(No Model.)

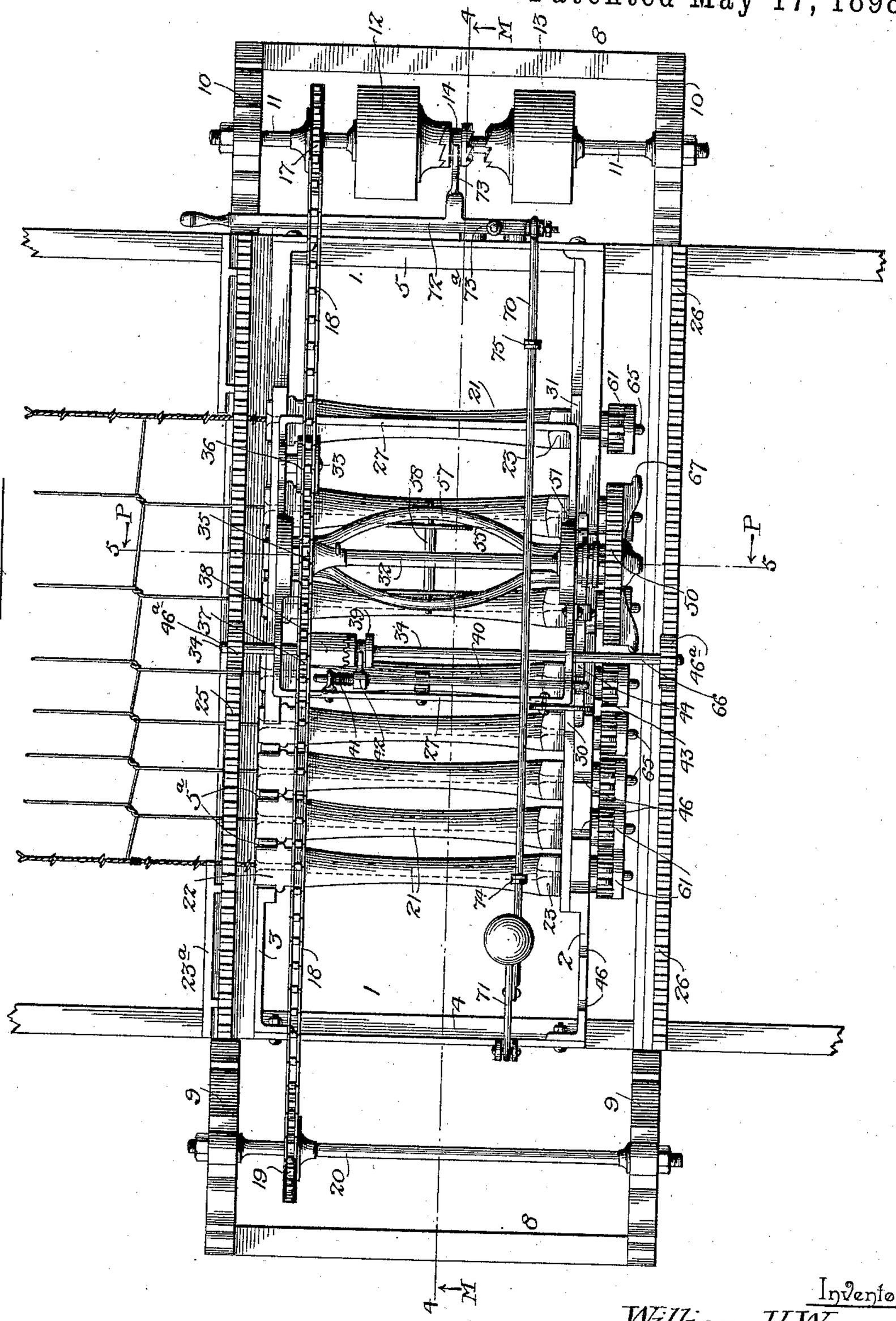
4 Sheets—Sheet 1.

W. H. WARNER.

WIRE FENCE WEAVING MACHINE.

No. 604,099. Patented May 17, 1898.

Fig. 1.



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Inventor :-

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(No Model.)

4 Sheets—Sheet 2.

W. H. WARNER.

WIRE FENCE WEAVING MACHINE.

No. 604,099. Patented May 17, 1898.

Fig. 2.

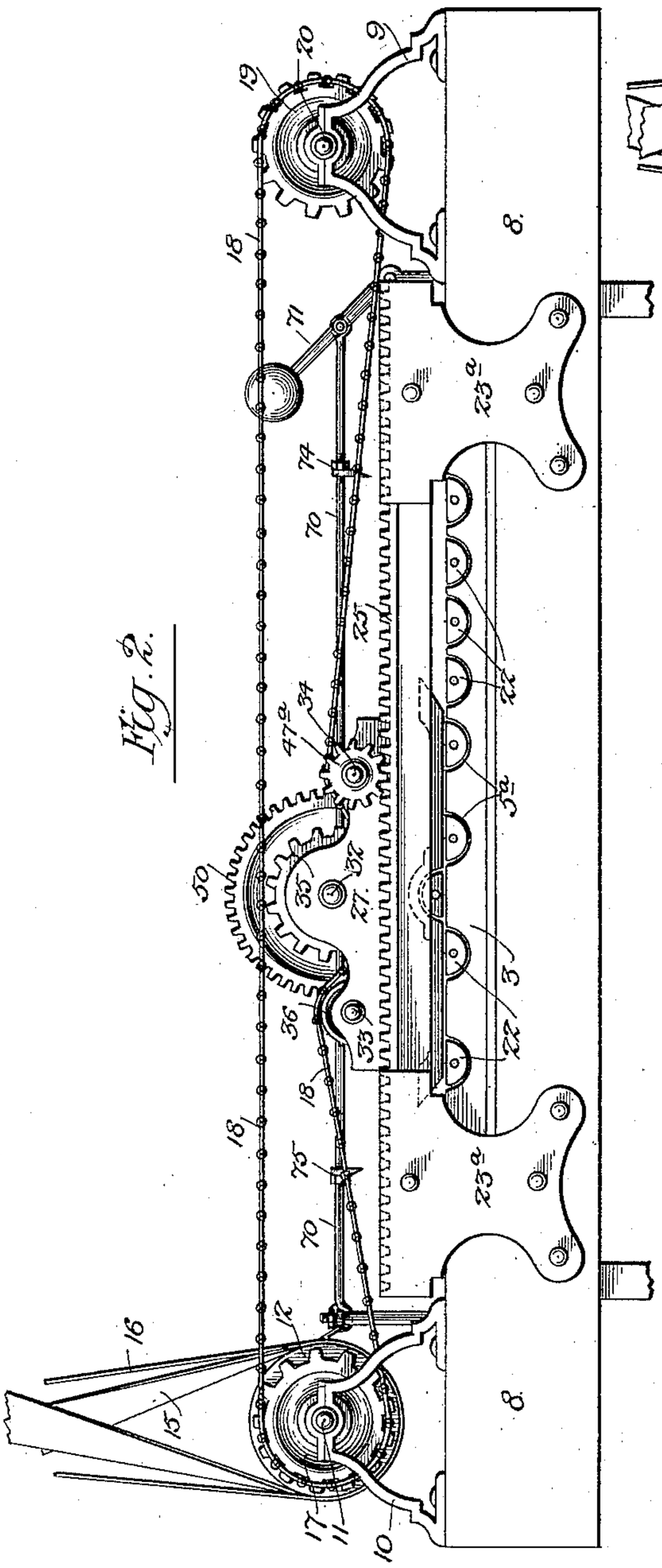
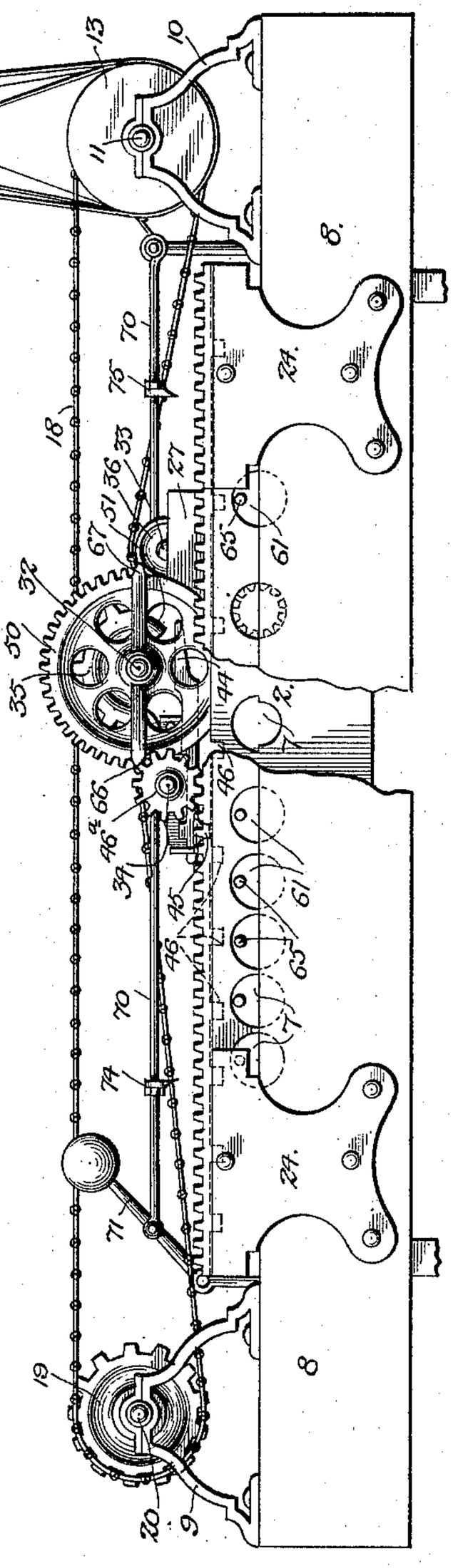


Fig. 3.



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4 Sheets—Sheet 3.

W. H. WARNER.

WIRE FENCE WEAVING MACHINE.

No. 604,099. Patented May 17, 1898.

Fig. 4.

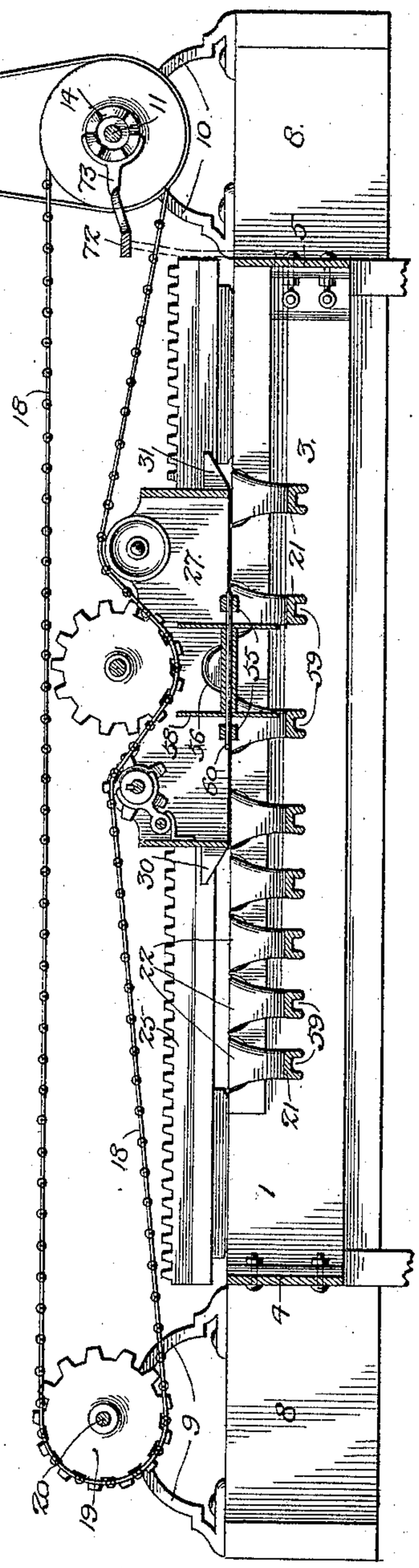

Fig. 6.

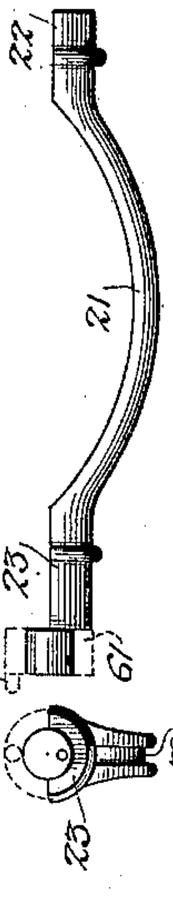

Fig. 6a.

Fig. 7a.

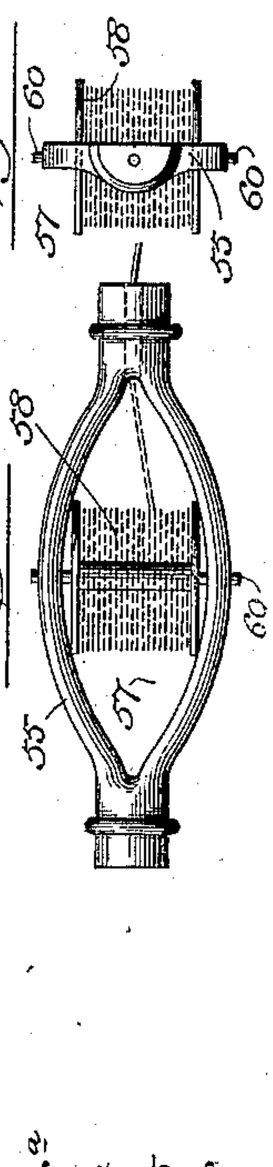

Fig. 7.

Fig. 5.

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(No Model.)

4 Sheets—Sheet 4.

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WIRE FENCE WEAVING MACHINE.

No. 604,099. Patented May 17, 1898.

Fig. 9.

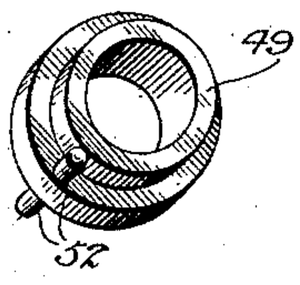


Fig. 8.

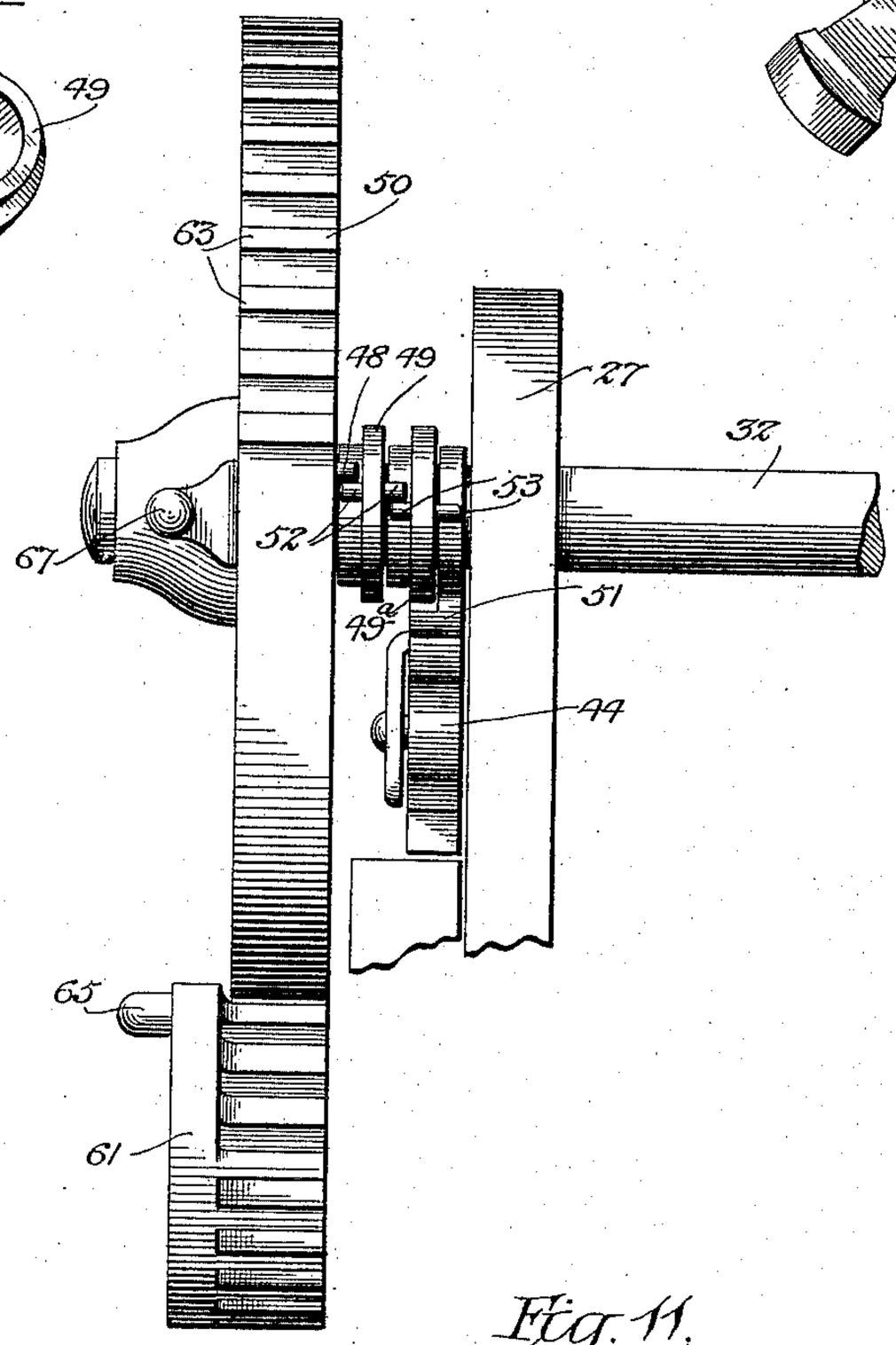


Fig. 10.

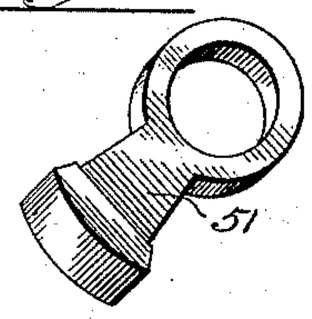
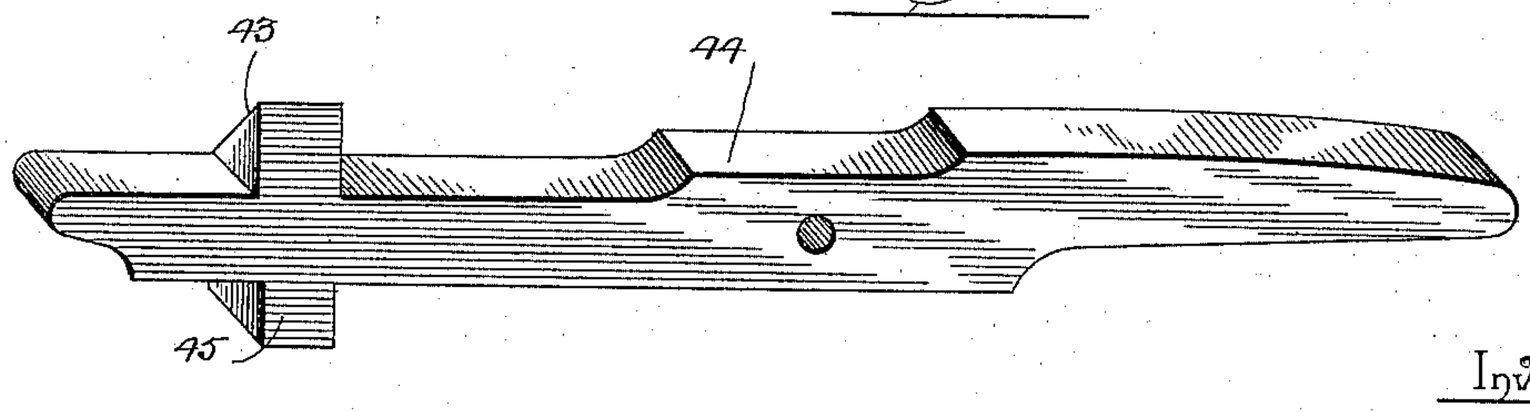


Fig. 11.



Inventor:-

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UNITED STATES PATENT OFFICE.

WILLIAM H. WARNER, OF MELVERN, KANSAS.

WIRE-FENCE-WEAVING MACHINE.

SPECIFICATION forming part of Letters Patent No. 604,099, dated May 17, 1898.

Application filed August 23, 1897. Serial No. 649,201. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. WARNER, a citizen of the United States, residing at Melvern, in the county of Osage and State of Kansas, have invented a new and useful Wire-Fence-Weaving Machine, of which the following is a specification.

My invention relates to improvements in machines for weaving wire-fence fabrics, more particularly a fabric of the character disclosed by Design Patent No. 26,290, issued to me on November 17, 1896, although the operative elements of the machine may be arranged in a manner to weave fabrics of other patterns.

The object that I have in view is to provide a simple machine in which the operation of weaving the wire-fence fabric may be carried on continuously and automatically and at the same time provide for the manual control of the machine to enable the operation of weaving the fabric to be arrested at any time.

With this leading thought in view my invention consists in the combination, with a series of warp-carriers supported within a stationary frame, of a shuttle-carrier movable across the plane of the series of warp-carriers, a shuttle mounted in said carrier and carrying a bobbin for the weft-wires, mechanism for imparting intermittent feed to said shuttle-carrier, a locking device for arresting the shuttle-carrier when the shuttle coincides with either of the series of warp-carriers, mechanism for imparting motion to the shuttle and the warp-carrier with which it is temporarily in alinement, a timing device associated with the mechanism for imparting motion to the shuttle and the warp-carrier to regulate the number of rotations of the shuttle and the warp-carrier, and shifting devices to release the shuttle-carrier and the latch and to throw the feed mechanism into operation to renew the feed of the shuttle-carrier.

The invention further consists in the provision of a trip mechanism to reverse the direction of the travel of the shuttle-carrier, in the provision of a manually-controlled lever which is associated with the trip mechanism to arrest the carriage-feed mechanism or to reverse the shuttle-carrier, in a peculiar arrangement of the shuttle-carrier with relation to the warp-carrier to prevent either of the latter from getting out of operative relation with the shuttle-carrier and the shuttle as said shuttle-carrier moves in either direction, and to provide for the easy removal of either of the warp-carriers as occasion may require; and the invention further consists in the novel combination of elements and in the construction and arrangement of parts, which will be hereinafter fully described and claimed.

To enable others to understand my invention, I have illustrated the preferred embodiment thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a plan view of part of my invention, certain parts of the machine being omitted for the sake of clearness in the illustration and because they form no part of the present invention, such omitted parts being the supporting-bench, a cylinder and reel connected to said bench, the spools, and certain driving-belts. Fig. 2 is an elevation of the machine shown by Fig. 1, looking at the right-hand side of the machine nearest to the operator. Fig. 3 is a side elevation taken from the opposite or left-hand side of the machine. Fig. 4 is a longitudinal sectional elevation on the plane indicated by the dotted line 4 4 of Fig. 1 and looking in the direction indicated by the arrow M. Fig. 5 is a vertical transverse sectional view on the plane indicated by the dotted line 5 5 of Fig. 1, looking in the direction indicated by the arrow P. Fig. 6 is an enlarged detail view, in side elevation, of one of the warp-carriers removed from the main supporting-frame of the machine. Figs. 6^a and 6^b are detail views, in end elevation, looking at the right and left hand ends of the carrier shown by Fig. 6. Figs. 7 and 7^a are detail views, in side elevation and end elevation, respectively, of the shuttle and a bobbin carried therein. Fig. 8 is an enlarged detail view of the cam-wheel or mutilated gear, its shaft, and the time-actuating trip mechanism to control the revolutions of the shuttle and the warp-carrier with which the shuttle may be engaged for the time being. Fig. 9 is a detail perspective view of one of the time-collars. Fig. 10 is a detail perspective view of the trip to be actuated by the time-collars and to control the locking-latch. Fig. 11 is a detail perspective view of the locking-lever.

Like numerals of reference denote like and corresponding parts in each of the several figures of the drawings.

In the practical embodiment of my improved machine for wire fabrics especially designed for use as wire fencing I provide a novel form of main supporting-frame in which or upon which all the operative elements of the machine forming the subject of this application are mounted or carried. This main supporting-frame sustains all the warp-carriers of the series of warp-carriers which are employed for the individual warp-wires of the wire fabric, the shuttle-carrier, and the various operative parts combined with said shuttle-carrier and the warp-carriers. This main supporting-frame 1 consists of two sides 2 3 and the ends 4 5, all of which are of metal and rigidly united together to present a substantial open structure. The sides 2 and 3 are arranged in parallel relation to each other and at a suitable distance apart to accommodate between them the warp-carriers, and the ends are arranged at right angles to the sides and in parallel relation to each other, the ends and sides of said frame 1 being preferably bolted together, as exhibited by the several views in the drawings. The side plate 3 at the right-hand side of the frame is provided in its upper edge with a series of semicircular openings 5^a, which are spaced apart at suitable intervals to leave intermediate solid portions of the plate between said openings 5^a. These semicircular openings are designed to form in part the bearings for one end of the series of warp-carriers, and the upper horizontal edge of the side plate 3 forms one of the tracks or ways for the traveling shuttle-carrier. The other side plate 2 is of greater depth or height than the companion side plate 3 of the frame, and this plate 2 at the left-hand side of the frame is provided with a longitudinal groove 6 in its inner face or side and with a series of substantially circular openings 7, said groove and the openings being arranged substantially along the medial line of the side plate 2. The openings 7 are preferably offset slightly at diametrically opposite points and are of substantially circular form, as shown by Fig. 3, said openings 7 being situated in the plane of and coincident with the openings 5^a in the companion side plate 3 in order to form bearings for the other or left-hand ends of the warp-carriers. The forms of these openings 7 are advantageous in that they permit the warp-carriers to be readily removed from the left-hand side of the machine should occasion require the removal of said carriers at any time, and said openings also form proper supports for the warp-carriers. The openings 7 in the side plate 2 open into the groove 6, and this groove forms in part a way or track for one side of the shuttle-carrier, a flanged edge of which fits beneath the top overhanging wall of the groove, as clearly shown by the cross-sectional view Fig. 5 of the drawings.

This main supporting-frame 1 sits within and is attached to a supplemental exterior frame, (indicated in part by the numeral 8 of the drawings.) The side timbers of this supplemental frame carry the brackets 9 9 at one end of the main supporting-frame 1 and similar brackets 10 10 at the opposite end of said main supporting-frame 1. In the pair of brackets 10 is journaled a power-shaft 11, on which is loosely fitted a pair of driving-pulleys 12 13, which are spaced apart to accommodate between them a slidable clutch 14, which is keyed to the power-shaft 11 and is adapted to engage with either of the driving-pulleys 12 or 13, to make the same fast with the shaft 11, alternately or as may be required. The pulley 12 is designed to be driven in one direction by a belt 15, while the other pulley is driven in the opposite direction by another belt 16, one of the belts being crossed and the other straight, so as to drive the pulleys in opposite directions.

The driving-shaft 11 carries a sprocket or chain wheel 17, around which passes a driving-chain 18, the latter being impelled by the wheel 17 on the shaft 11. This driving-chain extends continuously along the machine above the warp-carriers and in proper relation to the shuttle-carrier, and this endless driving-chain passes around a sprocket or chain wheel 19, mounted on a transverse idler-shaft 20, which is journaled in bearings of the brackets 9. The endless driving-chain is thus supported by the two shafts 11 20 in proper relation to the working elements of the machine, and said chain is driven positively by the power-shaft 11 in either direction, according to the direction in which the shaft 11 is driven by one or the other of the pulleys 12 13, mounted on said shaft 11.

A series of the warp-carriers are employed, according to the width of the fabric to be woven by the machine. These warp-carriers are indicated at 21 in the drawings, and they are all arranged in the same horizontal plane in the main frame 1 of the machine. Each warp-carrier is of the construction shown more clearly by Figs. 6, 6^a, and 6^b of the drawings. The warp-carrier is made in a single piece of the bowed form, with straight ends, the latter being indicated at 22 23. Each of the end portions of the warp-carrier is semicylindrical on one face and flat on the other face, and the warp-carrier has its end 23 made somewhat longer than the end 22 thereof. The end 22 of the warp-carrier fits in the semicircular opening 5^a in the side 3 of the main frame, while the long end 23 of the warp-carrier fits in one of the openings 7 of the other side plate 2 in order that said long end 23 of the warp-carrier may extend through the left-hand plate 2 to enable the shell-pinion, presently described, to be readily and securely fastened thereto. When in their normal operative positions, the warp-carriers have their semicircular faces occupying the openings 5^a 7, respectively, of the side plates 3 2 of the

main frame, while their upper straight faces are flush with the top edge of the side plate 3 of said main frame.

On the side timbers of the supplemental frame 8 are secured two pairs of holding-plates, (indicated at 23ª 23ª on the right-hand side of the machine and at 24 24 on the left-hand side of the machine.) On the plates 23ª, at the right-hand side of the machine, is mounted a toothed track-bar 25, which extends inwardly toward the main frame, so as to have its inner edge overhang the edge of the plate 3 of said main frame, while the toothed upper edge of this track-bar 25 is exposed for a traveling pinion to engage therewith. On the other pair of supporting-plates 24, at the left-hand side of the machine, is fastened another horizontal toothed track-bar 26, which is arranged a suitable distance away from the side plate 2 of the main frame to accommodate between the track-bar 26 and the side plate 2 the series of shell-pinions on the warp-carriers 21, said track-bar 26 having its upper toothed edge exposed for engagement by another track-pinion.

27 designates the shuttle-carrier. (Shown more clearly by Figs. 1 to 4, inclusive, and having one side thereof partly shown by Fig. 8.) This shuttle-carrier consists of a substantially square or rectangular box-like structure, of hollow form, arranged to travel upon the side plates 2 3 of the main supporting-frame and to extend from one side thereof to the other. This shuttle-carrier is provided at its lower side edges with the laterally-extending flanges 28 29, situated on the respective sides of the carrier. One side of this shuttle-carrier is adapted to travel upon the track or way formed by the upper edge of the plate 3, and its flange 28 fits beneath the inner overhanging edge of the track-bar 25. The other side of the shuttle-carrier travels upon the flat upper faces of the long ends 23 of the warp-carriers 21, and the flange 29 of said shuttle-carrier fits beneath the overhanging top edge of the groove 6 in the side plate 2 of the main supporting-frame. This construction and arrangement of parts tends to hold the shuttle-carrier in proper operative relation to the main frame and to the warp-carriers, so as to permit the shuttle-carrier to travel along the main frame and above the warp-carriers.

It sometimes happens through accident that the warp-carriers become displaced or get out of position in the main supporting-frame 1, and in order to force the warp-carriers 21 back into position and enable the shuttle-carrier to travel without hindrance from the warp-carriers I have provided the shuttle-carrier with the protruding adjusting-lugs 30 31, which extend from both ends of the shuttle-carrier near the lower edge thereof, said adjusting-lugs having beveled lower faces adapted to impinge or ride against the straight upper faces of the ends 22 23 of the warp-carriers, so as to restore the latter to their proper positions for operation and to enable the shuttle-carrier to travel without hindrance from the warp-carriers or either of them. This shuttle-carrier is provided at its top edge with upwardly-extending lugs or bearings, which are disposed on both sides of said shuttle-carrier, and the middle lugs of this carrier are arranged on a plane above the lugs near the ends of the shuttle-carrier. In the bearings provided in the middle lugs of the shuttle-carrier is mounted the transverse cam-wheel shaft 32. In the lugs at one side of this cam-wheel shaft is journaled an idler guide-shaft 33, and in the lug-formed bearings of the shuttle-carrier on the opposite side of the idler guide-shaft 33 is journaled the shuttle-carrier-advancing shaft 34.

The cam-wheel shaft 32 carries a large-sized driving-sprocket 35, beneath which is fitted one strand of the endless driving-chain 18. On the idler-shaft 33 is fitted a guide wheel or sheave 36, which is arranged in alinement with the chain-wheel 35 on the cam-wheel shaft 32, and this idler guide-sheave 36 is arranged in such relation to the chain-wheel 35 of the cam-wheel shaft as to operate in conjunction with the chain-wheel 37 on the advancing-shaft 34 as to enable the driving-chain 18 to secure tight frictional engagement with the chain-wheel 35 of the cam-wheel shaft 32 in order to properly rotate or drive the latter, so as to impel the shuttle and the warp-carrier engaged by and with the shuttle. The three shafts 32, 33, and 34 are all journaled in the shuttle-carrier 27 to travel therewith along the main frame 1 and over the series of warp-carriers 21. The advancing or propelling shaft for the shuttle-carrier is provided with a sleeve 38, which is mounted loosely on the shaft 34 in the vertical plane of the endless drive-chain, and on one end of this loose sleeve 38 is rigidly fastened the pinion or chain-wheel 37, which engages with the driving-chain 18 and which serves as the means for imparting rotary motion to this sleeve 38. Said sleeve 38 forms one member of a clutch by which motion may be transmitted from the driving-chain to the advancing or propelling shaft 34, and to this end I form one end of the sleeve 38 with a series of clutch-teeth, with which may be engaged the clutch-teeth or edge on the sliding member 39 of the clutch. This sliding clutch member 39 is keyed to the advancing or propelling shaft 34 to rotate therewith and to slide thereon, and when the sliding clutch member is engaged with the loose clutch member or sleeve 38 the shaft 34 is driven from the endless chain 18 through the pinion 37 and the clutch members, as will be readily understood.

With the sliding clutch member 39 on the advancing-shaft 34 is engaged a shipper mechanism, which operates the clutch to connect the advancing-shaft operatively with the driving-chain or to disconnect the parts, and in the drawings I have shown this shipper mechanism as consisting of a shipper-rod 40,

a spring 41 to normally impel the shipper-rod in one direction, and an arm 42, which is carried by the shipper-rod and fits in a groove in the sliding clutch member 39. This shipper-rod 40 is slidably mounted on the shuttle-carrier, and the spring 41 thereof normally impels the rod in a direction to cause its arm 42 to move the clutch member 39 to a position where it is free from engagement with the sleeve-like clutch member 38. One end of the shipper-rod passes through the shuttle-carrier, and this protruding end of the shipper-rod lies in the path of a cam-lug 43, provided on the upper side of the locking-latch 44, the latter being shown more clearly by Fig. 11. This locking-latch 44 is disposed alongside of the shuttle-carrier, and it is attached or pivoted thereto at a point intermediate of the length of said locking-latch by a suitable bolt or pin, which passes through a hole in the latch, as shown. This latch is arranged on the left-hand side of the shuttle-carrier, by which it is supported or carried in its traveling movements back and forth over the warp-carriers, and this latch is provided with a rectangular or square-locking shoulder 45, which projects from the lower edge of the latch and is adapted to fit or seat itself in one of a series of square notches or sockets 46, provided in the straight top edge of the side plate 2 of the main supporting-frame 1. As the shuttle-carrier moves from one warp-carrier to the other the latch is adapted to be lowered to have its shoulder 45 fit in one of the notches or sockets of the plate or side 2 of the main frame, thus enabling the latch to hold the shuttle-carrier at rest during the intervals of its intermittent feed from one warp-carrier to the other of the series provided in the machine. This latch holds the shuttle-carrier at rest for a period of time sufficient for the shuttle and the warp-carrier to make two complete revolutions in order to wrap or carry the weft-wire twice around the warp-wire in the fabrication of the fencing, and at the termination of this period of the operation of the shuttle and the warp-carrier the latch is automatically released from its locking engagement with the side plate 2 and its lug 43 operates the shipper-rod 40 to throw the clutch 38 39 and enable the pinion 37 to drive the advancing-shaft 34, said advancing or propelling shaft 34 for the shuttle-carrier being provided at its protruding ends with the advancing-pinions 46ª, which are arranged to engage with the toothed surfaces of the track-bars 25 26, whereby the rotation of the shaft 34 from the driving-chain serves to impel the shuttle-carrier 27 for a distance equal to the distance between the locking notches or sockets 46 in the side or plate 2 of the main frame 1.

The operation of the latch 44 is controlled automatically by a timing device which permits of the latch being in locking engagement with the plate 2 to restrain the shuttle-carrier from movement while the cam-wheel shaft 32 is being driven by the chain 18 to rotate the shuttle and the warp-carrier in the operation of wrapping the weft-wire around the warp-wire. In the preferred embodiment of this timing mechanism I provide a lug or pin 48 on the inner face of the cam-wheel 50, and in connection with said pin or lug 48 I employ the two time-collars 49 49ª and a trip 51. The first time-collar 49 is provided with laterally-extending pins 52, one of which lies in the path of the pin 48 on the cam-wheel 50. The second time-collar 49ª is likewise provided with two pins 53, one of which lies in the path of the other pin on the first time-collar, while the other pin 53 on said second time-collar is adapted to impinge or bear against the trip 51. The two time-collars 49 49ª and the trip 51 are fitted loosely on the cam-wheel shaft 32, between the cam-wheel 50 and the adjacent side of the shuttle-carrier 27, as shown clearly by Fig. 8, and these parts of the time device are thus arranged to have a certain limited loose play or movement, except when controlled by the series of stop pins or lugs. The trip 51 is in the form of an arm which depends from the cam-wheel shaft 32, and the free end of this trip is arranged to bear or press against the latch 44 on the opposite side of the fulcrum thereof from the end which carries the cam 43 and the locking-shoulder 45.

The shuttle 55 is loosely mounted in the shuttle-carrier 27; but said shuttle is movable with the carrier in its back-and-forth traveling movements above the series of warp-carriers in order that the shuttle-carrier may present the shuttle successively to each of the warp-carriers of the series. This shuttle-carrier is provided in the lower edges of its sides with the semicircular openings 56, which are arranged centrally of the shuttle-carrier and in alinement with each other. The shuttle 55 is constructed with the bowed center 57 to provide an opening for the accommodation of the bobbin 58, and the ends of this shuttle 55 are made semicircular and provided with flat faces, as shown by Figs. 7 and 7ª of the drawings. The semicircular ends of the shuttle are fitted in the semicircular openings 56 of the shuttle-carrier, and the flat faces of the shuttle are adapted to bear squarely against the corresponding flat faces of the ends 22 23 of each warp-carrier when the shuttle is moved by its carrier 27 to bring the shuttle to a position immediately over one of the warp-carriers, whereby the shuttle is adapted to have its ends coincide with the ends of each warp-carrier, and when the ends of the shuttle and the warp-carrier are so alined they together form cylindrical journals, which permit the shuttle and the warp-carrier with which it is engaged to rotate freely in the openings 57 and 56 of the frame 1 and the shuttle-carrier, as will be understood. Each warp-carrier is provided on the outer face or side with the longitudinal groove or channel 59, through which may be fed or passed the warp-wires that form a part of the fence fab-

ric, said groove or channel 59 being clearly shown by Figs. 6[a] and 6[b] of the drawings. The bobbin 58 is fitted loosely on a spindle 60, which is arranged across the opening or slot 57 in the shuttle, and said spindle is attached to the shuttle to rotate therewith and to cause the bobbin to turn with the shuttle in its rotary movements.

I will now proceed to describe the mechanism by which the shuttle and the warp-carrier may be rotated when the shuttle-carrier is adjusted and locked by the latch to a position where the shuttle alines with one warp-carrier. This mechanism consists of the cam-wheel or mutilated gear 50 and a shell-pinion 61 on each of the warp-carriers at the left-hand end of the same. This cam-wheel or mutilated gear is rigidly attached to a protruding end of the shaft 32, and it consists of a wheel or disk having a series of teeth 63 extending across its periphery for one-half the distance around the periphery of said wheel or disk, the remaining half of the peripheral edge of the cam-wheel being smooth, solid, and unbroken. Each shell-pinion 61 on a warp-carrier is attached to the long protruding end 23 of said carrier, and the shell-pinion has its periphery of greater thickness or width than the periphery of the cam-wheel 50. The peripheral edge of each shell-pinion is provided with a plain smooth annular surface, and within this annular unbroken surface is a series of transverse gear-teeth which extend continuously around the circumference of the gear but not entirely across the cylindrical face of the gear, as clearly represented by Fig. 8. The shell-pinion is further provided on its outer face adjacent to plate 24 with a single tooth or lug 65, arranged in eccentric relation to the center of said pinion, and the cam-wheel 50 is provided on its outer face with diametrically opposite lugs or studs 66 67. (Shown more clearly by Figs. 1 and 3 of the drawings.) The shell-pinion 61 for each carrier is made separate from the carrier and afterward fitted and firmly fixed to the long end 23 thereof, in the position shown by Fig. 5 and on the left-hand end of Fig. 6. The teeth of the shell-pinion are arranged to lie opposite and adjacent to the cogless half of the cam-wheel to provide room for the cogless half of the cam-wheel to pass the toothed part of the shell-pinion. When the smooth part of the cam-wheel enters the toothed part of the shell-pinion, one of its entrance teeth or studs 66 or 67 strikes against the tooth or lug 65 of the shell-pinion and causes the shell-pinion to begin its rotation, thus insuring rotation of the warp-carrier and the shuttle which engages therewith. Before the entrance cog of the cam-wheel can be disengaged from the stud of the shell-pinion the toothed part of the cam-wheel, through the partial revolution thus made, engages with the toothed part of the shell-pinion, and thereby the cam-wheel is made to impart two full revolutions to the shuttle 55 and the warp-carrier engaged with said shuttle, causing the shuttle to carry the weft-wire of the bobbin twice around the warp-wire in the warp-carrier, thus completing the double twist used in forming the wire fabric.

The mechanism for reversing the shuttle-carrier at the end of its traveling movement in either direction consists of a reversing-rod 70, arranged longitudinally above the machine and the shuttle-carrier. One end of this reversing-rod is pivoted to a balanced lever 71, which is fulcrumed on the end or plate 4 of the main frame 1, and the opposite end of said rod is pivoted to a hand-lever 72, which is fulcrumed at 73 on the end plate 5 of the frame 1. This hand-lever is provided with a forked arm 73, which fits in a groove in the sliding clutch 14. The reversing-rod is provided with the dogs 74 75, which are attached to the rod and which lie in the path of the shuttle-carrier.

The main frame, with the operating parts hereinbefore described, is set upon the supplemental frame at a proper height for the convenience of the operator. This supplemental frame carries all the necessary spooling and tension and reeling devices, all of which are omitted, as they form no part of the present invention.

The operation of the machine may be described as follows: The power is applied to the driving-shaft 11, which in turn drives the endless chain 18 in one direction, and the latter engages with the sprocket-wheel 35 on the shaft 32, which carries the cam-wheel 50, and said chain also engages with the sprocket-wheel 37 on the shaft 34. The cam-wheel 50 acts on the shell-pinion 61 of the warp-carrier, which is directly under and engaged with the shuttle, as shown by Fig. 5, causing the warp-carrier and the shuttle to conjointly make two complete revolutions, thus carrying the bobbin twice around the strand of warp-wire held by the revolving carrier. While this double twist is being effected, the shuttle-carrier is held in a stationary position by the latch 44, which engages with one of the notches or seats in the plate 2, thus preventing the shuttle-carrier from advancing or receding until said latch is raised out of locking engagement with the main frame. As the cam-wheel shaft 32 rotates with the cam-wheel the stud or pin 48 of the cam-wheel is carried around with the wheel, which stud, after one full forward revolution of the cam-wheel, engages the pin on the time-collar 49, adjoining said cam-wheel, thus carrying the first collar entirely around the shaft while the cam-wheel makes its second revolution, thus bringing the oppositely-extending pin of the collar 49 in contact with the outer pin on the second collar 49[a], carrying the second collar completely around with the shaft, and when the second revolution is completed the inner pin of the collar 49[a] engages the trip 51. The trip is depressed to bear upon the latch 44, thus raising the rear end of the latch and

withdrawing its shoulder 45 from the seat in the plate 2 of the frame 1. The shuttle-carrier is thus liberated, and simultaneously with this liberation of the carrier and the raising of the latch the cam 43 of the latch engages a beveled end of the protruding shipper-rod 40, forcing the latter inward against the tension of the spring 41 and moving the arm 42 to move the clutch member 39 into engagement with the sleeve-like clutch member 38, thereby setting in motion the advancing-shaft 34 and causing its gear-pinions to engage with the track-bars 25 26 to advance the shuttle-carrier in the direction given by the driving-chain to the shaft 34. This traveling movement of the shuttle-carrier continues until the latch arrives at the next socket in the frame 1, when it drops into engagement therewith to arrest the shuttle-carrier and releasing the shaft 34 from the driving-chain. The shuttle-carrier is thus brought to a position above the next warp-carrier and locked in position, and the shuttle is thus presented immediately over said warp-carrier ready to revolve with the same. This operation is continued until the shuttle-carrier has traversed all the warp-carriers and until it reaches the carrier for the selvage-wire. At this time the shuttle-carrier arrives in contact with one of the collars or dogs on the reversing-rod, and as it presses against the dog the reversing-rod is moved to throw over the balanced lever and move the hand-lever, thus reversing the clutch 14 from engagement with one driving-pulley and moving it into engagement with the other driving-pulley, whereby the direction of the driving-chain is reversed, and consequently the travel of the shuttle-carrier is reversed. The latch being in locking engagement with the frame 1, the shuttle and the selvage-wire carrier are rotated, while the entire web or fabric is drawn through the machine by the action of the reel, such movement of the web or fabric being equal to the length of a mesh in the web. The shuttle-wire having cabled itself upon the selvage-wire for a distance equal to the length of a mesh and the cam-wheel having made three revolutions, the trip 51 is brought down on the latch to lift the latter, as explained, and release the shuttle-carrier, the latter starts on its return trip across the web being woven.

I am aware that changes in the form and proportion of parts and in the details of construction of the devices herein shown and described as the preferred embodiment of my invention may be made without departing from the spirit or sacrificing the advantages of the invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for weaving wire fabrics, the combination with a carriage, and a shuttle, of an advancing-shaft for said carriage, a common driving connection, a clutch device for said advancing-shaft, and a latch arranged to lock the carriage and having an operative connection with said clutch device for the carriage-advancing shaft, whereby the adjustment of the latch to release the carriage brings into service the clutch device and the advancing-shaft to feed the carriage, substantially as described.

2. In a machine for weaving wire fabrics, the combination with a carriage, warp-carriers, and a shuttle, of a shuttle-driving mechanism mounted on the carriage for rotating the shuttle, a feed mechanism for intermittently moving the carriage, a common driving connection for the carriage-feed mechanism and the shuttle-driving mechanism, and a locking device having operative connections with the shuttle-driving mechanism and the carriage-feed mechanism, said locking device arranged in relation to the shuttle-driving mechanism to be operated thereby after the shuttle has been rotated a predetermined time and serving to throw the carriage-feed mechanism into operative engagement with the common driving connections, substantially as described.

3. In a wire-fence-weaving machine, the combination of the warp-carriers, a shuttle-carrier having a shuttle, a feed mechanism for imparting intermittent traveling movement to the shuttle-carrier, a locking mechanism for holding the shuttle-carrier at rest in the intervals between its feed, and a trip mechanism acting in synchronism with a driving mechanism for the shuttle and the warp-carrier and arranged to release the locking mechanism and the shuttle-carrier automatically after the shuttle and the warp-carrier have completed the twisting of the warp and weft wires, as set forth.

4. In a wire-fence-weaving machine, the combination with a series of warp-carriers, a shuttle-carrier, and a shuttle, of a driving mechanism carried on the shuttle-carrier for imparting rotary motion to the shuttle and the warp-carrier with which the shuttle may be alined, and a trip-latch mechanism acting in conjunction with the shuttle-driving mechanism to lock the shuttle-carrier and release the same at intervals, as and for the purposes described.

5. In a wire-fence-weaving machine, the combination with a series of warp-carriers, a shuttle-carrier, and an intermittent feed mechanism for said shuttle-carrier, of a shuttle mounted in the shuttle-carrier, a driving mechanism for rotating the shuttle and the warp-carrier with which it may be alined, a latch mechanism for the shuttle-carrier, and a trip mechanism between the shuttle-driving mechanism and the latch mechanism, for the purposes described, substantially as set forth.

6. In a machine for weaving wire fabrics, the combination with a carriage, and a shuttle, of a shuttle-driving mechanism, a latch mechanism for locking the carriage, and a time-controlled trip mechanism in operative relation to the shuttle-driver and serving to free

the latch after the shuttle has made a predetermined number of revolutions, substantially as and for the purposes described.

7. In a machine for weaving wire fabrics, the combination with a carriage, warp-carriers, and a shuttle, of a shuttle-driver, a latch mounted on the carriage, and a time-controlled trip having its operating-arm arranged to ride against the latch and actuated by independent collars which are capable of independent play and of interlocking engagement with one another, the shuttle-driver, and the operating trip-arm, substantially as described.

8. In a wire-fence-weaving machine, the combination with warp-carriers, a shuttle-carrier, and a shuttle, of an endless drive-chain, a driving mechanism for the shuttle and the warp-carrier alined therewith, a latch mechanism for the shuttle-carrier, a feed or advancing shaft for the shuttle-carrier, and a clutch-controlled driving-gear between the drive-chain and the feed-shaft and arranged to be thrown into and out of action by the latch mechanism, as and for the purposes described.

9. In a wire-fence-weaving machine, the combination with warp-carriers, a shuttle-carrier, and a shuttle, of a latch mechanism for the shuttle-carrier, a feed-shaft journaled on the shuttle-carrier, a drive-chain, a clutch-controlled gear between the drive-chain and the shuttle-carrier feed-shaft, and a shipper mechanism for said clutch acting in connection with the latch mechanism, as and for the purposes described.

10. In a wire-fence-weaving machine, the combination with warp-carriers, a shuttle-carrier, and a shuttle, of a latch mechanism on the shuttle-carrier, a feed-shaft journaled on the shuttle-carrier, a drive-chain, a clutch-controlled gear between the drive-chain and the feed-shaft for the shuttle-carrier, a shipper-rod between said clutch-controlled gear and the latch mechanism, a mechanism for rotating the shuttle and the warp-carrier alined therewith, and a trip mechanism between the shuttle-driving devices and the latch mechanism, for the purposes described, substantially as set forth.

11. In a wire-fence machine, the combination with a carriage, and a shuttle, of a series of warp-carriers each having its shell-pinion provided with lugs, a shaft journaled in said carriage, the cam-wheel provided with a toothed segment and with projecting arms to engage with the lugs and the teeth of the shell-pinions on the warp-carriers successively, a latch, and a time-controlled trip mechanism, substantially as described.

12. In a wire-fence-weaving machine, the combination with a shuttle-carrier, and a shuttle, of a series of warp-carriers each provided with a shell-pinion having teeth and a lateral eccentric stud, a cam-wheel mounted on the shuttle-carrier and provided with teeth for a part of its circumference and with lateral entrance-studs to coact with the shell-pinions, and mechanism for rotating the cam-wheel and the shell-pinion of the warp-carrier with which the cam-wheel may be temporarily engaged, as and for the purposes described.

13. In a wire-fence-weaving machine, the combination with a shuttle-carrier, a shuttle, and a series of warp-carriers, of a cam-wheel shaft, a latch mounted on the shuttle-carrier, a cam-wheel on said shaft, and a time-controlled trip on the cam-wheel shaft to act in conjunction with the cam-wheel and the latch, as and for the purposes described.

14. In a wire-fence-weaving machine, the combination with a shuttle-carrier, a shuttle, and warp-carriers, of a latch mounted on the shuttle-carrier, a cam-wheel shaft journaled in said carrier, a cam-wheel on the shaft and provided with a stud, a trip arranged to move the latch, and one or more time-collars between the cam-wheel and the trip, as and for the purposes described.

15. In a wire-fence-weaving machine, the combination with a shuttle-carrier, a shuttle, and a series of warp-carriers, of a cam-wheel shaft on the shuttle-carrier, a latch on the shuttle-carrier, a cam-wheel on said shaft, a time-trip between the cam-wheel and the latch, a feed-shaft journaled on the shuttle-carrier, a clutch-controlled gear on said feed-shaft, a drive-chain engaging with the cam-wheel shaft and with the clutch-controlled gear of the feed-shaft, and a shipper-rod between the latch and the clutch-controlled gear of the feed-shaft, for the purposes described, substantially as set forth.

16. In a wire-fence-weaving machine, the combination of a main supporting-frame, one side of which is provided with semicircular openings and the other side having openings along its medial line and a groove on its inner side, a shuttle-carrier flanged to engage the groove of one side of said frame and resting upon the other side thereof, track-bars one of which engages with the flange on one side of the shuttle-carrier, a series of warp-carriers journaled in the main frame contiguous to the shuttle-carrier, a shuttle, and a feed mechanism for the shuttle-carrier which engages with the track-bars, as and for the purposes described.

17. In a wire-fence-weaving machine, the combination with a series of warp-carriers, a traveling shuttle-carrier, and a shuttle, of a shuttle-driving shaft on said carrier, a feed mechanism for the shuttle-carrier, a drive-chain, a power-shaft having a reversing mechanism for its pulleys, a hand-lever associated with the reversing mechanism, a balanced lever, and a reversing-rod connected with the balanced lever and the hand-lever and having dogs arranged in the path of the shuttle-carrier, for the purposes described, substantially as set forth.

18. In a wire-fence-weaving machine, the combination with a series of warp-carriers

mounted within a stationary frame, of a shuttle-carrier, a shuttle mounted in said carrier and supporting a weft-bobbin, mechanism for imparting intermittent feed to said carriage, mechanism for imparting motion to the shuttle and the warp-carrier with which the shuttle may be temporarily in alinement, a timing device associated with the mechanism for rotating the shuttle and warp-carrier to regulate the number of rotations thereof, a latch traveling with the carriage to lock the same in the intervals between its feed and lying in the path of the timing device to be actuated thereby at the completion of the desired number of rotations of the shuttle and warp-carrier, and shifting devices controlled by the latch to throw the feed mechanism into operation and renew the feed of the shuttle-carrier, substantially as described.

19. In a machine for weaving wire fabrics, the combination of a series of warp-carriers arranged in the same horizontal plane in a suitable frame, a traveling carriage having a shuttle for a weft-bobbin, a driving-shaft with a reversing-gear, a driving connection from said driving-shaft for feeding the carriage and rotating the shuttle and warp-carrier, a shifting rod with stops in the path of the traveling carriage, and a reversible clutch with which the shifting rod is connected, substantially as described.

20. In a machine for weaving wire fabrics, the combination of a series of warp-carriers arranged in the same horizontal plane in a suitable frame, a traveling carriage mounted to travel in a plane at one side of said warp-carriers, a shuttle mounted in said carriage and having a weft-bobbin, a driving-shaft, pulleys mounted thereon, a shiftable clutch between said pulleys, a driving connection between the driving-shaft and the carriage for feeding the latter and for rotating the shuttle and warp-carrier in the intervals between the feed of the carriage, a shifting rod supported above the warp-carriers and the carriage and having stops in the path of the carriage, and a lever fulcrumed on the frame and operatively connected with the shifting rod and the clutch, substantially as described.

21. In a machine for weaving fence fabrics, the combination with a traveling carriage, a series of warp-carriers, a shuttle, and a driving connection, of a driving-shaft by which the driving connection is operated, the pulleys on said shaft, a clutch, a lever connected with the clutch, an overbalanced swinging arm opposite to the lever, a shiftable rod attached to said lever and the swinging arm to hold the rod and lever in their adjusted positions, and stops carried by the rod in the path of the carriage, substantially as described.

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

WILLIAM H. WARNER.

Witnesses:
HORACE A. SMITH,
RICHARD E. WARNER.