

No. 674,103.

Patented May 14, 1901.

J. M. STUCKER.

WIRE FENCE MAKING MACHINE.

(Application filed Jan. 15, 1901.)

(No Model.)

5 Sheets—Sheet 1.

Fig. 1.

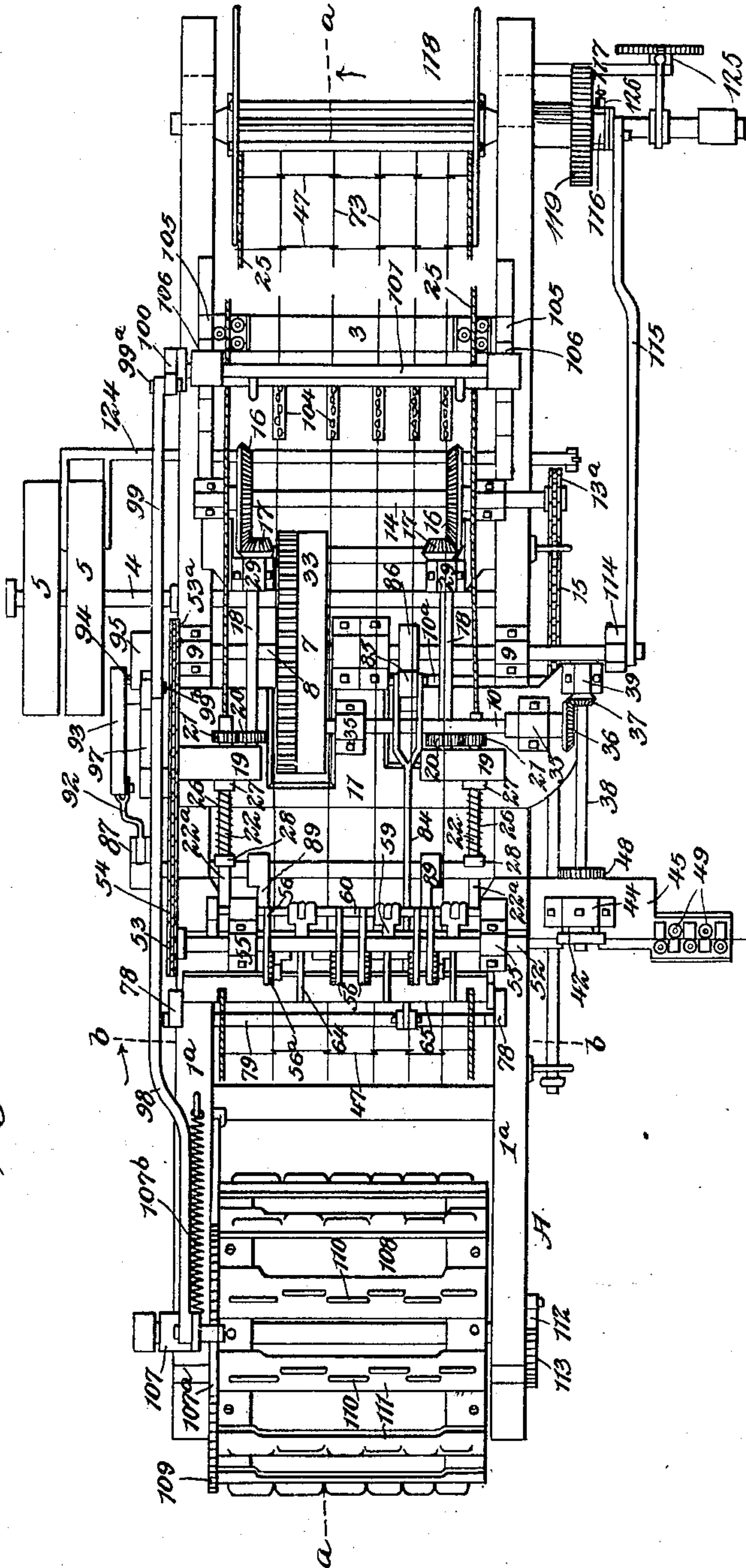
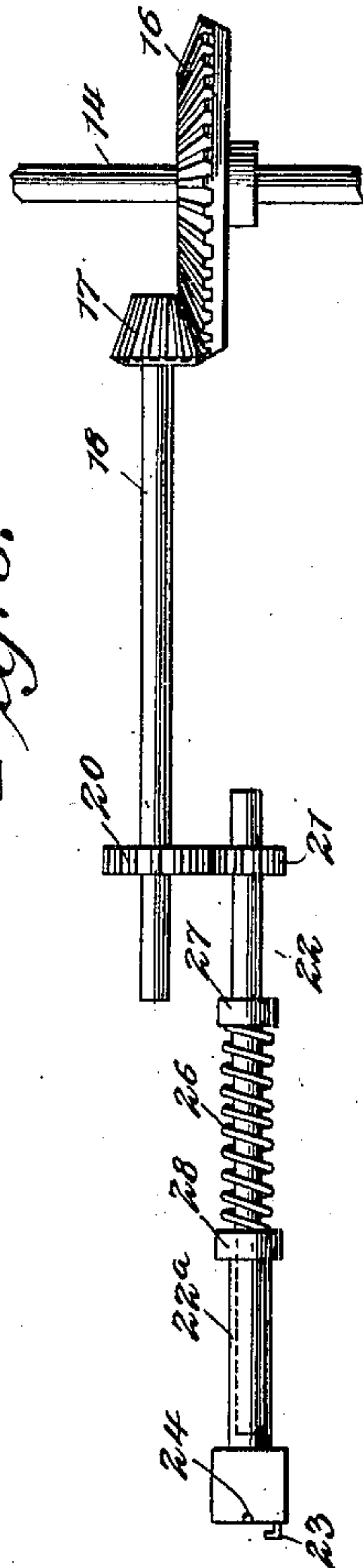


Fig. 6.



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5 Sheets—Sheet 2.

Fig. 2.

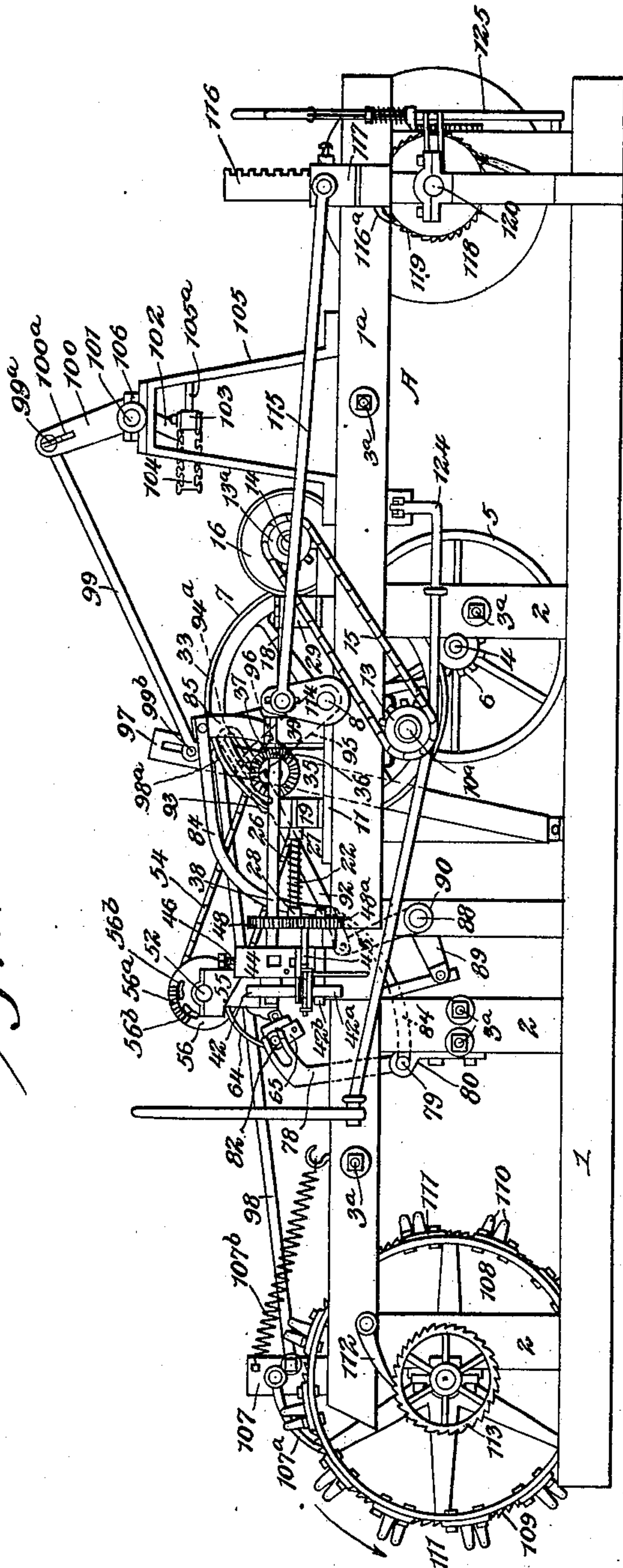


Fig. 12.

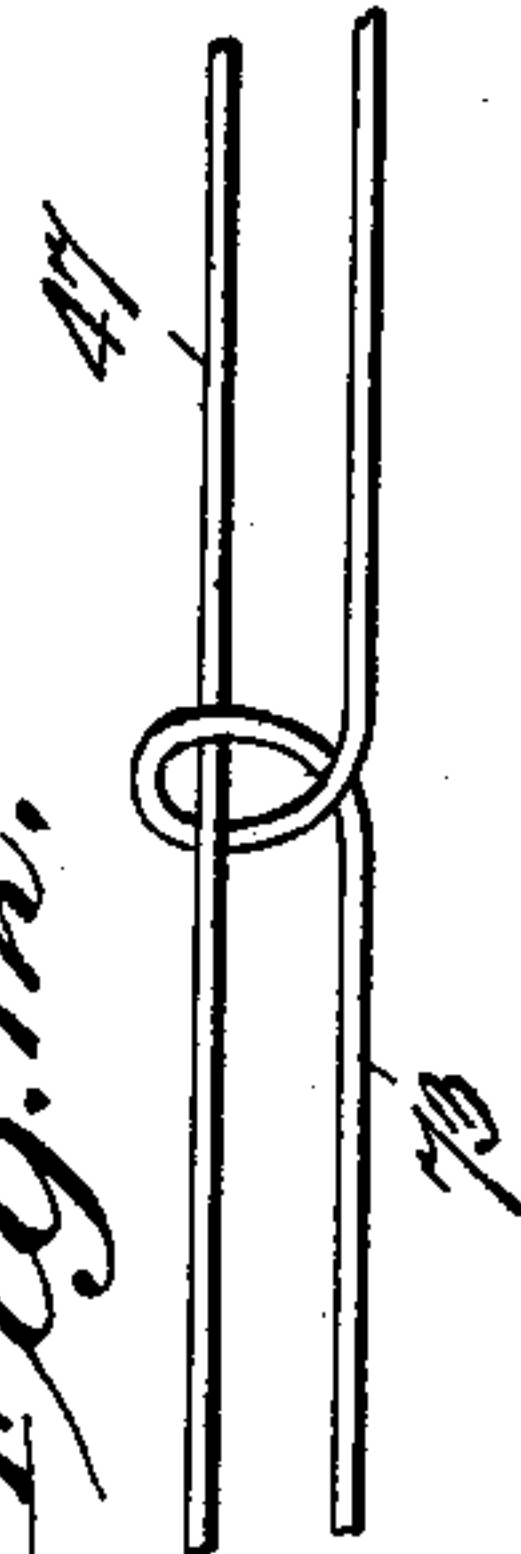


Fig. 13.

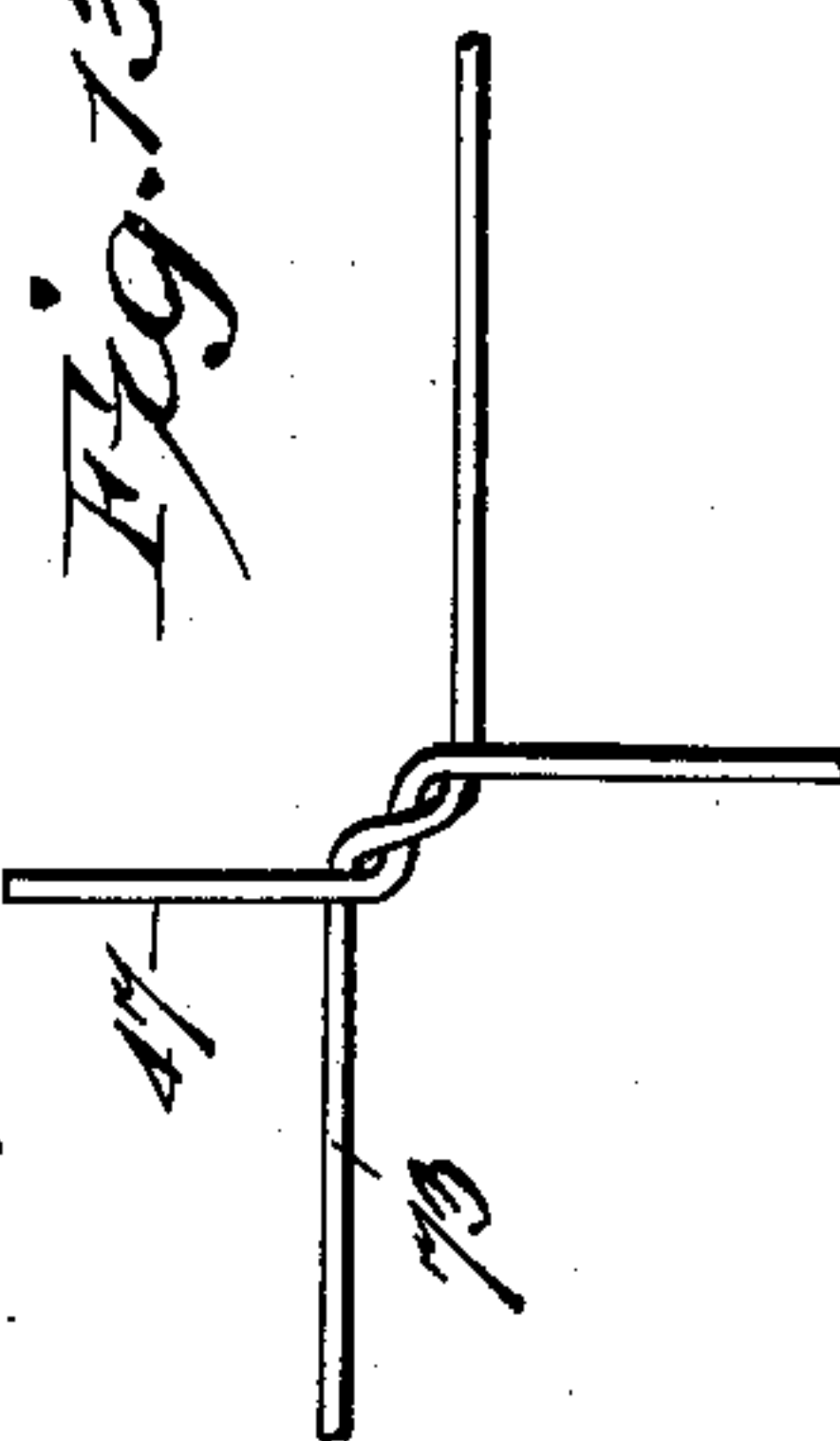


Fig. 7.



Fig. 10.

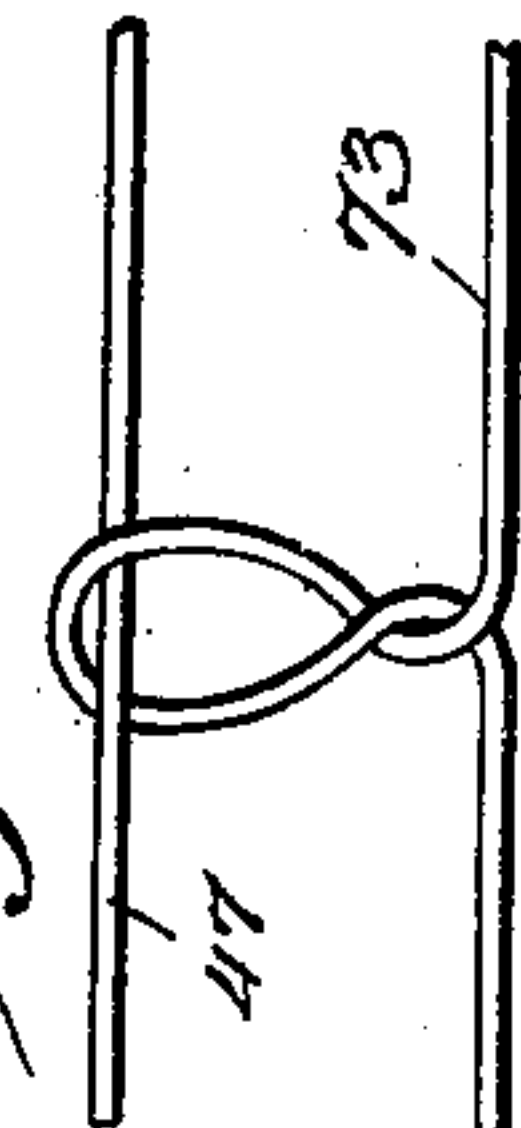
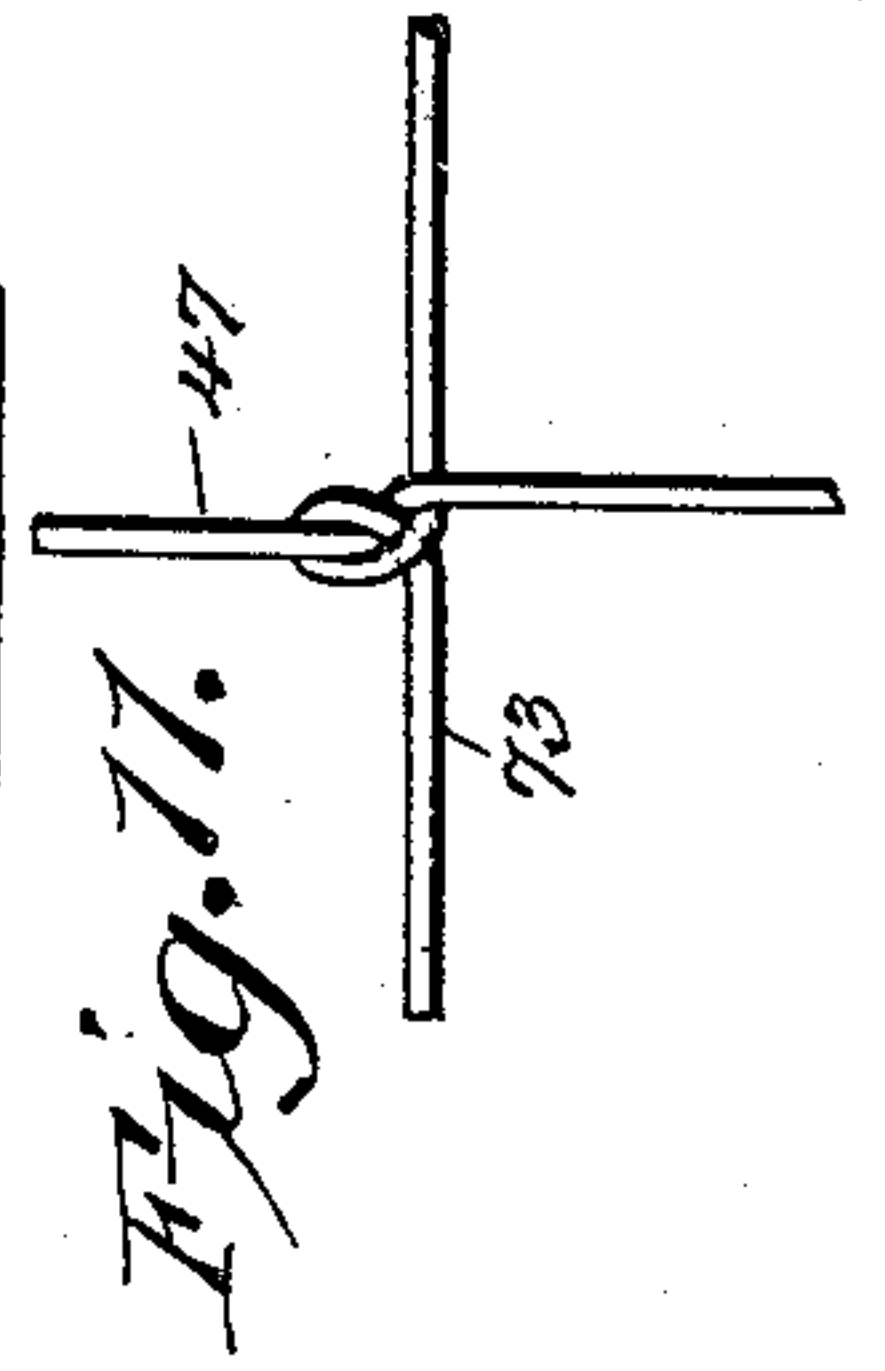


Fig. 11.



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5 Sheets—Sheet 3.

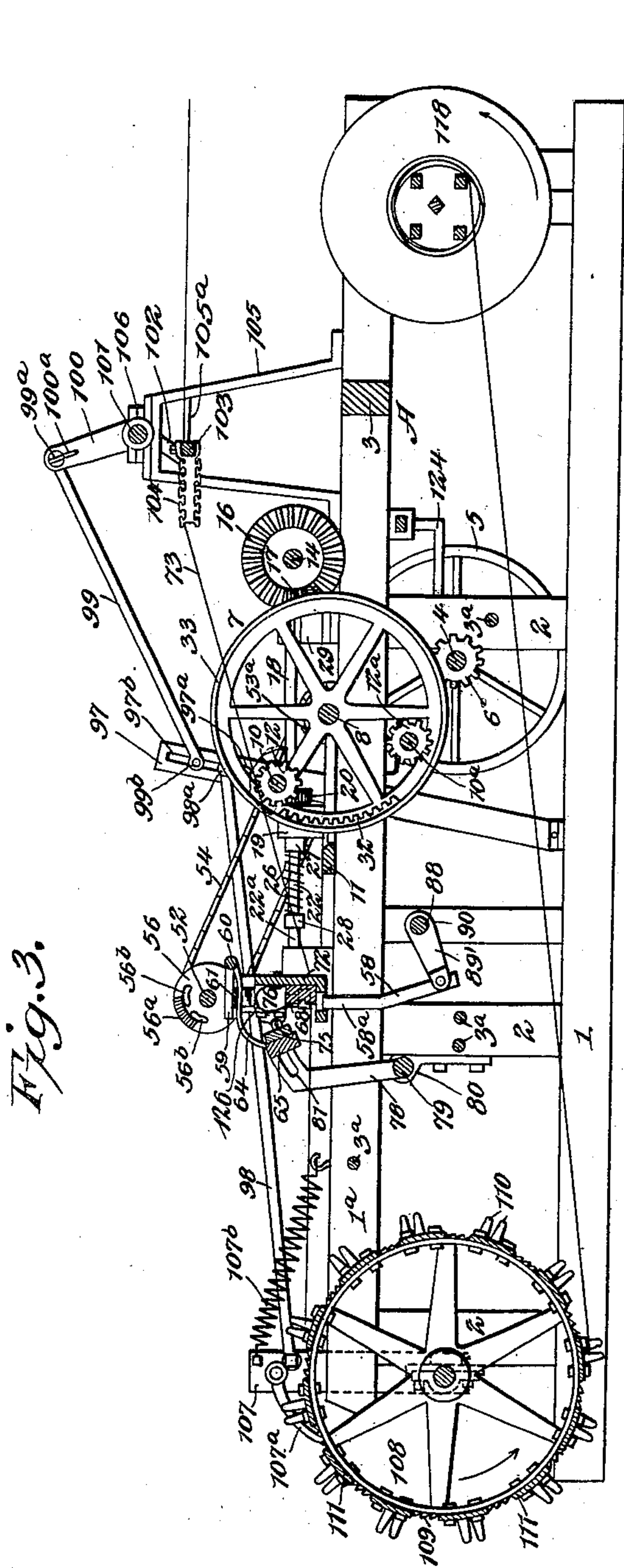


Fig. 3.

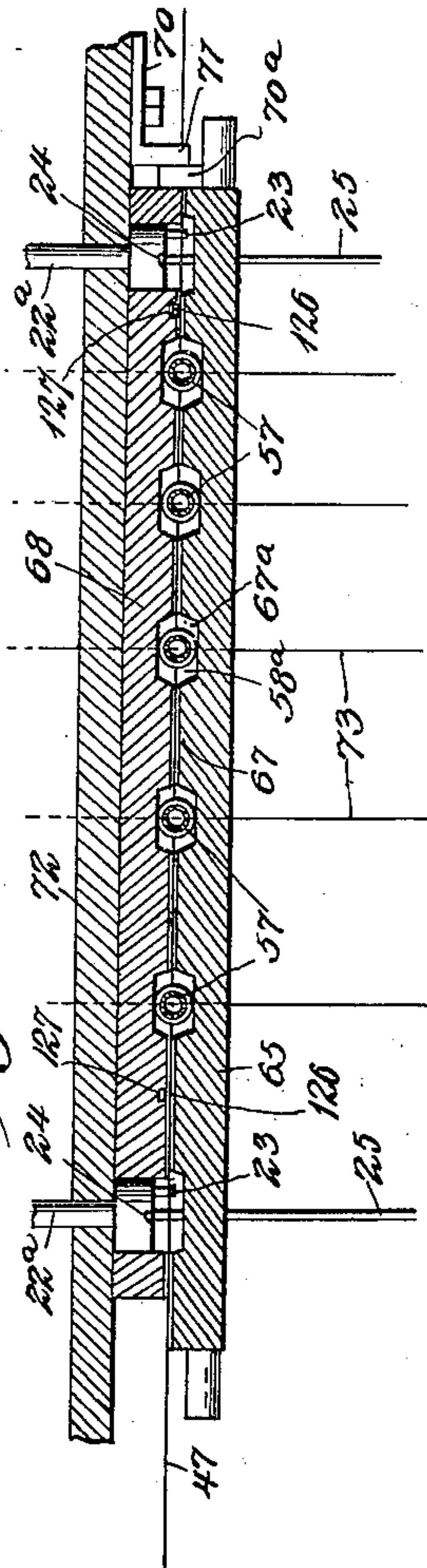


Fig. 8.

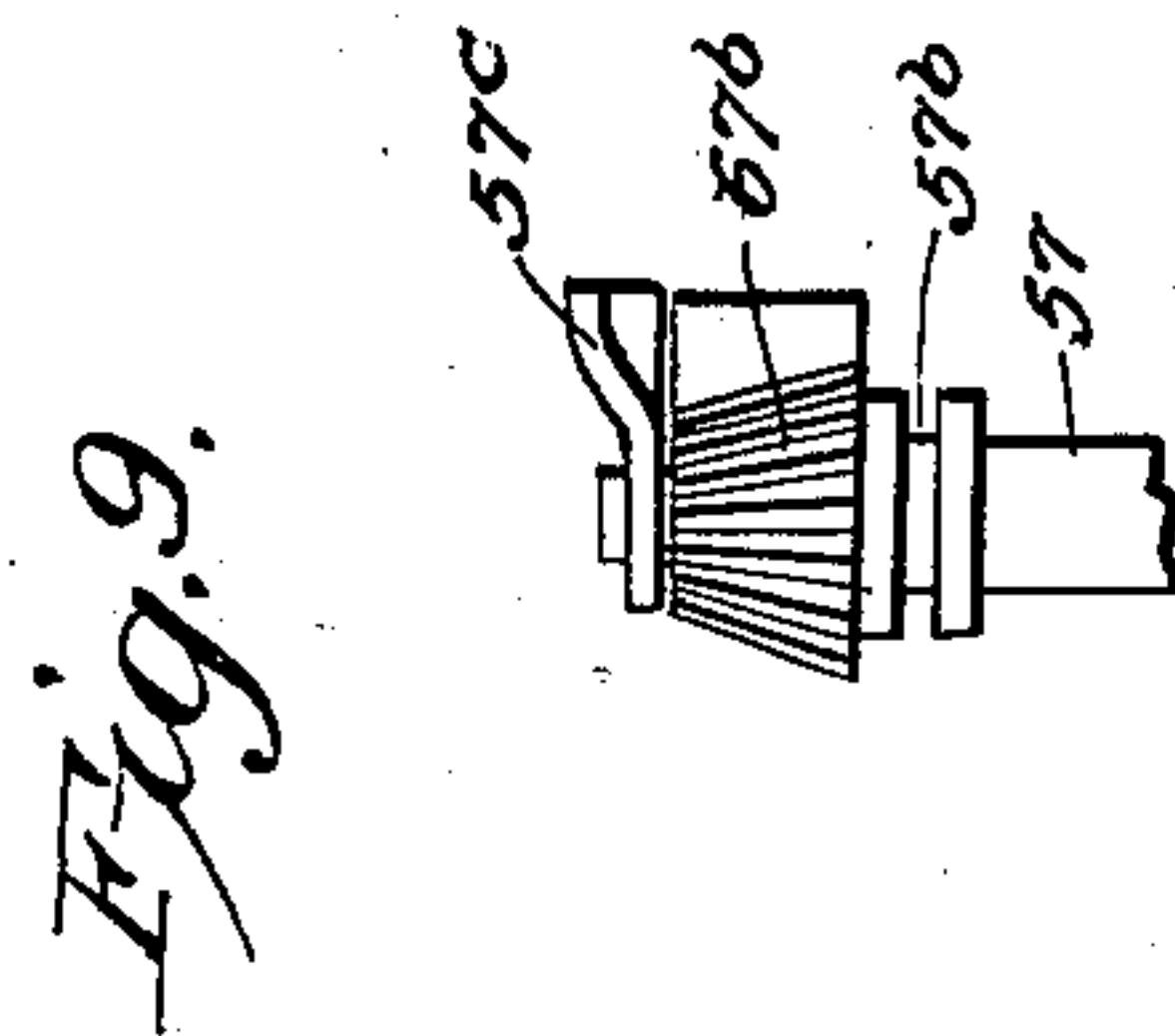


Fig. 9.

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Fig. 4.

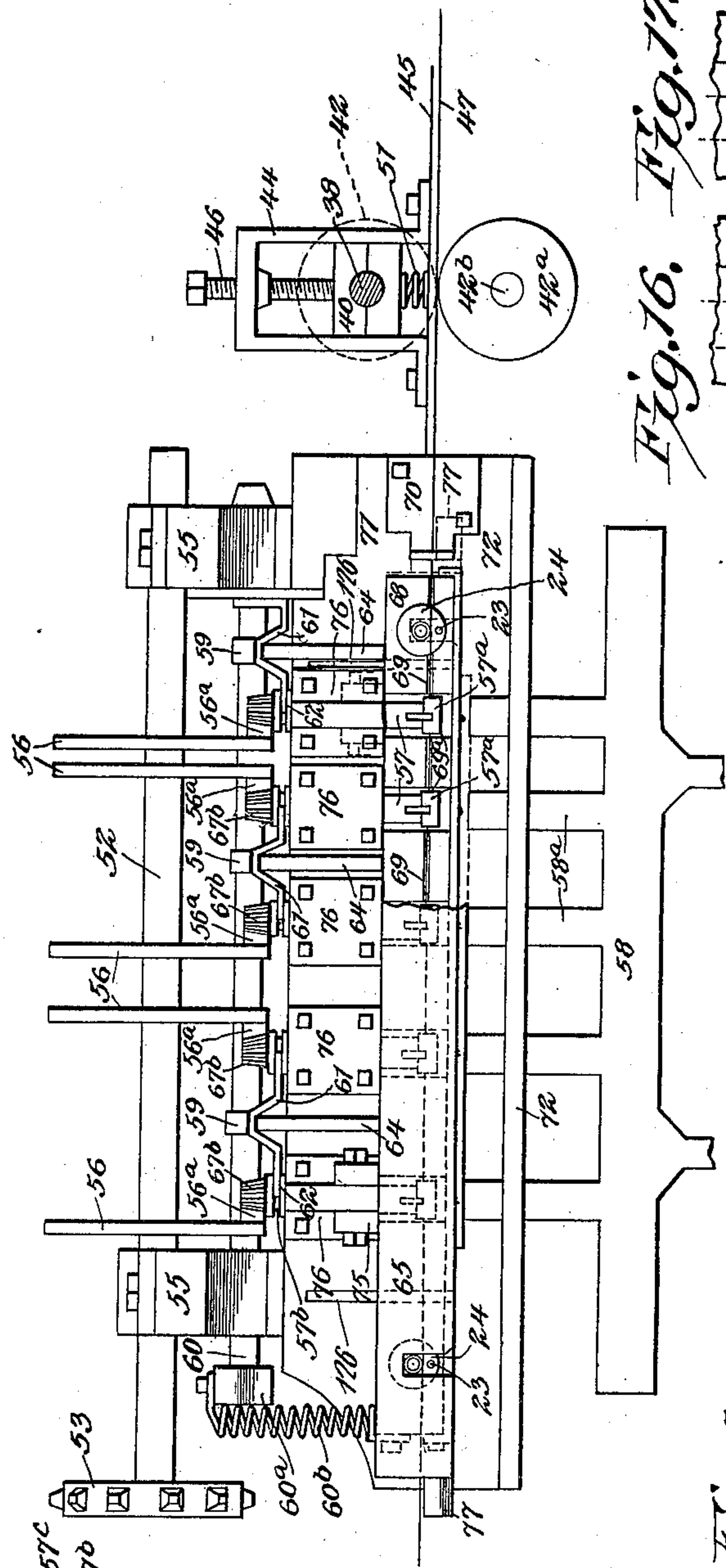


Fig. 15.

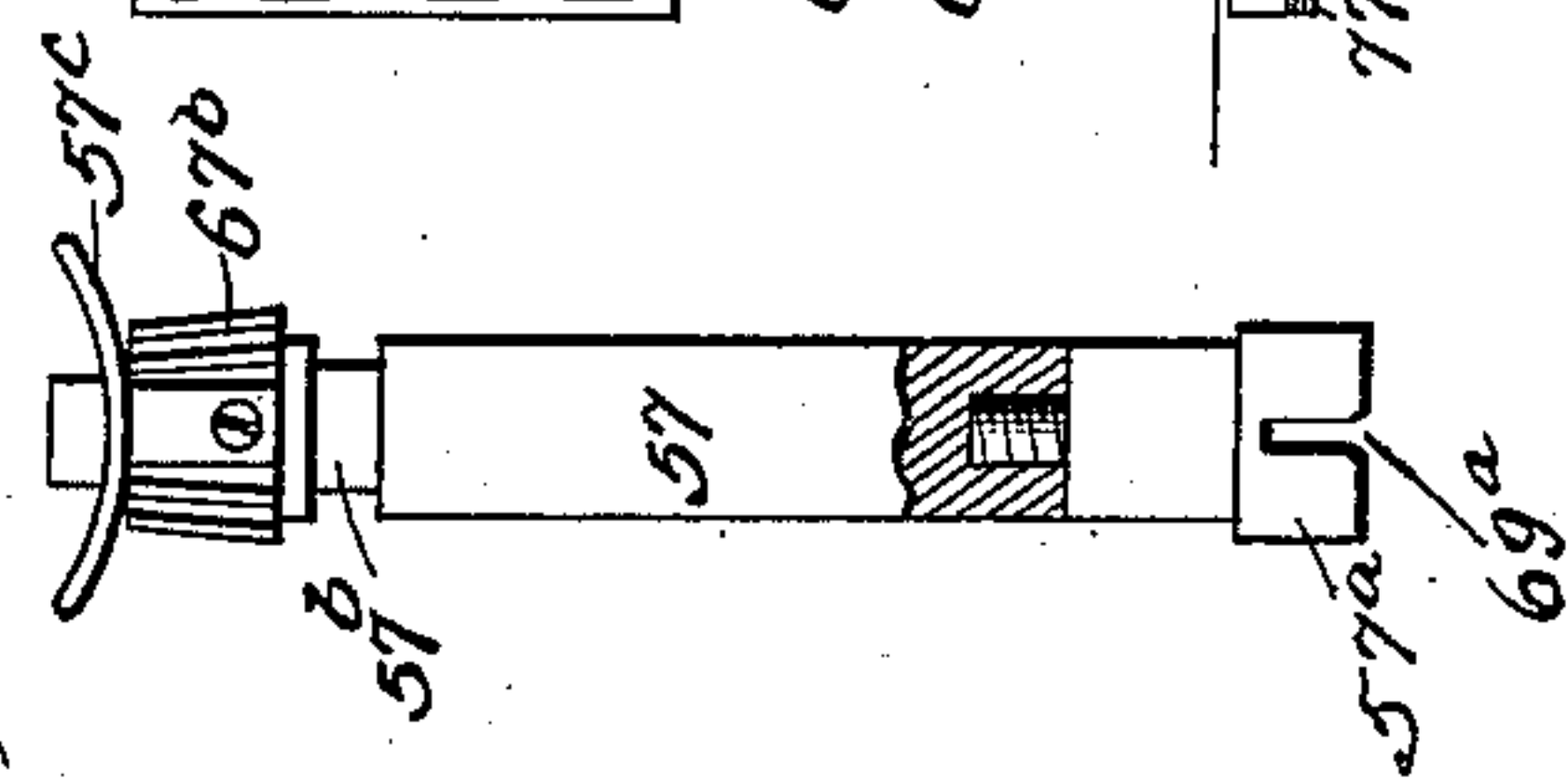


Fig. 16.

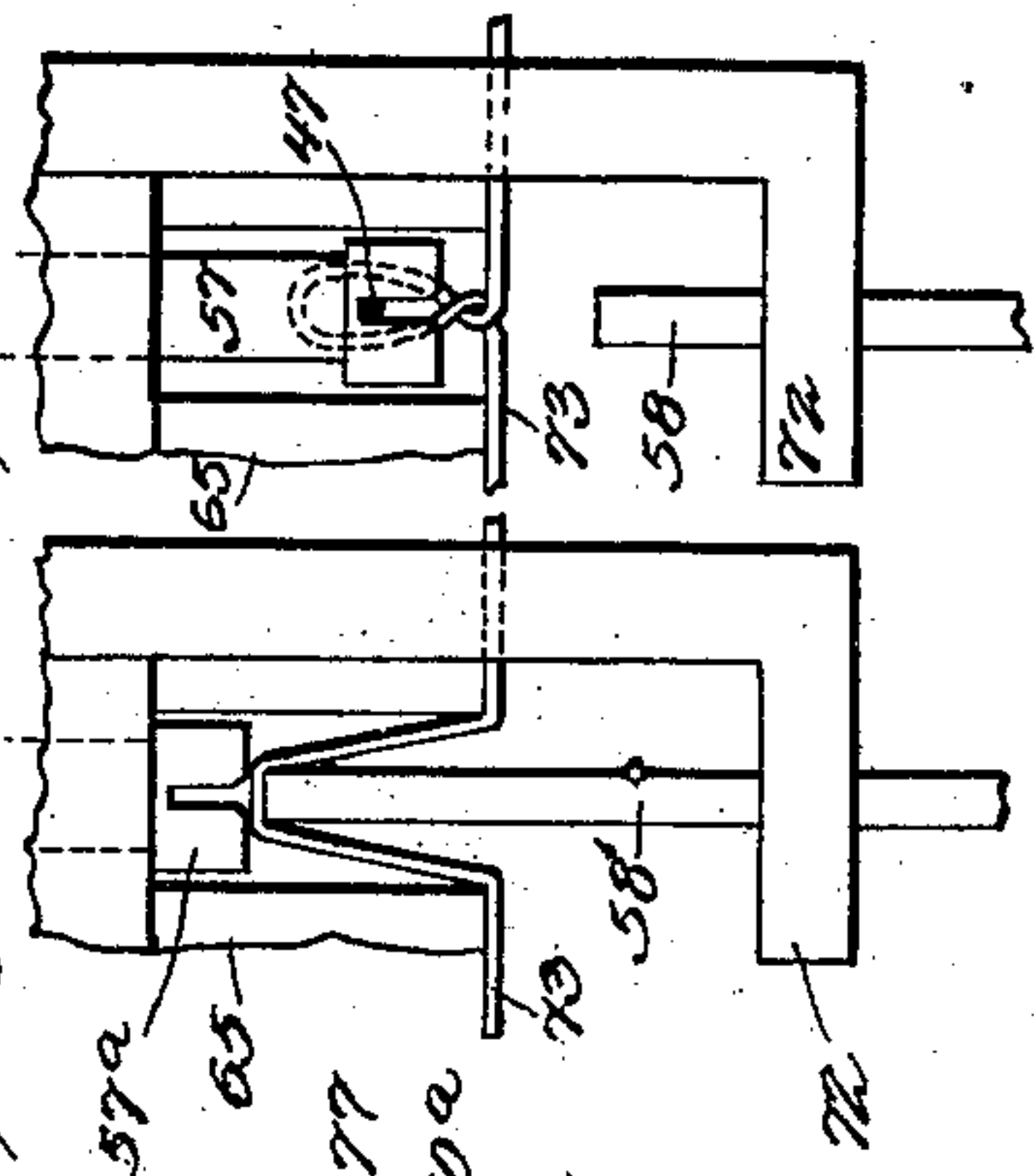


Fig. 5.

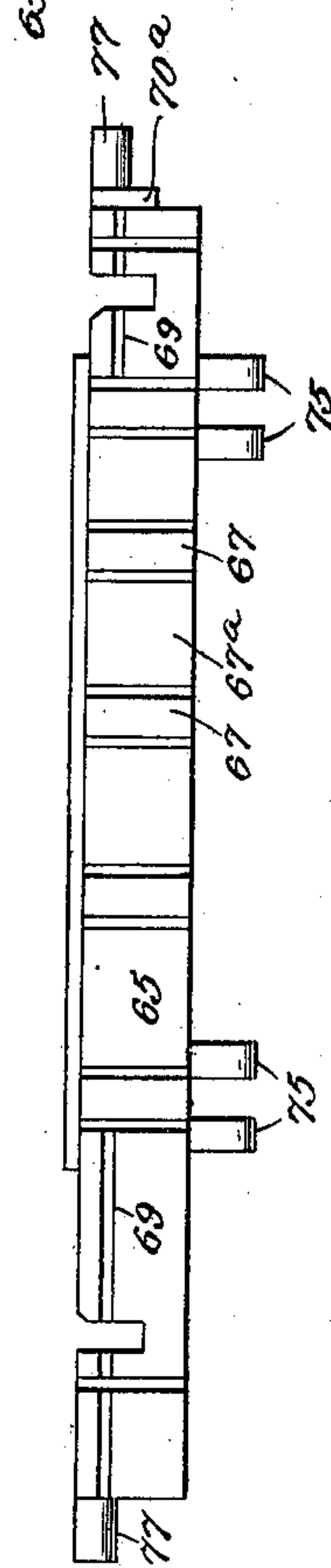


Fig. 14.



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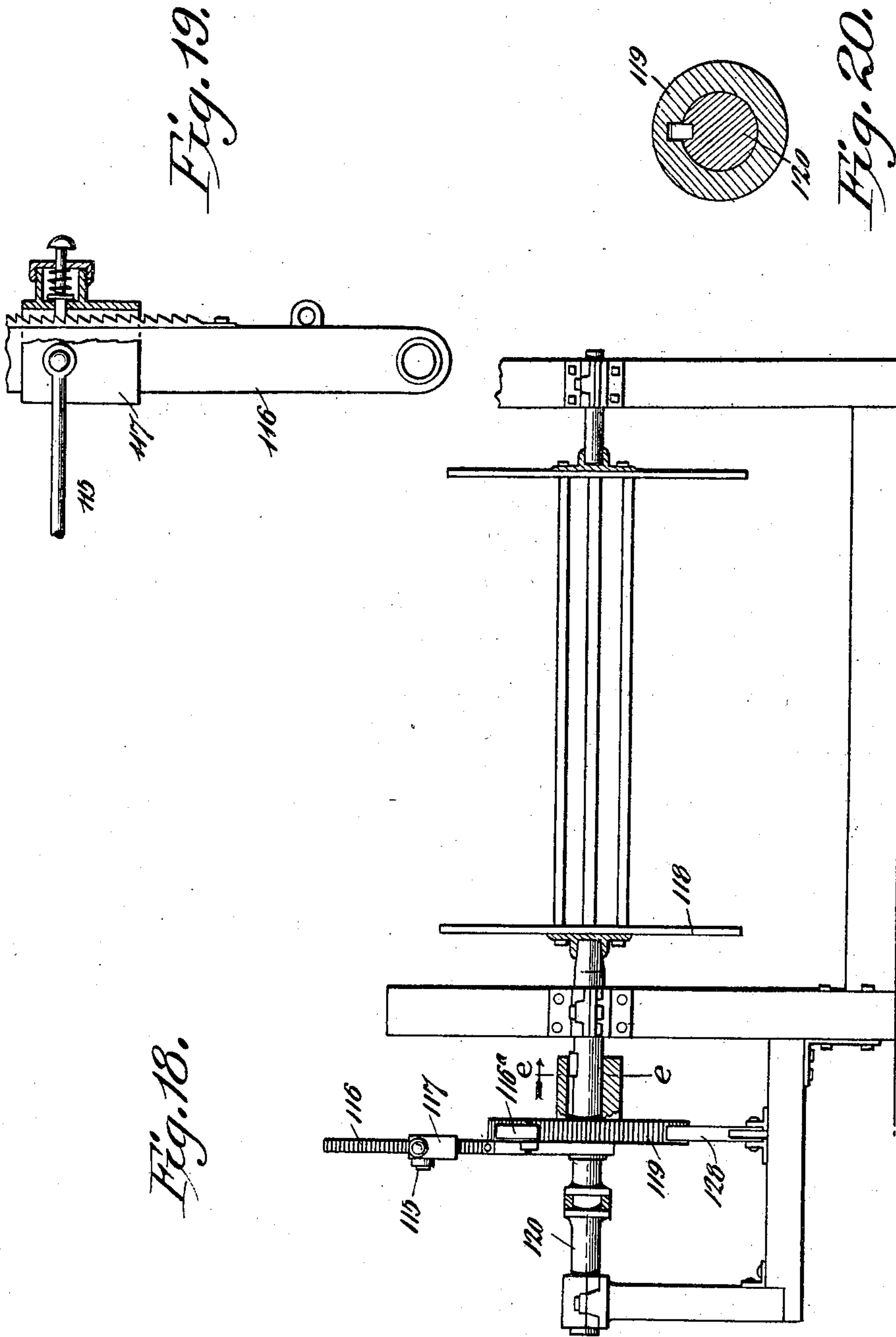
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(Application filed Jan. 15, 1901.)

(No Model.)

5 Sheets—Sheet 5.



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By *C. A. Snow & Co.* Attorneys

UNITED STATES PATENT OFFICE.

JOHN M. STUCKER, OF LAWRENCE, KANSAS, ASSIGNOR OF ONE-HALF TO
JOHN A. HENDERSON, OF SAME PLACE.

WIRE-FENCE-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 674,103, dated May 14, 1901.

Application filed January 15, 1901. Serial No. 43,354. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. STUCKER, a citizen of the United States, residing at Lawrence, in the county of Douglas and State of Kansas, have invented a new and useful Wire-Fence-Making Machine, of which the following is a specification.

My invention is an improved wire-fence-making machine; and it consists in the peculiar construction and combination of devices hereinafter fully set forth, and pointed out in the claims.

One object of my invention is to provide an improved woven-wire-fence-making machine which is adapted for automatically forming loops in the running-wires, passing the cross-wires through the said loops, tightening the said loops on the said cross-wires so as to unite the cross-wires to the running-wires, cutting off the cross-wires in appropriate lengths, and twisting the ends of the cross-wires around the outer or selvage running-wires to complete the formation of the woven fence fabric.

Another object of my invention is to effect improvements in the construction of the jaws which cooperate with the looper and twisters to form loops in the running-wires and cooperate with a feed mechanism for feeding the cross-wires to said loops.

A further object of my invention is to effect improvements in the construction of the twisters which twist loops in the running-wires, and to provide improved means for operating said twisters.

A further object of my invention is to provide automatically-operated tension devices for the running-wires which will slacken the running-wires while the loops are being twisted therein to prevent the running-wires from being strained.

A further object of my invention is to combine with the stationary jaw and movable jaw a guide and cutter for the cross-wires, whereby the cross-wire is cut after having been disposed in the loops in the running-wires, as said movable jaw opens from said stationary jaw.

A further object of my invention is to effect improvements in the means for feeding

the cross-wire through the loops of the running-wires.

A further object of my invention is to effect improvements in the drum which draws the completed portion of the fabric as the same is woven.

A further object of my invention is to effect improvements in the construction of the reel on which the woven fabric is wound and in the means for rotating said reel and permitting the same to be removed from the machine when filled.

In the accompanying drawings, Figure 1 is a top plan view of a wire-fence-making machine constructed in accordance with my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a vertical longitudinal sectional view of the same, taken on a plane indicated by the line *a a* of Fig. 1. Fig. 4 is a vertical transverse sectional view of the same, taken on a plane indicated by the line *b b* of Fig. 1. Fig. 5 is a detail view of the hinge-jaw. Fig. 6 is a detail view of one of the twisters for connecting the cross-wires to the selvage-wires and of the gearing for rotating said twisters. Fig. 7 is a detail view of one of the tension devices. Fig. 8 is a horizontal sectional view through the jaws and the twisters for twisting loops in the running-wires, taken on a plane which is level with the cross-wire. Fig. 9 is a detail view of a portion of one of the twisters, showing its pinion and stop-cam. Figs. 10, 11, 12, and 13 are diagrammatic views illustrating the formation of the loops and the twisting of the cross-wire therewith. Figs. 14 and 15 are detail views of the twisters for forming the loops in the running-wires. Figs. 16 and 17 are detail views of the jaws, the jaw-plate, a looper, and portions of the twisters which cooperate therewith. Fig. 18 is a detail view, partly in section, of the reel, the supports therefor, and the step-by-step mechanism for rotating the reel. Fig. 19 is a detail view, partly in section, of the oscillating arm and connections for rotating the reel. Fig. 20 is a detail transverse section taken on the line *e e* of Fig. 18.

In the embodiment of my invention here shown the frame A comprises the sills 1, plates 1^a, posts 2, and cross-beams 3, which are pref-

erably mortised together. Tie-rods 3^a may be also employed, as here shown, to strengthen the construction of the frame.

A power-shaft 4, which revolves continuously when the machine is in operation, is journaled transversely of the frame, near the center thereof, in suitable bearings, as shown, and the said shaft is provided with a spur-pinion 6, located about midway between the sides of the frame. At one end of the said shaft 4 are pulleys 5, one of which is fast and the other loose thereon. Said pulleys are operated by an endless traveling power-belt in the usual manner, and by means of a shifting device 124 the said belt may be caused to engage either the fast pulley or the loose pulley, and thereby either rotate the shaft 4 or discontinue the rotation thereof.

A master-wheel 7 is engaged by the pinion 6 and continuously revolved thereby when the machine is in operation. The said master-wheel is fast on the shaft 8, which is journaled in bearings 9 on the sides of the frame A. The said master-wheel 7 is provided on one side with a projecting flange 33, on the inner side of which is a gear-section 32. A plate 11 is disposed transversely on the frame A and secured thereto, and said plate has a bearing for the central portion of the shaft 8 and is also provided with bearing-blocks 35, in which is journaled an intermittently-revoluble shaft 10, which is provided with a gear-pinion 12, which is engaged and rotated successively by the gear-section 32 of master-wheel 7. Said shaft 10 is provided at one end with a beveled gear-wheel 36. A shaft 10^a is journaled in bearing-brackets which depend from the plate 11. Said shaft 10^a has a gear-pinion 12^a, which is similar to the gear-pinion 12, and is likewise successively engaged and rotated by the gear-sections 32 of master-wheel 7, and hence the said shaft 10^a is also intermittently rotated, as will be understood. A sprocket-wheel 13 is secured on one end of shaft 10^a and is connected by an endless sprocket-chain 15 to the sprocket-wheel 13^a on a shaft 14. Said shaft 14 is provided with a pair of beveled gear-wheels 16, which engage beveled gear-pinions 17 on the rear ends of longitudinally-disposed shafts 18, of suitable length, the said shafts 18 being journaled in suitable bearings 19 and 29 and provided at their front ends with spur-gears 20. The said gears 20 engage pinions 21 on the rear ends of shafts 22, which shafts 22 are tubular and provided each with a collar 27, fast thereon. A tubular section 22^a has one end concentrically disposed on tubular shaft 22, so that said shaft 22 and said section 22^a thereof are capable of rotation independently of each other, and to said section 22^a is secured a collar 28, which is connected to the collar 27 by a coiled spring 26, which is disposed on the said section 22^a. At the rear end of the latter is an enlarged cylindrical head, which is provided with a transversely-disposed groove 24 and a rearward-projecting pin 23. The outer

running-wires, which I will term the "selvage-wires," pass through the longitudinally-disposed tubular shafts 22, and the grooves 24 and pins 23 serve to wrap the ends of the cross-wires around the said selvage-wires to secure the said cross-wires thereto, as is hereinafter more fully described. The said selvage-wires are herein designated by the reference-numeral 25, and the intermediate running-wires are designated by the reference-numeral 73, the cross-wires being designated by the reference-numeral 47.

It will be understood from the foregoing description and by reference to the drawings that the shafts 22 are intermittently rotated in order to twist the ends of the cross-wires on the selvage-wires and that during the periods when the said shafts 22 are stationary the cross-wires are fed transversely of the running-wires by the means hereinafter described, cut off, and united to the running-wires.

A longitudinally-disposed shaft 38 has its rear end journaled in a bearing 39 on one end of the plate 11 and is journaled near its front end in a block 40, which is vertically movable in a guide-frame 44. A spring 51 supports the said vertically-movable bearing-block 40, and an adjusting-screw 46 bears on the upper side of said bearing-block to regulate the vertical movement thereof. A beveled gear-wheel 37, near the rear end of the shaft 38, engages the gear 36. Said shaft 38 is provided near its front end with a spur-gear 48, and said shaft carries at its front end a feed-wheel 42, which coacts with a feed-wheel 42^a to feed the cross-wires 47. Said feed-wheel 42^a is carried by a shaft 42^b, which has a gear-wheel 48^a, that engages the gear 48. The guide-frame 44 is supported by a tension-plate 45, which projects laterally from one side of the frame A, and the bearing for the shaft 42^b is carried by the said tension-plate. The latter is provided at its outer end with suitable tension-rollers 49, between which the wire 47 is passed, said wire being fed to the machine by the feed wheels or rollers 42 42^a and cut in suitable lengths by the means hereinafter described to form the cross-wires of the fence fabric. It will be understood that the wire 47 is straightened as it is drawn from the tension-rollers 49 by the feed-wheels. It will be further understood that by the means hereinbefore described the feed-wheels are operated while the tubular wrapping-shafts 22 are stationary, and vice versa, said feed-wheels and wrapping-shafts being successively operated.

A shaft 52 is journaled in bearings 55 and is provided at one end with a sprocket-wheel 53, which is connected to a sprocket-wheel 53^a on shaft 8 by an endless sprocket-chain 54. The shaft 8 being continuously revolved while the machine is in operation by the means hereinbefore described it follows that the shaft 52 is also continuously revolved. Said shaft 52 is provided with a series of cir-

cular disks 56, which are appropriately spaced thereon. Each of the said disks is provided on one side with a gear-sector 56^a and is further provided with a clearance-opening 56^b.

5 A series of bearings 76 are secured on a suitable support, and in the said bearings are journaled vertically-movable twister-shafts 57, each of which is provided at its lower end with a twister-head 57^a, which is tubular in

10 form and has an open groove 69^a transversely disposed in its lower side and adapted for the reception of a cross-wire 47. Each of the twister-shafts has a beveled pinion 67^b near its upper end adapted to be engaged by the

15 gear-sector 56^a of one of the disks 56, and above the said pinion is a stop-cam 57^c, which is adapted to operate in the clearance-opening of said disk while the pinion is rotated by the gear-sector 56^a and to bear against one

20 side of the said disk when the said pinion has been cleared by the said segment-gear, so as to instantaneously arrest the rotation of said pinion and twister-shaft and maintain the latter in an appropriate position. A groove

25 57^b is made annularly in each twister-shaft 57 below the pinion thereon. Lifter-plates 61 have semicircular recesses 62 in their ends, which engage the grooved portion of the twister-shafts. A rock-shaft 60 has the series of

30 rock-arms 59, which bear on the said lifter-plates. Said shaft 60 is journaled in suitable bearings and is provided at one end with an arm 60^a, which is normally depressed by a spring 60^b, and thereby the said rock-arms 59

35 bear downward normally on the lifter-plates 61, hence serving to depress the twister-shafts 57 and normally dispose the pinions 67^b thereof in position to be engaged by the gear-segments 56^a. Lifter-arms 64 bear under the

40 lifter-plates 61.

I will now describe means which coact with the twisters 57 to form loops in the running-wires 73, through which loops cross-wires 47 are passed to secure said cross-wires to the

45 said running-wires. A rear jaw 68 is secured to a transversely-disposed plate 72 on the frame A, which plate 72 also forms a support of the bearing 76. A hinged jaw 65, which coacts with the jaw 68, has the hinge mem-

50 bers 75 formed thereon, which hinge members are pivotally attached to the bearings 76 of the two outer twister-shafts 57. Thereby the jaw 65 is adapted to be closed against the jaw 68 and to be opened therefrom. The jaw

55 68 is provided at its end which is proximate to the feed-wheels 42 42^a with a plate 70, which is bent at right angles, as shown, and provided with an opening 71, through which the cross-wire is fed by said feed-wheels.

60 The said plate 70 thus forms a guide for the cross-wire, and also forms one member of a wire-cutter, the other member 70^a, which coacts with the member 70, being carried by the hinge-jaw 65. In the proximate sides of

65 said jaws 65 68 are semicircular grooves 69, which aline with the feed-wheels, the guide-plate 70, and the front faces of the twisters

24, and when the said jaws are closed together the said semicircular grooves 69 form a guide-groove for the cross-wire 47, this

70 cross-wire being moved lengthwise through the said groove by the said feed-wheels, as will be understood. When the twisters 57 are lowered and in their initial position for engagement with and rotation by the segment-

75 gears 56^a of disks 56, the grooves 69^a in the lower sides of said twisters 57 are disposed in line with said guide-grooves 69 in the opposing faces of said jaw. Hence as the cross-wire is fed between the said jaws through the

80 said grooves 69 it is also fed transversely through the grooves 69^a of the twister-heads 57^a. The said jaws 65 68 are provided on their opposing sides with matched projections 67 and recesses 67^a, as shown. The front jaw

85 65 supports the lifters 64, and when said jaw is opened from the jaw 68 operates said lifters 64 and causes the same to raise the twisters 57 for the purpose hereinafter described. The hinge-jaw 65 has trunnions 77 at its ends,

90 on which trunnions are antifriction-sleeves 82, which operate in cam-grooves 81 of rock-arms 78, which are attached to a shaft 79, the said shaft being journaled in bearings 80, as shown. A cam-wheel 86 is keyed on the

95 continuously-revoluble shaft 8. A lever 84 extends rearward from the rock-shaft 79, and said lever has at its rear end an arm 85, which is engaged and operated by the cam 86. Hence oscillating motion is imparted to the

100 shaft 79 and the jaw 65 opened from and closed against the jaw 68, as will be understood.

A rock-shaft 88 is journaled in bearings 90. Said shaft has an arm 87 at one end and is

105 provided with rock-arms 89, which are connected to and operate a looper 58. The said looper comprises a transversely-disposed bar and has on its upper side a series of fingers

110 58^a, which operate in openings in the plate 72 and are disposed in line with the twister-shafts 57 and are adapted to pass between the jaws 65 68 and to operate as hereinafter described.

The operation of my invention in the for-

115 mation of loops in the running-wires, the disposition of the cross-wires in said loops, the uniting of the cross-wires to the running-wires, and the twisting or coiling of the ends of the cross-wires on the selvage-wires is as

120 follows: The running-wires pass through openings in the jaw-plate 72 under the jaws 68, bearing against the lower side thereof, and under the jaw 65 when the latter is closed against the jaw 68. The looper is raised,

125 causing the fingers thereof to pass upward between the jaws and under the twisters 57, thereby raising the latter and forming bights in the running-wires. Immediately after thus forming the said bights the looper de-

130 scends, the twisters redescending therewith, said bights becoming thereby disposed in the hollow tubular shanks of the twisters, and the grooves 69^a in the lower sides thereof en-

gaging the said bights of the running-wires and the twist-ers being then rotated said bights are converted into loops, as shown at Fig. 17. The twist-ers when the rotation thereof is arrested dispose their grooves 69^a in line with the guide-grooves 69 in the opposing faces of the jaws. The feed-wheels 42 42^a by the means hereinafter described then feed the cross-wire, causing the same to pass through the loops, as shown in Figs. 4, 10, and 12. The cross-wire is cut as the jaw 65 opens from the jaw 68. The completed portion of the fence fabric is drawn forward intermittently by a step-by-step mechanism, hereinafter described, thus drawing the running-wires and selvage-wires forward longitudinally, and the hinge-jaw being simultaneously opened from the jaw 68 by the means hereinbefore described said hinge-jaw by engagement with the lift-ers 64 raises the twist-ers 57 a sufficient distance to cause the latter to disengage the cross-wire 47 and the loops in the running-wires 73, the tension of the said running-wires closing the said loops and uniting the cross-wire thereto, as shown in the diagram Fig. 11, and the hinge-jaw being open the running-wires as they are drawn forward carry the cross-wire which has been just united thereto with them, and while the cross-wire, together with the running-wires and selvage-wires, are thus moving forward the shafts 22 are rotated by the means hereinbefore described, causing the pins 23 of the twister-heads 24 and which are engaged by the ends of the cross-wire to wrap or coil said ends of the cross-wire on the said selvage-wires, as will be understood, and thereby secure the said cross-wire and said selvage-wires together and complete the formation of a portion of the fence fabric.

Springs 126 are secured on the plate 72, as shown in Figs. 3 and 4, and are located at points near and on the inner sides of the twister-heads 24. The free ends of these springs play at right angles to the line represented by the cross-wire and across the same. When the jaw 65 is closed against jaw 68, said jaw 65 moves the free ends of the springs rearwardly out of the line of the cross-wire into grooves 127 in the face of the said jaw 68, made to receive said free ends of said springs. When the hinged jaw opens in the manner and for the purpose hereinbefore set forth, said springs, while the pins 23 of twister-heads 24 are wrapping the ends of the cross-wire on the selvage-wires, move the intermediate portion of the cross-wire forward from the jaw 68 and clear the cross-wire from said jaw, as will be understood.

Secured to one end of the continuously-revoluble shaft 8 is a crank-arm 95, which is provided near its center, on its inner side, with a tappet-roller 96. On the outer side of the said arm 95 is a projecting wrist-pin 94, which may be provided with an antifriction-roller and operates in a slot 94^a in a head 93, which is connected to the arm 87 of rock-shaft 88

by a pitman 92. It will be understood that the said crank-arm 95, pitman 92, and rock-arm 87 serve to actuate the rock-shaft 88. On the end of the shaft 8 opposite the crank-arm 95 is a crank-arm 114.

In bearings on the front end of the frame A is journaled the axle-shaft of a revoluble drum 108, which comprises a pair of heads and a series of transversely-disposed plates 111, which connect them together and may be secured thereon at any desired distance apart. Each of the said plates 111 is provided with a series of projecting lugs 110, disposed in two parallel lines and alternating, as shown. The said lugs are thereby adapted to engage a cross-wire of the fence fabric, the running wires being received in the spaces between the proximate ends of the said lugs. One of the heads of the drum 108 is provided with a ratchet-wheel 109. The fence fabric as the same is woven by the machine passes over the said drum 108, which serves to keep the running-wires and the cross-wires in their correct relative positions at right angles to each other and preserves the shape of the fabric and of the meshes thereof, and from the said drum the completed fabric is wound upon a reel 118 in the rear end of frame A. A rock-arm 107 is loosely mounted on one end of the axle-shaft of the drum 108, and said rock-arm carries a feed dog or pawl 107^a. By means of the said rock-arm, the said pawl, and the ratchet-wheel 109 drum 108 may be rotated in the direction indicated by the arrow in Fig. 2 by a step-by-step movement as the fence fabric is woven, as will be readily understood. A spring 107^b connects the rock-arm 107 to a fixed point on the frame A. As here shown, the spring is a coiled retractile spring; but any other suitable form of spring may be employed, the function of the said spring being to move the rock-arm 107 in one direction.

I will now describe the means which coacts with the spring 107^b to oscillate the rock-arm 107, and thereby rotate the drum 108 by a step-by-step movement. An oscillating lever 97 is pivoted at its lower end and is mounted slightly beyond one side of the frame A. Said oscillating lever is provided with a slot 97^a and a slot 97^b, the latter being nearest the free end of said oscillating lever. A pitman 98 is pivotally connected to the rock-arm 107 and is also connected to the oscillating lever 97 by a pin or roller 98^a, which engages the slot 97^a and is adjustable therein to regulate the throw of the rock-arm 107, and hence predetermine the extent of each partial rotation of the drum 108. The said oscillating lever 97 is operated by the tappet-roller 96 on the crank-arm 95. By means of the said crank-arm, tappet-roller, and the spring 107^b the lever 97 is oscillated, as will be understood, said lever being moved in one direction by said tappet-roller, which serves as a cam, and being moved in the opposite direction when said tappet-roller clears said lever by the

spring 107^b and the connection between the same and said lever 97.

On the frame A, near the rear end thereof, are brackets 105, on which are bearing-blocks 106. A shaft 101, journaled in said bearing-blocks, is provided with an upwardly-extending rock-arm 100 and with the downwardly-extending rock-arm 102. A shaft or cross-bar 103 reciprocates longitudinally of the frame A on supporting-guides 105^a, with which the brackets 105 are provided. Said reciprocating cross-bar is connected to and actuated by the arm 102 of rock-shaft 101, and tension devices 104 are carried by said reciprocating cross-bar, the running-wires passing through said tension devices, as shown, and said tension devices serving to keep said running wires and also the selvage-wires at the requisite tension at all times during the operation of the machine. A pitman 99 connects the oscillating lever 97 to the arm 100 of rock-shaft 101. The pivotal pin 99^a, which connects said pitman to said rock-arm 100, is adjustable in a slot 100^a, with which said rock-arm is provided, and the pin 99^b, which connects said pitman to said oscillating lever 97, is adjustable in the slot 97^b, with which said oscillating lever is provided. Thereby the throw of the rock-arm 100, and hence the extent of the longitudinal movement of the tension devices carried by the reciprocating cross-bar 103, may be predetermined and regulated. The mechanism is so timed that said tension devices 104 slacken the running-wires while the loops are formed and twisted therein by the means hereinbefore described and tighten said running-wires to close said loops and unite the cross-wires to the running-wires, as will be understood. By thus providing means for causing the tension devices to slacken the running-wires while the loops are being formed and twisted the said running-wires are relieved of injurious stress and are prevented from being unduly strained, thus obviating a defect heretofore existing in machines of this class.

The reel 118, on which the woven fence fabric is wound as the same is made by the machine, is rotated by a step-by-step mechanism synchronously with the drum 108. The axle-shaft 120 of said reel has a ratchet-wheel 119 feathered thereon. A rock-arm 116 is pivoted on said shaft 120 and carries a pawl 116^a, which engages ratchet-wheel 119. A sleeve 117 is adjustable on the rock-arm 116 and is connected to the crank-arm 114 of the continuously-revoluble shaft 8 by a pitman 115, and hence said arm 116 is oscillated and the pawl 116^a and ratchet-wheel 119 impart a step-by-step movement to the reel 118 and cause the wire fabric to be wound on the reel as it is completed, as will be understood. The drum 108 is provided with a ratchet-wheel 113, which is engaged by a dog 112, that is pivoted to the frame A. Said dog and ratchet-wheel prevent retrograde rotation of

the said drum 108 and cause said drum to exert the requisite tension at all times upon that portion of the woven-wire fabric which is between said drum and the jaws and twisting mechanism.

The shaft 120 is a stub-shaft and engages one end of the reel 118, the other end of the reel having a suitable trunnion mounted in a suitable bearing. A lever 125 is connected to the shaft 120 and adapted to shift the latter longitudinally to release or engage the reel 118. By this means the said reel may be readily mounted in its bearings, rotated by a step-by-step movement, and removed from the machine when filled with the wire fabric. A dog 128 engages said ratchet-wheel 119 and prevents retrograde rotation of the reel.

Having thus described my invention, I claim—

1. In a wire-fence-making machine, the combination of the jaws, one movable with relation to the other, tension devices for the running and selvage wires, guides for the cross-wire, a looper having fingers to form bights in the running-wires between the jaws, vertically-movable twist-ers to engage said bights and twist the same into loops, and means to feed the cross-wire through said loops, substantially as described.

2. In a wire-fence-making machine, the combination of a pair of jaws, one movable with relation to the other, said jaws having guide-grooves in their opposing sides for the cross-wire, and recesses at right angles to said guide-grooves, a looper to form bights in the running-wires, vertically-movable twist-ers to twist said bights into loops, means to feed the cross-wire through said guide-grooves in the said jaws and through said loops, means to cut the cross-wire, and a tension mechanism for said running-wires, to close the loops therein and thereby unite the cross-wire thereto, substantially as described.

3. In a wire-fence-making machine, the combination of a stationary jaw having a guide for the cross-wire, and the movable jaw having a blade, coacting with said guide, to cut the cross-wire, substantially as described.

4. In a wire-fence-making machine, the combination of the jaws, one movable with relation to the other, said jaws having guides in their opposing sides for the cross-wire, means to feed the cross-wire through said guides, and means to wrap the ends of the cross-wire around the selvage-wires, substantially as described.

5. In a wire-fence-making machine, the combination of a stationary jaw, a hinged jaw having trunnions at its ends, rock-arms having cam-grooves engaging said trunnions, and means to oscillate said rock-arms, substantially as described.

6. In a wire-fence-making machine, the combination of a stationary jaw, a jaw hinged thereto, means to operate said hinged jaw, a looper, vertically-movable revoluble twist-

ers, means to rotate said twist-
ers, means to raise and lower said
twisters, and means to feed a
cross-wire through the loops in
said twist-ers, substantially as
described.

5 7. In a wire-fence-making machine, the combination of a stationary jaw, a movable jaw, means to actuate the latter, a looper, vertically-removable revoluble twist-ers, said twist-ers having gear-pinions, gear-segments to rotate
10 said pinions and twist-ers, means to lower said twist-ers and thereby engage said pinions with said segments, and means actuated by said movable jaw, to raise said twist-ers and there-
15 by disengage said pinions from said segments, substantially as described.

8. In a wire-fence-making machine, the combination with means to form loops in the run-
ning-wires and means to dispose a cross-wire in said loops, of an automatically-operated
20 tension mechanism to slacken and tighten said running-wires, substantially as described.

9. In a wire-fence-making machine, the combination with means to form loops in the run-
ning-wires and means to dispose a cross-wire in said loops, of a drum to draw the fabric as
25 the same is woven, a step-by-step mechanism to actuate said drum, a longitudinally-mov-
able tension device for the running-wires, and
30 connections between said tension devices and an element of said step-by-step mechanism to move said tension devices alternately in op-
posite directions, for the purpose set forth, substantially as described.

10. In a wire-fence-making machine, the combination of a fixed jaw, a movable jaw,
35 means, coacting with said jaws to unite the cross-wire to the running-wires, means to wrap the ends of the cross-wire on the selvage-wires, and springs to move said cross-wire from said
40 fixed jaw, substantially as described.

11. In a wire-fence-making machine, the combination of the jaws, one movable with
relation to the other, said jaws having guides on their opposing sides for the cross-wire,
45 means to form loops in the running-wires in line with said guides, means to feed a cross-
wire through said guides and hence through said loops, and means to wrap the ends of
50 said cross-wire around the selvage-wires, substantially as described.

12. In a wire-fence-making machine, the combination of a pair of jaws, one fixed and
one movable, said jaws having guides in their opposing sides for the cross-wire, and
55 said fixed jaw having guides for the running and selvage wires, means to form loops in
said running-wires, means to feed the cross-wire through said loops, means to cut said
cross-wire, and means to wrap the ends of

said cross-wire around said selvage-wires, 60
substantially as described.

13. In a machine for making wire fences, in combination with a reel, a fixed bearing therefor, a longitudinally-movable shaft adapted to engage said reel, a bearing for
65 said shaft, a ratchet-wheel splined on said shaft, a step-by-step mechanism to rotate said ratchet-wheel and thereby rotate said shaft, and a lever to shift said shaft endwise, sub-
70 stantially as described.

14. In a wire-fence-making machine, the combination of a fixed jaw having guides for the running-wires, revoluble elements in said fixed jaws and forming guides for the selvage-
wires, a movable jaw coacting with said fixed 75 jaw, said fixed and movable jaws having guides on their opposing sides for the cross-
wire, means to form loops in the selvage-wires, means to feed the cross-wire through
80 said loops, means to cut said cross-wire, and means to rotate said revoluble elements, the latter being adapted to wrap the ends of the cross-wire around said selvage-wires, sub-
stantially as described.

15. In a wire-fence-making machine, the combination of the jaws, one movable with
relation to the other, means to form bights in the running-wires between said jaws, means
85 to twist said bights into loops, means to feed a cross-wire through said loops, and tension
90 mechanism for said running-wires, to close the loops therein and thereby unite the cross-
wire thereto, substantially as described.

16. In a wire-fence-making machine, the combination of a fixed jaw having guides for
95 the running-wires, a movable jaw, said jaws having guides on their opposing sides for the cross-wire, an element movable at right angles to the fixed jaw and having fingers to form bights in said running-wires, rev-
100 oluble twist-ers on shafts movable endwise in one direction with and by said fingers, and means to move said twist-ers in the reverse
direction as said fingers recede, and thereby cause said twist-ers to engage said bights,
105 means to rotate said twist-ers and thereby convert said bights into loops, means to feed the cross-wire through said loops, and tension
mechanism for said running-wires, for the purpose set forth, substantially as described. 110

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN M. STUCKER.

Witnesses:

FRED BROOKS,
ENDSLEY JONES.