broken away, as will appear. Fig. 18 is a perspective of a guiding-fork which constitutes a part of each tension device. Fig. 19 is a side elevation of one of the tension devices used at the flat-passes—in other words, at the points where the rod passes between the rolls which operate upon its flats or sides. In this view the rolls are indicated and a portion of the handle for the device is broken away, as in Fig. 17. Fig. 20 is substantially a front elevation of the device shown in Fig. 19. Fig. 21 is a view representing a succession of lengths of the rod, showing the form of the same in the successive stages of the rolling process.

Throughout the drawings and specification the same numerals of reference denote like parts.

Referring more particularly to the parts, 1, 2, and 3 represent three machines or parts of the mechanism which operate successively upon the rod 4, the said rod passing successively through the machines, as shown, from a supply-reel 5 to a delivery-reel 6. The general construction of the machines 1, 2, and 3 is substantially the same; but they differ in the forms of the rolls, as will be readily understood, the rolls of each machine being especially adapted for operating upon the rod during a certain stage of the rolling process.

Each of the machines 1, 2, and 3 constitutes a division or section of the rolling mechanism, whereby the rolls 7 are disposed in sets, each set comprising two pairs of rolls 8 and 9, mounted upon each machine. As the rod 4 passes from the reel 5 it passes through a straightening device 10 of any common construction, after which it passes between the rolls 8, and this point constitutes what I call an "edge-pass," for at this point the rolls operate upon the edge of the rod. Beyond this point the rod turns back upon itself to form a loop 11 and repasses across the machine between the rolls 9, which rolls are, by the way, driven in the opposite direction to the rolls 8. The pass between the rolls 9 is called a "flat-pass," as these rolls operate upon the flat side of the rod. Beyond this point a second loop 12 is formed, at which point a quar-

ter-turn is made similar to a quarter-turn which is made also in the loop 11, whereupon the rod goes through a second edge-pass, which is the first pair of rolls on the machine 2. In this manner other loops, 13 and 14, are formed and similar passes made through the machines until the rod is eventually delivered upon the reel 6. From this arrangement it will be evident that the rolls 8 all constitute edge-passes, while the rolls 9 constitute flat-passes. In conjunction with each machine at the point where the rod goes between the rolls 8 are provided tension devices 15, which are substantially similar in construction to other tension devices 16, the latter of which are used in conjunction with the flat-passes. These tension devices will be described more fully hereinafter, at which time it will be shown that their differences lie principally in their adaptation to the particular position of the rod at the points where they are applied.

The machines 1, 2, and 3 are preferably driven independently by means of belts 17.

Proceeding now to a detailed description of one of the machines, it should be said that it comprises a frame 18, comprising suitable standards 19 and a body or table 20, upon which table are mounted housings 21 and 22, 23 and 24, the same being attached by means of suitable bolts 25, as shown. A portion of each housing is removed centrally, so as to form a deep guideway or opening 26, in the lower portions of which boxes or brasses 27 are permanently secured, the same constituting bearings for spindles 28 and 29, which extend in opposite directions from the center of the machine and carry rigidly at their outer extremities gear-wheels 30 and 31, which are attached beyond pillow-blocks 32, in which the said spindles are rotatably mounted. These gear-wheels 30 and 31 are for the purpose of enabling the pairs of rolls 8 and 9 to be driven. To this end a belt-pulley 33 is provided, the same being driven by one of the belts 17 and being mounted upon a shaft 34, which extends longitudinally beneath the table 20 and carries rigid gear-wheels 35 and 36, the former of which meshes with the gear-wheel 31, as indicated. The gear-wheel 36, however, meshes with an idle gear 37, the same being of great length, as shown, and meshing at another part of its face with the aforesaid gear-wheel 30. From this arrangement it should be understood that the shaft 34 may operate to drive the spindles 28 and 29 in opposite directions. Adjacent to the belt-pulley 33 there is provided a hand-wheel or balance-wheel 38.

Above the spindles 28 and 29 spindles 39 and 40 are respectively placed, the same being mounted in boxes or brasses 41, 42, and 43, the brasses 43 being used in connection with the spindle 40 and the brasses 41 42 in connection with the spindle 39. It may be said at this point that the boxes or bearings 42 and 43 are substantially similar, the same being

guided in the housings vertically, but being incapable of longitudinal movement with respect to the spindles. However, such a longitudinal movement is possible for the box 41 for the purpose of securing an accuracy of adjustment between the rolls 8. The mechanism for this purpose will be described more fully hereinafter.

Arrangement is made for driving the spindles 39 and 40, respectively, from the spindles 28 and 29. For this purpose (referring especially to Fig. 4) gear-wheels 44 are provided, which are rigidly attached to the spindles 28 and 29 and mesh, respectively, with idle gear-wheels 45, which in turn mesh with second idlers 46, and these operate to drive gear-wheels 47, which are carried rigidly, respectively, by the spindles 39 and 40, as shown. It should be understood that the spindles 39 and 40 may be adjusted vertically, and in order to enable the gears 47 to be driven whatever be the position of their corresponding spindles the gears 46 are carried at elbows 48, the said elbows being formed by arms 49 and 50, disposed, respectively, as shown. The arms 49 attach to the projecting extremities of the spindles 39 and 40, as indicated, and are disposed in a substantially horizontal or slightly-inclined position. The arms 50 are disposed normally in a substantially vertical position, their lower extremities being loosely attached by means of bolts 51, passing through horizontal slots 52, formed in the sides of the housings, as indicated most clearly in Figs. 8 and 10. The eyes of the arms 49, which attach to the spindles, are preferably split, as shown, and provided with ears 53, through which bolts 54 respectively pass. It should be understood that the elbow 48 has a free joint, permitting the spindles to be moved upwardly to permit the arms 50 to adjust themselves in those positions which would correspond to the new positions of the spindles.

It should be understood that in all the passes it is necessary to adjust the distance between the faces of the coöperating rolls very nicely, for which purpose arrangement is made for effecting a vertical adjustment of the spindles 39 and 40, the axis of the spindles 28 and 29 always remaining stationary. Moreover, in the edge-passes it is necessary to provide for a very nice longitudinal adjustment of the faces of the rolls with respect to each other. At this point it should be said that the members which coöperate to form the edge-pass rolls 8 are substantially alike, the faces of these rolls being provided with coöperating dies; but in the flat-passes 9 only one of the rolls has the dies, the coöperating rolls simply having a flat face.

For the purpose of effecting the vertical adjustments of the spindles 39 and 40 the boxes 41, 42, and 43 (referring especially to Figs. 7 to 10) are mounted upon cotters or

wedges 55, the same being slidably mounted upon gibs 56 and carrying threaded stems 57, mounted in threaded openings 58, for the purpose of effecting a longitudinal adjustment of the cotters, as shown. These stems 57 pass through vertically-disposed openings 60, through the housings 21, &c., and at the faces of the housings they are provided with enlarged heads 61, with reduced necks 62 therebeyond, which necks pass through vertical openings 63, formed in guide-brackets 64, which attach to the forward face of the housings, as shown, so as to prevent longitudinal movement of the stems 57, as will be readily understood. Beyond the necks 62 collars 65 are rigidly attached to the stems, as shown, the same being provided with peripheral notches 66, and upon each stem, just beyond the necks 62, there is mounted a loose arm 67, and these arms are connected by a link 68. The arms 67 are provided, respectively, with small spring-barrels 69, formed upon their forward faces, in which catches 70 are respectively provided, the same being constrained each by a spring 71 toward the collars 65. From this arrangement it should appear that the catches 70 may operate as locks to prevent the accidental rotation of the stems 57. At the same time it should be observed that the link 68 in connection with the arms 67, constitutes a movable rack, which may be swung backward and forward in order to rotate the stems 57 equal amounts. The catches 70 are preferably provided with small handles 72 in order to enable them to be withdrawn from the notches during this operation. From an inspection of Fig. 7 it will appear that the gib and cotter 56 and 55 are formed with an interlocking tongue and groove 73. The extremities of the gibs 56 rest against the inner faces of the guideways 26, and the under sides of the gibs rest upon the upper faces of the boxes 27.

It should be observed from an inspection of Fig. 2 that this adjusting arrangement just described is constructed in duplicate, one device being disposed on one side of the machine in connection with the housings 21 and 22, while the other device is disposed on the opposite side of the machine in conjunction with the housings 23 and 24. The construction of the two devices and their mode of operation is substantially the same, and the devices on the different machines are also identical.

For the purpose of effecting a longitudinal adjustment of the spindle 39 the inner face of the housing 21 is provided at one side with a vertically-disposed groove 74, which groove is adapted to receive the body 75 of a key 76, which key is of substantially the form shown in Fig. 14 and comprises an inclined tongue 77, formed integrally with the said body 75. At its upper extremity the body 75 is formed with a laterally-projecting bifurcated head 78, between the forks of which there is received

a vertically-disposed adjusting-screw 79, the lower extremity of which is in threaded engagement with the box 41. Nuts 80, carried by this adjusting-screw respectively above and below this head 78, afford means for adjusting the key 76 into any desired position. Upon the side face of the box 41, as shown most clearly in Fig. 7, there is provided an inclined groove 81, which receives the afore-
 10 said inclined tongue 77, and from this arrangement it should be evident that an elevation or depression of the key 76 would operate to move the box 41 in a direction longitudinal with respect to the axis of the spindle 39. In
 15 this connection it should be understood also that the box 41 is unrestricted in its movement, as it simply rests slidably between the faces of the guideway 26 and between collars 41^a upon the spindle.

20 The housings 21 are bridged above by caps 26^a, in which are mounted vertical adjusting-screws 26^b, the lower extremities whereof rest in movable cups 26^c, lying upon the upper faces of the boxes 41, 42, and 43.

25 The rolls 8 are substantially similar, the roll 8^a being rigidly attached to the spindle 28, while the roll 8^b is rigidly attached to the spindle 39. From this arrangement it follows that when the spindle 39 is moved longitudi-
 30 nally in the manner just described it is possible to make a very nice adjustment between the faces of the rolls.

As has been stated above, those rolls which constitute the edge-passes for the rod have
 35 oppositely-recessed coöperating faces, which operate to press and roll the opposite edges of the rod in the same manner, and so that the opposite edges of the rod as it leaves these rolls are exactly alike. Referring to Fig. 21,
 40 it will be observed that the first operation of the machinery is to form rudimentary heads 83 upon the rod, the said heads being disposed at equal intervals apart and presenting abrupt shoulders 84, disposed rearwardly with re-
 45 spect to the direction in which the rod advances. It should be stated that these shoulders 84 are instrumental in bringing about the advance of the rod through all the passes, and the manner in which this is accomplished will
 50 be described more fully hereinafter. On all the edge-passes it is absolutely essential that the projections of the dies which produce these shoulders should be exactly opposite to each other, and for this reason an arrangement is
 55 made whereby the angular position of one roller may be accurately adjusted with respect to its mate at all edge-passes. To this end one of the gear-wheels 47 (indicated specifically by the numeral 47^a) is constructed as
 60 shown in Figs. 11 and 12. It comprises a hub 85, which is rigidly secured to the spindle, upon which hub there is mounted a rim 86, formed with gear-teeth 87, as indicated, the same being connected with the hub through
 65 the medium of bolts 88, passing through short

circumferentially-disposed slots 89. The peripheral face of the hub 85 is provided for a portion of its circumference with gear-teeth 90, which are disposed opposite to correspond-
 70 ing gear-teeth 91, the latter being formed at the side of a recess 91^a, formed in the face of the rim, as shown. The teeth 90 and 91 are intended to be engaged by a pinion 92, which is formed integrally at the extremity of a key or handle 93, and it should be understood that
 75 the pinion 92 would be inserted so as to rotate the spindle through any required angle, after which the bolts 88 will be tightened. Of course the amount of adjustment would always be very slight, so that the slots 89 need
 80 be only very short slots. It should be remembered, however, that this arrangement is only necessary at edge-passes.

In Fig. 5 the construction of a roll 9^a is shown, which roll constitutes a die-roll or
 85 lower roll in a pair of flat-pass rolls 9. Referring to this figure in connection with Fig. 6, it will be observed that the roll consists of a body or hub 94, in the face whereof there are formed a plurality of pockets or recesses
 90 95, preferably having inclined end walls 96, as shown. Within these recesses 95 a plurality of dies 97 are received, the bodies of which conform substantially to the bottoms of the
 95 recesses, as indicated. Upon their sides these dies are formed with inclined shoulders 98, which shoulders constitute substantially sections of a conical surface formed about the axis of the roll as an axis. The dies 97 are
 100 maintained in position by means of rings or keepers 99, which are threaded, as shown, so as to screw up upon threaded necks 100, which project at each side and constitute a
 105 portion of the body 94 of the roll. Between the dies 97 there are notches 101, which receive the heads of the rudimentary nails as the bodies of the nails are being rolled in the
 110 recesses 102 of the dies, which recesses are of shallower depth toward the rear, so as to facilitate the drawing of the material and the formation of the points of the nails.

The construction just described in connection with the rolls involving the use of a plu-
 115 rality of removable dies is considered highly advantageous, for if from any reason a die becomes injured or broken it can be readily replaced by another without necessitating the
 120 loss of the entire roll, as would necessarily follow otherwise if the dies were integral with the body of the roll.

At all the edge-passes tension devices 15 are employed and the construction of one of these devices is very clearly shown in Figs.
 125 15 to 18. Each device comprises a bracket 103, which is adapted to be bolted to the table of the machine, as shown, the said bracket having an upwardly-extending wing 104, which is provided on one face with a vertical
 130 tongue 105, and this tongue is received by a corresponding groove formed in an adjustable

head 106, which attaches to the face of the wing 104; as shown. The head 106 carries a bolt 107, which passes through a vertically-elongated slot 108 for the purpose of effecting a vertical adjustment, as will be readily understood. This adjustable head 106 is formed above, preferably, into a substantially rectangular body 109, which presents a horizontal upper face 110 and a substantially horizontal lower face 111. Upon the end face 112 of the body 109 which is remote from the rolls there is attached a guide-block 113, the same being secured by means of an ear 114, provided with a horizontal slot 115, through which passes a bolt 116 for the purpose of locking the same in position, as will be readily understood, at the same time enabling a horizontal adjustment of the guide-block in a direction parallel with the axis of the rolls. This guide-block 113 is supported upon the face 110, as shown, and projects in both directions therebeyond. It is formed at one side with a flange 117, which extends throughout the length of the same, and to the upper side of this flange are attached a pair of elongated plates or clips 118. The lower portion of the block 113 presents a substantially flat face 119, above which project the aforesaid clips 118, and in the space between this face 119 and the clips there are mounted a pair of elongated blocks, constituting shoes or slippers 120. These project beyond the guide-block adjacent to the rolls, at which point they are formed with tapered noses 121, so as to enable them to approach close to the rolls, as will be readily understood. Between these slippers 120 a rod 4 passes, it being understood that the said slippers are disposed a slight distance apart for this purpose. In order to support or guide the rod between the faces of the slippers 120, the guide-fork 122 is employed, the construction of which is very clearly shown in Fig. 18. It consists of a bifurcated elongated plate, the forks 123 of which bend laterally and unite to form a head 124, as shown. This guide-fork is placed between the slippers in the manner indicated, with the head 124 disposed against the end face of one of the slippers and at the end remote from the rolls. Arrangement is made for subjecting the rod to some pressure as it passes between the slippers. For this purpose there is employed a bow-spring 125, the extremities whereof are slotted, as shown, to receive pins 126, which project outwardly from the side face of the outer slipper. At or near the central portion of this spring the guide-block 113 is provided with an ear 127, upon which is mounted a handle 128, having a cam-head 129, the face whereof rests upon the spring, as shown, and in order to effect an adjustment of the handle 128 the pivot-bolt 130 thereof passes through a slot 131, which slot is disposed transversely with respect to the direction in which the rod passes.

In this connection a set-screw 132 is employed, adapted to force the bolt or stud 130 longitudinally in the slot, as will be readily understood.

It should be understood that the rod passes through the guide-fork in the space between the tines 123, and it should be also stated that the thickness of the bar is always greater than the thickness of the guiding-fork, so that the slippers may exert a certain pressure upon the flat faces of the rod, as indicated. The slippers and the guide-fork are preferably composed of hardened steel.

In the upper edge of the wing 104 of the bracket 103 there is mounted a set-screw 133, the head whereof rests against and constitutes a support for the bracket 106, the head of the set-screw being received by the face 111, as shown. From this arrangement it should be understood that by loosening the bolt 107 and turning the set-screw 133 any desired adjustment as to height could be effected, whereupon the head 106 could be locked again to the bracket in a simple manner. Also the presence of the slot 115 facilitates the making of any necessary horizontal adjustment of the guide-block with respect to the roll.

In Figs. 19 and 20 one of the tension devices 16 is represented which are used at the flat-passes for the rod. The construction of the device in this instance is substantially the same as that just described except that the guide-block 134 is of modified construction, so as to adapt the slippers 135 to rest, respectively, above and below the rod instead of at the sides of the same, as before. In this instance the guide-block is formed above with an ear 136 to facilitate the attachment of a clamping or cam head 137, the function of which is the same as that of the head 129, the spring 138 exerting a downward pressure upon the upper face of the upper slipper, as indicated. A bracket 139 is employed, the same being used in connection with an adjustable head 140, which parts are substantially similar in their functions and construction to the corresponding parts of the tension devices 15. Upon the under side the guide-block 134 is provided with an ear 141, the same having a horizontal slot 142, enabling horizontal adjustment of the device to be effected as before and in the same manner.

It should be understood that the tension devices are for the purpose of insuring the correct positioning of the rudimentary nails in the dies. The manner in which they perform their function in this respect should be clearly understood from an inspection of Fig. 19, where a roll 9^a is indicated coöperating with a plain roll 9^b thereabove. It should be understood that as rotation takes place in the direction indicated by the arrow the shoulders 84 will be engaged by the faces 143 of the dies, whereby the proper position of the rudimentary nail with respect to each forming-die is

definitely assured. While these tension devices act to guide and keep the advancing rod in proper relative position to the grooves in rolls, their main purpose is to so act by tension on the rod as to successively retard its forward movement until the rolls engage with the shoulders 84, and this is an essential feature of invention.

The mode of operation of the mechanism will now be summarized. The rod 4 passes through the rolls 8 and 9 alternately in opposite directions, forming loops 11 12, &c., disposed at the sides of the rolls, as shown. The rolls being grouped in sets, each of which comprises an edge-pass and a flat-pass, it follows that between each pair of rolls the rod is subjected to a quarter turn or twist, since the axes of the rolls are substantially in alinement. In the edge-passes the edges only of the rod are operated upon by the rolls and in the flat-passes the flats only are operated upon. At the edge-passes the faces of the cooperating rolls are similarly recessed or figured, so that the opposite edges of the rudimentary nails are similarly formed. At the flat-passes the recess to receive the rudimentary nail is formed entirely in one roll, the cooperating roll having simply a flat face, and while the purpose of the edge-passes is to substantially form the heads of the nails the flat-passes operate substantially to draw out or roll the material. The head-space is formed permanently by the first set of edge-pass rolls, which also serve to set out the exact amount of stock necessary for forming the shank or blade of the nail. Each successive set of both edge and side passes serve to elongate or draw out this shank or blade portion, always leaving the head portion as originally set out by the first pass-edge set. For this purpose the head-recesses in all rolls other than the first edge set are substantially longer than the recesses on the first edge set, allowing these rolls to slip over blanks, which are for this period held back by tension devices until the shoulders 84 are engaged for further forward movement. Therefore each blank is independently rolled after the first edge set, both by all edge and all side passes. It will be understood from this that forward motion of rod is intermittent. In the edge-passes the rod is formed with shoulders which constitute the extremities of the rudimentary heads, and these shoulders are instrumental in effecting a proper positioning of the nails in all the following passes, and cooperating to effect this result the tension devices 15 and 16 are employed.

When it is desired to adjust the distance between the spindle 28 and 39 or 29 and 40, the link 68 would be moved so as to reciprocate the arms 67. At the same time the catches 70 would be withdrawn, so as to enable the catches to pass around the peripheries of the collars 65 to engage the next of the teeth 66. In this manner the adjusting-screws 57 would

be rotated through the same amount, so that the cotters 55, operating in conjunction with each spindle, would be moved through the same angle. The boxes 41, 42, and 43 are held down by the adjusting-screws 26^b, which thrust against the cups 26^a, as illustrated.

By means of the adjusting-screw 79 and the nuts 80 the key 76 can be adjusted vertically in such manner as to bring about the horizontal movement of the box 41, in this manner effecting the longitudinal adjustment of the roll 8^a, the lateral movement of the box being effected by reason of the inclined tongue 77, which engages with the inclined groove 81 in the face of the housing.

In order to effect accurate angular adjustment of the upper roll 8^a at all the edge-passes, the key 93 is inserted between the teeth 90 and 91, which are formed, respectively, on the hubs and rims of the gears 47^a. By rotating the key when inserted in this manner a very nice angular adjustment can be effected between the hub and its rim—in other words, between the rim and the roll. After the proper adjustment has been effected the bolts 88 may be tightened again, the same passing through short circumferentially-disposed slots 89 in order to permit an adjustment such as that described.

Adjustments at the tension devices 15 would be effected by loosening the bolts 107 and 116 and tightening the same after the parts have been moved into the desired relation. The pressure of the slippers would be adjusted by means of the adjusting-screw 132. The adjustment of the tension devices would be effected in a manner similar to that described in connection with the tension devices 15.

While I have shown in the accompanying drawings the preferred form of my invention, it will be understood that I do not limit myself to the precise form shown, for many of the details may be changed in form or position without affecting the operativeness or utility of my invention, and I therefore reserve the right to make all such modifications as are included within the scope of the following claims or of mechanical equivalents to the structures set forth.

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

1. In rolling machinery, in combination, a roller, a member rotatably supporting the same, a second member adjacent to said first member, said second member and said first member having grooves in the adjacent faces thereof inclined with respect to each other, and a key having a vertical and an inclined member adapted to move in said grooves.

2. In rolling machinery, in combination, a housing, a box carried therein and constituting a bearing for a roll, said box having oppositely-disposed faces abutting the faces of said housing, said box and said housing hav-

ing grooves disposed in a generally vertical direction in the adjacent faces thereof, said grooves being disposed in an inclined direction with respect to each other, a key having a vertical and an inclined member running in said grooves for adjusting said box horizontally, and means for adjusting said box vertically.

3. In mechanism of the class described, in combination, a housing presenting a vertically-disposed guide, a box mounted in said guide and having an inclined groove in the face thereof, said housing having a substantially vertical groove in the face thereof, a key having a vertical member and an inclined member seated in the correspondingly-disposed grooves, means for adjusting the said key, a wedge beneath said box for adjusting the same vertically, and a roller rotatably mounted in said box.

4. In mechanism of the class described, in combination, a housing presenting oppositely-disposed guide-faces, a box mounted between said faces and constituting a bearing, a roller rotatably mounted in said box, the axis whereof is substantially parallel with said faces, one of said faces having a substantially vertical groove formed therein, said box having an inclined groove adjacent to said first groove, a key having a vertical member and an inclined member, said members running in the correspondingly-disposed grooves, a wedge beneath said box and adapted to adjust the same vertically, and a set-screw disposed above said box and adapted to limit the upward movement of said box.

5. In mechanism of the class described, in combination, housings, boxes mounted in said housings, a roller rotatably mounted in said boxes, wedges adapted to adjust said boxes in a direction at right angles to the axis of said roller, threaded stems controlling the movement of said wedges, means attached to said housings for preventing longitudinal movement of the stems, and mechanism connecting said stems and adapted to rotate the same simultaneously through equal angles.

6. In mechanism of the class described, in combination, housings, boxes supported therein, a roller disposed between said boxes, wedges cooperating with said boxes to adjust said roller, threaded stems projecting from said wedges, means to prevent longitudinal movement of the stems, collars carried by said stems and having notches, and members cooperating with said collars and engaging said notches.

7. In mechanism of the class described, in combination, a roller, boxes therefor, wedges for adjusting said boxes, threaded stems cooperating with said wedges, means attached to the housings of the boxes for preventing longitudinal movement of the stems, means for guiding said stems in a direction substantially at right angles to the axis of said roller, arms loosely carried by said stems, a link con-

necting said arms, collars carried rigidly by said stems and having notches in the peripheries thereof, and catches carried by said arms and adapted to engage said notches.

8. In mechanism of the class described, in combination, housings, boxes mounted therein, a roller between said boxes, wedges cooperating with said boxes to adjust the same, threaded stems adapted to advance said wedges, said housings having openings constituting guides for said stems in a direction substantially at right angles to the axis of said roller, means attached to said housings to prevent longitudinal movement of said stems, arms loosely carried by said stems, a link connecting the same, collars rigidly carried by said stems and having notches in the peripheries thereof, and spring-pressed catches carried by said arms and engaging said notches.

9. In a pair of die-rolls, an adjustment for one of the same upon its shaft, consisting of a hub, and a rim adjustably attached thereto, said hub and rim having opposite circumferentially-disposed teeth adapted to receive an adjusting-key therebetween.

10. In mechanism of the class described, an adjustment for the die-roll, comprising a spindle, a hub rigidly carried by said spindle, a portion of said hub constituting a toothed segment, a rim, bolts adapted to attach said rim to said hub, there being slots in connection with said bolts permitting an angular adjustment of said rim with respect to said hub, said rim having peripheral teeth and constituting a gear-wheel through which its spindle is driven, said rim further having teeth constituting a segment opposite to said first segment, the space between said segments being adapted to receive a removable pinion for adjusting said rim with respect to said hub.

11. A roller comprising a body having peripheral pockets with inclined end walls, in combination with dies disposed about the periphery thereof in said pockets and having shoulders inclined at right angles to the inclined end walls of the pockets, and rings mounted upon the opposite faces of said body and retaining said dies.

12. A roller comprising a body having circumferentially-disposed recesses formed in the edge thereof, in combination with dies received in said recesses, said dies having recesses tapering in depth and having also shoulders circumferentially disposed with respect to the axis of said body, and threaded rings attaching to said body and seating over said shoulders.

13. In rolling mechanism, in combination, a guide-block, slippers carried thereby and having adjacent faces between which a rod may pass, means for constraining said slippers toward each other, and a guiding-fork having tines passing longitudinally between said slippers and disposed apart to receive the said rod therebetween.

14. In combination, a guide-block, slippers mounted therein and having adjacent faces, a fork having tines disposed apart and extending longitudinally between the adjacent faces of said slippers, said fork constituting a guide for a rod passing between the tines thereof, a spring constraining said slippers to clamp said rod, and clamping means cooperating with said spring.
15. In rolling mechanism, a guide-block disposed before a pass, means for adjusting said guide-block with respect to said pass, slippers supported upon said guide-block, and adapted to have the rod pass therebetween, a member disposed between said slippers and adapted to guide said rod, a spring constraining one of said slippers, and a handle having a cam-head behind said spring and carried by said guide-block.
16. In combination, a bracket, a vertically-adjustable head attached thereto, a guide-block carried by said head, means for adjusting said guide-block horizontally upon said head, and means carried by said guide-block for guiding a rod therethrough, and means whereby said guiding device serves also as a tension device.
17. In combination, a bracket, a vertically-adjustable head carried thereby, a set-screw carried by the upper part of said bracket and adapted to support said head, a guide-block supported upon said head, means for adjusting the same horizontally with respect to said

head, slippers carried by said guide-block and adapted to receive a rod therebetween, and means for constraining said slippers together.

18. In a nail-making machine, in combination, a plurality of rolls having means to operate alternately upon the edge and the flat side of a rod and means for forming the head in the first pass and means for successively drawing out or elongating the shank or blade only of the nail and preventing the head from being effected by the rolls, slippers adapted to receive a rod between them and means for constraining said slippers together, and means for driving said rolls alternately in opposite directions, whereby a continuous rod may pass successively through said rolls.

19. In mechanism of the class described, in combination, a pair of rolls adapted to form shoulders in a rod passing therethrough to form nail-blanks, other rolls adapted to draw the material of said blanks and having recesses cooperating with said shoulders, and tension devices through which said rod passes, said tension devices affording means for retarding the forward movement of the rod and insuring engaging said shoulders with said recesses.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

EBEN PERKINS.

Witnesses:

WALTER L. SMITH,
EDITH I. HANNAH.