(No Model.) 3 Sheets—Sheet 1.

# C. E. WARNER.

## WIRE FENCE MACHINE.

No. 594,128. Patented Nov. 23, 1897.

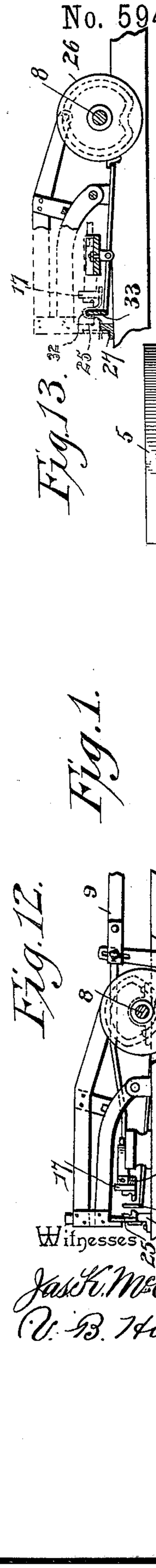

Fig. 12.



Fig. 13.

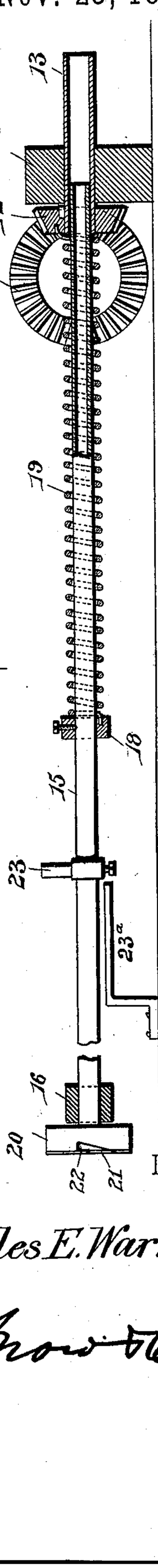

Fig. 11.

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(No Model.) 3 Sheets—Sheet 2.

# C. E. WARNER.

## WIRE FENCE MACHINE.

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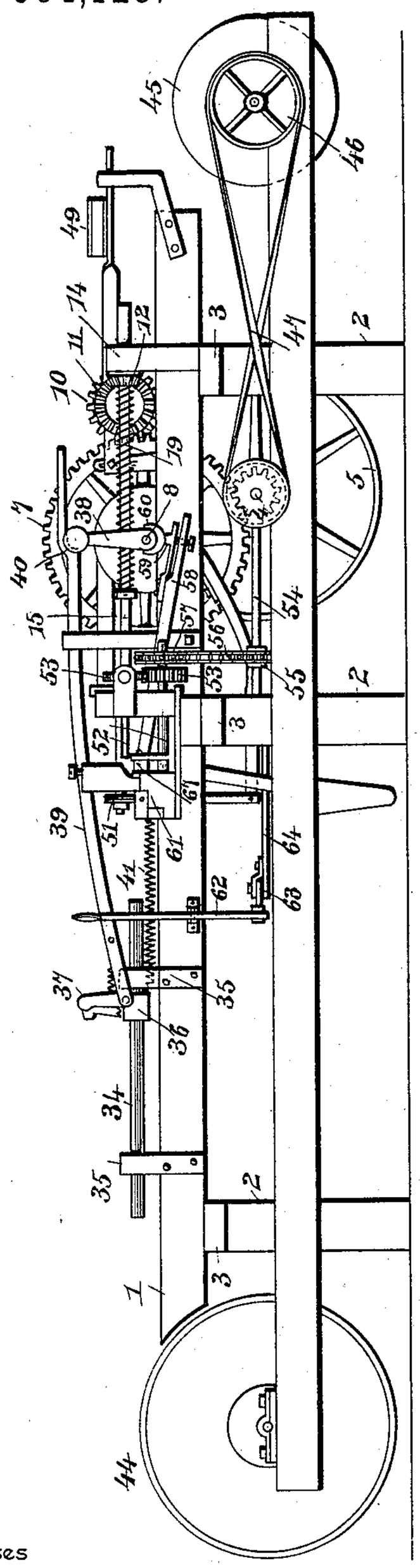


Fig. 2.

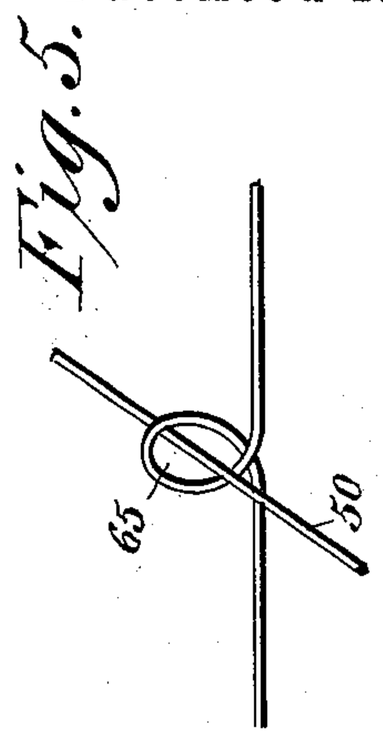


Fig. 5.

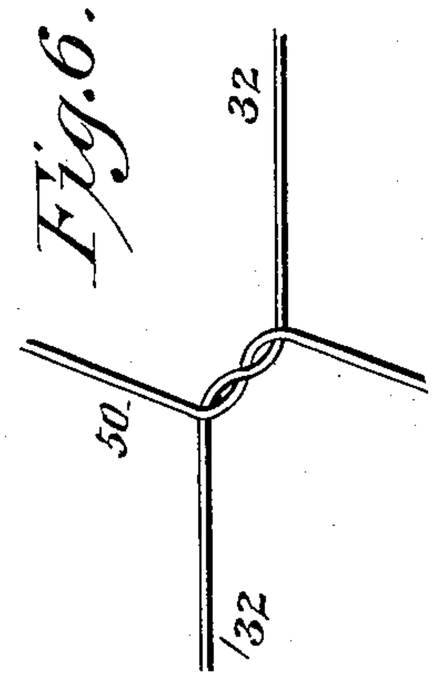


Fig. 6.

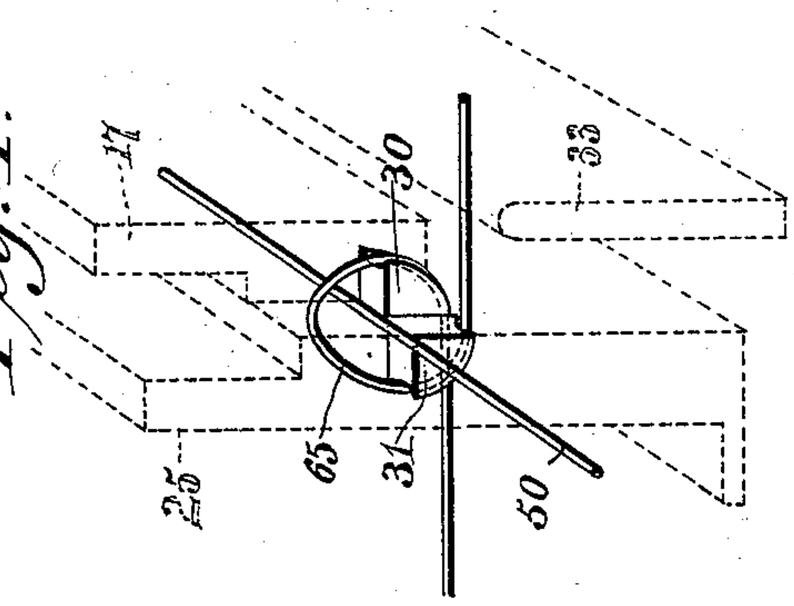


Fig. 4.

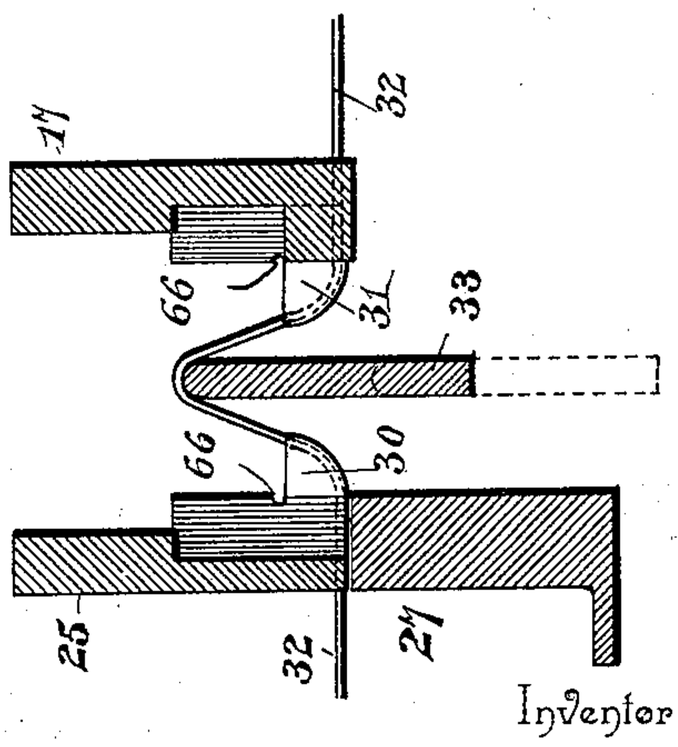


Fig. 3.

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(No Model.) 3 Sheets—Sheet 3.

# C. E. WARNER.

## WIRE FENCE MACHINE.

No. 594,128. Patented Nov. 23, 1897.

Fig. 7.

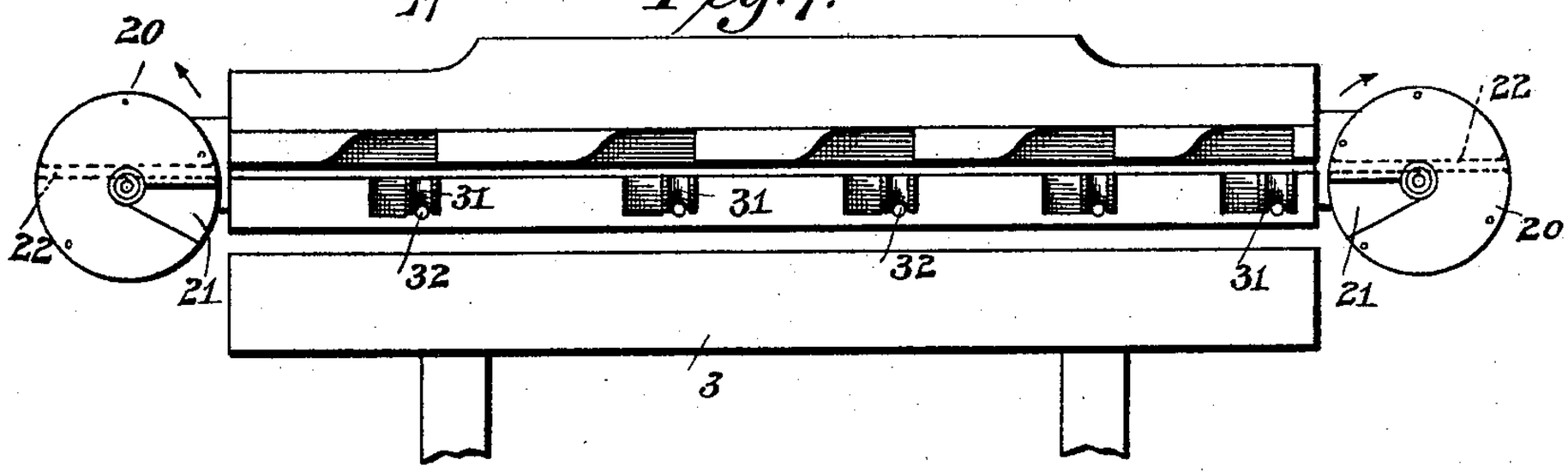



Fig. 8.

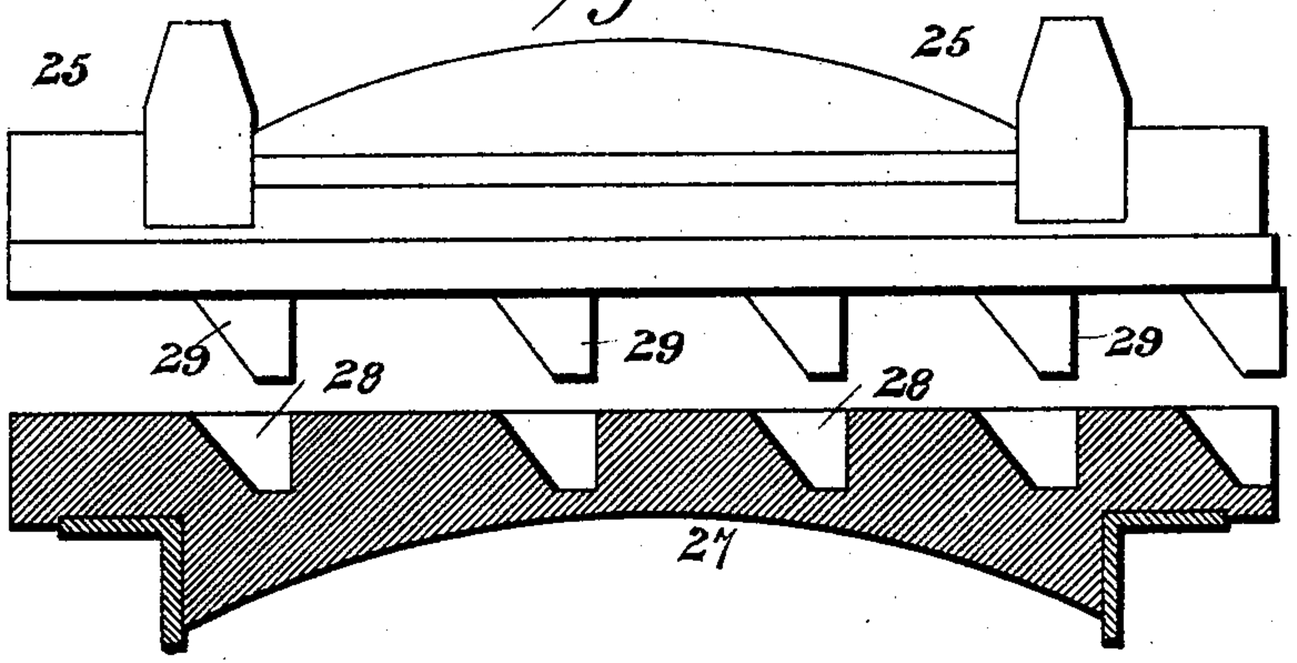



Fig. 9.

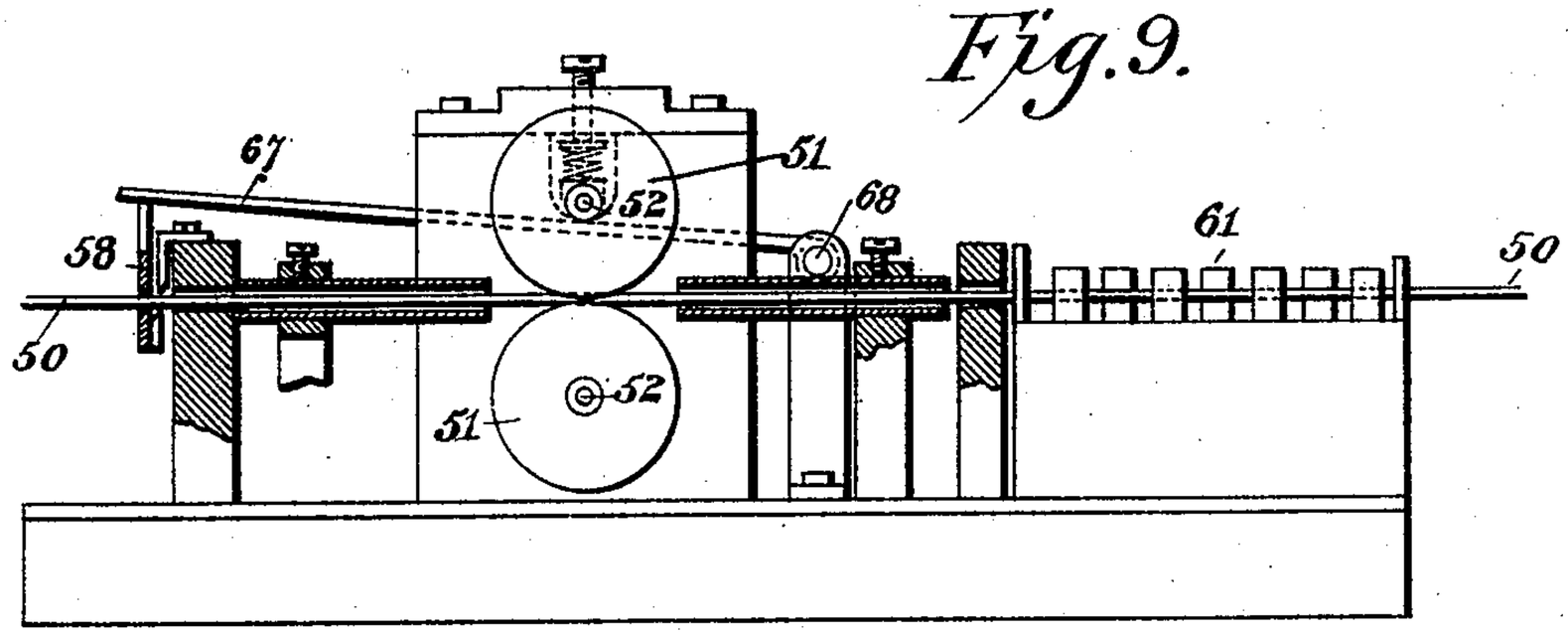
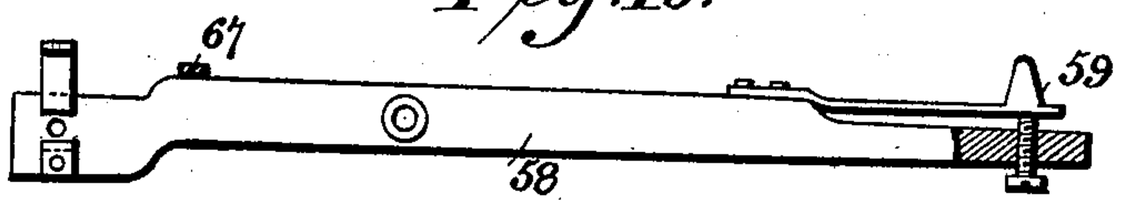



Fig. 10.




Inventor

Witnesses

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Charles E. Warner

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# UNITED STATES PATENT OFFICE.

CHARLES E. WARNER, OF WAVERLY, KANSAS.

## WIRE-FENCE MACHINE.

SPECIFICATION forming part of Letters Patent No. 594,128, dated November 23, 1897.

Application filed November 30, 1896. Serial No. 614,016. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES E. WARNER, a citizen of the United States, residing at Waverly, in the county of Coffey and State of Kansas, have invented a new and useful Wire-Fence Machine, of which the following is a specification.

This invention relates to wire-fence machines designed for applying cross-wires to longitudinal wires and forming meshes therewith.

The purpose of the improvement is to secure a substantial lock-joint at the points of crossing of the stay and longitudinal wires, whereby the shape of the fence will be preserved under all conditions and which will admit of the fence being quickly and economically constructed and require a simple mechanism as compared with machines of this type where the cross or filling wires are twisted with or about the longitudinal wires.

An essential feature of the invention consists of looping the longitudinal wires at required intervals in their length, causing the ends of the loops to pass by each other, threading the cross-wires through the loops, and subsequently drawing the longitudinal wires to straighten the loops and causing the interlocking between the cross and longitudinal wires.

Another feature of importance is the peculiar formation of the jaws in combination with a looper for taking up the slack produced in the longitudinal wires by the closing of the jaws, whereby the loops are formed, and in the provision of a passage between the meeting faces of the jaws for directing the cross-wire through the loops after the jaws have come together. Coöperating with the interlocking mechanism are twisters for wrapping the loose ends of the cross-wires around the edge cables, thereby completing the operation of securing a stay or filling wire in proper position.

In its general construction the machine comprises a tension device for the cross and longitudinal wires, a looping mechanism, means for threading the cross or filling wires through the loops, a feeder for advancing the fence and stretching the loops, twisters for binding the ends of the filling-wires about the edge or side cables, a roller of given size for measuring the length of completed fencing, a roller for bundling the fencing after it has been completed and measured, and suitable mechanism for actuating the coöperating parts, all as will appear more fully hereinafter, reference being had to the following description and the accompanying drawings, in which corresponding and like parts are designated by the same reference-characters.

For a full understanding of the merits and advantages of the invention reference is to be had to the accompanying drawings and the following description.

The improvement is susceptible of various changes in the form, proportion, and the minor details of construction without departing from the principle or sacrificing any of the advantages thereof, and to a full disclosure of the invention an adaptation thereof is shown in the accompanying drawings, in which—

Figure 1 is a top plan view of a wire-fence machine especially designed for attaining the objects of this invention. Fig. 2 is a side elevation thereof. Fig. 3 is a detail view showing the first step in the formation of a loop. Fig. 4 is a detail view showing a loop complete and a cross-wire passed therethrough. Fig. 5 shows a loop and a cross-wire prior to forming the lock-joint by drawing the loop. Fig. 6 is a detail view showing the lock-joint after the loop has been closed. Fig. 7 is a transverse section on the line X X of Fig. 1, looking in the direction of the arrow. Fig. 8 is a rear view of the jaw which has imparted thereto a vertical movement and illustrating the base which coöperates therewith. Fig. 9 is a detail view of the means for threading the cross-wires through the loops. Fig. 10 is a detail view of the wire-cutting mechanism. Fig. 11 is a detail view of a tubular spindle carrying a wire-twister, showing the coil-spring in which power is stored for operating the twister when the latter is released. Fig. 12 is a detail view showing the means for actuating the looper and the horizontally-movable jaw. Fig. 13 is a detail view showing the actuating mechanism for the upper portion of the two-part jaw.

The framework for supporting the operating parts of the machine may be of suitable construction, and, as shown, comprises lon-

gitudinal beams 1, uprights 2, and cross-timbers 3, which are connected together in any substantial manner. A transverse shaft 4, journaled in bearings applied to the lower side beams, is provided at one end with a band-pulley 5, by means of which power is transmitted to the machine from a suitable motor by means of a drive-belt. A pinion 6 is secured to the shaft 4 intermediate of its ends and meshes with a gear-wheel 7, mounted upon a shaft 8 parallel with the shaft 4 and journaled in bearings applied to the upper longitudinal beams. A shaft 9, parallel with the shafts 4 and 8 and journaled in bearings provided on the upper longitudinal beams, has a pinion 10, which is in mesh with the gear-wheel 7 and is provided at its ends with bevel gear-wheels 11, which mesh with companion bevel-pinions 12, secured to hollow shafts 13, mounted in bearings 14, secured to the upper longitudinal beams nearly opposite the shaft 9. Tubular spindles 15 are mounted at one end in the hollow shafts 13 and at their opposite end in bearings 16, secured to the ends of a jaw 17, and collars 18 are secured thereto intermediate of their ends to form positive means of connection therewith of coil-springs 19, which are mounted upon the tubular spindles and have one end secured to the bevel-pinions 12 and their opposite end to the collars 18. These tubular spindles are located at the sides of the machine and extend parallel with the upper longitudinal beams and are provided at their inner or rear ends with wire-twisters 20, which are disks having a radial slot 21 in their rear faces communicating with a diametrical passage 22, formed in the body of the disks intermediate of their faces. As explained more fully hereinafter, the tubular spindles receive a longitudinal movement due to the opening and closing of the jaws in the formation of the loops. Hence they are adapted to rotate and move longitudinally in the hollow shafts. When the jaws are closed, the tubular spindles are held against rotation by coöperating stops 23 and 23ª, and during this time the cross-wire is threaded through the loops and the hollow shafts 13 are rotated and store power in the coil-springs 19, and when the jaws open the stops 23 are disengaged and the coil-springs 19 being liberated regain themselves and rotate the tubular spindles and twist the ends of the cross-wire about the longitudinal or side cables, the cross-wire escaping from the twisters 20 through the radial slots 21.

The jaw 17 receives a reciprocating movement lengthwise of the machine and is operated by means of a cam 24, secured upon the shaft 8, and a companion jaw 25 is mounted so as to receive a vertical reciprocating movement and is operated from the shaft 8 by means of a cam 26, mounted thereon, and this jaw 25 is composed of complementary parts, the lower part or base 27 having sockets 28 at intervals in its length to receive corresponding projections 29 of the upper part, one wall of the sockets and projections being inclined, so that as the parts of the jaw come together the longitudinal wires will be moved laterally and caused to come beneath the projections 30, this action being brought about by the inclined edges of the projections 29 engaging with the said longitudinal wires. This operation is essential, as the projections 30 and 31 do not aline longitudinally and pass by each other as the jaws come together to the proper formation of the loop, as most clearly indicated in Figs. 4 and 7. In order to admit of the jaws coming together, as indicated in Fig. 4, they will be provided in their meeting faces with recesses or depressions to receive the projections 30 and 31, as will be readily understood. The projections 30 and 31 are of quadrantal shape and are grooved in their arcuate edges, so as to retain the longitudinal wires 32 in proper position during the formation of the loops. The longitudinal wires pass beneath the jaw 17 and between the complementary parts of the jaw 25 and in the operation of the machine are looped between the jaws, the loops being formed simultaneously with the closing of the jaws, the portion of the wires between the said jaws being deflected to form the loops as the space between them diminishes.

The looper 33 is a plate extending parallel with the jaws and adapted to move vertically between them and is actuated from one of the cams on the shaft 8 by means of suitable connections, so as to be projected between the jaws as the latter are closing and be withdrawn from between them just prior to their final closing, so as to admit of the jaw 17 passing by it, as indicated in Fig. 4.

The feeding mechanism for straightening the loops and advancing the completed fence after each cross or filling wire has been placed in position consists of slide-rods 34, mounted in bearings 35, attached to the upper longitudinal beams, a cross-head 36, secured to the slide-rods, and spring-actuated dogs 37, pivoted to the cross-head 36. This feed mechanism is actuated from the shaft 8 by means of arms 38, secured to the ends of the said shaft, and bars 39, having pivotal connection with the cross-head 36 and provided near their front ends with shoulders 40 to be engaged by the arms 38 as the latter are rotated, the feeding mechanism being operated during a quarter of a revolution of the shaft 8. The front ends of the bars 39 project in front of the shoulders 40 a sufficient distance to be engaged by the arms 38 as the latter rise to a vertical position prior to making positive engagement with the shoulders 40. Springs 41 serve to return the cross-head to a normal position after the bars 39 have been disengaged from the arms 38. The dogs 37 engage with the cross or filling wires 42 when drawing the fence forward, and when the feeding mechanism is returning to a normal position the said dogs turn upon their pivotal connec-

tion with the cross-head, so as to clear the cross-wire with which they are to engage. The bars 39 are strengthened and braced between their ends by a cross-rod 43.

A measuring-roller 44 is located at the rear end of the machine and is of definite circumferential length, so as to determine the length of fence manufactured, and a suitable mechanism (not shown) will be connected therewith for registering the number of revolutions and thereby keeping tally of the length of fence turned out. Inasmuch as the measurement is determined in rods the roller 44 will be half a rod in circumferential length, and each two complete revolutions thereof will indicate a rod of fencing. This measuring-roller is operated solely by frictional engagement therewith of the completed fencing as the latter passes thereover.

A drum or spool 45 is located at the front end of the machine, and the completed fencing is wound thereon, said drum having heads to cause the fence to wind true thereon. A band-pulley 46 is provided on an end of the shaft supporting the drum 45, and motion is imparted thereto from a band-pulley 48 on the shaft 4 by means of a belt 47.

Each longitudinal wire 32 has a tension device 49, which is located at the front end of the machine, so that in the formation of the fence the loops will be drawn with equal strain, thereby resulting in a fence of uniform appearance and having lock-joints of like size, whereby the strain on all parts of the fence will be alike and buckling, warping, and twisting obviated when the fence is unrolled prior to attaching it to the fence-posts. The several tension devices are connected in series, and each consists of a plate bearing a series of rollers set staggering and provided with means (not shown) for increasing the resistance to their rotation, whereby the tension may be varied at will.

The wire 50, forming the cross or filling wires, is threaded through the loops by a feeding mechanism located at one side of the machine, and which comprises companion feed-rollers 51, grooved in their periphery and having their shafts 52 connected by spur-gearing 53, whereby each roller is positively operated. A counter-shaft 54, driven from the shaft 4 by intermeshing gearing or in any of the usual ways, is provided with a sprocket-pinion 55, and motion is transmitted therefrom by means of a sprocket-chain 56, passing around a sprocket-wheel 57, secured upon one of the shafts 52. The upper shaft is adapted to tilt to separate the feed-rollers 51, so as to check the feed after a proper length of the wire 50 has been fed across the machine to form a cross or filling wire. A lever 58, fulcrumed between its ends, is provided at its rear end with a cutter to sever the cross-wire from the main wire after a proper length of the latter has been fed to the machine, and this lever is constructed to engage with a lever 67, passing beneath the upper shaft 52 and fulcrumed at 68, so as to check the feed of the wire 50 the instant the lever 58 begins to operate. The forward end of the lever 58 is provided with an adjustable tappet 59, which is adapted to be engaged by a cam 60 on the shaft 8 for operating the lever at the proper time. A straightening device 61 is used in conjunction with the feeding mechanism for straightening the wire 50 prior to the threading of the latter through the loops, and consists of a series of rollers or pins set staggering and so related as to attain the desired result.

The machine is at all times under the control of the operator and may be thrown into and out of gear by means of a hand-lever 62, which for convenience is located at one side of the machine within convenient reach of the feeding mechanism, and this lever is connected by means of a bar 63 with a shipper-lever 64 at the opposite side of the machine for throwing the band-wheel 5 into and out of gear with the shaft 4, the usual clutch mechanism being provided for attaining this end.

The operation of the machine will be readily comprehended from the foregoing detailed description, and in order to remove any doubt on this score the following brief description is submitted. The longitudinal wires 32 being threaded through the tension devices 49 and passed beneath the jaw 17 and between the complementary parts of the jaw 25 are engaged with the drum or spool 45, and the machine being started the jaw 17 advances toward the jaw 25 and the latter moves vertically to throw the projections 30 and 31 out of line, and as the jaw 17 is closing toward the jaw 25 the looper 33 is projected between the jaws to take up the slack in the longitudinal wires and form the loops, and just prior to the closing of the jaws the looper 33 is withdrawn from between them, and, the jaws closing, the projections 30 and 31 pass by each other and complete the loops, as clearly indicated in Fig. 4. At this instant the wire 50 is threaded through the loops 65 by means of the feeding mechanism herein described, the said wire being directed through the loops by means of a passage formed by semicircular grooves 66 in the meeting faces of the jaws, and which grooves in the jaws when closed form a circular passage for the wire, as clearly indicated. After the wire 50 is fed a proper distance, so as to form a cross or filling wire 42, the lever 58 is operated and checks the feed of the wire 50 and severs the length thereof fed to the machine. The cross-head 36 is now moved and the longitudinal wires drawn forward, thereby stretching the loops and forming the lock-joint shown most clearly in Fig. 6. While the jaws are closing, the hollow shafts 13 are rotating and storing power in the coil-springs 19, and as the jaws open the coöperating stops 23 and $23^a$ become disengaged and the power stored in the coil-springs 19 is expended in rotating the tubular spindles and the wire-twisters connected

therewith, so as to twist the end portions of the cross or filling wires around the longitudinal side or edge cables, which latter pass through the said tubular spindles.

The stops 23 are adjustable on the spindles 15 and consist of collars having projecting parts, and the stops 23ª are brackets attached to the framework and extending longitudinally thereof, so as to be engaged by the stops 23 to hold the spindles from turning until the longitudinal and filling wires have become interlocked.

Having thus described the invention, what is claimed as new is—

1. In a wire-fence machine, the combination of jaws having inwardly-extending projections to pass by each other, means for closing the jaws, and a looper for deflecting the longitudinal wires during the closing of the jaws, substantially as set forth.

2. In a fence-machine, the combination of jaws having quadrantal-shaped projections grooved in their arcuate faces, means for closing the jaws and causing the projections to pass by each other, and a looper for deflecting the longitudinal wires as the jaws are closing, substantially as set forth.

3. In a fence-machine, the combination of jaws having companion grooves in their meeting faces which unitedly form a passage, means for closing the jaws and looping the wires between them, and a feeding mechanism for threading a cross or filling wire through the loops, substantially in the manner set forth for the purpose described.

4. In a fence-machine, the combination of coöperating jaws having projections at their inner faces, one of the jaws comprising upper and lower parts, the upper part carrying the inner projections, inclined projections between the parts for moving the longitudinal wires laterally and beneath the inner projections on the said upper part as the jaws close, and means for advancing and withdrawing the other jaw from the two-part jaw, substantially as and for the purpose set forth.

5. In a fence-machine, the combination of coöperating jaws having inner projections on their meeting faces, one of the jaws comprising an upper and a lower part, projections between the complementary parts of the jaw having an inclined edge to cause a lateral movement of the longitudinal wires as the parts of the jaw come together, and means for moving the other jaw toward and from the two-part jaw, substantially as and for the purpose set forth.

6. In a fence-machine, the combination of a movable jaw, a tubular spindle provided with a wire-twister and movable with the said jaw, a coil-spring having connection with the tubular spindle, means for storing power in the coil-spring, which power when expended actuates the wire-twister, and coöperating stops to hold the tubular spindle against rotation during the operation of storing power in the coil-spring, substantially as set forth.

7. In a wire-fence machine, the combination of a movable jaw, a tubular spindle movable with the jaw and bearing a wire-twister, a hollow shaft mounted upon the tubular spindle, a coil-spring mounted upon the tubular spindle and having connection therewith and with the hollow shaft, means for rotating the hollow shaft to store power in the coil-spring, and coöperating stops to hold the tubular spindle against rotation during the storing of power in the said coil-spring, substantially as set forth for the purpose described.

8. In a wire-fence machine, the combination of coöperating jaws, means for imparting a reciprocating movement to one of the jaws, tubular spindles located at the ends of the movable jaw and adapted to reciprocate therewith and provided with wire-twisters, hollow shafts having the tubular spindles operating therein, coil-springs placed upon the tubular spindles and secured thereto at one end and to the hollow shafts at their opposite end, coöperating stops for holding the tubular spindles against rotation during the closing of the jaws, and means for rotating the hollow shafts for storing power in the coil-springs, substantially as and for the purpose set forth.

9. In a wire-fence machine, the combination of mechanism for looping the longitudinal wires, a feeding mechanism for threading the cross or filling wires through the loops, comprising companion feed-rollers, and a lever bearing a cutter for severing the length of wire when fed to the machine and at the same time throwing the feeding mechanism out of operation, substantially as set forth.

10. In a wire-fence machine, the combination with the mechanism for effecting an interlocking of the cross or filling wires with the longitudinal wires, of a mechanism for advancing the completed fence, consisting of a cross-head, a series of spring-actuated dogs having pivotal connection with the cross-head, and actuating mechanism for the cross-head, substantially as and for the purpose set forth.

11. In a wire-fence machine, the combination with the mechanism for producing an interlocking of the cross or filling wires with the longitudinal wires, of a feeding mechanism for advancing the completed fence, consisting of a cross-head, dogs carried thereby, bars having pivotal connection with the cross-head and extending forwardly and having shoulders a short distance from their front ends, and arms attached to a rotatable shaft to engage with the shoulders of the said bars, substantially as and for the purpose set forth.

12. A wire-fence machine, comprising in its organization the following instrumentalities: coöperating jaws having inner projections and companion grooves in their meeting faces, means for moving one of the jaws vertically and the other jaw toward and from the first-mentioned jaw, a looper for deflect-

ing the longitudinal wires between the jaws as the latter are closing, a feeding mechanism for threading a filling-wire through the loops, a lever bearing a cutter for severing the filling-wire and at the same time throwing its feeding mechanism out of operation, tension devices for the longitudinal wires, a feeding mechanism for drawing the completed fence through the machine and at the same time straightening the loops and producing an interlocking of the longitudinal and filling wires, wire-twisters for wrapping the ends of the filling-wires about the side cables, a measuring-roller for determining the length of completed fence, and a drum for winding up the completed fencing into a roll, substantially in the manner set forth.

13. In a fence-machine, the combination of independent coacting jaws, a looper for deflecting the longitudinal wires between the jaws as the latter are closing and coöperating therewith to form the deflected portion of the wires into loops, a feeding mechanism for passing a cross-wire through the loops, and means for separating the jaws and subjecting the longitudinal wires to linear tension, whereby the said loops are stretched and an interlocking between the longitudinal and cross wires is effected, substantially in the manner shown for the purpose specified.

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

CHARLES E. WARNER.

Witnesses:
G. W. DAVIS,
T. W. MCFADDEN.