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M. T. GREENLEAF.

MACHINE FOR MAKING FENCES.

No. 388,355. Patented Aug. 21, 1888.

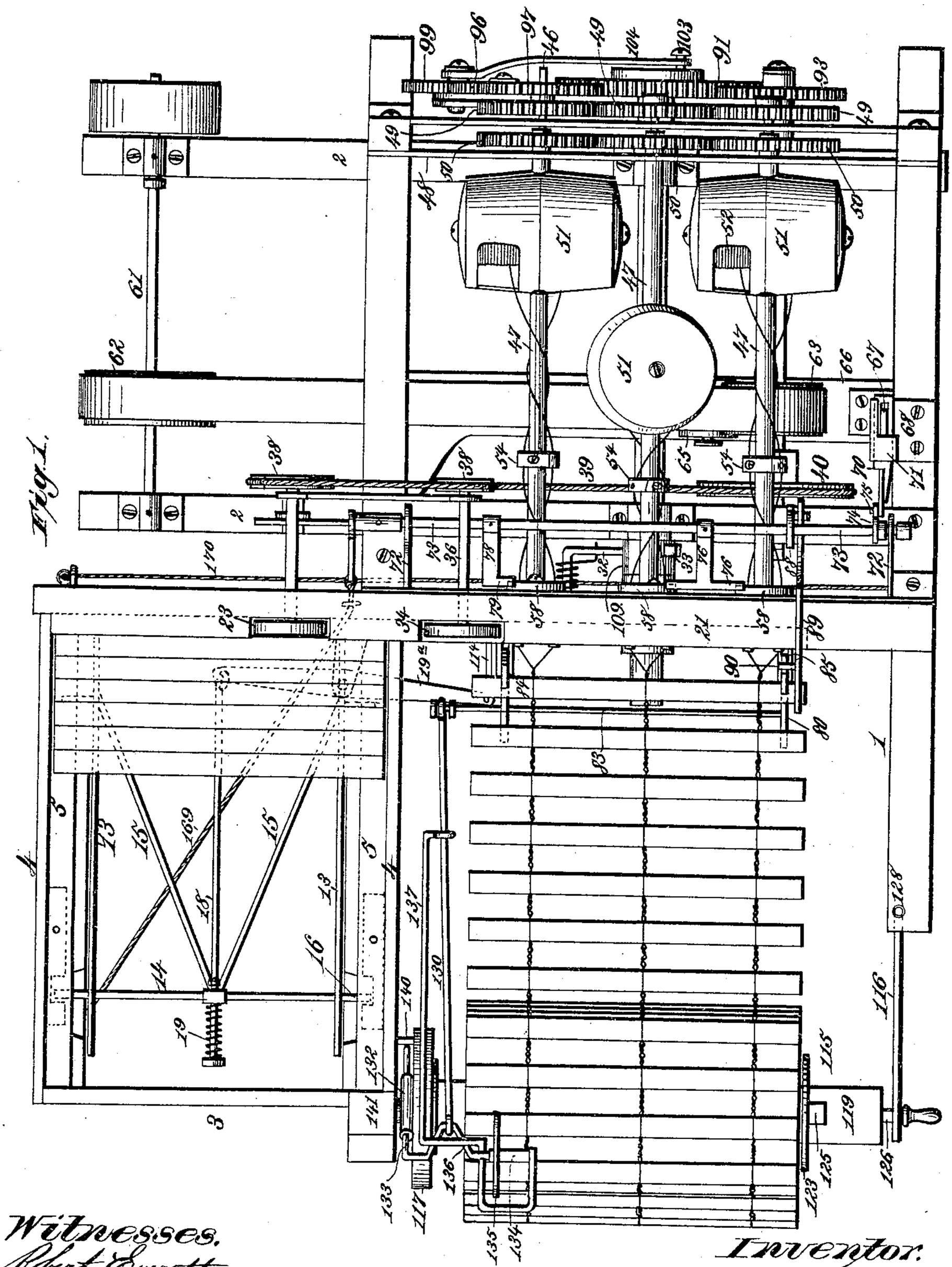

Fig. 1.

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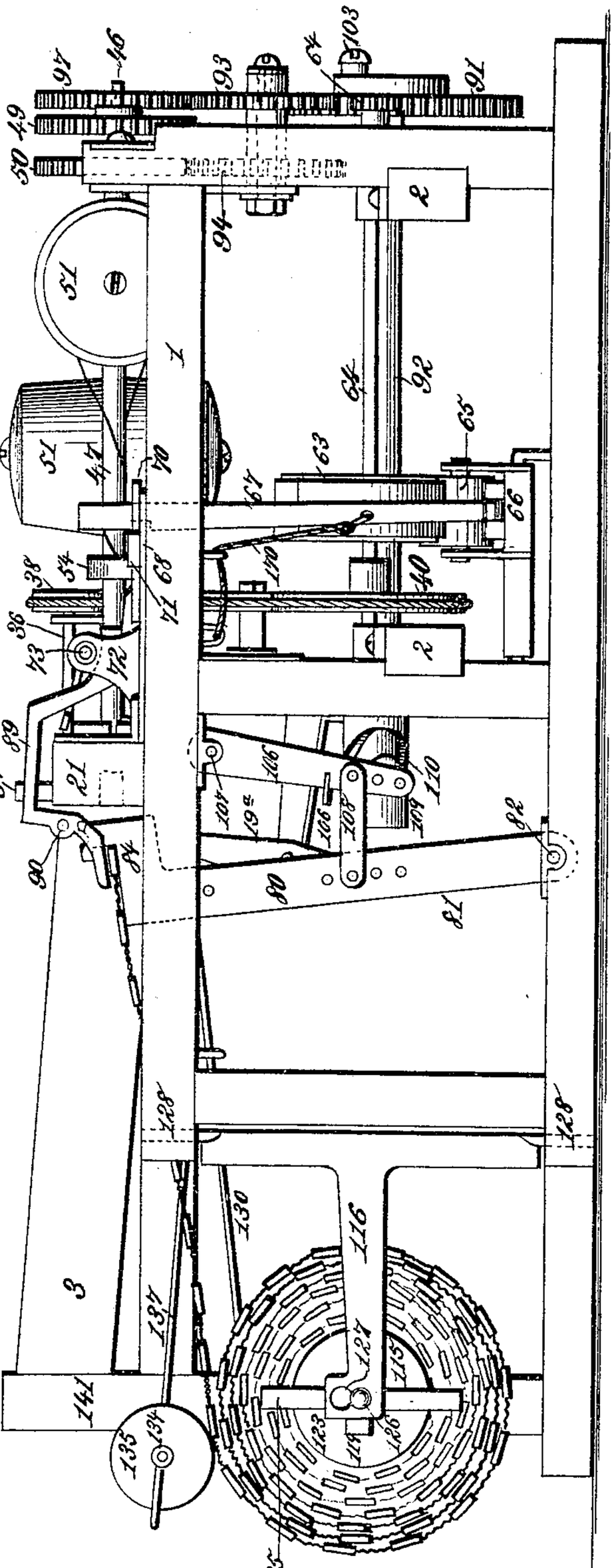

Fig. 2.

Fig. 2a.

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M. T. GREENLEAF.

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Fig. 3.

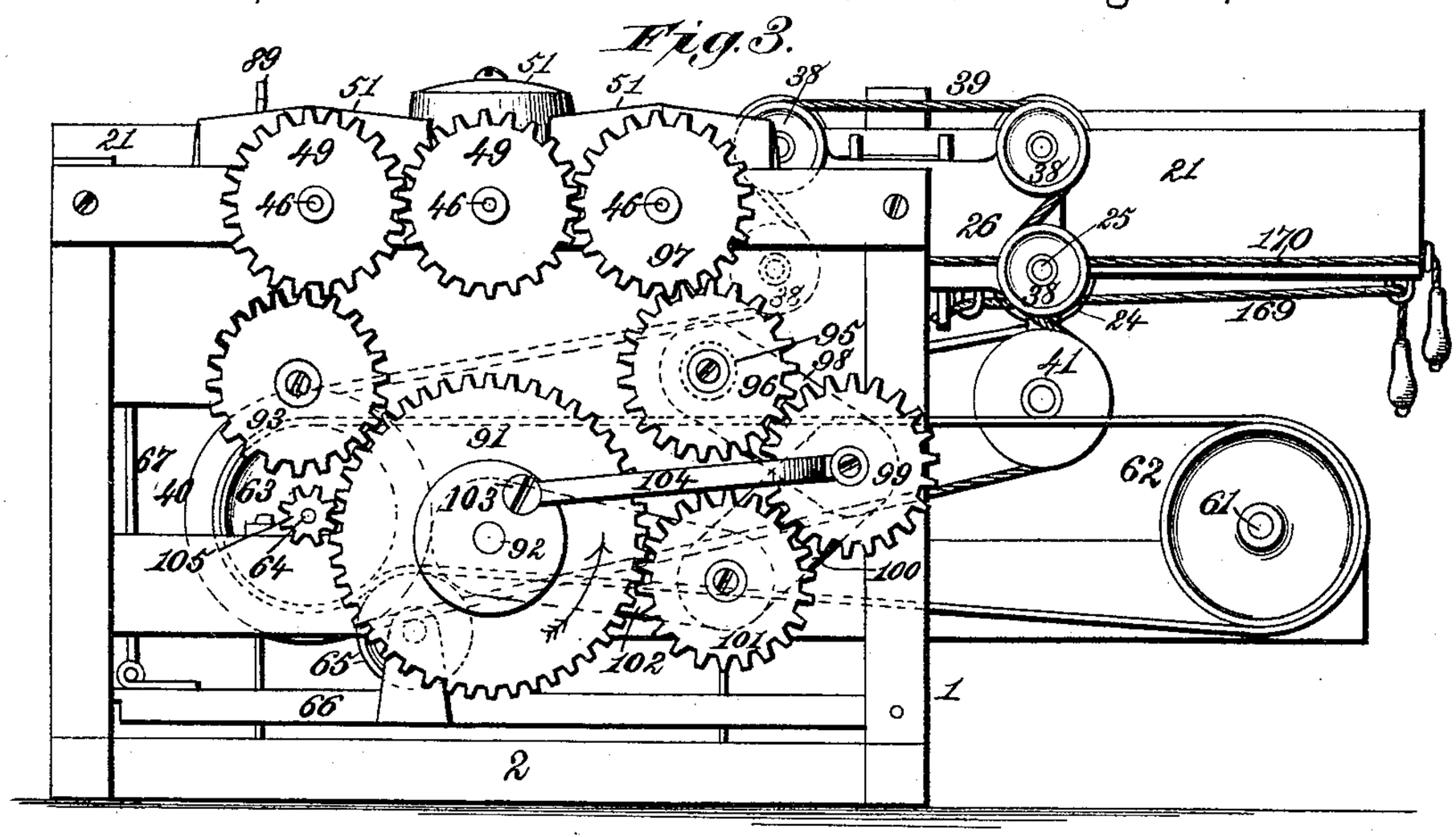

Fig. 4.

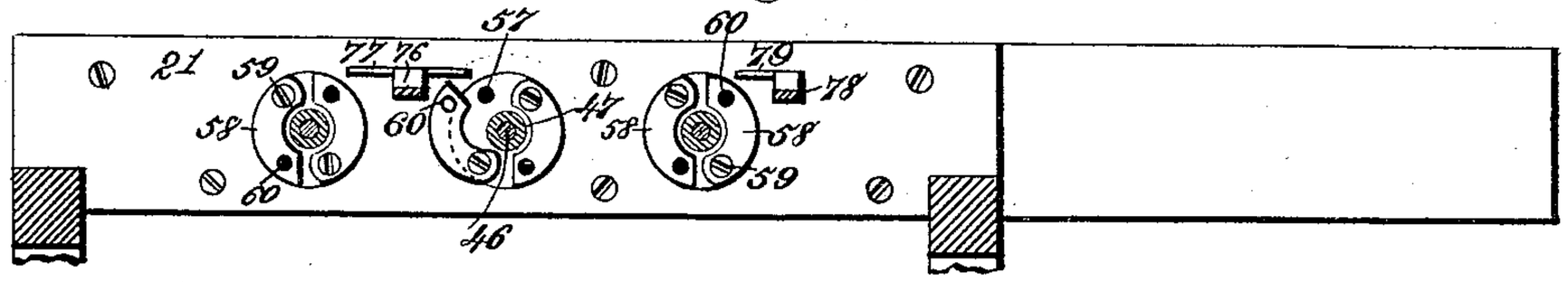

Fig. 5.

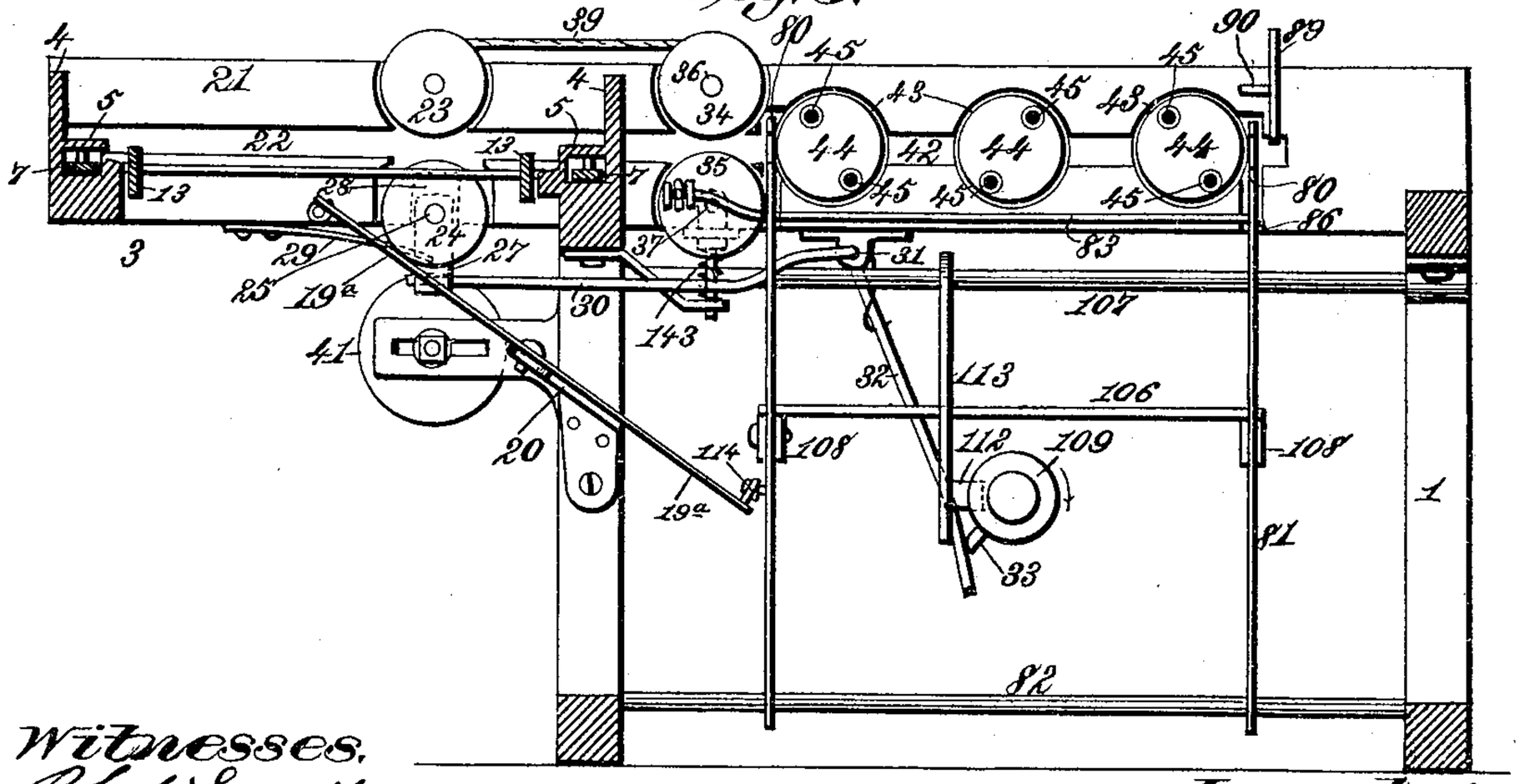

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Fig. 6.

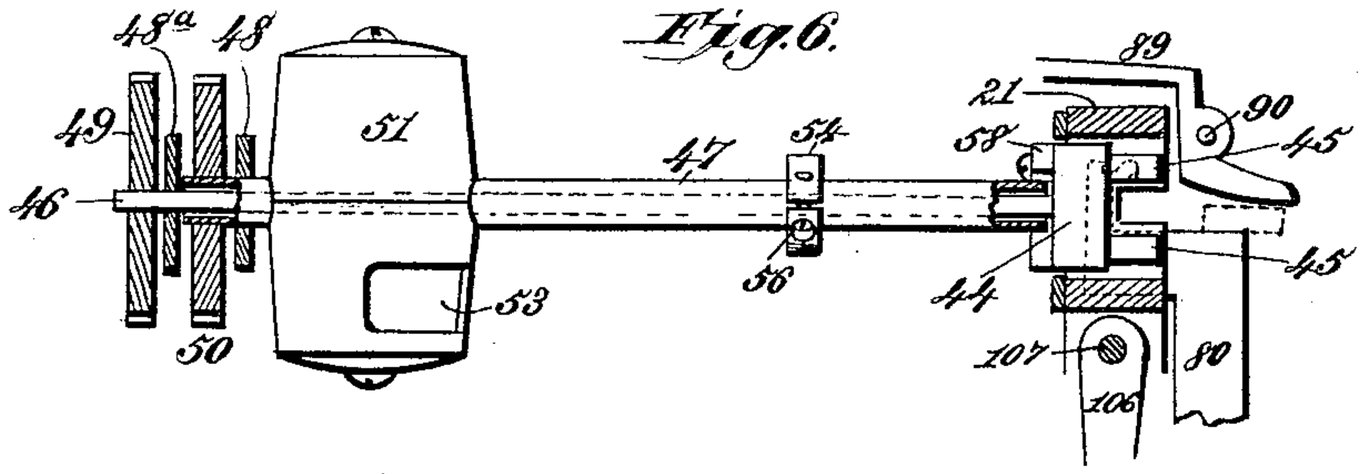

Fig. 7.

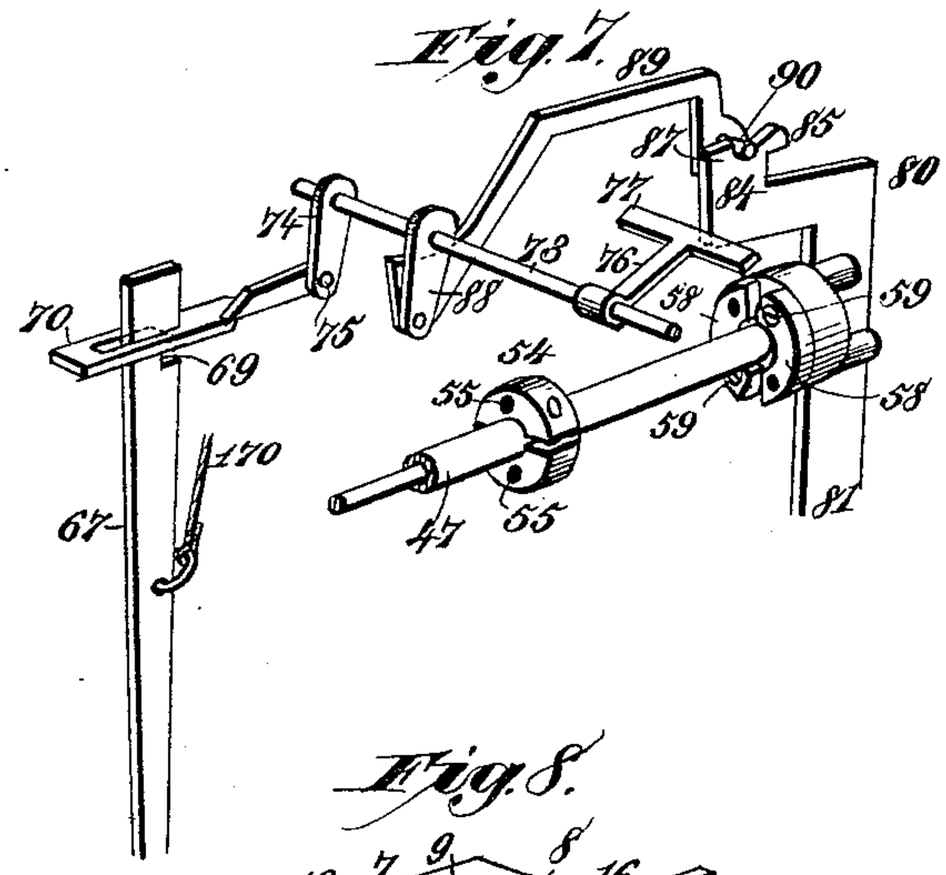

Fig. 8.

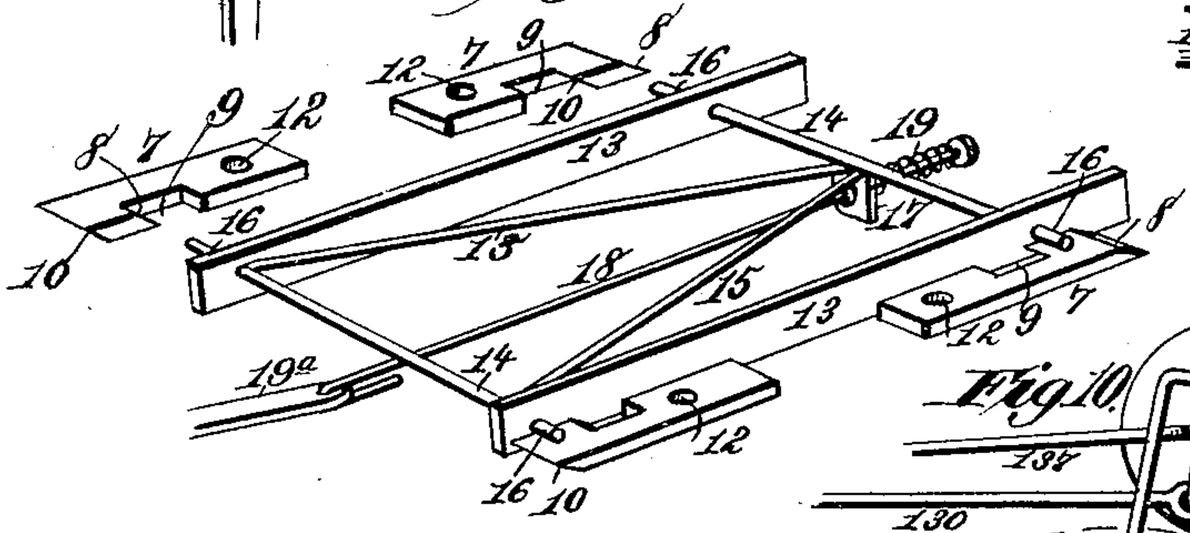

Fig. 9.

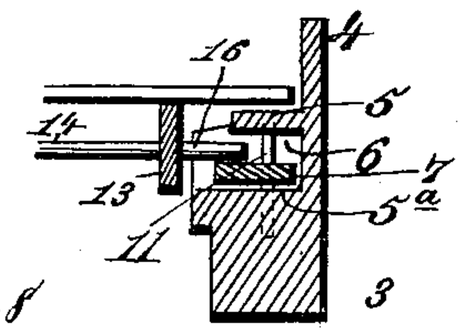

Fig. 10.

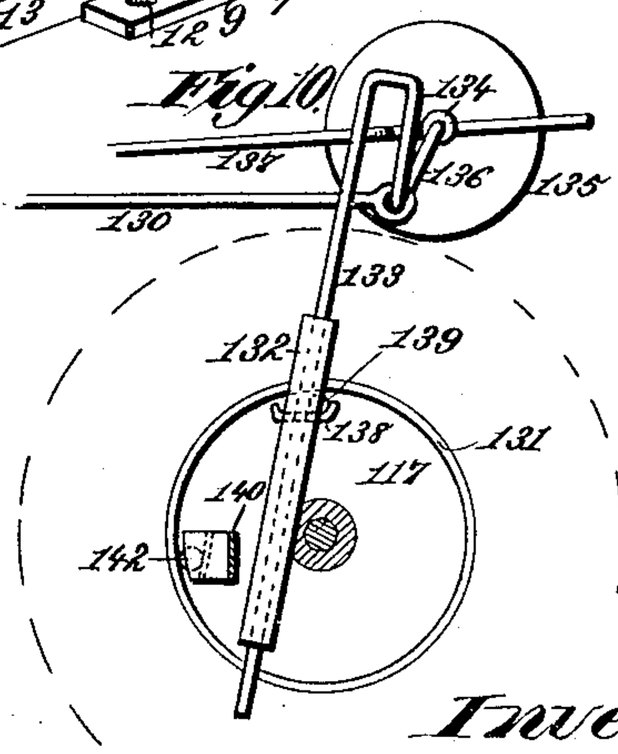

Fig. 11.

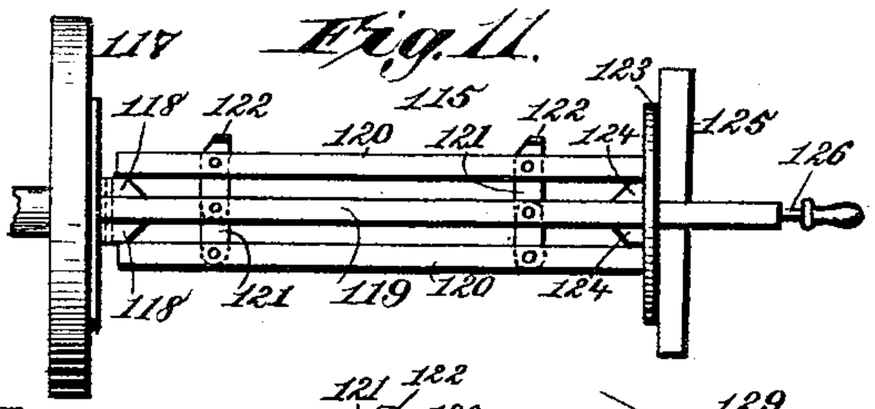

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Fig. 12.

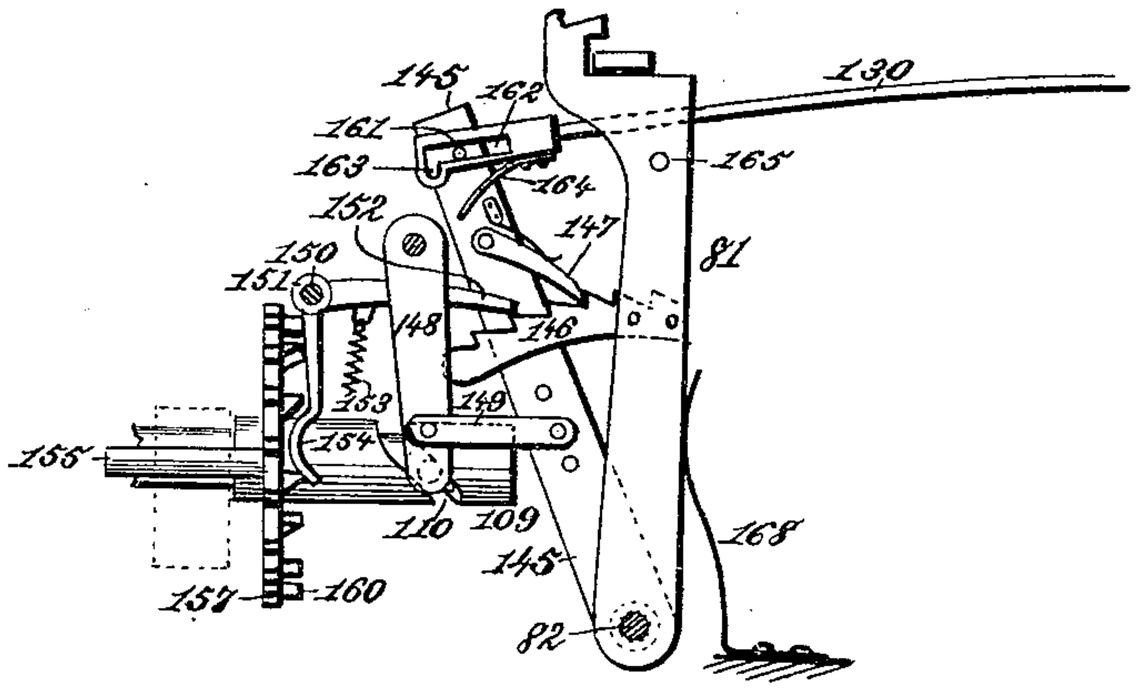
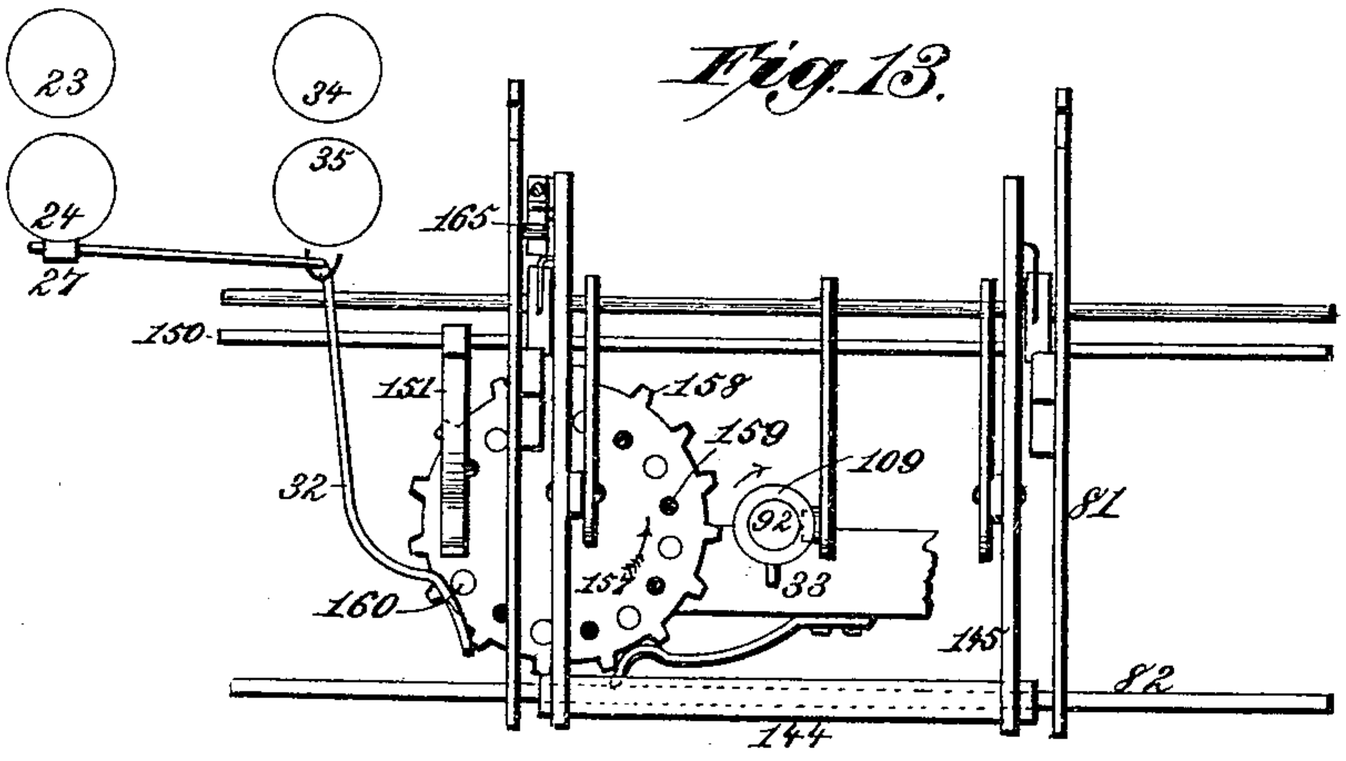


Fig. 13.



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By James L. Norris.
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UNITED STATES PATENT OFFICE.

MILLER T. GREENLEAF, OF QUINCY, ILLINOIS.

MACHINE FOR MAKING FENCES.

SPECIFICATION forming part of Letters Patent No. 388,355, dated August 21, 1888.

Application filed December 6, 1887. Serial No. 257,138. (No model.)

To all whom it may concern:

Be it known that I, MILLER T. GREENLEAF, a citizen of the United States, residing at Quincy, in the county of Adams and State of Illinois, have invented new and useful Improvements in Machines for Making Fencing, of which the following is a specification.

My invention relates to machines for making fencing of that class in which wooden pickets or palings are connected by wire strands twisted around them at intervals, the product of said mechanism being substantially a fabric of wood and wire, which may be set up as a fence and supported in place in any suitable manner.

It is the purpose of my invention to provide simple and novel means for feeding the separate slats or pickets to the devices, whereby they are delivered to the web-forming mechanism.

It is also a purpose of my invention to provide mechanism for rolling up the finished web of fencing, and for imparting to the constantly-increasing roll a constantly-decreasing rotary movement, the diminution thereof being proportioned to the increased diameter of the roll, whereby a uniform advance will be imparted to the wires at the point where they enter into the formation of the web, thus aiding the spacing mechanism in the production of regular intervals between the palings.

It is also my purpose to combine with the twisting devices simple and novel means for imparting a variable tension to the wires, said tension being located between the spools and the twisters instead of being upon the spools themselves. By this feature of my invention I am enabled to produce an equal tension upon both wires without special relative adjustment, and the twist is always thereby brought squarely against the central part of the edge of each paling, adding materially to the beauty as well as the durability of the fencing.

It is also a purpose of my invention to provide simple and novel mechanism for arresting or greatly diminishing the rotation of the twisters, to enable the picket to pass between them and between the confining wires to bring it in proper position to pass into the web.

To these ends my invention consists in the several novel features of construction and new combinations of parts hereinafter fully set forth, and definitely pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view showing the entire mechanism. Fig. 2 is a side elevation of the parts shown in Fig. 1. Fig. 2^a is a detail view of the end of the bracket-arm supporting one end of the take-up roll. Fig. 3 is a rear elevation taken from the right-hand end of Fig. 2. Fig. 4 is a vertical section taken in the line $x\,x$ of Fig. 1. Fig. 5 is a vertical section taken in the line $y\,y$ of Fig. 1. Fig. 6 is a detail view of one of the spool-carrying sleeves, twister-shaft and twister, the tension device, and a portion of the stop-lever. Fig. 7 is a detail perspective of the parts comprising the automatic stop mechanism as combined with the twisting devices. Fig. 8 is a detail perspective of the slat-feeding apparatus, whereby the separate pickets are advanced to the devices delivering them to the spacing and twisting mechanism. Fig. 9 is a detail section taken through one side of the feed-table upon the line 2 2, Fig. 1. Fig. 10 is a detail elevation of the automatic take-up mechanism for rolling up the completed web. Fig. 11 is a plan, a cross-section, and a detail perspective of one end of one of the parts composing the rectangular take-up roll or shaft. Fig. 12 is a partial side elevation showing a modified construction. Fig. 13 is a front elevation of the parts shown in Fig. 12.

In the said drawings, the reference-numeral 1 denotes the frame of the machine bound together by cross-ties 2 and having any suitable shape and proportions required for the purpose. Upon one side and near one end of the frame of the machine I provide a feed-table, 3, of rectangular form, in which the loose palings are arranged in the manner hereinafter described and are successively fed to the twisting devices. As the operation of the mechanism proceeds in natural order from this point to the completion of the web, I will follow the same order, as nearly as may be, in describing the construction, combination, and function of the several parts.

Beginning, therefore, with the feeding-table 3, I construct the same of two parallel sides, 4, separated by an interval which is slightly greater than the length of the pickets to permit the latter to be easily introduced endwise between the same. Projecting inwardly from

these parallel sides are ledges 5, upon which the ends of the slats or pickets rest, and beneath said ledge upon each side is a space or chamber, 6, upon the floor 5^a of which lies a pair of plates, 7, having a notch or opening, 9, near one end and having ascending and descending bevels 8 and 10 at the end of the plate and at one end of the notch. Each of said plates, while free to rise and fall, is restrained from movement in the direction of its length by a dowel-pin, 11, rising from the floor of the chamber 6 and passing through openings 12 in each plate.

Within the frame 3, and adjacent to the ledges 5, I arrange two parallel strips, 13, connected by cross-ties 14 and braced by diagonal bars 15. Projecting from each of these strips are two pins, 16, extending into the chamber 6 and partly overlying the plates 7. Centrally connected to one of the cross-ties 14 is a depending lug, 17, through which passes one end of a pitman, 18, a spring, 19, being interposed between the headed end of said pitman and the lug 17 to soften the shock of the reciprocation. The other end of said pitman is connected to a lever, 19^a, fulcrumed upon a support or bracket, 20, and having its other end vibrated in the manner hereinafter set forth, whereby a reciprocating movement is given to the connected strips 13. By this movement the pins moving upon the ledges 5^a beneath the ledges 5 strike the beveled ends 8 of the plates 7, ride upon the same, and, passing over the upper surface of said plates, arrive at the notches 9, drop through the same, and again rest upon the ledges 5^a. Hereupon, moving in an opposite direction, the pins 16 then pass under the bevels 10, lifting the plates 7 and moving back to their original position upon the ledges 5^a beneath the plates. Riding upon the plates 7 on the forward reciprocation and beneath said plates and upon the ledges 5^a on their rearward movement it will readily be seen that the strips 13 will ride somewhat above the level of the ledges 5, upon which the pickets rest, thereby carrying the latter forward a distance equal to the length of the stroke of the lever 19^a. Said strips then drop, as described, through the notches 9, leaving the pickets on the ledges 5 and moving back for a succeeding stroke.

Forming the forward end of the feed-table 3 is a cross-beam, 21, arranged at a right angle with the longer sides of the feed-table, and in which is formed a delivery-chute, 22, of such width as to receive the slats without difficulty. Mounted in a segmental cavity in said cross-beam, so formed that it opens into the upper part of the delivery-chute, is a feed-roll, 23, and arranged in a similar cavity below is a similar feed-roll, 24, which is adapted to drop slightly and withdraw the roll from operative contact with the slat lying in or moving into the chute. One end of the shaft 25 is journaled in a bracket-bearing, 26, and the other end nearest the feed-roll 24 has bearing in a movable journal-box, 27, lying partly in a slot, 28, in the cross-beam 21. This box is normally thrown downward by a spring, 29, mounted on the beam, and is thrown up into operative engagement with the picket by a lever, 30, fulcrumed at 31 on the lower surface of the beam 21 and having an arm, 32, which is operated by a lug, 33, carried by a collar on the main shaft. (See Fig. 5.) Each engagement of this lug causes the feed-roll 24 to rise and grip a slat which has been carried into the chute 22, between it and the roll 23. The rotation of these two rolls shoots the picket longitudinally in said chute and between two similar feed-rolls, 34 and 35, located beyond the end of the chute and in proximity to the twisters. The latter rolls are similar to those already described, save that their shafts 36 and 37 have rigid bearings. All four of the feed-roll shafts are provided with driving-pulleys 38, driven by a cord, 39, which derives its motion from a pulley, 40. An intermediate pulley, 41, is employed to give proper turn to the cord around the driving-pulley on the shaft of the feed-roll 24.

The chute 22 communicates with and forms a practical continuation of a channel, 42, in the cross-beam 21. This channel is interrupted at intervals by circular openings 43, of which there may be two or more, the number shown in the present instance being three. Within these openings are placed the twisters, each consisting of a cylindrical head, 44, having two tubular guides, 45, projecting from its front at opposite ends of a diametrical line. Each twister is rigidly mounted upon a shaft, 46, supported in a sleeve, 47, the latter having bearing at one end in plates 48. The rear end of the shaft projects beyond the end of the sleeve, is supported in a plate, 48^a, and has a driving-pinion, 49, rigidly mounted thereon, the three pinions rotating the separate twisting-shafts being meshed together. The sleeves 47 project through the rearward bearing-plate, 48, and have driving-gears 50 mounted thereon and meshing together like the pinions 49.

Upon the sleeves 47, between the bearing-plates 48, are mounted spool-cylinders 51, having the shafts passing directly through their centers at right angles to their cylindrical axes. In each end of each cylinder is journaled a spool, 52, carrying wire, which passes out of the cylinder through an opening, 53. From the spools the wires pass over the surfaces of the sleeves 48 to the twisters, passing through intermediate tension devices, 54, mounted on and rotating with the sleeves. Each of these tension devices is composed of a centrally-divided annulus, each half having an opening, 55, for the wire, and the two sections being united by screws 56, passing through the end of one section and tapped into the end of the other, thereby firmly clamping the annulus upon the sleeve. Increased or decreased tension is imparted to the wires by turning the tension-ring upon the sleeve, thereby winding or coiling the wires spirally between the spool-cylinders and the tension-ring and between the latter and

the twisting-heads. Openings 57 (see Fig. 4) are formed in the latter to allow the wires to pass through them into the tubular guides 45.

Upon the rear face of each twisting-head 44, I pivot two segments, 58, of an annulus, the pivotal point 59 being at one end of each segment and so arranged that the other or free end of the segment shall swing over the opening 57, through which the wire traverses the twisting-head. In this free end of each segment is formed a perforation, 60, registering with the opening 57 and adapted to receive the wire as it passes to the latter. The pivotal attachment of these segments is such that unless they are sustained by the wires they will swing away from the sleeve at each rotation of the latter, as shown in Fig. 4.

The mechanism is operated from a power-shaft, 61, having a pulley, 62, belted to a pulley, 63, upon the shaft 64, which also carries the pulley 40. Beneath the belt-gearing of the said pulleys is a belt-tightener, consisting of an idler, 65, mounted upon a bar, 66, connected at one end to the frame and provided at the other with a rod, 67, passing up through a guide-plate, 68, mounted on the frame of the machine, said rod having a notch, 69, (see Fig. 7,) in its edge. Mounted upon the guide plate 68 is a detent-plate, 70, having a slot through which the entire notched end of the rod 67 passes, the detent moving in an inclosing-keeper, 71. Journaled in bracket-bearings 72 above said detent is a rock-shaft, 73, having an arm, 74, rigid therewith, and connected at its extremity to a pin, 75, upon the end of the detent. Rigidly mounted upon the rock-shaft, between the two twisting sleeves 47, is a finger, 76, having a cross-head, 77, the ends whereof extend out over or partly over the adjacent twisting-heads and the segmental sections 58. Beyond the third sleeve 47 a similar finger, 78, having a single arm, 79, of a cross-head, extends over the third twisting-head.

The mechanism being in operation, with the belt-tightener 65 66 raised and the rod 67 locked by the detent-plate 70, the breaking of a wire or the exhaustion of the wire from any one of the spools would release one of the segmental sections 58, which will swing away from the sleeve by gravity as the sleeve rotates, and its projecting end will strike one arm of the cross-head 77 or the half cross head 79 and raise the same, thereby rocking the shaft 73, withdrawing the detent-plate 70 and releasing the rod 67, by which operation the belt-tightener is dropped by gravity and the machine at once arrested.

The slats as they shoot into the channel 42 pass over the jaws 80 of a spacing frame or carrier, 81. This frame consists of the two parallel plates 81, mounted on a rock-shaft, 82, and rigidly connected together by a brace, 83. The upper end of each plate has a rearwardly and then upwardly extending plate, 84, provided with a tooth or finger, 85, forming the jaw 80. The part 84 at each rearward vibration of the frame passes into a slot, 86, at each end of the channel 42, and lies in such position that the picket passes over and in front of the jaw, as well as between the tubular guides 45. One of the jaw-pieces 84 is provided with a notch or hook, 87, Fig. 7, for a purpose now to be described.

The pickets are aligned and their ends brought into line by the end of the channel 42, against which they abut. In rear of this point an arm, 88, is rigidly mounted on the rock-shaft 74, and pivotally connected to the end of this arm is a finger, 89, which is carried forward over the cross-beam 21, and then downward, its end passing just outside of the jaw 80, having the notch or hook 87. A pin, 90, is mounted on said finger, and when the finger 89 is not supported this pin drops into the path of the hook 87, which engages it on the forward vibration of the frame 81 and draws the finger forward, thereby rocking the shaft 73 and releasing and dropping the belt-tightener in the manner already set forth. The relative position of parts just previous to the forward movement of the frame is shown in Fig. 7.

When the slats or pickets pass into the channel 42 properly and are carried completely to the end thereof, as they should be, to bring their extremities into line, they will pass out of the channel at each vibration of the spacing-frame under the downwardly and forwardly curved end of the finger 89, which rides up on the passing pickets. As long, therefore, as the latter pass in proper position the pin 90 will be held up out of engagement with the hook or notch 87; but if a single picket fails to reach the end of the chamber 42 and is thereby out of line with its predecessors, the moment it is carried forward by the spacing-frame its end fails to pass under the curved end of the finger 89, and the latter therefore drops by gravity, bringing its pin 90 into position to engage the hook 87, whereby the rock-shaft 73 is operated and the machine arrested. This automatic stopping of the mechanism upon the breakage or exhaustion of wire or the malposition of a picket is of great importance to the invention, as it removes the necessity of a number of employés to watch the operation of the different parts and enables a single man to operate the machine, the placing of the pickets in the feed-compartment being the only service required of the operator.

In inserting the pickets successively between the wires to incorporate them in the web it is necessary that the twisting-heads 44 shall either cease rotation during the time the picket is shooting from the delivery-chute of the feed-table into the channel 42, or if the rotation does not entirely cease it must be very greatly retarded. This "slow-up" motion, alternating with a successive speeding of the twisters, must not only take place at regular intervals but must be so arranged that it shall throw the tubular guides 45 upon opposite sides of the channel 42 and retain them, or at

least prevent them from crossing said channel until the spacing-frame has carried the picket out of the channel and up against the previously-formed twists of the wire strands. This result I accomplish in the following manner:

As already stated, the twisters are revolved by shafts 46, driven by three intermeshing pinions, 49, while the sleeves 47 are driven independently by pinions 50, also intermeshing and arranged for convenience in a train parallel with and close to the train of gears 49. As the sleeves simply carry the spool-cylinders and tension devices, they have a constant revolution and are driven by power from the gear 91 on the main shaft 92. This gear meshes with a pinion, 93, by which movement is transmitted through a second pinion, 94, to the train 50.

Mounted upon a stud, 95, is a pinion, 96, meshing with a gear, 97, on the same shaft with one of the train 49. Upon the stud 95 is pivoted one end of a link, 98, having upon its other end a bearing for a pinion, 99, the length of the link and the diameter of the gear being such that the pinion 99 will mesh with the pinion 96. In like manner a link, 100, is mounted by its end upon the bearing of the pinion 99, and its other end similarly connected to the journal of a pinion, 101, which meshes with both the pinion 99 and the gear 91. The latter gear is connected in exactly the same manner to the journal of said pinion 101 by a link, 102. Upon the face of the gear 91 is a crank-pin, 103, carrying a pitman, 104, the end of which is connected to the journal of the pinion 99. The rotation of the twister-heads is derived from the gear 91 through the train of gears 101, 99, 96, and 97. Now, as the gear 91 revolves, the pitman 104 will reciprocate the pinion 99 through an arc of the circumference of pinion 96, and at each reciprocation the action of the links 98, 100, and 102 will cause the pinion 101 to travel toward and from the pinion 96—or, in other words, it will travel up and down upon an arc of the revolving gear 91. The latter gear revolving in the direction of the arrow in Fig. 3, it will be seen that as the pinion 101 travels upward on the periphery of gear 91 the motion communicated by it will be equal to its own revolution minus the simultaneous rotation of the gear 91. As it runs down in the opposite direction, its communicated motion will be equal to its own revolution plus that of the gear 91. By the former movement the twisters are arrested and by the latter their revolution is again restored, the picket being shot between the tubular guides 45 and carried out by the spacer during the period occupied by the upward vibration of the gear 101.

I have shown the pinions 49 and 50 and those intermediate between these trains and the power-gear 91 as of the same size to give relative accuracy to the several movements.

The shaft 64 is driven from gear 91 through a pinion, 105. In rear of the spacing-frame 81 is a bracket-frame, 106, mounted at its upper part on a rock-shaft, 107, and connected to the spacing-frame by links 108. Upon the shaft 92 is the collar 109, carrying the lug 33, which raises the feed-roll 24, and in said collar is cut a cam-race, 110, in which travels a friction-roll, 112, on a bearing, 113, mounted on the bracket 106. This cam-race vibrates the spacing-frame, and the movement of the feeding devices by which the pickets are advanced in the table 3 is derived therefrom through a short pitman, 114, connected to the end of the lever 19a.

As the web is produced it is received upon the take-up 115, Figs. 1, 2, and 11, supported in a bracket, 116, at one end and in the frame of the machine at the other. This take-up is composed of a circular head, 117, having two parallel lugs, 118, separated from each other and lying upon opposite sides of the center of the head 117. The outer angles of these lugs are beveled off, as shown in Fig. 11. Between the lugs the end of a plank, 119, is inserted and pivoted by a pin shown in dotted lines, Fig. 11.

Upon each side of the plank 119 is arranged a strip, 120, of equal width, connected to the former by links 121, pivoted to the plank and to each strip. Upon one surface these links are prolonged and extend through the slots in one of the strips 120, their projecting ends having hooks 122, to which the first slat in the web may be attached. A disk, 123, is slipped over the free end of the plank 119, which passes between lugs 124 on its inner face, similar to the lugs 118. The ends of these strips 120 rest upon the outer edges of these lugs, and thereby hold the links 121 distended, the disk being locked by a key, 125. When the web is to be removed from the take-up, the bearing 126 on the end of the plank 119 is raised in a key-hole slot, 127, in the bracket bearing 116, and the latter, which is pivotally mounted at the point 128, is swung out of engagement, the key-hole slot 127 having its upper enlarged portion of such size as to permit the handle 126a on the journal-bearing 126 to pass freely through the same. The key 125 is then removed, the disk 123 is slipped off, and the strips 120 are drawn outward, collapsing them upon the plank 119 and turning the hooks 122 into the slots 129, from which they project. This releases the roll of fencing and permits it to be removed from the take-up with ease.

Movement is intermittingly given the take-up by means of a pitman, 130, vibrated by the spacing-frame. As the constantly-increasing diameter of the roll of fencing gives an increased peripheral movement at each equal movement of the axis of the roll, I provide the following means for constantly decreasing the axial movement in proportion to the increase in diameter:

Projecting from the exterior of the head 117 is a flange, 131, and pivotally mounted on the journal of said head is a sleeve, 132, in which a lever, 133, has free longitudinal movement. From the upper end of this lever pro-

jects a bearing, 134, carrying a rider-disk, 135. The pitman 130 is connected to an arm, 136, of the lever 133 and a branch, 137, of said pitman is connected directly to the bearing of the rider-disk, the lever being by this arrangement prevented from turning axially in the sleeve.

Upon the sleeve 132 is formed or mounted a pocket-plate, 138, in which a roll, 139, is carried, the angle of the plate forcing it on the forward throw of the sleeve against the flange 131, and upon the backward throw releasing it, forming a friction-clutch whereby the head is rotated. A bracket, 140, is mounted on the post 141 and carries a holding-clutch, 142, of similar construction, whereby retrograde movement of the take-up is prevented. As the rider-disk travels on the increasing roll of fencing, the lever 133 is withdrawn from the sleeve and its acting distance prolonged, thereby decreasing the effective stroke. In this manner a constant tension is applied to the web of fencing, the rotation of the take-up being constantly diminished as the roll increases in diameter.

The feed-roll 35, though described as being carried by a shaft mounted in rigid bearings, is preferably provided with a support which yields to the passage of the picket, and for the purpose of giving a firm grip to the rolls I place a spring, 143, beneath the journal-support of said roll, which will accomplish the result specified.

In order to provide means for varying the number of twists imparted to the wire strands and to vary also the spacing or interval between the successive pickets, I provide the mechanism shown in Figs. 12 and 13. In these figures the numeral 81 denotes the spacing-frame, already described. Upon the rock-shaft 82, which supports said frame, is mounted a sleeve, 144, on which is an auxiliary frame, 145. A curved rack, 146, is mounted on one of the parts of the spacer 81, and a pushing-pawl, 147, on the auxiliary frame 145. A bracket-frame, 148, is linked to the auxiliary frame by one or more links, 149, the end of said bracket-frame having a friction-roll which runs in the cam-race 110 in collar 109, whereby vibration is given to the spacer through the auxiliary frame 145.

Mounted upon a rock-shaft, 150, is a bell-crank lever, 151, having its end 152 lying over the rack 146 and serving as a holding-pawl, being drawn by a spring, 153, down upon said rack. The other arm of said lever has a curved extremity, 154, hanging down below the rock-shaft 150.

Upon a shaft, 155, is mounted a wheel, 157, having teeth 158 at intervals, and provided with openings 159 in its face, near the periphery, in which pins 160 are placed. The arrangement of parts is such that the teeth 158 shall pass in proximity to the collar 109, while the vertical arm of the lever hangs in front of the face of the wheel near the pins 160. In the upper end of the auxiliary frame 145 a pin, 161, is placed, with which the end of the pitman 130 is engaged. A slot, 162, is formed in the end of the pitman, and a pocket, 163, at the end of the slot. A spring, 164, is mounted by one end below the slot, and a pin, 165, projects from the spacer 81 to lie in the path of said spring.

The wheel 157 is rotated one step at each revolution of the shaft 64 by the lug 33 on the collar carried by said shaft. As the pins 160 move they impinge upon the end of a lever, 32, the vibration of which raises the journal-box 27, in which the journal of the shaft carrying the movable roll 24 is supported, and at each vibration of said lever a picket is shot from the delivery-chute. If the pins 160 are all placed in the wheel, a picket will be carried into the web at each revolution of the shaft 92; but if part of the pins are removed the shaft will necessarily rotate two, three, or more times in effecting the delivery of each picket.

As the bracket-frame 148 is reciprocated, it rocks or vibrates the auxiliary frame 145, the pawl 147 is drawn back, engages a tooth of the rack 146, and pushes the spacer 81 forward. At each vibration this operation is repeated, the spacer being moved each time toward the web until one of the pins 160 comes in contact with the curved end of the bell-crank lever 151 and trips the holding-pawl 152, which in rising lifts the pushing-pawl 147, whereupon a spring, 168, throws the spacer back into position to receive a picket from the delivery-chute. As the spacer moves back the spring 164 on the pitman 130 strikes the pin 165 on the spacer, and the pin 161 passes into the pocket 163, thereby giving positive connection to the pitman and causing it to operate the take-up.

It will be seen that by simply arranging the pins 160 in the wheel and leaving greater or less intervals between adjacent pins the twist of the wires will be prolonged and the intervals between the pickets proportionally increased.

A let-off, 169, is connected to the lock 70, which supports the belt-tightener, whereby the operator may stop the machine at any time. A second cord, 170, is attached to the bar 67, Fig. 7, and carried over pulleys or through staples to the angle of the feed-table or other convenient point. By tension upon the latter cord the belt-tightener is raised at any time and the machine started.

What I claim is—

1. In a machine for making fencing, the combination, with a feed-table having parallel ledges for the support of the slats or palings, and provided with plates arranged below said ledges and beveled as described, of a feeding-frame arranged between the ledges of the table and composed of parallel bars having trunnion-pins projecting outward to engage with the beveled plates, and means for reciprocating said frame, substantially as described.

2. The combination, with a feed-table hav-

ing supports upon which the ends of the pickets rest, of a feed-frame arranged beneath said supports and provided with trunnion-pins, a pitman reciprocating said frame, plates having an upward bevel at their ends and provided with notches in their adjacent edges, and descending bevels adjacent to said notches and pins, preventing longitudinal movement of said plates, substantially as described.

3. The combination, with a feeding-table having supports for the ends of the pickets, of a cross-beam arranged at a right angle to the longer sides of the feed-table, said cross beam having a delivery-chute adapted to receive the pickets singly, and separable feed-rolls having constant rotation within said chute, substantially as described.

4. The combination, with a rectangular feed-table having one side formed by a cross-beam having a delivery-chute adapted to receive the single pickets, of separable feed-rolls revolving within said chute, and a pair of feed-rolls revolving upon shafts having rigid bearings and rotating between the delivery-chute and a channel in the cross-beam communicating with the same, substantially as described.

5. The combination, with the twisting-heads of a fence-machine, of sleeves within which the shafts of the twisters revolve, spool-cylinders mounted on said sleeves, and tension devices each composed of a divided ring, the parts thereof having apertures to receive fastening-screws by which they are united and drawn into contact with or clamped upon the sleeves, and provided also with openings for the passage of the wires, substantially as described.

6. The combination, with the twisting-heads and with sleeves mounted on the shafts thereof, of spool-cylinders mounted on and revolving with said sleeves, and tension devices having passages for the wires and clamped upon said sleeves between the spool-cylinders and the twisters, said tension devices having rotary adjustment upon the sleeves, whereby the tension is varied, substantially as described.

7. The combination, with the twister-shafts and the sleeves in which they rotate, of spool-cylinders carried by said sleeves, two separate trains of intermeshing pinions revolving the twister-shafts and sleeves independently, a power-gear communicating constant revolution to the sleeves, a train of pinions giving movement to the twister-shafts, two of said pinions being mounted on movable bearings linked to the bearing of the adjacent pinion, and a pitman connected to a crank-pin on the power-gear and to the journal of one of the movable pinions, substantially as described.

8. The combination, with two independent trains of gearing revolving the twister-shafts and the sleeves carrying the spool-cylinders and having adjustable tension devices, of a power-gear, a train of gears communicating constant rotation therefrom to the sleeves, and a train of gearing communicating motion to the shafts from the same power-gear, one of said gears having its journal connected by a pitman to a crank-pin on the power-gear and by a link to the journal of each of the intermeshing gears, substantially as described.

9. A take-up for fencing-machines, consisting of a central section, strips linked thereto, one upon each side thereof, one of said links near each end of the take-up being prolonged to extend through slots in one of said strips, and having the points of said prolonged ends adapted to engage the web, substantially as described.

10. A take-up for fence-machines, consisting of a flat central piece or section, strips linked thereto on opposite sides, two of said links being prolonged to extend through slots in one of said strips, a head having beveled lugs, between which one end of the central section is fastened, a removable collar having similar lugs to engage the other end of the central section, a wedge or key lying in a slot in the central section to hold the collar, and a movable bracket supporting a journal on the outer end of said section, substantially as described.

11. The combination, with a series of twisting-shafts, of a series of sleeves having rotation about said shafts and carrying spools, a power-gear, a train of gears intermediate between said power-gear and the pinions of said shafts, links connecting the journals of the adjacent gears, and a pitman driven by the power-gear and connected to the end of the journal of one of said intermediate gears, substantially as described.

12. The combination, with a main or power gear, of a train of gears driven thereby, links connecting the axis of the main gear and the movable journals of the gears in the train, a pinion on one of the twisting-shafts having a rigid bearing to which the last gear of the train is linked, a spool-carrying sleeve revolving with a constant speed about said shaft, and a connection between the main or power gear and one of the gears of the train, whereby the gear linked to the shaft of the power-gear is caused to travel back and forth upon an arc of the power-gear, substantially as described.

13. The combination, with the spacing-frame having a rack, of the auxiliary frame having a push-pawl engaging said rack, a holding-pawl adapted to trip the push-pawl when raised, a rotating disk having adjustable pins at intervals impinging on said holding-pawl, and means for vibrating the auxiliary frame, substantially as described.

14. The combination, with the vibrating spacer having a rack, of the auxiliary frame having a push-pawl engaging said rack, a holding-pawl adapted to trip the push-pawl when raised, a wheel or disk having teeth and provided with removable pins projecting from its face, a lever having one end engaged by said pins, a movable journal of one of the picket-feeding rolls raised by said lever, and

a lug on the main shaft by which intermittent rotation is given to said wheel, substantially as described.

15. The combination, with the spacer having a rack and a vibrating auxiliary frame having a push-pawl, of a spring-actuated bell-crank engaging the rack, an intermittingly-rotated wheel having adjustable pins projecting from its face toward the other end of the bell-crank, a pitman having a slotted end engaging a pin on the auxiliary frame and provided with a pocket opening out of said slot, a spring on the pitman below the slotted end lying in the path of a pin on the spacer, and a take-up mechanism with which the pitman is connected, substantially as described.

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

M. T. GREENLEAF.

Witnesses:

JAMES L. NORRIS,

J. A. RUTHERFORD.