

(No Model.)

3 Sheets—Sheet 1.

J. C. & W. J. POPE.
WIRE FABRIC MACHINE.

No. 567,360.

Patented Sept. 8, 1896.

FIG. 1.

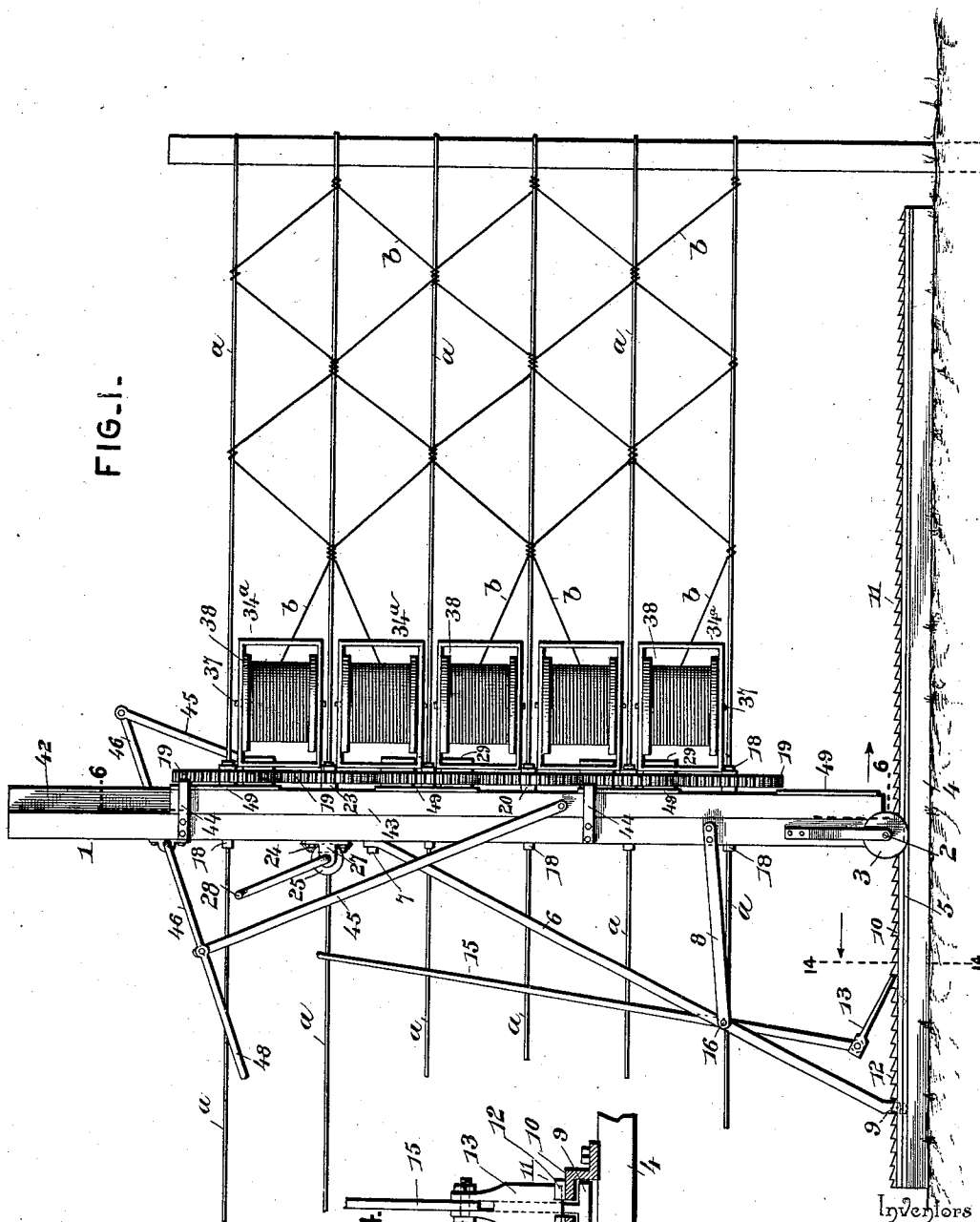
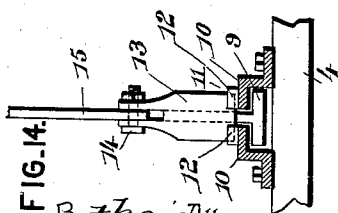


FIG. 14.



Witnesses
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By their Attorneys,

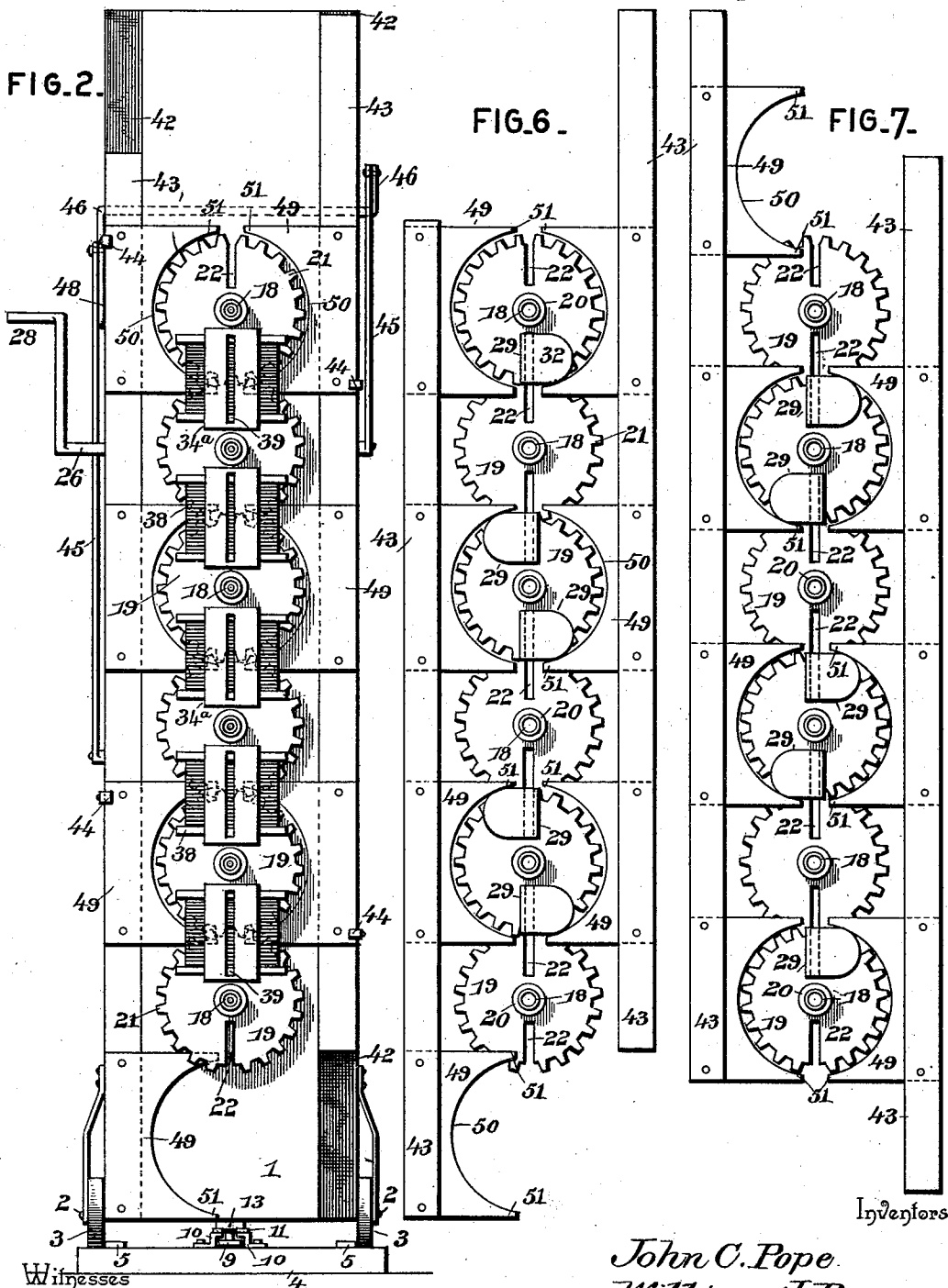
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Inventors

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(No Model.)

3 Sheets—Sheet 3.

J. C. & W. J. POPE.
WIRE FABRIC MACHINE.

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FIG. 3.

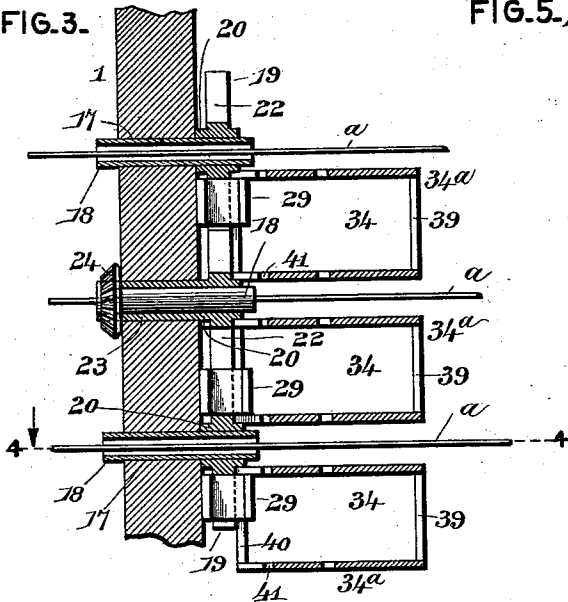


FIG. 5.

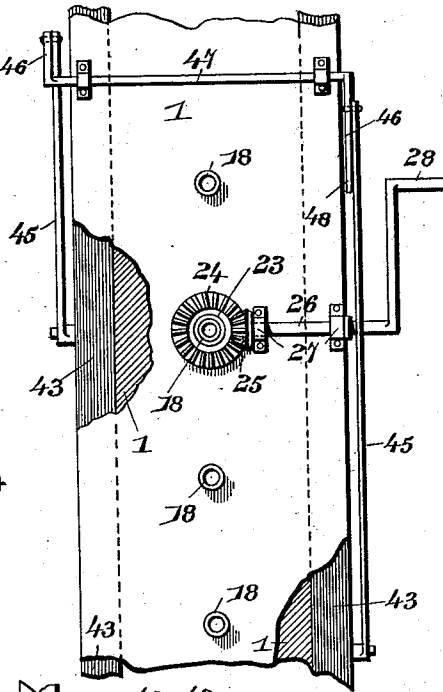


FIG. 8.

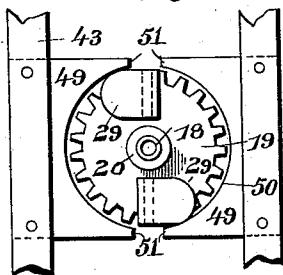


FIG. 9.

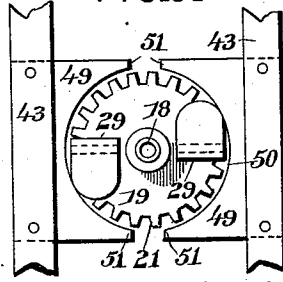


FIG. 4.

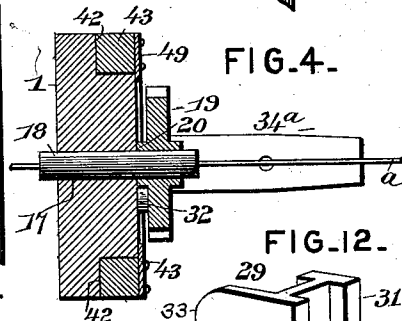


FIG. 10.

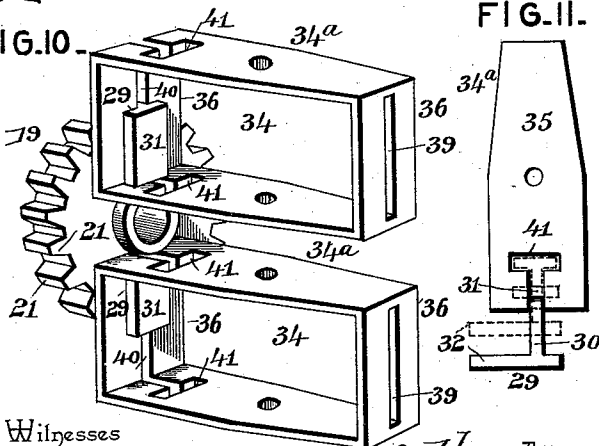


FIG. 11.

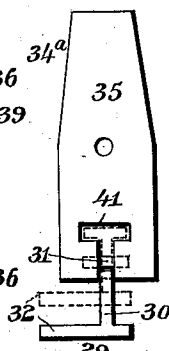


FIG. 12.

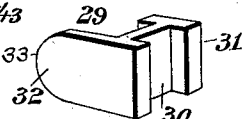
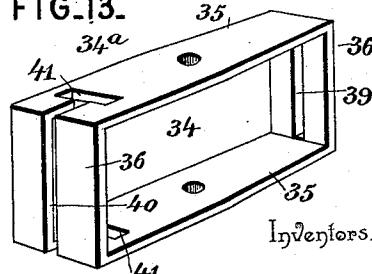


FIG. 13.



Witnesses

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John C. Pope
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UNITED STATES PATENT OFFICE.

JOHN C. POPE AND WILLIAM J. POPE, OF FOX, ILLINOIS.

WIRE-FABRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 567,360, dated September 8, 1896.

Application filed April 27, 1896. Serial No. 589,270. (No model.)

To all whom it may concern:

Be it known that we, JOHN C. POPE and WILLIAM J. POPE, citizens of the United States, residing at Fox, in the county of Kendall and State of Illinois, have invented a new and useful Wire-Fabric Machine, of which the following is a specification.

This invention relates to wire-fabric machines; and it has for its object to provide a new and useful machine of this character primarily intended to be used on the field in the construction of wire fences, but which may also be used in the shop for weaving wire fabric or fencing. To accomplish these objects, the machine is so constructed that the various parts thereof can be easily controlled and operated to insure a positive weaving operation, whereby a symmetrical line of fabric or fencing can be uniformly and quickly woven.

With these and other objects in view, which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

In the drawings, Figure 1 is a side elevation of a wire fabric or fence machine constructed in accordance with this invention and shown in its proper position for weaving a line of wire fencing. Fig. 2 is a front elevation of the machine. Fig. 3 is a central vertical sectional view thereof. Fig. 4 is a detail cross-section on the line 4 4 of Fig. 3. Fig. 5 is a rear elevation of a portion of the machine, illustrating the mechanism for adjusting the slide-bars and for turning the series of intergeared twister-wheels. Fig. 6 is a vertical sectional view on the line 6 6 of Fig. 1, including the slide-bars of the shifting device. Fig. 7 is a similar view showing a different adjustment of parts from the arrangement shown in Fig. 6. Figs. 8 and 9 are enlarged detail elevations showing different positions of one of the twister-wheels in connection with the shuttle-pieces carried thereby and a pair of the shifting-plates for said shuttle-pieces. Fig. 10 is a detail in perspective of one of the twister-wheels carrying a pair of shuttle-pieces and spool-holders. Fig. 11 is an enlarged detail elevation of one of the spool-holders and shuttle-pieces, show-

ing the manner of inserting and removing the shuttle-piece from the holder. Fig. 12 is a detail in perspective of one of the shuttle-pieces. Fig. 13 is a detail in perspective of one of the spool-holders. Fig. 14 is an enlarged detail sectional view on the line 14 14 of Fig. 1.

Referring to the drawings, the numeral 1 designates an upright frame, which is illustrated as being a single vertical frame-piece, which may be of any desired length, according to the width or height of the fabric or fencing to be woven. The upright frame 1 of the machine has fitted to the opposite lower side edges thereof at its extreme lower end the short bearing-spindles 2, on which are journaled the traveler-wheels 3, rolling on the upper side of a ground-track 4, which is designed to be arranged stationary on the ground or floor over which the machine is designed to travel as the weaving of the fabric progresses. At the inner sides of the opposite traveler-wheels 3 of the frame the ground-track 4 has fitted thereon the guide-rails 5, which prevent lateral displacement of the wheels 3 from the track 4, and therefore serve to guide the machine in a straight line as the same is propelled on the ground-track 4, as will be readily understood.

The frame 1 of the machine is guided and braced in its upright position by means of an inclined brace-standard 6, secured at its upper end, as at 7, to the rear side of the frame at an intermediate point, and held rigidly in its inclined position by means of the short brace-bar 8, connected therewith and also with the frame 1. The inclined brace-standard 6 is provided at its lower end with a T foot-piece 9, which slidably works in the space between and below the longitudinal rack-plates 10 of a sectional rack 11. The sectional rack 11 consists of the two angled rack-plates 10, spaced a distance apart to admit in the slot therebetween the lower end of the standard 6 and secured longitudinally on the upper side of the ground-track 4, so as to extend the entire length of the said track. The spaced angled rack-plates 10 are provided on their upper sides with the rack-teeth 12, which are engaged by the lower end of the pivoted pawl-plate 13, the upper end of which pawl-plate is pivotally connected at

14 to the lower end of a propelling-lever 15, pivoted intermediate of its ends, as at 16, to the brace-standard 6, and adapted to be moved toward and away from the upright frame 1 to provide for propelling the machine along the track as the weaving progresses. It will of course be understood that when the propelling-lever 15 is moved toward the rear side of the frame 1 the pivoted pawl-plate 13 freely rides over the rack-teeth 12, and as the upper end of said propelling-lever is drawn away from the frame the pawl-plate catches in the rack-teeth, so that a continued pull on the lever will draw the machine along the desired distance, according to the mesh of the fabric being woven, for the movement of the said propelling-lever, so as to carry the pawl-plate over any desired number of rack-teeth, provides accurate means for weaving the fabric any desired width of mesh.

The upright frame 1 of the machine is provided therein with a longitudinal series of regularly-spaced wire-openings 17, in which are fitted the stationary elongated warp-wire tubes 18, which extend a distance beyond both sides of the frame to form guides for the longitudinal line or warp wires *a* of the fabric or fencing to be woven, and the number of wire-openings 17 and wire-tubes 18 may be regulated to suit the particular number of warp-wires in the fabric to be woven, although, for the purpose of illustrating the present invention, the fabric or fencing in Fig. 1 is shown as having six of the warp-wires *a*, there being a corresponding number of the wire-tubes 18.

At one side of the upright frame 1 the elongated warp-wire tubes 18 form bearing-spindles for the vertical series of intermeshing cogged twister-wheels 19, all of which wheels have a simultaneous rotation by reason of the cogs or teeth of each wheel meshing with the cogs or teeth of the adjacent wheels above and below the same. A twister-wheel 19 is loosely journaled on each of the tubes 18 at one side of the frame 1, and each twister-wheel is provided at its inner side with an inner hub projection 20, which works against the adjacent side of the frame 1 and forms a spacing-block to space the twister-wheel from the frame, said intervening space being designed to accommodate for movement certain parts of the machine to be hereinafter more particularly referred to. Each twister-wheel 19 is provided with peripheral cogs or teeth 21, meshing with the peripheral cogs or teeth of the adjacent wheels, and with a pair of alined diametrically opposite open slots 22, leading inward from the periphery of the wheel to a point adjacent to the hub thereof, and one of said twister-wheels is further provided with a hub extension 23, projected through the frame 1 to the rear side thereof and carrying at its outer end a beveled gear-wheel 24, meshing with an adjacent beveled gear-pinion 25, mounted at the inner end of a crank-shaft

26, journaled in suitable bearings 27 on the rear side of the frame 1, and carrying at its outer end a crank-handle 28, which is manipulated by the operator to provide for rotating the entire series of intermeshing twister-wheels during the operation of twisting the weft-wires *b* around the warp-wires or onto each other at their point of intersection.

The open slots 22 of the twister-wheels 19 are designed to slidably receive therein the shiftable shuttle-pieces 29. The shiftable shuttle-pieces 29 essentially consist of a single casting having a flat web or shank 30 adapted to snugly register in one of the slots 22, and of a greater width than the thickness of the twister-wheels, and the flat web or shank 30 of each of the shiftable shuttle-pieces 29 is provided at its outer side edge with a T-head 31 and at its inner side edge with a widened retaining-flange 32, disposed at right angles to the web or shank 30, and having a rounded edge 33, said widened retaining-flange 32 of each shuttle-piece being designed to rotate and slide vertically at the inner side of the twister-wheels between the same and the adjacent side of the frame of the machine.

In connection with each of the slidable or shiftable shuttle-pieces 29 is employed a spool-holder 34^a, consisting of an open rectangular frame 34, composed of the opposite parallel side and end bars 35 and 36, respectively, and the opposite side bars 35 of the holder frame 34 have fitted therein the spindle extremities 37 of a wire-spool 38, on which spool is reeled a sufficient quantity of weft-wire *b* for use in weaving the fabric or fencing. The outer end bar 36 of the spool-holder 34 is provided therein with a longitudinal wire-opening 39, which forms a guide for the weft-wire as it unravels from the spool within the holder, and the inner end bar 36 of the said holder-frame is provided therein with a longitudinal slide-slot 40, extending from end to end of the said end bar and communicating at its ends with the T-shaped entrance-slots 41, formed in the opposite side bars 35 of the holder-frame.

Each spool-holder frame 34 is adapted to be connected with the twister-wheel for rotating the same by one of the shiftable shuttle-pieces 29 and to connect one of the shuttle-pieces with said holder-frame. The T-head 31 of said shuttle-piece is inserted through one of the T-shaped entrance-slots 41 of the holder-frame, thereby carrying the cross-piece of said T-head 31 within the holder-frame 34 at the inner side of the end bar having the slide-slot 40, and when the flat web or shank 30 of the shuttle-piece fits in one of the open shuttle-slots 22 of a twister-wheel the said cross-piece of the T-head 31 will hold the inner end bar of the spool-holder frame against the outer side of the twister-wheel in a rigid position, so that it will positively rotate with the twister-wheel to provide for carrying the weft-wire around the

warp-wire. The shuttle-pieces 29 are of a materially narrower width than the holder-frames, so as to freely slide within said holder-frames from side to side thereof, and at this point it will be noted that the cross portions of the entrance-slots 41 are located sufficiently remote from the inner end bar of each spool-holder frame that when a shuttle-piece is properly fitted within the holder-frame and in the shuttle-slot of a twister-wheel the T-head 31 of said shuttle-piece will be disposed out of alinement with the said T-shaped slots 41, and will thereby serve to securely retain the spool-holder frame in a proper position against and at the outer side of the twister-wheel with which it rotates.

Shifting mechanism is employed in conjunction with the shuttle-pieces 29 to provide for shifting the same from one twister-wheel to another, and this mechanism will now be particularly referred to. At its opposite side edges the frame 1 is provided with the longitudinal slide-grooves 42, adapted to slidably receive therein the oppositely-reciprocating slide-bars 43, which are disposed flush with the front face of the frame 1 and are properly retained in position within the grooves 42 by means of the guide-clips 44, attached to opposite side edges of the frame 1 and embracing the said slide-bars 43. The oppositely-reciprocating slide-bars 43 each has pivotally connected thereto one end of an adjusting-rod 45, the other end of which rod pivotally connects with one of the crank-arms 46 at opposite ends of a rock-shaft 47, journaled in suitable bearings at the rear side of the upright frame 1, near the top thereof. One of the rock-arms 46 at one end of the rock-shaft 47 is extended into a lever-handle 48, which is manipulated to provide for moving the said slide-bars 43 up and down in the grooves or ways therefor, whereby the shuttle-pieces may be readily shifted from one twister-wheel to another through the medium of the oppositely-arranged shifter-plates 49. A series of the shifter-plates 49 are fitted to the front face of each of the opposite slide-bars 43 and project inwardly from said slide-bars so as to work up and down in the space between the vertical series of twister-wheels and the adjacent side of the frame 1, and each of said shifting-plates 49 is provided with a concave inner side edge 50, forming upper and lower shifting-prongs 51, which are disposed on a line in close proximity to the vertical center of the machine, whereby the shifting-prongs 51 of directly opposite shifting-plates will be disposed sufficiently close together so as to positively prevent the displacement of the shuttle-pieces from the twister-wheels, while at the same time being adapted to just miss the hubs of the twister-wheels in order that the shuttle-pieces may be positively and easily shifted from one twister-wheel to another, as will be readily understood by those skilled in the art.

In weaving a wire-fence fabric with a ma-

chine of the character herein described it is well understood that during the operation of weaving the weft-wires onto the warp-wires every alternate twister-wheel is active and carries the shuttle-pieces and spool-holders in pairs, except, of course, when twisting on either the top or bottom warp-wire, and then the active twister-wheel for said top or bottom warp-wire carries only a single shuttle-piece and a single spool-holder, as plainly illustrated in Fig. 1 of the drawings. While every alternate twister-wheel are the only active twisting-wheels at any time during the operation of the machine, still it will be understood that all of said wheels act as gear-wheels to provide for a positive uniform rotation of the entire series, and when one set of active wheels have been rotated to provide for twisting the weft-wires either together or onto the warp-wires at their points of intersection the shuttle-pieces must then be shifted to those twister-wheels which were previously inactive, so that the desired mesh may be formed.

With the twister-wheels turned to a position in which the shuttle-slots of all of the wheels will be in precise alinement, as plainly illustrated in Figs. 2 and 6 of the drawings, it will be observed that the slots of the directly adjacent wheels are in direct communication with each other, so that the shuttle-pieces can be readily shifted from one twister-wheel to another; or to more explicitly define this relation of the shuttle-slots 22 it may be stated that when alined, as described, the upper slot of one wheel communicates directly with the lower slot of the wheel immediately above the same, while the lower slot of said wheel communicates with the upper slot of the next lower twister-wheel.

As already explained, each shuttle-piece 29 carries a spool-holder frame 34 and at the same time is slidably mounted in said spool-holder frame, so that it (the shuttle-piece) is free to slide from one twister-wheel to another to connect the spool-holder frame with such other twister-wheel, and therefore in order to connect a spool-holder with a previously-inactive twister-wheel the shuttle-piece fitted to said spool-holder is shifted by means of the mechanism described into one of the shuttle-slots of such previously-inactive wheel, as will be obvious from an inspection of the drawings.

Except for the top and bottom warp-wires each alternate twister-wheel is designed to carry a pair of shuttle-pieces and also a pair of spool-holders which are connected with the wheel, and by rotation of the twister-wheel, through the medium of the operating connections described, the weft-wires carried by the said pair of spool-holders will be twisted around each other at their point of intersection, or at least around the warp-wire passing through the tube of said twister-wheel, as plainly illustrated in Fig. 1 of the drawings. After this twisting operation the series of

twister-wheels are turned to the starting positions with the slots of all of the wheels in precise vertical alinement, as described, and with the wheels in this position there is a spool-holder arranged between and overlapping each adjacent pair of twister-wheels, as plainly shown in Figs. 2 and 3 of the drawings. It is now necessary to shift the shuttle-pieces to those shifter-wheels which were previously inactive so as to connect the spool-holders with such twister-wheels, and this is effected by manipulating the lever-handle 48 in order to move the slide-bars 43 in opposite directions. The movement of the slide-bars 43 in opposite directions carries one set of shifting-plates 49 in an upward direction and the opposite set in a downward direction, and those shifting-plates 49 which move in an upward direction have their lower shifting-prongs 51 engage against the widened retaining-flanges 32 of the shuttle-pieces in the upper shuttle-slots of the twister-wheels and slide such shuttle-pieces into the lower shuttle-slots of the previously-inactive wheel immediately thereabove, while those shifting-plates 49 which move in a downward direction operate to slide the shuttle-pieces in the lower shuttle-slots of the twister-wheels into the upper shuttle-slots of the previously-inactive wheels immediately therebelow, as will be readily understood by those skilled in the art. In thus shifting the shuttle-pieces from one twister-wheel to another it will of course be observed that the spool-holders remain in a fixed position and the T-heads 31 of the shuttle-pieces slide within the spool-holders at the inner sides of the inner end bars of the holder-frames, thereby providing means whereby a spool-holder can be connected with either of two twister-wheels by the same shuttle-piece.

From the foregoing it is thought that the construction, operation, and many advantages of the herein-described machine will be readily apparent to those skilled in the art without further description, and it will be understood that changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In a wire-fabric machine, the combination of a stationary ground-track having guide-rails thereon near its opposite side edges, a sectional rack secured longitudinally on the ground-track and comprising a pair of spaced angled rack-plates provided on their upper sides with rack-teeth, the upright traveling-machine frame carrying at its lower end traveler-wheels rolling on the track at the outer sides of said guide-rails, and a brace-standard connected with said traveling-machine frame and provided at its lower end with a T foot-piece slidably working in the space between and below said rack-plates,

and a propelling-lever mounted on said standard and carrying at its lower end a pivoted pawl-plate engaging with said rack-teeth, substantially as set forth.

2. In a wire-fabric machine, a series of intergeared twister-wheels having shuttle-slots, spool-holders, separate shuttle-pieces slidably connected with said spool-holders and working in the slots of said wheels and means for shifting the shuttle-pieces while the holders remain in a stationary position, substantially as set forth.

3. In a wire-fabric machine, a series of intergeared twister-wheels having shuttle-slots, spool-holders, a shuttle-piece slidably and detachably connected with each spool-holder and adapted to register in one of the shuttle-slots of either of two twister-wheels, and a shifting device for shifting each shuttle-piece from one adjacent wheel to another while the holder with which the shuttle-piece is connected remains in a stationary position, substantially as set forth.

4. In a wire-fabric machine, a vertically-alined series of intermeshing cogged twister-wheels provided each with a pair of alined diametrically opposite open slots leading inward from the periphery of the wheel to a point adjacent to the hub, spool-holder frames, separate shuttle-pieces slidably connected with said spool-holder frames and working in the slots of the wheels and means for shifting the shuttle-pieces while the holder-frames remain in a stationary position, substantially as set forth.

5. In a wire-fabric machine, a vertically-alined series of intermeshing cogged twister-wheels having shuttle-slots, spool-holder frames having slotted end bars, and a shiftable shuttle-piece detachably and slidably connected with the end bar of each holder-frame and working in the shuttle-slots of either of two twister-wheels, substantially as set forth.

6. In a wire-fabric machine a series of intermeshing vertically-alined twister-wheels having shuttle-slots, spool-holders comprising an open rectangular frame carrying a wire-spool and provided in its inner end bar with a longitudinal slide-slot and in its opposite side bars with T-shaped entrance-slots communicating with the ends of said slide-slot, and a shiftable shuttle-piece for each of said spool-holders, said shuttle-piece having a web or shank fitting in said shuttle-slots and provided at its outer side edge with a T-head adapted to be passed through said T-shaped entrance-slots, and to slidably work within the holder-frame at one side of the slotted inner end bar thereof, substantially as set forth.

7. In a wire-fabric machine, a series of intermeshing twister-wheels having slots, spool-holders comprising an open rectangular frame carrying a wire-spool and provided in its inner end bar with a longitudinal slide-slot, and in its opposite side bars with T-

shaped entrance-slots communicating with the ends of said slide-slot, the cross portions of said T-shaped slots being remote from said inner end bar of the holder-frame, and
 5 a shiftable shuttle-piece for each of said spool-holders, said shuttle-piece having a web or shank fitting in said shuttle-slots and provided at one side edge with a retaining-flange working at one side of the twister-wheels
 10 and at its opposite side edge with a T-head adapted to slidably work within the holder-frame at one side of the slotted inner end bar thereof and out of alinement with said T-shaped entrance-slots, substantially as set
 15 forth.

8. In a wire-fabric machine, the frame, a vertical series of elongated stationary warp-wire tubes fitted in said frame, a vertically-aligned series of intermeshing cogged twister-wheels journaled on said tubes at one side of the frame and provided at their inner sides with inner hub projections working against the adjacent side of the frame to space the wheels therefrom, said twister-wheels having
 20 shuttle-slots, spool-holder frames, a shiftable shuttle-piece for each spool-holder frame, said shuttle-piece slidably connecting at its outer edge with the spool-holder frame and provided at its inner edge with a widened retaining-flange rotating and sliding at the inner
 25 side of the twister-wheels in the space between the latter and the frame, and opposite sets of oppositely-reciprocating shifting-

plates having concaved inner side edges forming opposite shifting-prongs adapted to engage with said retaining-flange to provide for
 35 shifting each shuttle-piece from the slot in one wheel into the alined slot of an adjacent wheel, substantially as set forth.

9. In a wire-fabric machine, the upright
 40 frame, a vertical series of intermeshing cogged twister-wheels supported at one side of the frame and spaced therefrom, said wheels having shuttle-slots, spool-holders, shiftable shuttle-pieces slidably and detachably con-
 45 nected with said holders and working in the slots of the wheels, said shuttle-pieces being provided with retaining-flanges rotating and sliding in the space between the inner sides of the twister-wheels and the frame, oppo-
 50 sitely-moving slide-bars slidably supported at opposite sides of the frame and carrying shifting-plates to engage with said retaining-flanges for shifting the shuttle-pieces, and a lever-operated rock-shaft journaled at one
 55 side of the frame and having a crank connection with each of said slide-bars, substantially as set forth.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

JOHN C. POPE.

WILLIAM J. POPE.

Witnesses:

WILLIAM CRIMMIN,
 J. H. BUDGENS.