

C. A. WILLMARTH.
MACHINE FOR WEAVING WIRE FENCES.
APPLICATION FILED SEPT. 2, 1909.

965,268.

Patented July 26, 1910.

2 SHEETS—SHEET 1.

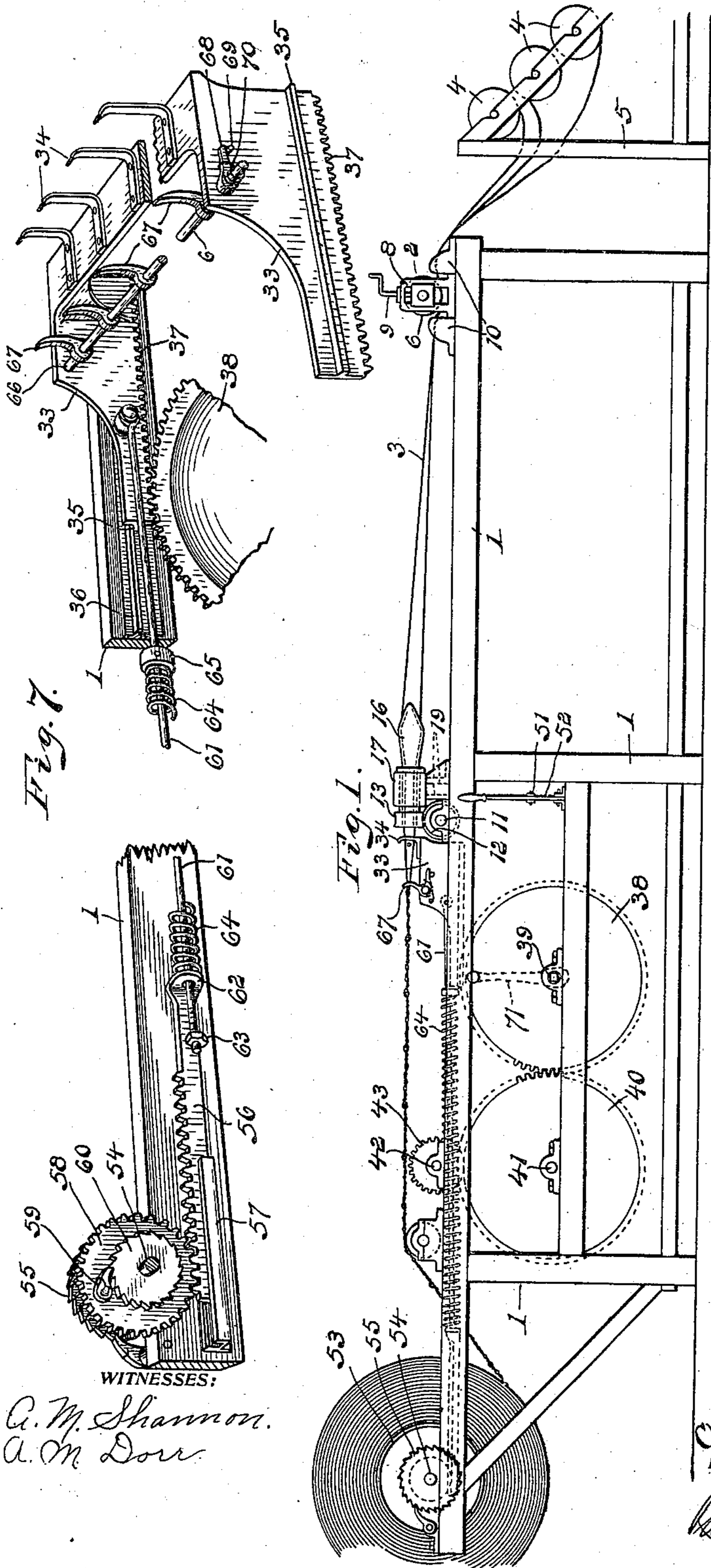
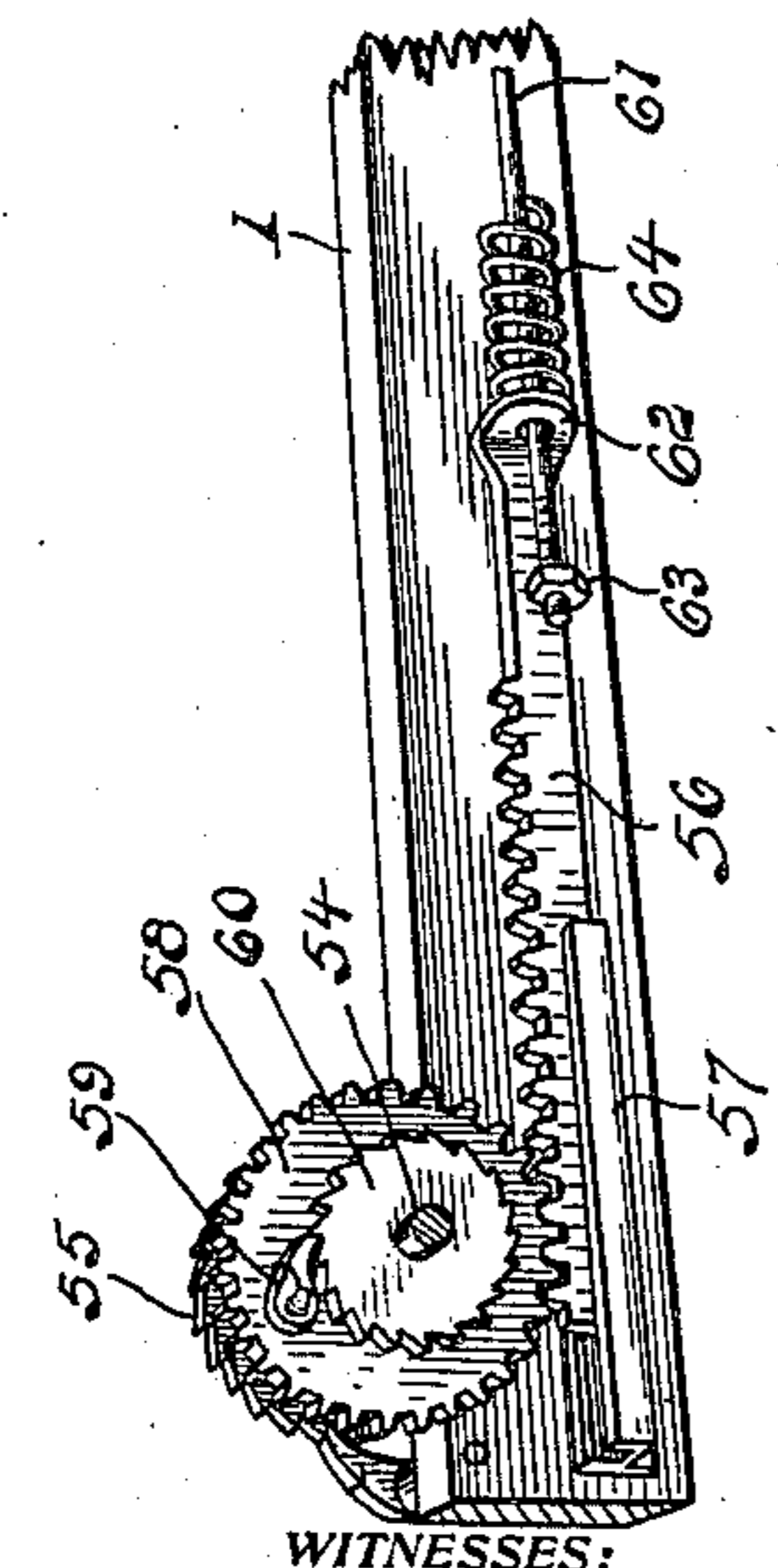


Fig. 7.



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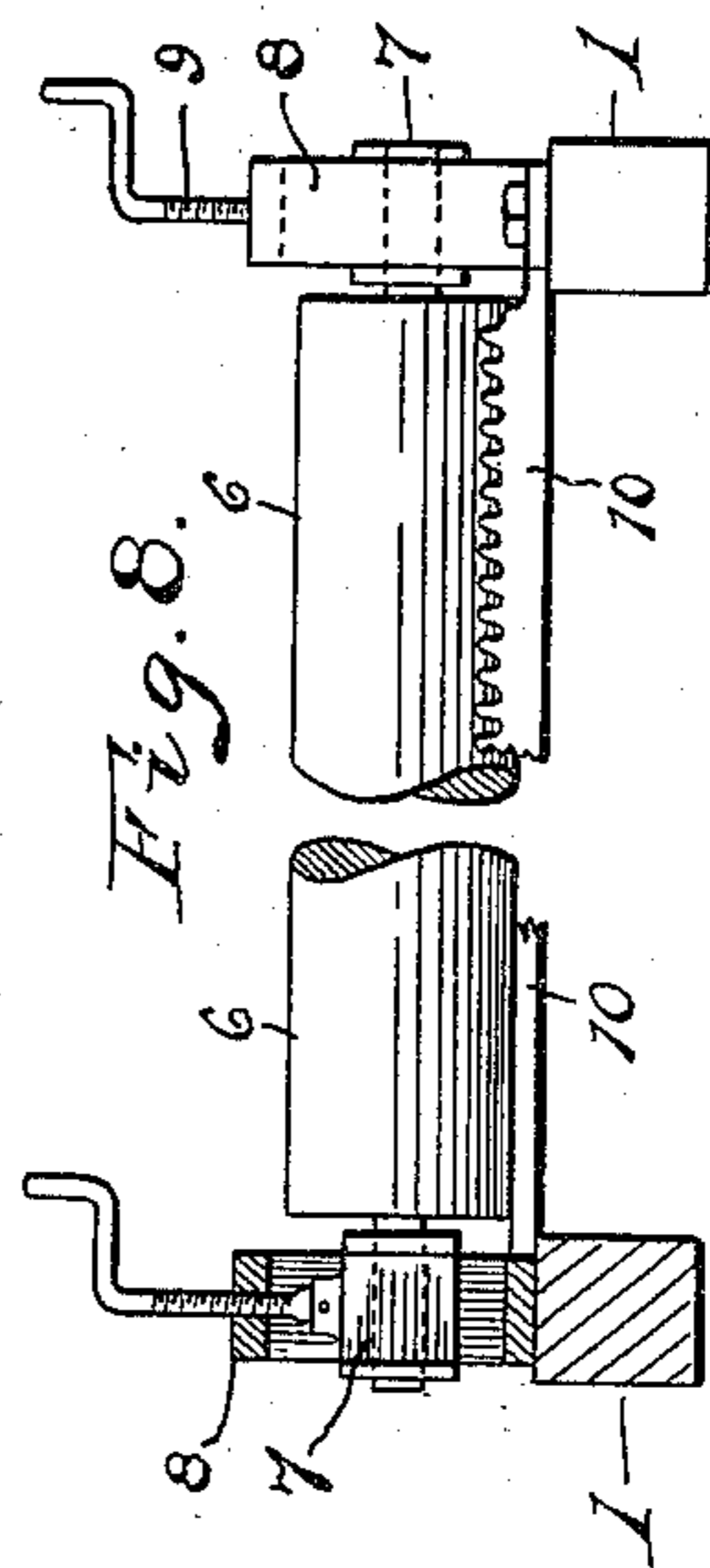


Fig. 8.

INVENTOR

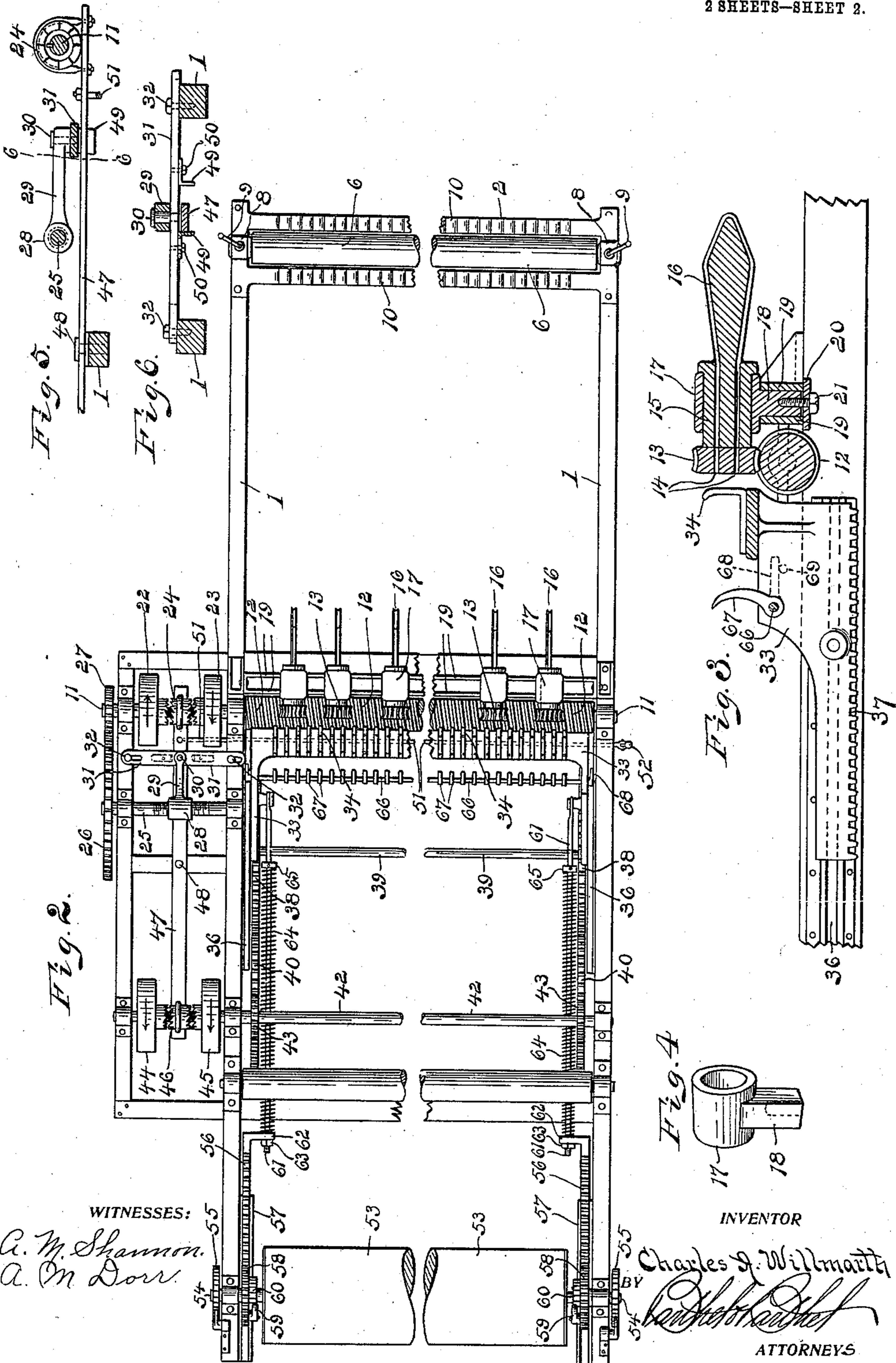
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A. M. Shannon.
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INVENTOR

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UNITED STATES PATENT OFFICE.

CHARLES A. WILLMARTH, OF DETROIT, MICHIGAN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO SIMPLEX FENCE MACHINE COMPANY, OF BATTLE CREEK, MICHIGAN.

MACHINE FOR WEAVING WIRE FENCES.

965,268.

Specification of Letters Patent.

Patented July 26, 1910.

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To all whom it may concern:

Be it known that I, CHARLES A. WILLMARTH, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Machines for Weaving Wire Fences, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in machines for weaving wire fences and more particularly to machines for weaving fences formed of longitudinally extending strands and cross stays which are woven together by placing the cross stays between the two wires forming each strand and alternately twisting the strands in first one direction and then the other.

The object of this invention is to provide a simple and cheap construction which will be rapid and efficient in its operation and having certain other new and useful features all as hereinafter more fully described and particularly pointed out in the claims, reference being had to the accompanying drawings in which,

Figure 1 is a side elevation of a machine embodying the invention; Fig. 2 is a plan view of the same; Fig. 3 is an enlarged sectional detail through one of the twist-ers and showing the adjacent parts; Fig. 4 is a perspective detail of one of the bearings for the twist-ers; Fig. 5 is a detail of the reversing mechanism; Fig. 6, a section of the same substantially on the line 6-6 of Fig. 5; Fig. 7 is an enlarged perspective detail showing a portion of the carriage and the winding mechanism; and Fig. 8 is a detail of the tension device.

As shown in the drawings 1 is a suitable supporting frame upon which near its forward end is mounted the tension device 2 for resisting the drawing of the longitudinal strands or line wires 3 of the fence from the wire spools 4 which are supported upon a suitable frame 5 adjacent to the forward end of the machine.

The tension device 2 consists of a roll 6, the shaft of which engages bearing blocks 7 at each end, which blocks are vertically movable within slotted bearings 8. Adjusting screws 9 extending through the tops of the bearings engage the blocks and adjust the same vertically. At each side of the

roll 6 is a bar 10 secured at its ends to the frame and spaced from the roll a suitable distance. These bars 10 are each corrugated transversely at their upper side to form notches to receive and space the wires which are passed over the bars within these notches and beneath the roll. The frictional resistance which the tension device will exert upon the line wires is regulated by the raising or lowering of the roll 6, and if it is desired that a greater tension be put upon the line wires at the top of the fence than those at the bottom, as for instance where the line wires or strands are much closer at the bottom of the fence than at the top, the roll 6 may be adjusted lower at one end than at the other thus creating a greater friction upon the wires passing beneath the lowest end of the roll.

Mounted in suitable bearings on the frame intermediate the ends thereof, is a transverse shaft 11 upon which is secured a worm gear 12 extending from side to side of the frame. A series of worm gears 13 engage the gear 12 and are provided with holes 14 extending longitudinally therethrough to receive the line wires of the fence and form twist-ers for twisting said wires. These gears 13 are each secured to a hub portion 15 having longitudinal holes therethrough registering with the holes 14, and formed integral with the hub portion is a tail piece or spreader 16 having a groove in its edge for the wire, said grooves forming a continuation of the holes 14. The edges of each support diverge outwardly from the hub for a distance and then converge to form a pointed end. Adjustable bearings 17 are provided to receive the twist-ers and within which the hub portions of the twist-ers turn freely. Formed integral with each of these bearings is a square shank 18 to fit between parallel bars 19 which are secured at their ends to the frame. Plates 20 engage the lower edges of the bars 19 and bolts 21 passing through openings in the plates and engaging screw-threaded openings in the ends of the shanks 18, draw the plates and bearings into engagement with the edges of the bars and adjustably clamp the bearings in place. By loosening the bolts 21 the twist-ers may be adjusted along the bars 19 as desired to change the spacing of the line wires.

The shaft 11 is driven by two belt pulleys 22 and 23 loosely mounted upon the project-

ing end of said shaft and connected to the shaft to turn the same, by means of a clutch 24 splined upon the shaft between said pulleys and adapted to be moved longitudinally to engage its teeth with teeth formed on the adjacent ends of the hubs of the pulleys. The space between the hubs of the pulleys is such that when the clutch is moved to mid position, it will be out of engagement with both of the pulleys and no motion will be transmitted from said pulleys to the shaft and the twisters will stand still. Extending parallel with the projecting end of the shaft 11 is a screw shaft 25 which receives a slow motion from the shaft 11 by means of a large gear 26 on the screw shaft in mesh with a small gear 27 on the twister shaft and mounted upon the screw shaft is a nut 28 held from turning thereon, by a laterally extending arm 29 formed integral therewith, which arm is connected by a vertical pivot pin 30 to a shifting bar 31 extending parallel with the screw shaft, and mounted upon the frame to slide longitudinally by bolts or pins 32 in the frame passing through longitudinal slots in the ends of the bar.

33 is a spacer carriage or movable support for the cross stays or pickets of the fence and on the top of this carriage are secured a series of spaced fingers 34 along its forward edge between which fingers the line wires pass from the twisters. Each end of the carriage is formed with a longitudinal rib 35 to engage a track or way 36 secured to the inner faces of the side members of the machine frame, and the lower edges of the ends of the carriage are formed with teeth forming racks 37 engaged by large gear wheels 38 mounted upon a transverse shaft 39. Similar gears 40 mounted upon a transverse shaft 41 mesh with the gears 38 at their rear side and motion is imparted to the gears 40 from a shaft 42 mounted in bearings upon the top of the frame, by small gears or pinions 43 on said shaft 42. Upon the extended end of the shaft 42 are mounted loosely two belt pulleys 44 and 45 which turn freely upon the shaft and between these pulleys upon the shaft is a clutch member 46 having teeth formed on each end to engage teeth on the adjacent ends of the hubs of the pulleys. The clutch member is splined on the shaft to turn therewith, but is free to move longitudinally thereof to engage the hub of either pulley and transmit motion from said pulley to the shaft.

A shifting lever 47 is pivoted intermediate its ends at 48 upon the machine frame, and extending forwardly beneath the nut 28 and shifting bar 31, is pivotally attached at its forward end to the clutch member 24. At its extreme rear end said shifting lever is pivotally attached to the clutch member 46 so that when said lever is moved said clutches 24 and 46 will be simultaneously shifted.

The shifting lever 47 in passing beneath the shifting bar 31 passes between stop plates 49 adjustably secured to the lower side of the bar 31 by bolts 50 passing through longitudinal slots in said stop plates. The shifting lever 47 will thus be moved to shift the clutches by the longitudinal movement of the shifting bar 31 which is actuated by the arm 29 on the traveling nut 28. A rod 51 is pivotally attached to the shifting lever 47 near the clutch 24 and extends across the machine frame to a point where it is accessible to the machine operator, a hand lever 52 being pivotally attached to the end of the rod so that the operator may move the rod longitudinally and shift the shifting lever 47 to start the machine. When the shifting lever is so moved by the operator to bring the clutch 24 into engagement with one of the driving wheels, as for instance the pulley 22, motion will be transmitted by the clutch from the pulley to the shaft 11 and from the shaft 11 by means of the gears 26 and 27 to the screw shaft 28. The turning of the screw shaft will cause the nut 28 to travel along the shaft and move the shifting lever 47 far enough to disengage the clutch from the pulley 22, when the turning of the shaft 11 and the operation of the twisters will be stopped. The operator may then insert a stay between the line wires and again start the machine by operating the lever 52 to turn the shifting lever 47 and move the clutch member 24 into engagement with the pulley 23 which pulley is turning loosely upon the shaft in a direction opposite to that of the pulley 22 and motion of the twisters is therefore reversed. This reversal of the twisters is insured by the arrangement of stops 49 for, as stated, the clutch 24 has just been moved out of engagement with the pulley hub 22 by the stop 49 coming in contact with the shifting lever 47 and this stop, thus being in contact with said lever, will prevent the shifting bar 31 from being moved to again engage the clutch with the pulley 22 but may be moved by the hand lever 52 toward the other stop and the clutch engaged with the hub of the pulley 23. The reversal of the movement of the twisters is thus insured after the same has been turned a fixed number of times to put the desired number of twists in the line wires and the number of twists may be varied as desired by adjustment of the stops 49 upon the bar 31 so that a greater or less number of turns of the screw and movement of the nut will be required to bring them into contact with the shifting lever and throw out the clutch.

Mounted upon the machine frame at its extreme rear end is a drum 53, the ends of the shaft 54 of which are extended through bearings on the frame and upon the outer ends of said shaft are secured ratchet wheels

55 engaged by pawls on the frame to prevent the drum from being turned backward by the pull of the line wires when the fence is wound upon the drum. The drum is
 5 turned to wind the fence thereon and pull the line wires through the twist-ers, by suitable rack bars 56 reciprocable in suitable guides 57 secured to the inner faces of the side bars of the frame, which racks engage
 10 pinions 58 mounted upon the shaft 54 of the drum. These pinions 58 are mounted to turn freely upon the drum shaft but motion is transmitted from said pinions to the shaft to turn the same in one direction by
 15 pawls 59 carried by the pinions in engagement with ratchet wheels 60 secured to the drum shaft. Upon a rearward movement of the racks 56 the drum will be turned by the engagement of the pawls 59 with the ratch-
 20 ets 60 to wind the fence upon the drum and upon a reversed movement of the racks the pawls will slide over the teeth of the ratchets and no motion will be imparted to the shaft, said drum being held in the position to
 25 which it has just been turned by the pawls and ratchets 55. The racks 56 are actuated by the rearward movement of the carriage 33 by connecting rods 61 pivotally attached at their forward ends to the carriage and
 30 passing freely through an opening through an ear 62 formed on the forward end of each rack. A nut or head 63 is provided upon the rear end of each connecting rod 61 to engage the ear 62 and return the rack bar
 35 to forward position upon the forward or return movement of the carriage. A coiled spring 64 is sleeved upon each connecting rod 61 between the ear 62 and a collar 65 adjustably secured upon the rod. Upon the
 40 rearward movement of the carriage the rack bars are moved to turn the drum by the resistance of the springs 64 to compression and therefore as more and more of the fence is wound upon the drum and the resistance
 45 to the turning of the drum thus becomes greater the springs will yield and put an even tension upon the line wires of the fence. As the diameter of the roll of fence upon the drum becomes greater said drum
 50 must be turned a decreasing amount in order that the fence may be moved the same distance as when the roll is first started upon the drum and the yielding of the springs 64 provides for this difference in movement.

55 As indicated by the arrows in Fig. 2, the pulleys 44 and 45 are both driven in the same direction and the clutch member 46 being operated by the shifting lever 47, it is thrown into engagement with one or the
 60 other of the pulleys in timed relation to the shifting of the clutch 24. Thus the rearward movement of the carriage 33 is in timed relation to the operation of the twist-ers and this movement of the carriage brings
 65 the fingers 34 into engagement with each

stay after it has been inserted within the space between the wires forming each line wire, and said stay is forced rearwardly toward the twists in the wires and the feed-
 ing of the fence toward the drum assisted. 70

A cross shaft 66 is mounted upon the carriage and provided with a series of fingers 67 to engage the stays of the fence and also assist in pulling the line wires through. This shaft 66 is mounted in bearings in the
 75 carriage and at one end is provided with a fixed arm 68 to engage a stop pin 69 on the carriage, a spring 70 being provided to normally hold the shaft turned with the arm in engagement with the stop. The fingers 67
 80 are so set upon the shaft relative to the arm that when the arm is in engagement with its stop the fingers will be in a position to engage the stays. Upon the return or
 85 forward movement of the carriage the shaft will be turned by the engagement of the fingers with the stays permitting the fingers to slip by and then come to a position to again engage the stays when the carriage
 90 is again moved rearwardly.

By constructing and mounting the twist-ers in the manner described they may be very quickly and easily adjusted to change the spacing of the line wires, and the number of twists which shall be given to the
 95 line wires between each stay may be very accurately and quickly adjusted by moving the stops 49. The construction of the reversible mechanism insures the reversal of the twists, the accuracy of the number of
 100 turns and a positive operation, and the winding mechanism for the drum insures an even tension upon the line wires and provides a simple and efficient construction
 105 which operates not only to turn the drum but also to automatically return the carriage to forward position as when the springs 64 are put under compression by the rearward movement of the carriage they
 110 will, when the clutch 46 is released, operate to run the carriage to forward position, and the necessity for returning the carriage by turning the crank 71 which is secured to the shaft 39 is obviated.

Having thus fully described my invention 115 what I claim is:—

1. In a fence machine, the combination with a series of twist-ers through which the line wires of the fence extend and means for drawing said line wires therethrough, 120
 of a tension device for said wires comprising a vertically adjustable roll and members at each side of the roll provided with means for spacing the wires, over which
 125 members the wires are passed and extend beneath the roll.

2. In a fence machine, the combination with a series of twist-ers through which the line wires of the fence extend and means for drawing said line wires therethrough, 130

of a roll beneath which said wires extend in contact therewith, a bearing for each end of the roll, a screw for adjusting each bearing vertically independently of the other bearing, and a bar at each side of the roll extending parallel therewith and provided upon its upper side with notches to receive and space the wires.

3. A fence machine comprising a series of twisters, a carriage movable toward and from said twisters, means for actuating the carriage, a drum upon which the woven fence is adapted to be wound, a longitudinally movable member for turning the drum in one direction, a rod attached to the carriage and extending through an opening in said member, and a coiled spring sleeved upon said rod to engage and move said member when the carriage is actuated in one direction.

4. A fence machine comprising a series of twisters, a carriage movable toward and from said twisters, means for actuating the carriage, a drum upon which the woven fence is adapted to be wound, a gear for turning the drum, a reciprocable rack bar engaging the gear, a rod pivotally attached to the carriage at one end and extending through an opening in the rack bar at its opposite end and sliding freely there-through, a coiled spring sleeved on the rod in engagement with the rack bar at one end, an adjustable collar upon the rod in engagement with the other end of the spring, and a head on the free end of the rod to engage the bar.

5. A fence machine comprising a series of twisters, a carriage movable toward and from said twisters, means for actuating the carriage, a drum upon which the woven fence is adapted to be wound, a pawl and ratchet to prevent the turning of the drum in one direction, a gear loosely mounted on the drum shaft, a ratchet fixed on the drum shaft, a pawl carried by the gear to engage the ratchet and turn the drum and shaft in one direction, a rack bar engaging the gear and provided with an opening at one end, a rod pivotally attached at one end to the carriage and sliding through the opening in the rack bar at its opposite end, a head on the free end of the rod, a coiled spring sleeved upon the rod in engagement with the rack bar at one end, and an adjustable collar upon the rod in engagement with the other end of the spring.

6. In a fence machine, the combination with a series of twisters, of means for turning the driving shaft in either direction comprising a shiftable clutch member adapted to be shifted to turn the shaft in one direction and to be oppositely shifted to turn the shaft in the reversed direction, a shaft extending parallel with the driving shaft, means for transmitting motion from the

driving shaft to said parallel shaft, a shifting lever for the clutch member, a member actuated by the parallel shaft and moved thereby longitudinally thereof, and adjustable means actuated by said member to engage and shift the shifting lever.

7. In a fence machine, the combination with a series of twisters and a driving shaft for simultaneously turning all of said twisters, of means on the driving shaft for turning the same in either direction comprising a shiftable clutch member, a screw shaft extending parallel with the driving shaft, means for transmitting motion from the driving shaft to the screw shaft, a shifting lever for shifting the clutch member, a member having a screw thread engaging the screw shaft and moved longitudinally of said shaft by the turning of the shaft, and means actuated by said member for shifting the shifting lever.

8. In a fence machine, the combination with a series of twisters and a driving shaft for simultaneously actuating all of the twisters, of means for turning the drive shaft in either direction comprising a shiftable clutch member, a shifting lever to shift the clutch member, a shaft extending parallel with the drive shaft, gears for transmitting motion from the drive shaft to the parallel shaft, a member extending transversely of the shifting lever, means actuated by the turning of the parallel shaft for moving said member, and means carried by said member and adjustable thereon for engaging the shifting lever upon the movement of said member by the parallel shaft.

9. In a fence machine, the combination of a series of twisters and a driving shaft for simultaneously actuating all of the twisters, of means for turning the drive shaft in either direction comprising a shiftable clutch member, a shifting lever for shifting the clutch member, a screw shaft extending parallel with the driving shaft, gears for transmitting motion from the drive shaft to the screw shaft, a member having screw-threaded engagement with the screw shaft, and moved longitudinally thereof by the turning of the screw shaft, a bar extending transversely of the shifting lever and adapted to be moved by said member, and means on the bar for engaging and shifting the shifting lever.

10. In a fence machine, the combination with a series of twisters and a driving shaft for actuating said twisters, of means for turning the driving shaft in either direction comprising a shiftable clutch member, a screw shaft, gears for transmitting motion from the driving shaft to the screw shaft, a member having screw threaded engagement with the screw shaft, a bar extending transversely of the shifting lever and connected to said member to be moved thereby, and

adjustable stops on the bar adapted to engage and shift the shifting lever.

11. In a fence machine, the combination of a series of twisters and a driving shaft for the twisters, of pulleys mounted upon the drive shaft and adapted to be turned in opposite directions, a clutch member upon the drive shaft between the pulleys adapted to be shifted to transmit motion from either pulley to the drive shaft and to be moved out of engagement with both of the pulleys to stop the transmission of motion, a lever to shift the clutch member, a bar extending transversely of the shifting lever, adjustable means on the bar to engage the shifting lever, means operating in timed relation to the turning of the driving shaft to move said bar, and a hand lever to move the shifting lever independently of said bar.

12. In a fence machine, the combination with a series of twisters and a driving shaft for simultaneously turning all of said twisters, of means for intermittently turning the drive shaft in first one direction and then the other, comprising pulleys loosely mounted upon the drive shaft and adapted to be turned in opposite directions, a clutch member upon the drive shaft between said pulleys to be shifted upon the drive shaft and transmit motion thereto from either pulley and to be moved out of engagement with both pulleys to stop the transmission of motion, a shifting lever for shifting the clutch member, stop members adapted to engage the sides of the shifting lever and spaced apart, and means for simultaneously moving said stop members to bring one of the same into engagement with the shifting lever in timed relation to the turning of the drive shaft.

13. In a fence machine, the combination with a series of twisters and a driving shaft for turning all of said twisters, pulleys loosely mounted upon said shaft and adapted to be turned in opposite directions, a clutch member shiftable upon the shaft between said pulleys, a shifting lever to move said clutch member, a screw shaft, gears for transmitting motion from the drive shaft to the screw shaft, a member upon the screw shaft having screw-threaded engagement therewith and provided with a laterally extending arm, a bar attached to and movable with the arm, and stop members adjustably secured to the bar to engage the shifting lever.

14. In a fence machine, the combination with a series of twisters and a drive shaft to

actuate said twisters, of a carriage movable toward and from said twisters, a rack on the carriage, a gear engaging the rack to actuate the same, a transverse shaft, gears transmitting motion from the transverse shaft to the gear engaging the rack on the carriage, pulleys on the transverse shaft, a movable clutch member for transmitting motion from the pulleys to the shaft, pulleys on the driving shaft adapted to be turned in opposite directions, a clutch on the drive shaft between said pulleys adapted to be shifted to transmit motion from either of the pulleys to the shaft, a shifting lever connected to the clutch member on the driving shaft and also to the clutch member on the transverse shaft, and means for automatically moving the shifting lever in timed relation to the turning of the drive shaft and the actuation of the twisters to shift the clutch members and stop the transmission of motion to both the twisters and the carriage.

15. In a fence machine, the combination of a series of twisters, a driving shaft, a worm on the drive shaft to actuate all of the twisters, pulleys loosely mounted on the drive shaft and adapted to be turned in opposite directions, a clutch member between said pulleys to transmit motion from either pulley to the drive shaft and adapted to be moved out of engagement to stop the transmission of motion to the drive shaft, a carriage movable toward and from the twisters, a rack upon each end of the carriage, gears engaging said racks, a transverse shaft, gears for transmitting motion from said transverse shaft to the gears engaging the racks, pulleys on the transverse shaft, a clutch member to transmit motion from the pulleys to the shaft, a shifting lever pivoted intermediate its ends and connected at one end to the clutch member on the drive shaft and at its opposite end to the clutch member on the transverse shaft, a screw shaft extending parallel with the drive shaft, gears for transmitting motion from the drive shaft to the screw shaft, a member having screw-threaded engagement with the screw shaft to travel longitudinally thereof when the shaft is turned, and means operated by said member for engaging and shifting the shifting lever.

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

CHARLES A. WILLMARTH.

Witnesses:

OTTO F. BARTHEL,
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