(No Model.) 2 Sheets—Sheet 1.

E. B. WILLIX.

FENCE STAY WIRE MAKING MACHINE.

No. 598,170. Patented Feb. 1, 1898.

Fig. 1.

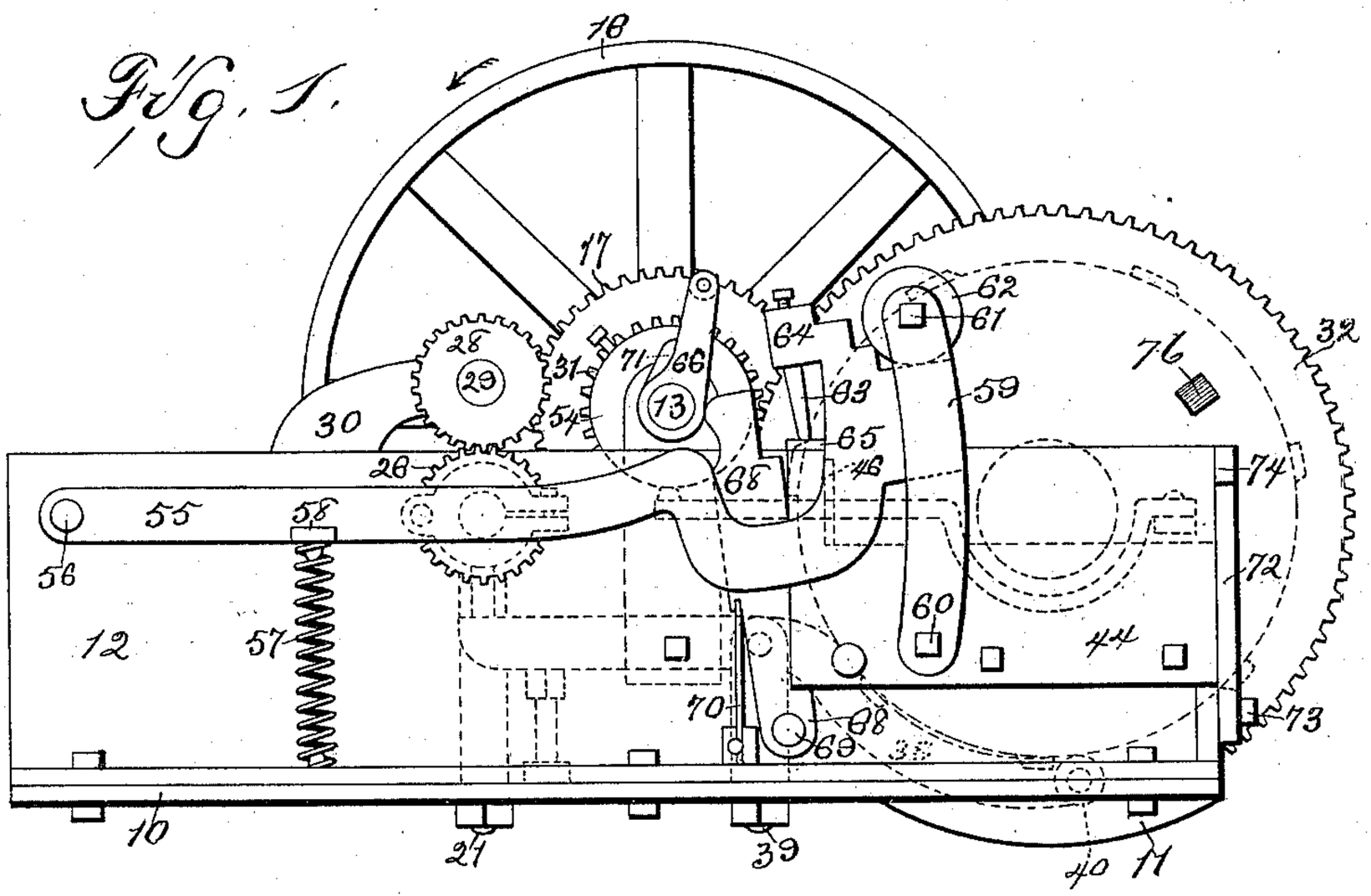
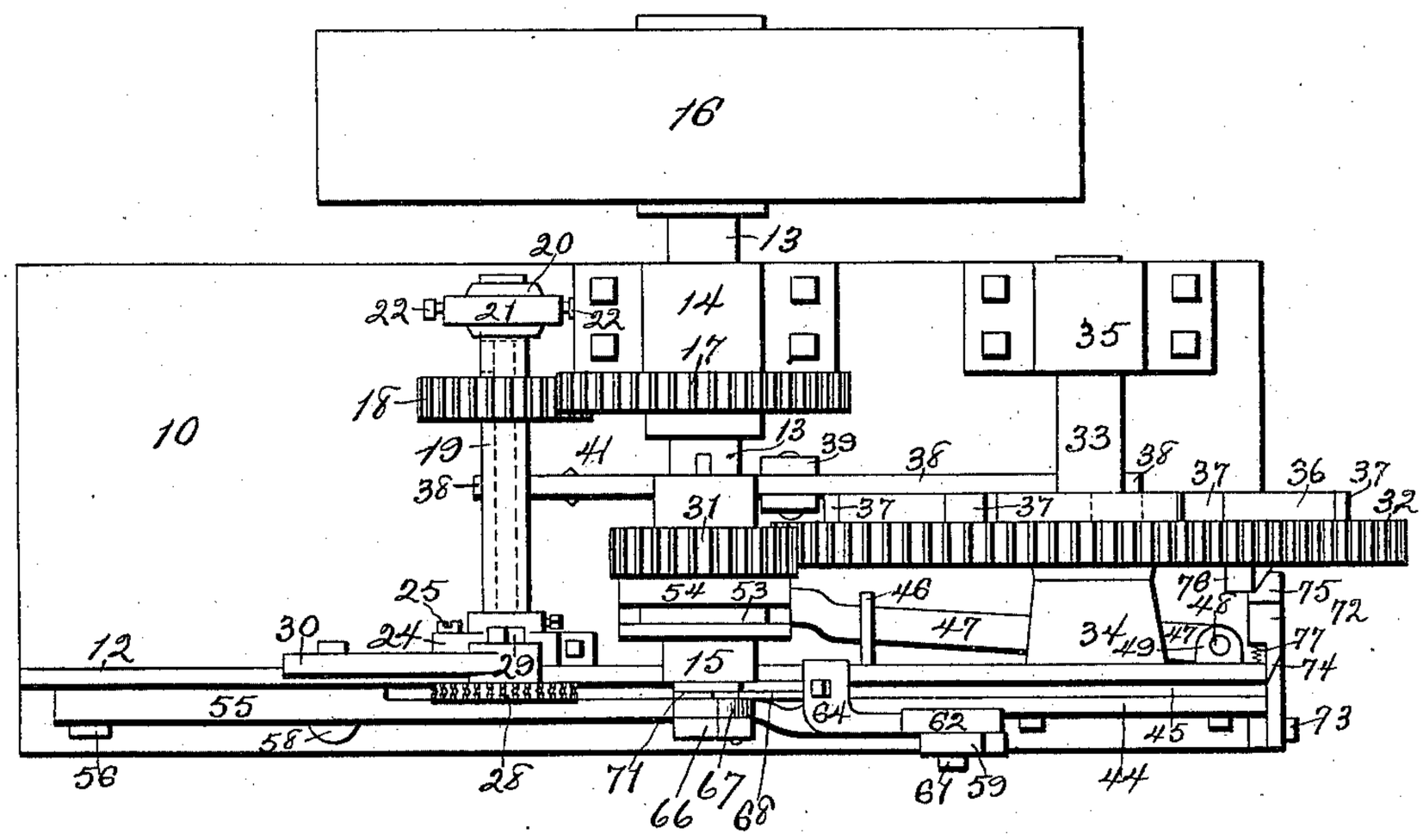


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

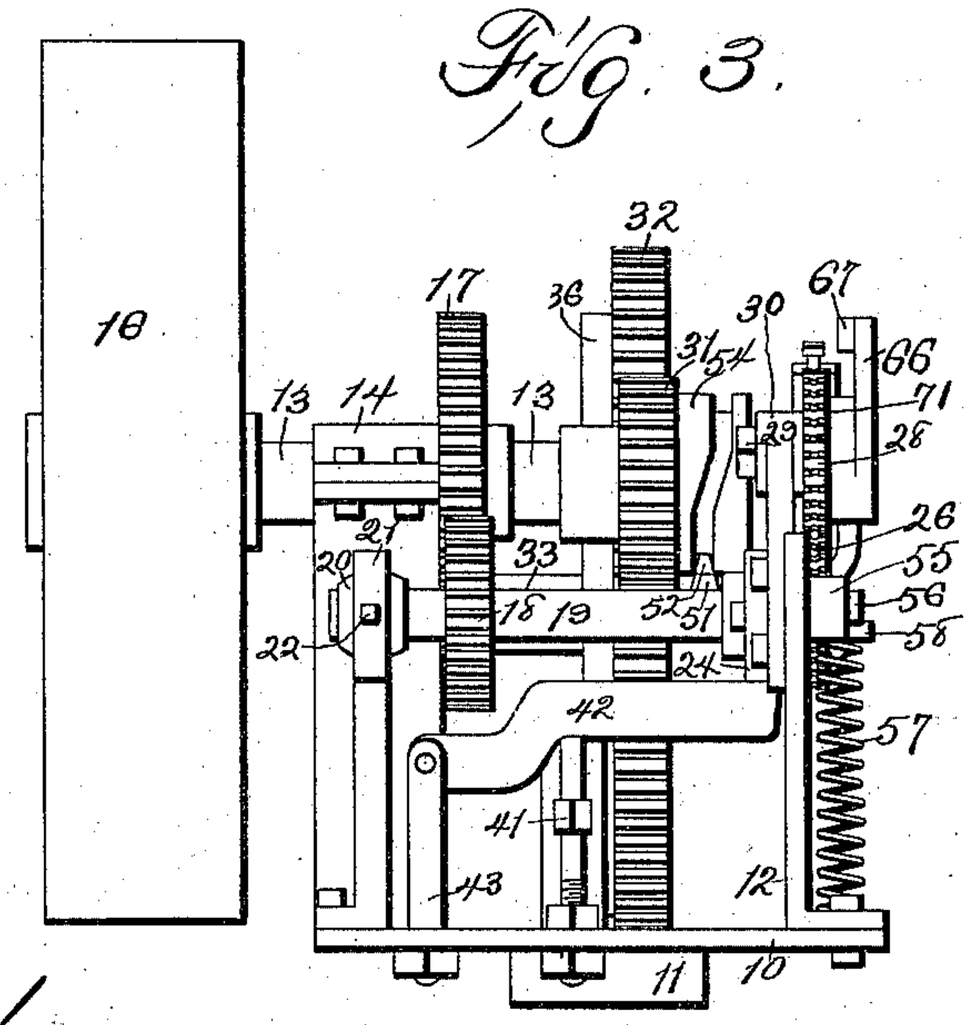


Fig. 4.

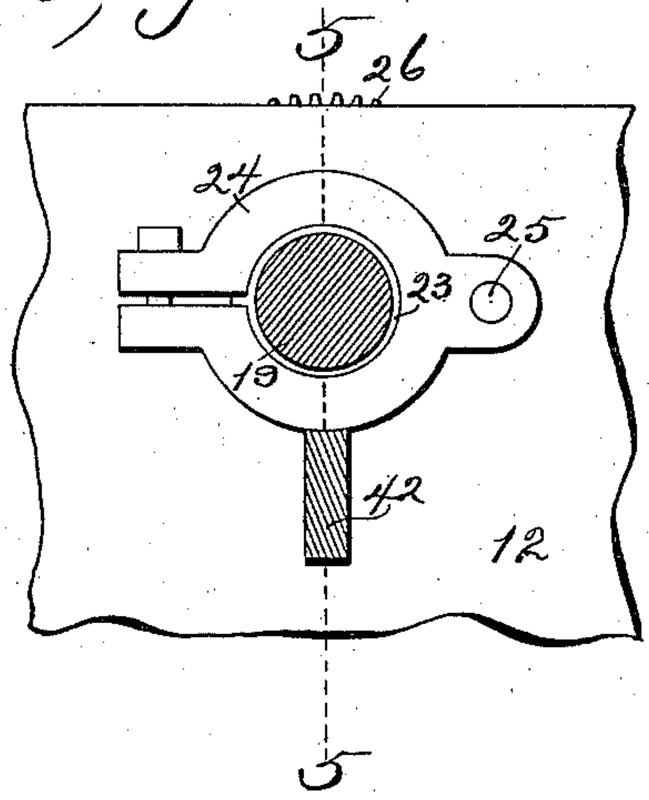


Fig. 5.

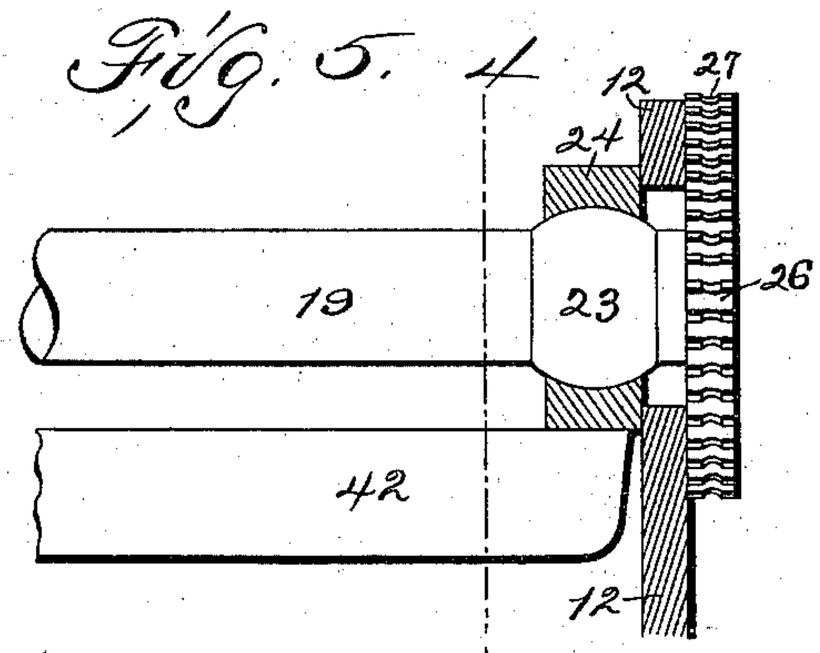
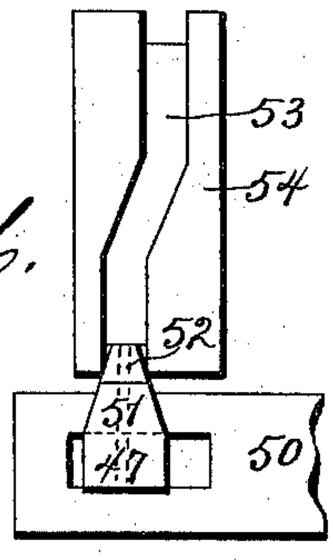


Fig. 6.



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UNITED STATES PATENT OFFICE.

ENOS B. WILLIX, OF MOUNT VERNON, IOWA.

FENCE-STAY-WIRE-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 598,170, dated February 1, 1898.

Application filed July 29, 1897. Serial No. 646,320. (No model.)

To all whom it may concern:

Be it known that I, ENOS B. WILLIX, a citizen of the United States of America, and a resident of Mount Vernon, in the county of Linn and State of Iowa, have invented a new and useful Fence-Making Machine, of which the following is a specification.

The machine illustrated and described in this application is designed and constructed to make and form vertical stay-wires to be applied to the strand-wires of a fence, which stay-wires and completed fence are shown and described in my application pending concurrently herewith, filed October 21, 1897, and serially numbered 655,948.

The object of this invention is to provide a machine into which wire may be fed automatically and transverse or lateral bends, loops, tongues, or projections formed in said wire and the wire cut into sections containing the desired number of said projections or tongues spaced apart to the desired degree.

My invention consists in the construction, arrangement, and combination of elements hereinafter set forth, pointed out in my claims, and illustrated by the accompanying drawings, in which—

Figure 1 is a side elevation of the mechanism employed to make and form the stay-wires. Fig. 2 is a plan of the machine shown in Fig. 1. Fig. 3 is a front end elevation of the machine shown in Figs. 1 and 2. Fig. 4 is a detail sectional elevation on the indicated line 4 4 of Fig. 5. Fig. 5 is a detail sectional elevation on the indicated line 5 5 of Fig. 4. Fig. 6 is a detail view of a cam-wheel, a lever operated by the cam-wheel, and guide for said lever.

In the construction of the machine to make and form the vertical stay-wires the numeral 10 designates a base-plate having a depressed portion 11 near one end. A side plate 12 is vertically positioned on an near one edge of the base-plate 10 and is bolted thereto. A main shaft 13 is mounted for rotation in a bearing 14, fixed to the base-plate 10 opposite to the side plate 12, and in a bearing 15, fixed to said side plate. A belt-wheel 16 is fixed to the outer projecting end portion of the main shaft 13. A spur-gear 17 is fixed to the main shaft 13 and meshes with a pinion 18 on a counter-shaft 19. The counter-shaft 19 is journaled at one end in a bearing 20, mounted for oscillation in a stand 21, fixed to and arising from the base-plate 10 and held therein by means of set-screws 22, traversing the upper end of the stand and engaging with rounded ends against the periphery of the bearing 20. The shaft 19 is journaled at its end portion opposite to the bearing 20 by means of a spherical boss 23, journaled in the yoke 24, which yoke is pivoted on a pin 25, seated in the side plate 12. The extremity of the shaft 19 extends through a slot or aperture in the side plate 12, and a feed-wheel 26 is fixed to said shaft. The feed-wheel 26 is formed with gear-teeth on its periphery, and each of said gear-teeth has a concave notch 27 at or about its center and extending from the end of the tooth inwardly approximately half the length of said tooth.

A feed-wheel 28 of identical construction with the feed-wheel 26 is mounted for rotation on a stub-axle 29, fixed in the upper and forward end of a bracket 30, the rear and lower end of said bracket being attached rigidly to the side plate 12 and meshes with the feed-wheel 26. The notches 27 are formed in the teeth of the feed-wheels 26 28 to admit and receive a stay-wire longitudinally of the side plate 12, and the feed-wheel 26 has a movement to and from the feed-wheel 28 in a manner about to be described, in order that the teeth of said wheels may be lapped more or less to release or engage rigidly the said stay-wire and advance the same through the machine or permit the same to remain stationary or to advance independently of the feed-wheels. A spur-gear 31 is mounted rigidly on the main shaft 13 and meshes with a pinion 32, mounted rigidly on a counter-shaft 33, which counter-shaft is journaled at one end in a boss 34, fixed to the side plate 12, and at the other end in a bearing 35, fixed to the base-plate 10 adjacent to the bearing 14. The pinion 32 is provided with a laterally-extending annular flange 36 of somewhat less diameter than said wheel, and the flange is provided on its periphery with a series of measuring-lugs 37, in this instance seven in number, which lugs are formed with chamfered forward ends and are arranged at equal distances of separation, but may be of different lengths relative to each other.

A lever 38 is fulcrumed near its center in a stand 39, fixed to and arising from the base-plate 10, and the rear end of said lever is curved downwardly and rearwardly and is provided with an antifriction-roller 40, (dotted lines, Figs. 1 and 2,) located beneath the perimeter of the flange 36 and in the path of travel of the lugs 37. The forward end of the lever 38 is limited in its downward movement by an adjusting-screw 41, seated in the base-plate 10, and the extreme forward end of said lever engages beneath and sustains the central portion of a lever 42, Fig. 3, (dotted lines, Figs. 1 and 2.) The lever 42 is fulcrumed at one end on a stand 43, fixed to and rising from the base-plate 10 and extends across the machine to a point of engagement at its outer end beneath and with the under side of the bearing-yoke 24. Since the bearing-yoke 24 carries the end portion of the shaft 19 on which the feed-wheel 26 is mounted, it follows that any oscillation of the lever 42 will effect an approximation or separation of the feed-wheel 26 relative to the feed-wheel 28, whereby to grip or release the stay-wire within the notches of said wheels.

In the rotation of the pinion 32 by engagement with the spur-gear 31 the lugs 37 on the flange 36 successively will engage the antifriction-roller 40 and move said roller and the end of the lever 38, to which it is attached, downwardly, thus raising the opposite end of the lever 38 and consequently the lever 42 and bearing-yoke 24 and causing the feed-wheel 26 to act in conjunction with the feed-wheel 28 and rigidly embrace and advance the stay-wire, which advancement of the stay-wire continues until the engaging lug 37 passes the antifriction-roller, at which time the weight of the shaft, yoke, and wheel on the lever 40 and their combined weight on the lever 38 will depress the outer end of the said lever 38 and elevate the inner end thereof and the antifriction-roller, thus permitting a release of the stay-wire by the separation of the feed-wheel 26 from the feed-wheel 28.

The movement of oscillation of the shaft 19 on the pivots formed by the set-screws 22 is very slight and consequently will not in any manner affect the meshing of the spur-gear 17 and pinion 18, being simply sufficient to engage and release alternately the stay-wires.

An auxiliary plate 44 is mounted adjacent to the outer face of the side plate 12 and secured to said side plate by means of lag-screws. The auxiliary plate is so shaped as that when it is mounted parallel with the side plate, as shown, a groove 45 is formed between the upper margin thereof, the bottom of which groove is shown by a dotted line in Fig. 1. A die-plate 46 is mounted in a slot (not shown) in the side plate 12 adjacent to the forward end of the auxiliary plate and is arranged to slide through the side plate and across the forward end of the groove 45. A lever 47 is fulcrumed at its rear end on a pin 48, seated in an ear 49, formed on the side plate 12 and projecting toward the pinion 32. The lever 47 extends forwardly from the ear 49, is bent downwardly beneath the boss or bearing 34, and then upwardly and extended forwardly to a point below the main shaft 13, traversing a slot in the die-plate 46, (dotted lines, Fig. 1.) The forward end portion of the lever 47 extends through a guide-plate 50, Fig. 6, and has a frustum-shaped stud 51 formed on and projecting upwardly from its forward end portion.

A frustum-shaped antifriction-roller 52 is pivoted on a pin (dotted lines, Fig. 6) fixed to and extending upwardly from the frustum-shaped projection 51 of the lever 47 and extends upwardly to and within a cam-groove 53 in a cam-wheel 54, fixed to the main shaft 13 between the spur-gear 31 and the bearing 15. A needle-lever 55 is horizontally positioned adjacent to the outer face of the side plate 12 and is fulcrumed at one end on a pin 56, seated in the said side plate. An expansive coil-spring 57 is interposed between an ear 58 on the needle-lever 55 and the flange of the side plate 12 and tends to retain the said lever in and return the same to its normal approximately horizontal position. The outer or free extremity of the needle-lever 55 is confined between guides 59, one only of which is shown, positioned parallel to each other and fixed to the auxiliary plate 44 by means of a lag-screw 60. The upper end portions of the guides 59 are connected by a bolt 61, which bolt also carries a bushing or cushion 62 between the guides, against which the outer or free extremity of the needle-lever 55 impacts in its upward movement. The needle-lever 55 is carried laterally from its longitudinal plane near its forward end into the plane of the groove 45, and a needle 63 is mounted on the laterally-projecting portion 64 of said lever in the vertical plane of said groove.

A guide-plate 65 is fixed to the side plate 12 and rests on the upper edge of the auxiliary plate 44, which guide-plate is provided with an aperture (not shown) through which the needle 63 may reciprocate to and from the groove 45, the aperture in the guide-plate being located in the vertical plane of the needle and a little to one side of the sliding die-plate 46. The needle-lever 55 is offset and bent downwardly at a point adjacent to the vertical plane of the main shaft 13, and a crank-arm 66 is mounted rigidly on the extremity of the said main shaft. An antifriction-roller 67 is pivoted on the extremity of the crank-arm 66 and extends inwardly therefrom in the vertical plane of the needle-lever 55.

In the rotation of the main shaft 13 the crank-arm 66 carries the antifriction-roller 67 in an orbit and into contact with the needle-lever 55, thereby depressing the said needle-lever against the resilience of the spring 57 and moving the needle 63 downwardly through the guide-plate 65 into and nearly across the groove 45.

When the antifriction-roller 67 in its travels reaches the offset or bend of the needle-lever 55 below the main shaft 13, the engagement or downward pressure of said roller on said lever is removed and the spring 57 returns the lever to its normal position, causing the needle 63 to recede from its abnormal position in the groove 45. A die-plate 68 is pivoted at its lower end on a pin 69, seated in the side plate 12, and is arranged for oscillation within that end of the groove 45 nearest to the main shaft. A leaf-spring 70 is seated at its lower end between the ears on the side plate 12 and its upper end engages a notch in the die-plate 68, the resilience of said spring being exerted in the direction that will hold the said die-plate normally out of the groove 45. A cam or eccentric 71 is fixed to the hub of the crank-arm 66 and between said crank-arm and the bearing 15, and in the rotation of the shaft 13 the said cam 71 engages the die-plate 68 and moves the same into the groove 45 and into close proximity with the die-plate 46, the die-plate 68 being notched in its upper end in order that the body portion thereof may pass beneath the guide-plate 65. A knife-bar 72 is fulcrumed at its lower end on the rearward end of the side plate 12 by means of a pin 73 and is provided with a chamfered projection 74, having a knife-edge. The rear portion of the upper end of the knife-bar 72 is chamfered at 75 and is so located as to be engaged by an inclined face of a lug 76 on the adjacent face of the pinion 32. An expansive coil-spring 77 is interposed between the shoulder on the knife-bar and the adjacent face of the side plate 12.

In the practical operation of the machine above described wire is fed through and between the feed-wheels 26 28 in the manner above explained until such portion of the wire as is desired has passed beyond the point of the needle 63. Now, the engaging lug having passed beyond the antifriction-roller 40, as shown by dotted lines in Fig. 1, the cam-wheel 54 moves the lever 47 laterally and thereby moves the die-plate 46 across the groove 45. The crank-arm 66 engages the needle-lever 55 and depresses said lever, moving the needle 63 downwardly. In the downward movement of the needle 63 said needle engages the wire and depresses the same across the die-plate 46 and the shoulder on the die-plate 68, forming a loop, bend, or offset in the said wire between said die-plates and within the groove 45. The crank-arm 66 passes out of engagement with the needle-lever, the needle-lever is returned to its normal position by the spring 57 withdrawing the needle 63 from engagement with the wire, the cam 71 comes into engagement with the die-plate 68, and said die-plate is moved toward the die-plate 46, folding and approximating the side portions of the projection or loop of the wire together and into a common plane transversely of the groove. The die-plate 68 is recessed on one side in order that the integral connecting lower end portion of the tongue or projection on the wire may simply be closed and remain in a position torsionally of or twisted relative to the body portions thereof instead of being overlapped and carried into the same transverse plane as said body portions, as is clearly described in my application pending concurrently herewith. The cam 71 passes out of engagement with the die-plate 68, and said die-plate is returned to its normal position by the spring 70. At this time the cam-wheel 54, acting through the roller 52, moves the lever 47 laterally, and said lever withdraws the die-plate 46 from the groove 45, and the next succeeding lug 37 contacts with the roller 40 and oscillates the lever 38 to raise the lever 42 and elevate the shaft 19 to approximate the feed-wheel 26 to the feed-wheel 28 and advance the wire the desired distance to form another and successive loop, tongue, or projection in said wire. When the needle 63 descends and makes a bend, offset, tongue, or projection in the wire, the said wire is free to draw from either direction a sufficient distance to form said tongue, and consequently it is necessary at each advance of the wire to feed through a sufficient quantity that half the quantity of wire required to make a tongue will return and feed downwardly over the die-plate 46 in the formation of said tongue. It is desirable to form the tongues, projections, or loops on the stay-wire at unequal distances of separation, and such result is effected by making the engaging lugs 37 of unequal lengths, since the amount of wire fed through the machine between the loops is dependent upon the relative length of time the feed-wheels are kept in engagement with the wire through the medium of the lever 38, held in a given position by the engagement of one or another of the lugs 37 with the roller 40, and I may alter and differentiate the space of the tongues on the stay-wire by replacing the lugs 37 by others of different lengths or readjusting those in use to different positions on the periphery of the flange 36. When a sufficient quantity of wire has been acted upon to form a stay of the desired length, the pinion 32 is permitted to complete the revolution, and at this time the inclined face of the lug 76 engages the chamfered face 75 of the knife-bar 72 and oscillates said knife-bar against the resilience of the spring 77 to carry the knife-edge 74 across the groove 45 to sever the wire therein.

It may be well to note here that the groove 45 is employed primarily to maintain the completed portion of a stay-wire in a given position with the tongues in vertical planes pending the formation of other and successive tongues on the stay-wire, and while a portion of the stay-wire may protrude beyond the groove, yet one or more of the tongues on said stay-wire always is contained within the groove 45 and tends to prevent twisting of the

stay-wire, and thereby obviates the necessity of gripping and holding said wire at all times during the process of its manufacture.

As the stay-wires are severed by the knife 74 they fall upon and into a trough 78, Figs. 7 and 8, of the other portion of the machine, heretofore mentioned, the machine heretofore described in detail performing the sole function of making the stay-wires.

I claim as my invention—

1. In a fence-making machine, an intermittent-feeding mechanism comprising a fixed bearing, a feed-wheel 28 mounted for rotation on said bearing, a pivoted bearing 24, a shaft 19 having a boss 23 thereon mounted for rotation in the pivoted bearing 24, a stand 21, a pivoted bearing 20 in said stand and carrying the end of the shaft 19 opposite to the bearing 24, a feed-wheel 26 fixed to the shaft 19 and meshing with the feed-wheel 28, a lever 42 fulcrumed at one end and engaging at its other end beneath the pivoted bearing 24, a lever 38 fulcrumed near its center and engaging at one end under the lever 42, a roller on the end of the lever 38 opposite to the lever 42, a measuring-flange 36, and lugs on said flange arranged for successive engagement with the roller on the lever 38, which lugs are of different lengths.

2. In a fence-making machine, a supporting-plate 12, a needle-carrying lever fulcrumed at one end on said supporting-plate, guides 59 limiting the lateral movement of the free end of the lever, a needle mounted in the free end portion of the lever, an eccentric for moving said lever in one direction, and a spring for returning said lever, the lever being offset in its body portion to form a shoulder whereby said lever may have a slow advance and quick return.

3. In a fence-making machine, a shaft, a cam-wheel on said shaft, a lever 47 fulcrumed at one end, a frustum-shaped antifriction-roller pivoted to the free end of the lever and engaging the cam-wheel, and operating devices connected to the body portion of said lever.

4. In a fence-making machine, a main shaft, means for driving said shaft, an intermittently-operating feed mechanism geared to said shaft, intermittently-operated dies, operating mechanism between the dies and shaft, intermittently-operating needle mechanism driven by the shaft in one direction and by a return-spring in the other direction, and intermittently-operated cutting mechanism actuated by gearing from said shaft.

5. In a fence-making machine, the combination of intermittent wire-feeding mechanism, traveling lugs for operatively positioning said feeding mechanism successively, a needle arranged to reciprocate across the plane of travel of the wire, die-plates between which the needle reciprocates, means for approximating and separating said die-plates and cutting mechanism whereby said wire is cut into lengths.

6. In a fence-making machine, the combination of feed-wheels whereby a wire may be advanced longitudinally, a rotating measuring member, lever connections between said measuring member and one of the feed-wheels whereby in the rotation of said member the feed-wheels are approximated and separated alternately to grip and loose the wire, a needle-carrying lever mounted for oscillation, eccentric mechanism for oscillating said needle-carrying lever, a die-plate mounted for reciprocation across and below the plane of travel of the wire, a die-plate mounted for oscillation to and from the sliding die-plate, a needle on the needle-carrying lever arranged for reciprocation between the die-plates, during an intermission of travel of the wire, whereby the wire is offset between the die-plates to form a tongue or loop therein, eccentric mechanism for approximating the oscillating die-plate to the sliding die-plate upon the recession of the needle, whereby the sides of the tongue or loop are approximated and cutting mechanism whereby sections of the wire with tongues or loops thereon are severed.

7. In a fence-making machine, a stay-wire-forming mechanism comprising a base-plate 10, a side plate 12 fixed to and rising from the base-plate, an auxiliary plate 44 fixed to the side plate and so shaped and arranged as to form a groove 45 between the side plate and auxiliary plate, a die-plate 46 mounted in the side plate 12 and arranged for reciprocation across the groove 45, a main shaft mounted for rotation, a cam-wheel on said main shaft, a lever mounted for oscillation and traversing the die-plate 46, an antifriction-roller on said lever engaging in a slot in the cam-wheel, a feed-wheel shaft 19 mounted for oscillation, a feed-wheel mounted on said shaft, a feed-wheel mounted for rotation on a fixed bearing and meshing with the first said feed-wheel, the teeth of the feed-wheels being notched to receive a wire, a lever 42 mounted for oscillation and engaging a movable bearing of the oscillating shaft, a rocking lever engaging the oscillating lever at one end and carrying a roller at the other end, a pinion 32 geared to the main shaft, a measuring flange or member on said pinion, lugs on the perimeter of said flange or member and arranged to engage the roller on the rocking lever successively and intermittently, gear connections between the oscillating shaft and the main shaft, a die-plate mounted on the side plate for oscillation to and from the sliding die-plate, an eccentric on the main shaft arranged to engage the oscillating die-plate, a needle arranged for reciprocation in the groove 45 between the die-plates, a lever mounted for oscillation on the side plate and carrying said needle, a crank-arm on the main shaft arranged to engage and move the needle-carrying lever in one direction, a spring for returning said lever, a cutting mechanism arranged for oscillation across the discharge end of the groove 45, and cam connec-

tions between the pinion 32 and cutting mechanism.

8. In a fence-making machine, a pinion 32 and connections whereby a wire is fed longitudinally, a knife-bar pivoted for oscillation across the path of travel of the wire, a knife-edge on said knife-bar, a spring for returning said knife-bar, and a lug 76 on the pinion arranged to engage a chamfered face 75 on the knife-bar and move the same in opposition to the spring.

9. In a fence-making machine, a traveling way or groove for the stay-wire, die-plates in said groove, a guide-plate traversing said groove, a needle arranged for reciprocation through said guide-plate into said groove, means for moving the die-plates, and means substantially as described for moving said needle.

10. In a fence-making machine, feed-wheels mounted for approximation and separation and provided with toothed peripheries intermeshing, the teeth on the peripheries of said wheels being provided with notches 27 to receive a wire.

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