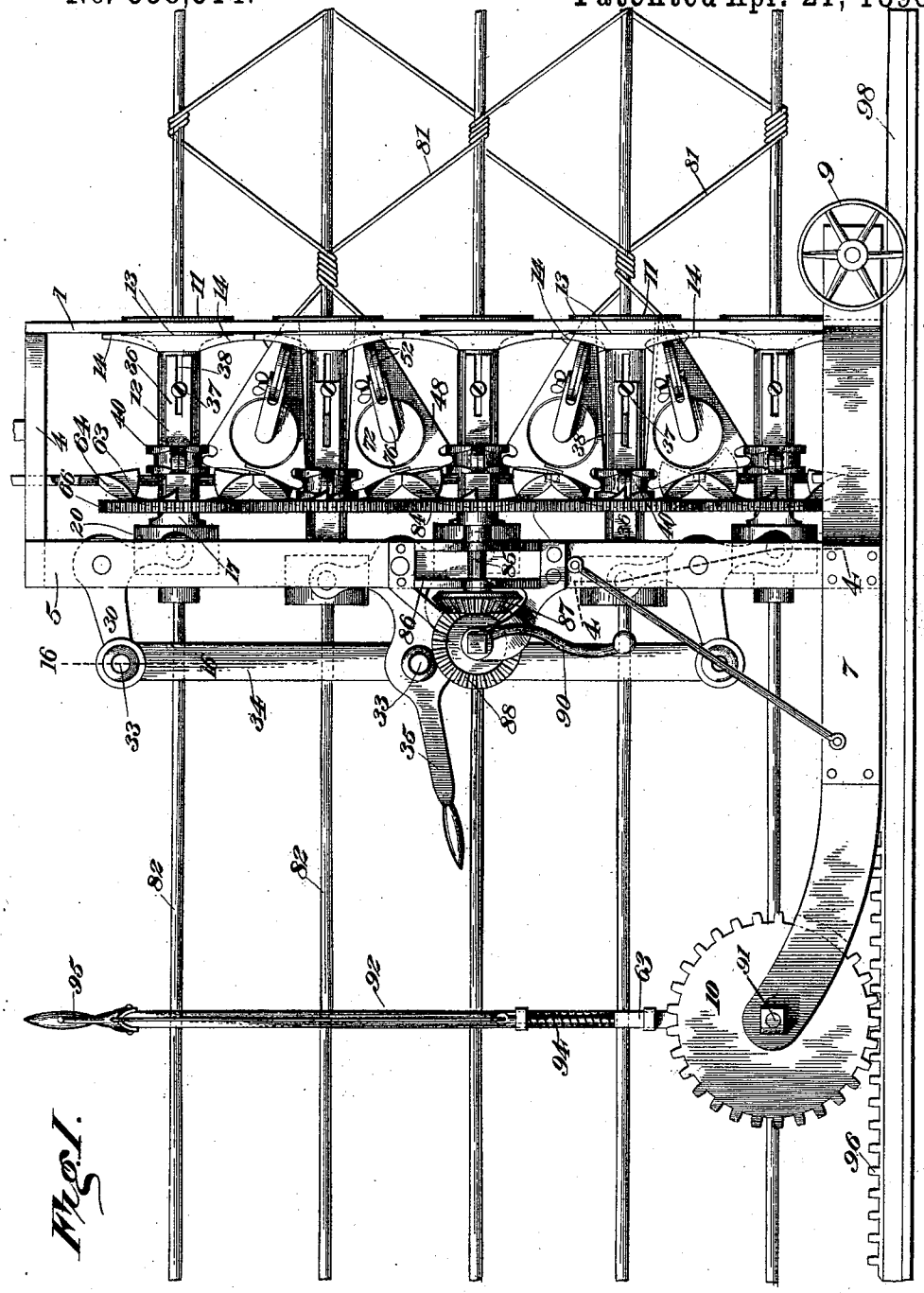
(No Model.) 6 Sheets—Sheet 1.

J. A. PARK.

FENCE MACHINE.

No. 558,514. Patented Apr. 21, 1896.



Witnesses
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S. Mackey

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James A. Park
By Joseph L. Atkins
Attorney

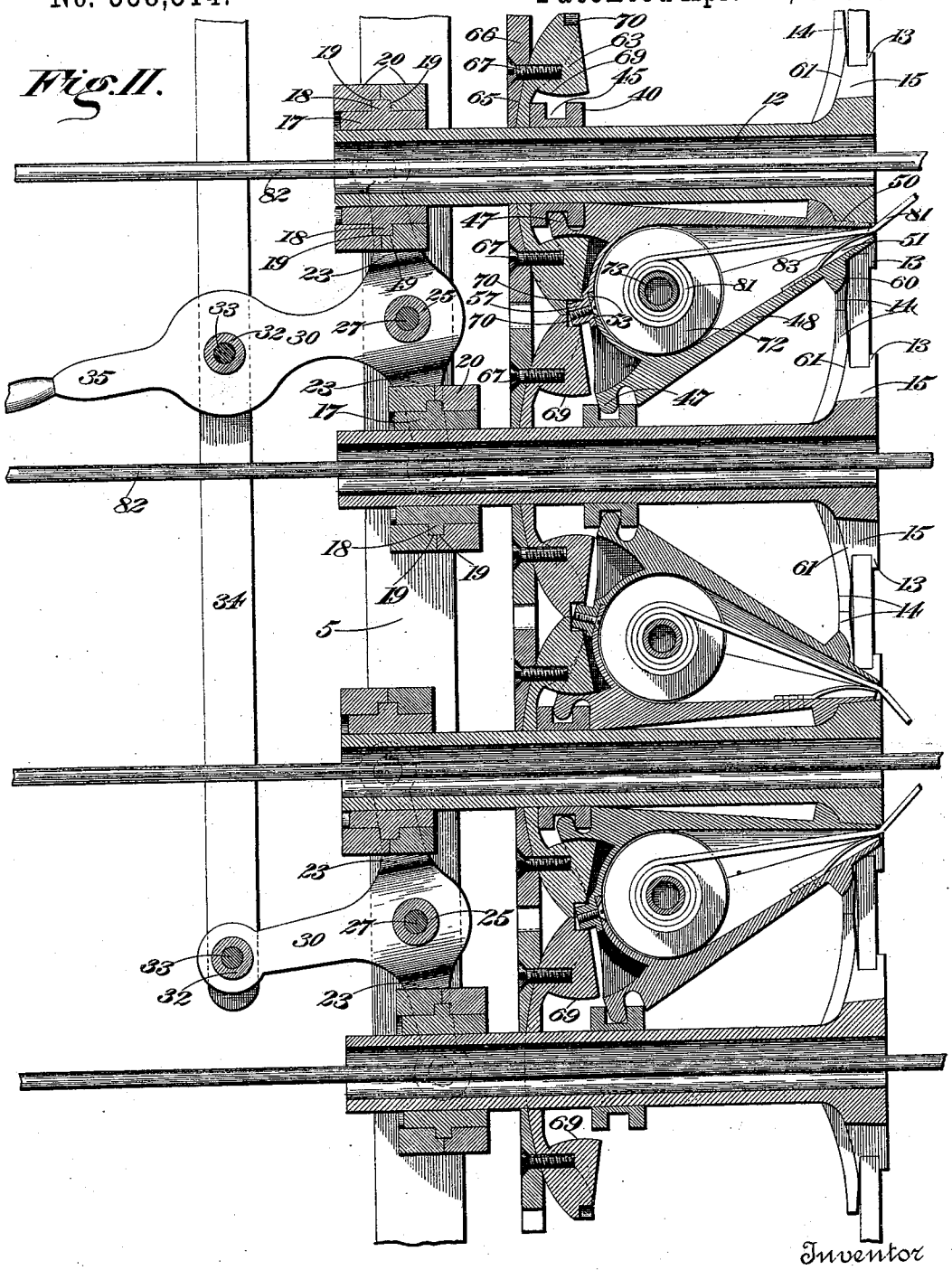
(No Model.) 6 Sheets—Sheet 2.

J. A. PARK.

FENCE MACHINE.

No. 558,514. Patented Apr. 21, 1896.

Fig. II.



Witnesses

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(No Model.) 6 Sheets—Sheet 3.

J. A. PARK.

FENCE MACHINE.

No. 558,514. Patented Apr. 21, 1896.

Fig. III.

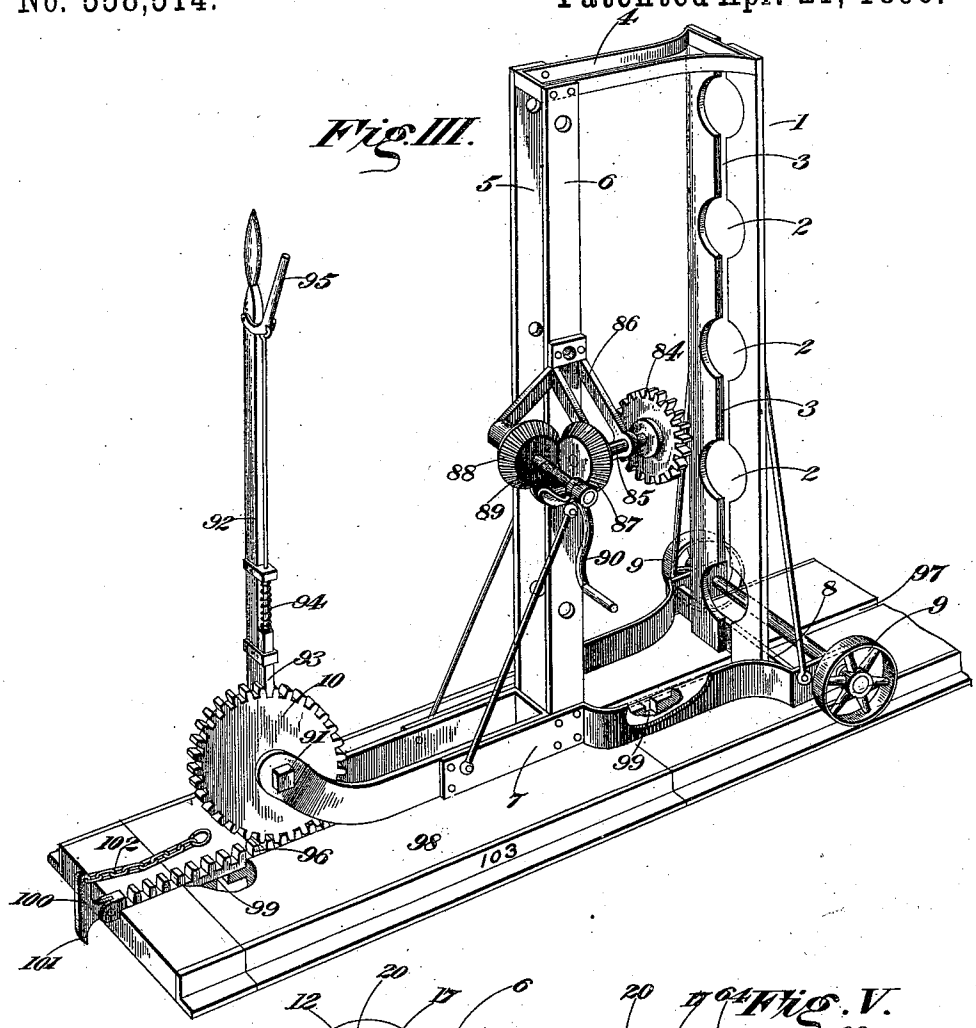


Fig. IV.

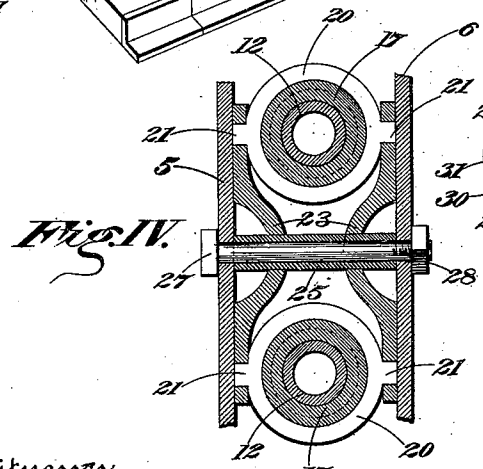
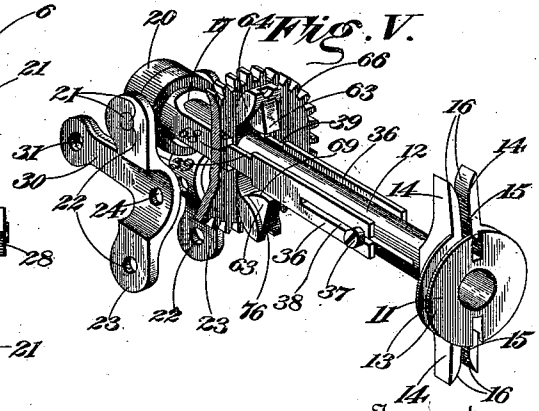


Fig. V.



Witnesses

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(No Model.) 6 Sheets—Sheet 4.

J. A. PARK.

FENCE MACHINE.

No. 558,514. Patented Apr. 21, 1896.

Fig. VI.

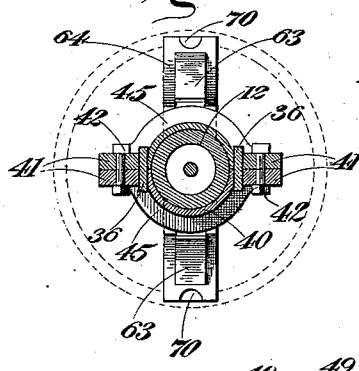


Fig. VII.

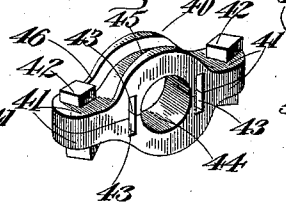


Fig. IX.

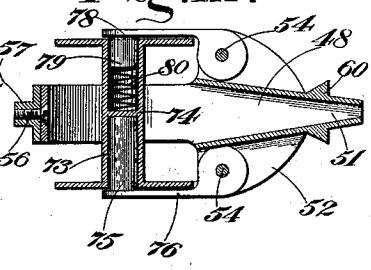


Fig. VIII.

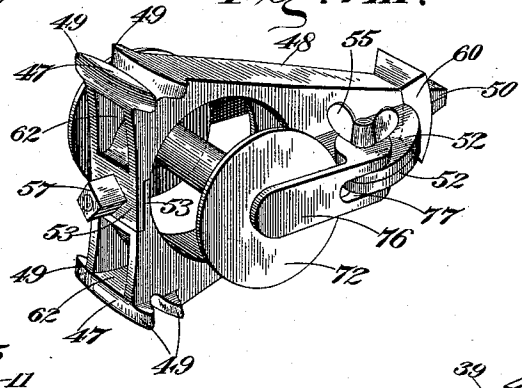


Fig. X.

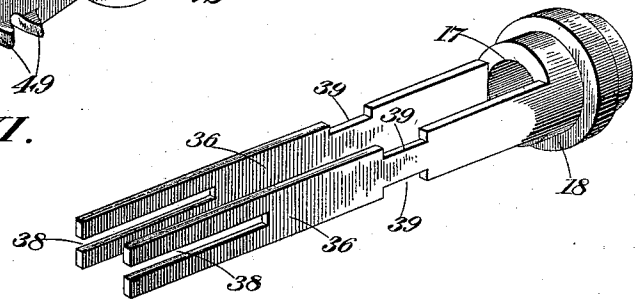


Fig. XI.

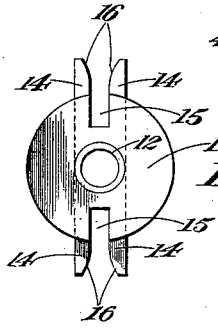
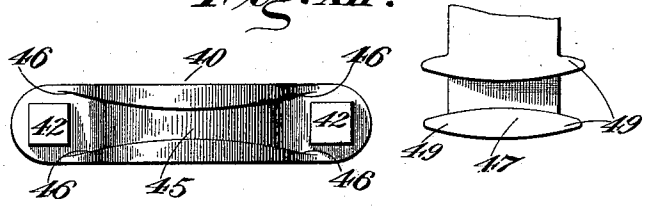


Fig. XII.



Witnesses
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(No Model.) 6 Sheets—Sheet 5

J. A. PARK.

FENCE MACHINE.

No. 558,514. Patented Apr. 21, 1896.

Fig. XIII.

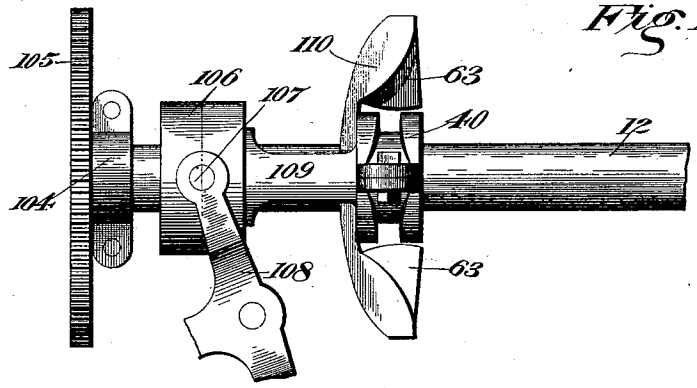


Fig. XIV.

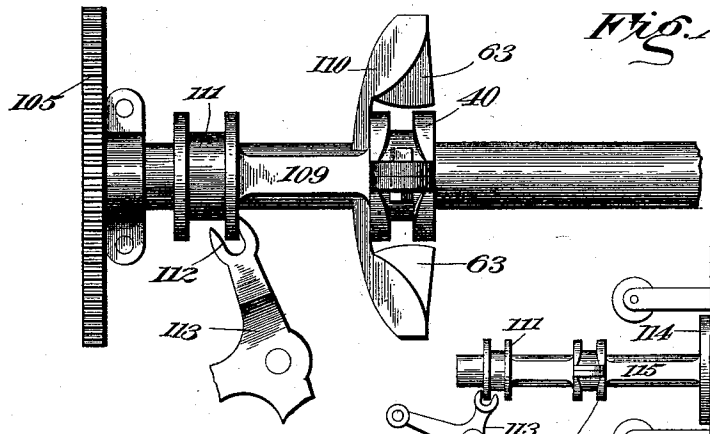


Fig. XVI.

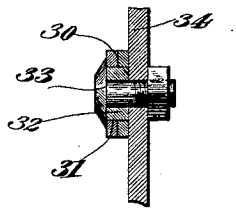
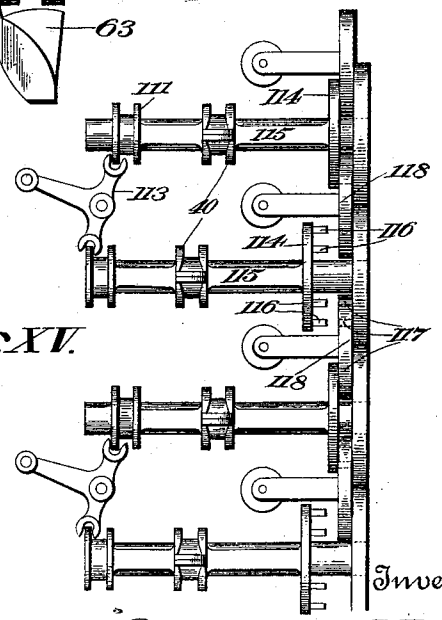


Fig. XV.



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(No Model.) 6 Sheets—Sheet 6.

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FENCE MACHINE.

No. 558,514. Patented Apr. 21, 1896.

Fig. XVII.

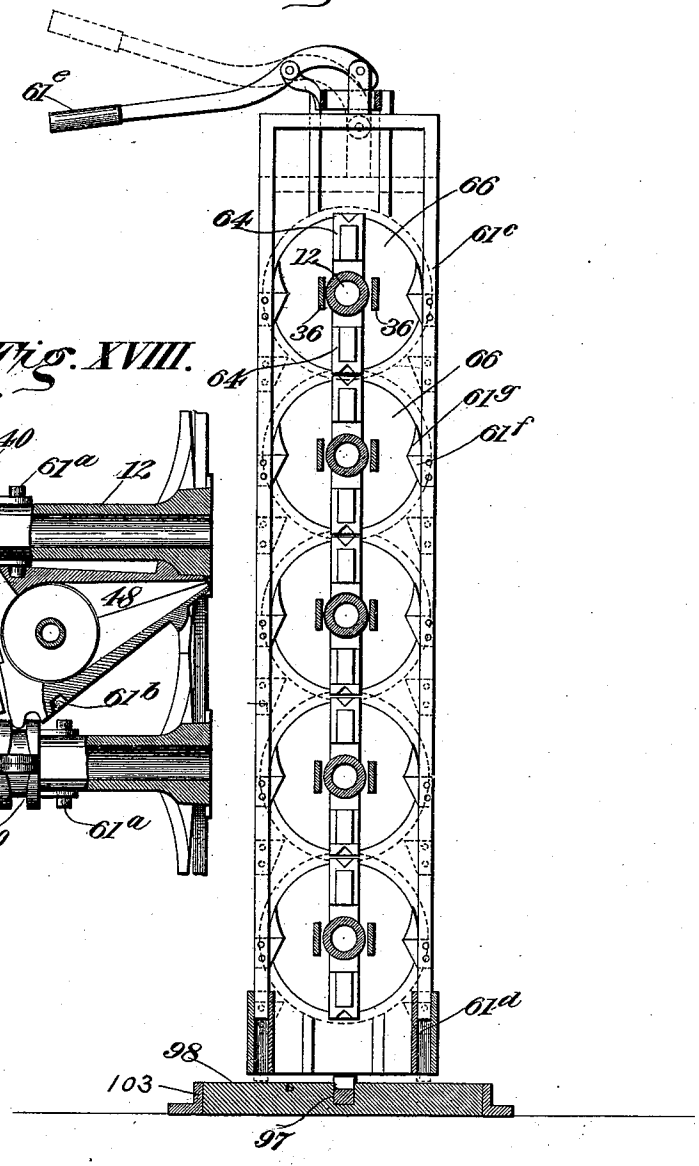

Fig. XVIII.

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UNITED STATES PATENT OFFICE.

JAMES A. PARK, OF LANSING, MICHIGAN.

FENCE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 558,514, dated April 21, 1896.

Application filed May 17, 1895. Serial No. 549,669. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. PARK, of Lansing, county of Ingham, State of Michigan, have invented certain new and useful Improvements in Fence-Machines, of which the following is a specification, reference being had to the accompanying drawings.

The object of my invention is to produce an improved machine which can be manufactured at comparatively small cost, that is simple and durable in construction, and which is adapted for the manufacture of fences composed of warp-wires and mesh-wires twisted at intervals around the warp-wires. It is adapted to produce a fence having diamond-shaped meshes, or can be used to produce other shapes of mesh, and may be employed in constructing a fence on the spot where it is to be set, or it may be employed for making the fence fabric in a factory, so that it may be shipped and sold in its complete form ready to be set up for use, as required.

In the accompanying drawings, Figure I is a side elevation of a section of fence and my machine as in use for constructing the same. Fig. II is a central vertical section of a portion of the fence-weaving mechanism. Fig. III is a perspective view of the frame, base, and track. Fig. IV is a section on the line 4 4 of Fig. I. Fig. V is a perspective view of detached parts of the machine, showing the twister-shaft and portions of the reversing mechanism. Fig. VI is a section through the twister-shaft, showing the reversing-jaws in position thereon. Fig. VII is a rear view of the same. Fig. VIII is a perspective view of one of the bobbin-frames detached. Fig. IX is a sectional view through the bobbin-frame and the bobbin-shaft. Fig. X is a perspective view of one form of reversing-rod detached. Fig. XI is an end view of one of the twisters detached. Fig. XII is a diagrammatical view showing the comparative shape of the groove of a reversing-jaw and the tooth of the bobbin-frame. Fig. XIII is an illustration of a modification of the reversing mechanism. Fig. XIV is an illustration of another modification thereof. Fig. XV is an illustration of still another modification thereof. Fig. XVI is a section on the line 16 16 of Fig. I. Fig. XVII is a vertical section of my complete machine, illustrating in detail the alining mechanism. Fig. XVIII is a detail, partly in section, showing a bobbin-frame pin and socket which may be employed for assisting in maintaining the proper relations between the bobbin-frame and the active twister-shafts.

Referring to the figures on the drawings, 1 indicates that which may be called the "front piece" of the frame of my machine. It may be made so as to constitute, when the parts are bolted together, a single piece of metal provided at suitable intervals with twister bearing-apertures 2 and connecting-slots 3. It is secured, as by a top piece 4, to the rear frame-pieces 5 and 6.

7 indicates a base-piece, preferably made of metal, the front being broader than the rear, and with a cross-piece 8, to which the front frame-piece is secured. It is preferably supported upon two front wheels 9 and a rear gig-wheel 10.

Within each of the bearing-apertures 2 before the parts of the front piece are united I locate a grooved disk head 11, a hollow twister-shaft 12 adapting the disk head to rotate freely in the bearing-apertures between the flanges 13, which define the groove, as shown in the periphery of the disk head.

Behind the front piece 1, upon the twister-shaft, and preferably made integral with it, I provide two sets of bobbin-frame-nozzle guide-jaws 14, which define guide-clefts 15, that extend partially across the face of the disk head in a direction radial to the axis of the twister-shaft. (See Fig. XI.) These clefts are preferably provided with somewhat-flared mouths 16. That end of each twister-shaft opposite to its disk head is carried in a bearing-collar 17. For supporting and actuating the collars I prefer to provide each collar with a boss 18, which enters opposite grooves 19 in the abutting edges of the two parts of a split box 20, so that the collar is revolubly confined within the box when the parts of the box are united, and is adapted to be longitudinally moved upon the twister-shaft by means of the box. The shaft 12 where it is inserted in the collar 17 may be round or square or of other desired shape, and the collar is preferably rotatory.

As a convenient means of uniting the boxes

I prefer to provide each part with a half-trunnion 21. Consequently when the two parts are united the half-trunnions 21 form complete trunnions on each side of the box, which are adapted to be inserted in the bearing-apertures 22 in the opposite sides of T-shaped reversing-levers. (See Figs. II and IV.) Each half of each reversing-lever is provided with a central bearing-aperture 24, located opposite each other, which receives the spacing-sleeve 25 by which the levers are pivoted to the rear frame-pieces 5 and 6, the spacing-piece being secured in place, as by a bolt 27 and nut 28. The side pieces 23 of the reversing-levers are by this means confined, as shown in Fig. IV, between the side pieces 5 and 6 and hold the parts of the box 20 together. The various sets of reversing-levers are designed to move in unison, and for that reason each pair may be provided with oppositely-located apertures 31, that are pivoted, as by means of a spacing-collar 32 and bolt and nut 33, to a common connecting-rod 34, as is shown in detail in Fig. XVI of the drawings.

For operating the connecting-rod, thereby working the reversing-levers, one of one pair of the shanks 30 may be prolonged into a reversing-lever handle 35. Each end of the cross-head of each of the reversing-levers is provided with a box 20 and each end serves thereby to exclusively support the rear end of a twister-shaft 12, and, by raising or depressing the handle 35, one of each of the adjacent collars 17 is moved lengthwise of its shaft 12. By this movement the boxes 20 are caused to move in the arc of a circle. The movement, however, is so small that the shafts 12 are not shifted widely from their horizontal position, but if necessary may have a slight vertical play.

To each of the collars 17 on opposite sides of each shaft 12 are secured reversing-rods 36, which are longitudinally movable upon the shafts 12, their free ends being supported and guided by cleats 37, secured to opposite sides of each shaft 12, and upon which the edges of terminal slots 38 work. Each of the reversing-rods 36 is provided with duplicate notches 39, each set of notches in each pair of rods being located opposite to each other on each twister-shaft. These notches are designed to assist in confining upon each pair of reversing-rods 36 reversing-jaws 40. The reversing-jaws may be constructed like a split collar with lugs 41, that are designed to be secured together, as by screws or screw-bolts 42. Each of the reversing-jaws is provided with a recess 43, whose walls clamp upon one of the reversing-rods between the notches 39, so that by the tension of the screws 42 the jaws are firmly secured to the reversing-rod. Each jaw is provided with a semicylindrical bore 44, which spans but does not touch a shaft 12, so that in the reciprocation of the reversing-rods the reversing-jaws are moved freely lengthwise of their respective shafts 12. Each of the jaws is provided with a groove or channel 45, having its opposite ends flared, as indicated at 46, which is designed to receive the tooth 47 of a bobbin-frame or weft-wire-supplying frame 48. The flare of the channels 45 and the tapered ends 49 of the teeth 47 are designed to insure their ready engagement when the machine is in operation. (See Fig. XII.)

Each bobbin-frame preferably resembles in general outline a four-sided pyramid, (see for explication Fig. VIII,) two sides of the base thereof being bounded by the opposite teeth 47, and its apex being represented by a nozzle 50, which is provided with a central axial bore 51. I prefer in the practical manufacture of the bobbin-frames to construct them in halves, the nozzle ends being provided with ears 52 and the opposite ends being provided with overlaps 53. The ears may be secured together by a bolt 54 and a wing-nut 55, while the overlaps may be secured by a screw or rivet 56, which also passes through the square lug 57 on the outer overlap.

Each of the bobbin-frames is partially retained by the engagement of one of its teeth 47 with one of the jaws 40; but it is more firmly secured by the insertion of its nozzle 50 into one of the clefts 15, and is steadied in position by a smooth-faced bearing-segment 60, which engages with the inner grooved face 61 of the jaws 14 as it swings through the movement of the jaws 40, as will hereinafter more fully appear, from one to the other of the adjacent shafts 12.

In addition to the segments 60 and the engagement of the jaws 40 with the teeth 47, pins 61^a upon the jaws 40 may be employed in connection with sockets 61^b in the wall of the bobbin-frame, as illustrated in Fig. XVIII.

Each half of the bobbin-frame is provided with a mortise or socket 62, which is designed to receive a tongue or tenon 63, that is carried in a reinforced frame-piece 64, partially embedded in a recess 65 in a gear-wheel 66, and to which it is secured, as by screws 67. Each gear 66 is secured to its shaft 12 and is provided with apertures 68 on opposite sides of the shaft, through which the reversing-rods 36 may loosely reciprocate. The inner contours 69 of each of the tenons 63 are preferably curved to accommodate the sweep of the bobbin-frame, and each frame 64 is provided, beyond the tenon 63, with a crotch or recess 70, which receives the lug 57 of the bobbin-frame. The several gears 66 intermesh to constitute a train of gear, so that the rotation of any one of them imparts rotary motion to each of the shafts 12.

A collar 40 through the reciprocation of the sets of reversing-rods 36 moves in and out on each of the shafts 12 between it and its pair of tenons 63. When the clefts 15 are in alinement with the slits 3 of the front frame 1 and the groove 45 of one of the jaws 40 is in engagement with the tooth 47 of a bobbin-frame, the movement of that jaw toward its gear 66

(which is accompanied by a corresponding movement in the opposite direction of the jaw 40 on the opposite adjacent shaft 12) swings the bobbin-frame upon the lug 57 as an axis and draws the mortise 62 next to the receding jaw upon its tenon 63, thereby securing the one end of the bobbin-frame between it, the said jaw 40, and its overhanging tenon and securing its opposite or nozzle end in the cleft 15 of the head of that shaft 12 which carries the aforementioned jaws 40. The lugs 57 are not essential to the rotation of the bobbin-frames, but assist them in rotating as upon a pivot.

The reversing operation being, as above stated, dependent upon the alinement of the clefts 15 with the slits 3, I prefer to employ alining mechanism, which may consist of a rectangular frame 61^e, (clearly illustrated in Fig. XVII of the drawings,) which is preferably located in proximity to the jaws 40, and which is susceptible of vertical movement in ways 61^d in the base-piece 7 and is adapted to be actuated by a handle-lever 61^e, secured to the top piece 4. The sides of the frame 61^e carry projections 61^f, that, in the alining operation, engage projections 61^g upon the gears 66. Consequently, by the operation of the lever 61^e, the gears may be partially rotated, so as to produce the necessary alinement above referred to.

When the machine is in operation, the frame 61^e may be lowered in its bearings, so as to prevent the engagement of the projections 61^g and 61^f, and thereby permit the full operation of the machine without interference.

On account of the relative movement of the jaws 40 on adjacent shafts 12 the movement of one pair of jaws which secures the bobbin-frame to one shaft 12 liberates it from the adjacent shaft by disengaging the tenon 63 of the adjacent shaft from its mortise 62.

The operation just described clearly appears from comparison of the different positions of the several shafts 12 and the bobbin-frames in Figs. I and II of the drawings. The shafts 12 whose clefts 15 are filled with the nozzles of the bobbin-frames may be called "active" shafts, while the other shafts may be called "idle" shafts. This is, of course, merely a relative distinction, because one set of shafts is at one time active and at another time idle; but in the operation of the machine the bobbin-frames are secured, in the manner above described, to certain shafts during their activity and are liberated from them during their idleness.

Each of the bobbin-frames carries transversely to its axis a bobbin-spool 72, whose bore 73 may be provided with a transverse partition 74, against which the pin 75 on an arm 76 abuts. The arm is bifurcated, as indicated at 77, and may be secured to the ears 52 by the same bolt 54 which secures the ears together. 78 indicates a similar arm secured to the other side of the frame and provided also with a pin 79, which abuts against the coil-spring 80, that is secured within the bore of the spool, its end opposite the pin 79 resting upon the partition 74. By this means the tension of the spool 72 may be regulated. The spool carries a strand of wire 81, which is designed to be wrapped at intervals around the taut warp-wires 82. The tension of the weft-wire as it is fed from the bobbin may be regulated by the compression of the spring 80 against the partition 74; or, if the wire is stiff, an auxiliary spring 83, secured to the bobbin-frame and projecting into its nozzle end, may be employed.

To impart motion to one of the gears 66, and thereby to operate the train of gears, suitable mechanism may be employed—as, for example, a spur-gear 84, carried on a horizontal shaft 85 in a bearing-frame 86, secured to the side piece 6. The end of the shaft 85 opposite the gear 84 may be provided with a beveled gear 87, which meshes with another beveled gear 88, that is secured to a crank-shaft 89, that is carried in the frame 86, transversely to the shaft 85.

90 indicates a crank-handle by which the shaft 89 may be rotated and motion imparted to the gear 66, with which the gear 84 meshes, and through said gear to each one of the gears 66.

The gig-wheel 10 is secured to the base 7 by an axle-bolt 91, which also secures in operative proximity to the gig-wheel a lever 92, that carries an ordinary pawl or dog 93, that is actuated by a spring 94 and controlled by a handle 95. By means of the engagement of the dog 93 with the teeth of the gig-wheel motion is imparted to the gig-wheel, as required. The teeth of the gig-wheel mesh with those of the rack 96, which is preferably embedded in the longitudinal guideway 97 of a track-piece 98.

I prefer to make the track in short sections, which may be easily handled, so that as the machine travels upon one section it relieves the other section, which may be moved behind the machine, so as to render the track available for the continuous travel of the machine without employing heavy and cumbersome material.

In the bottom of the guideway 97 I provide at suitable intervals apertures 99, and on the end of the rack 96 I pivot the dog 100, whose lower end 101 is designed to enter successively the apertures 99 and to hold the rack in fixed position while the gig-wheel is being operated to draw the frame along the track. The upper end of the dog may be provided with a chain 102 for lifting it out of the apertures and shifting its position, as required.

It will be readily perceived that when the dog is disengaged from an aperture 99 and the gig-wheel released from the engagement of the pawl 93 the track can be drawn along the guideway and adjusted anew for the required travel of the frame. The frame is held to the

track by the engagement of the wheels 9 with a flanged rail 103, located on the sides of the track.

In the foregoing I have described what I consider a preferable form of embodiment of my invention; but in Figs. XIII, XIV, and XV I have illustrated modifications of the reversing mechanism, which I will proceed to briefly describe.

In Figs. XIII and XIV the end of the twister-shaft 12 is shown as supported, as by a collar 104, on the frame (the frame not being illustrated) and provided on its end with a gear-wheel 105, which corresponds with the gear 66. The gears 105 of each twister-shaft 12 are designed, like the gears 66, to intermesh. 106 indicates a sliding collar provided with trunnions 107 and adapted to be operated by reversing-levers 108, corresponding in shape and arrangement to the levers 23. 109 indicates reversing-links which secure the collar 106 to the reversing-jaws 40. The tenons 63 are also present, but are secured to the shaft 12, as by a frame 110. The remaining mechanism is the same as that heretofore described, and its operation will clearly appear, it is believed, from the previous illustration and description.

In Fig. XIV the only further modification shown is in the employment of a grooved collar 111, with which the teeth 112 of a single reversing-lever 113 engage.

In Fig. XV disks 114, secured, as by arms 115, to the reversing-jaws 40, are shown. The disks are provided with pins 116, which enter apertures 117 in the heads 118, and so render, through the movement of the jaws 40, as above described, one set of the twister-shafts active and the remaining twister-shafts idle.

The operation of the device is as follows: The warp-wires 82 of required number being passed through the respective twister-shafts 12 and being stretched taut between suitable supports—as, for example, the posts to which the fence is to be secured, or between temporary supports to correspond therewith in a factory—the ends of the weft-wires are secured to the warp-wires, or at the outset to the post which at one end holds the warp-wires, two weft-wires being secured to each of the warp-wires which is to be wound, except if the upper and lower warp-wires are to be wound one weft-wire is secured to them respectively. (See Figs. I and II.) When the ends of the weft-wires are properly secured, rotatory motion is imparted to the crank 90 and the weft-wires are wound the required number of times around the respective warp-wires. The operator then taking hold of the handle 92, through the manipulation of the lever 95 gigs the frame along the track the length of one mesh. Next, operating the lever 35, he shifts the bobbin-frames upon their axes so that their nozzles leave the warp-wire around which they had previously wound the weft-wire and enter the cleft 15 of the adjacent twister-shafts, in which positions they are securely fixed by the engagement of the tenons 63 with the mortises 62. The required amount of weft-wire is paid out from the bobbin-spool as the frame is gigged, and also by the shifting of the bobbin-frame. When the machine has been reversed, as thus described, motion is again imparted to the crank 90 and the weft-wire is thereby wound around the warp. By the above-described movement of the main frame and reversing of the bobbin-frames the weft-wire is wound alternately upon the adjacent warp-wires and the diamond-shaped mesh illustrated is thereby produced.

In the rotation of the twister-shafts the bobbin-frames revolve with that shaft to which they are firmly secured by the engagement of the tenons 63 with the mortises 62; but they do not actuate the adjacent shafts because the tenons do not engage the mortises and the exterior tooth 47 of the bobbin-frame works freely through the channels 45 of the reversing-jaws on that shaft.

I do not limit myself to the details of construction herein shown and described, but reserve the right to modify and vary them at will within the scope of my invention to secure the best mechanical embodiment of my invention which may be from time to time by use and experiment suggested.

What I claim is—

1. The combination with a frame and a plurality of rotatory twister-shafts, of a pyramidal weft-wire-supplying frame designed to rock upon its base between each pair of shafts so as to secure it exclusively to one of each pair of twister-shafts, as required, and means for actuating the weft-wire-supplying frame in that manner, substantially as set forth.

2. The combination with a frame, a plurality of rotatory twister-shafts, and disk heads thereon rotating in the frame, of radially-disposed clefts in the several disk heads, a pyramidal weft-wire-supplying frame, mechanism for rocking the same upon its base so as to secure the weft-wire-supplying frame to one or the other of adjacent twister-shafts and thereby to engage the apex thereof with the cleft in the disk head of the twister-shaft to which it is secured at the base, substantially as set forth.

3. The combination with a frame and a plurality of rotatory twister-shafts, of a weft-wire-supplying frame and teeth on opposite sides thereof, a pair of reversing-jaws movable upon each of the twister-shafts, a channel in each of the jaws adapted to engage the teeth of the weft-wire-supplying frames, means for simultaneously engaging one of the teeth to the jaws of one twister-shaft and releasing it from the jaw of the other twister-shaft, whereby the weft-wire-supplying frame is made to revolve with the first-named shaft independently of the second-named shaft, substantially as set forth.

4. The combination with a frame and a plurality of rotatory twister-shafts, of reversing-jaws movable lengthwise of the twister-shafts

on each of the twister-shafts, a weft-wire-supplying frame secured between the reversing-jaws of adjacent twister-shafts and actuated by the movement of the jaws on the shafts, substantially as set forth.

5. The combination with a frame, a plurality of twister-shafts and reversing-jaws movable on each of the shafts, of a pyramidal weft-wire-supplying frame secured between the reversing-jaws of the shafts and adapted by the movement of the jaws thereon to rock upon its base, substantially as set forth.

6. The combination with a frame and a plurality of rotatory twister-shafts, of tenons secured to each of the shafts, reversing-jaws on each of the shafts movable thereon between the shafts and their tenons, a weft-wire-supplying frame secured between the reversing-jaws of adjacent shafts, and adapted to be actuated by the movement of the jaws thereon, and mortises in the weft-wire-supplying frame adapted to receive the tenons, substantially as and for the purpose specified.

7. The combination with a frame and a plurality of rotatory twister-shafts, of a tenon secured to each of the shafts, reversing-jaws on each of the shafts movable upon the shaft between it and the tenon, a pyramidal weft-wire-supplying frame secured between the jaws of adjacent shafts and adapted to receive a rocking movement upon its base by the movement of the jaws, and mortises in the base thereof adapted to receive the tenons, substantially as and for the purpose specified.

8. The combination with a frame and a plurality of rotatory twister-shafts revolubly secured thereto at one end, of weft-wire-feeding mechanism comprising a pair of reversing-jaws on each shaft, a sliding collar on each of the shafts adjustably connected with the reversing-jaws, and reversing-levers secured to the frame and supporting and actuating the collars, substantially as set forth.

9. The combination with a frame and a plurality of rotatory twister-shafts secured thereto at one end, of weft-wire-feeding mechanism comprising a pair of reversing-jaws on each shaft, sliding collars on each shaft secured to the respective reversing-jaws, reversing-levers carried on the frame, each lever carrying a pair of collars, and connecting mechanism uniting the several reversing-levers, substantially as set forth.

10. In a fence-machine, the combination with a frame, and bearing-apertures in one side thereof carrying rotatory twister-shafts, of two other parallel sides of the frame, reversing-levers carried thereby, and exclusively supporting the free ends of the twister-shafts, substantially as set forth.

11. The combination with a frame, a plurality of disk-headed rotatory twister-shafts therein, and clefts in the disk heads thereof, of a pyramidal weft-wire-supplying frame, means for rocking it upon its base between adjacent shafts so that its nozzle end, or apex, shall enter a cleft of one of the disk heads, and bearing-segments near the nozzle end adapted to engage with the inner parts of the disk heads, substantially as and for the purpose specified.

12. As a part of a fence-machine, the combination with a bobbin-frame and pivoted arms thereon, of a bobbin-spool, a bore therein, a partition in the bore, bearing ends on the arms, and a spring carried in the bore between one of the bearing-pins and the partition, substantially as and for the purpose specified.

13. The combination with a frame and three-wheeled base, one of the wheels being a gear-wheel, of a sectional track, a guide-way running longitudinally in the different sections of the track, apertures in the guide-way, a rack adapted to mesh with the gear-wheel of the frame, and a dog upon the rack adapted to enter the apertures in the guide-way, and means for actuating the gear-wheel, substantially as set forth.

14. The combination with a frame and a plurality of rotatory twister-shafts operatively connected to intermeshing gears, of a common weft-wire-supplying frame for each pair of twister-shafts, means for shifting the same from one shaft to the other, and alinement mechanism consisting of a frame, coöperating mechanism upon the frame and gears, and means for actuating the alinement-frame, substantially as specified.

In testimony of all which I have hereunto subscribed my name.

JAMES A. PARK.

Witnesses:
ALBERT DUNHAM,
ERIC LINDHOLM.