

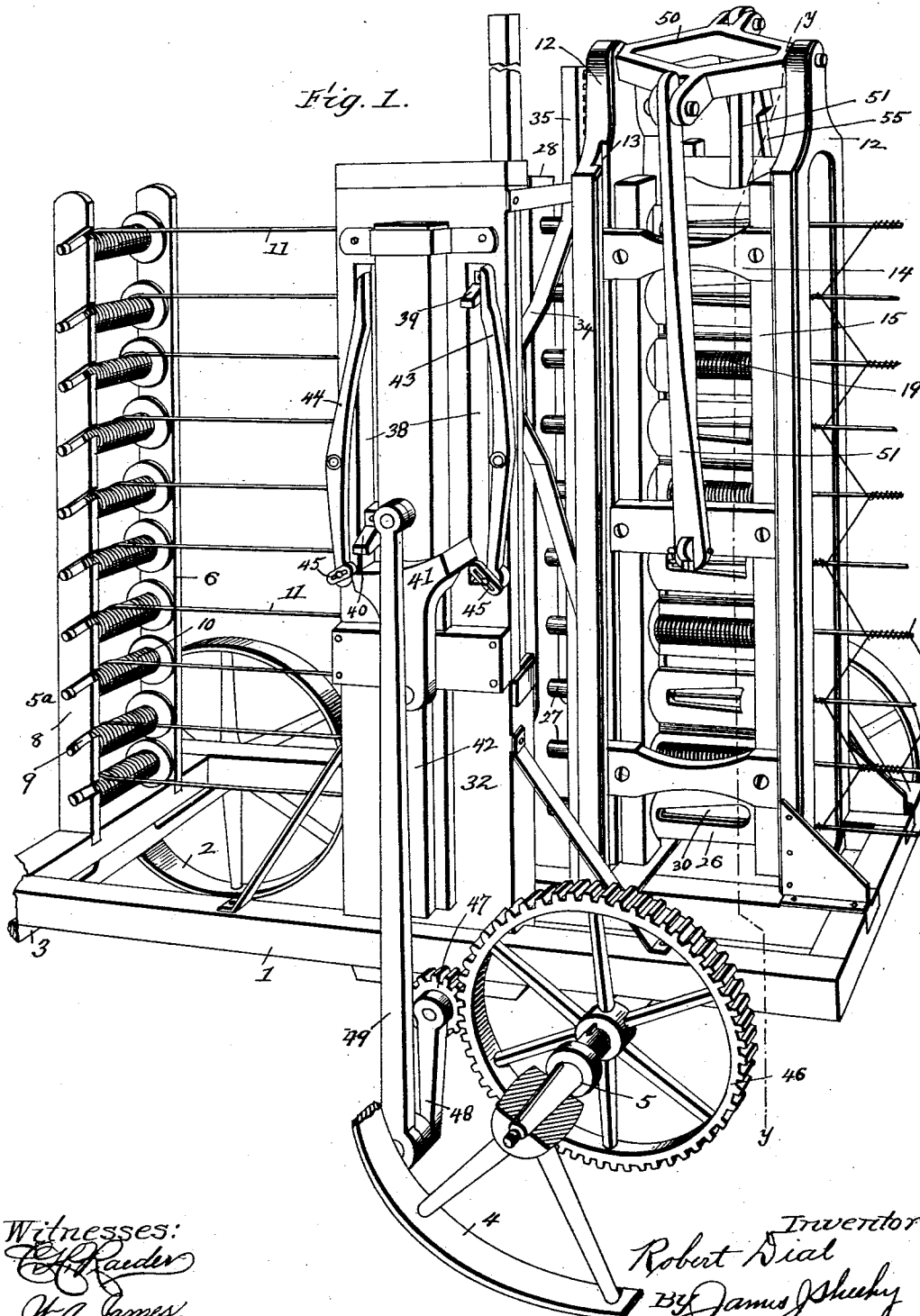
(No Model.)

5 Sheets—Sheet 1.

R. DIAL.
FENCE MAKING MACHINE.

No. 573,815.

Patented Dec. 22, 1896.



Witnesses:
E. H. Rader
H. A. James

Inventor
Robert Dial
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Attorney

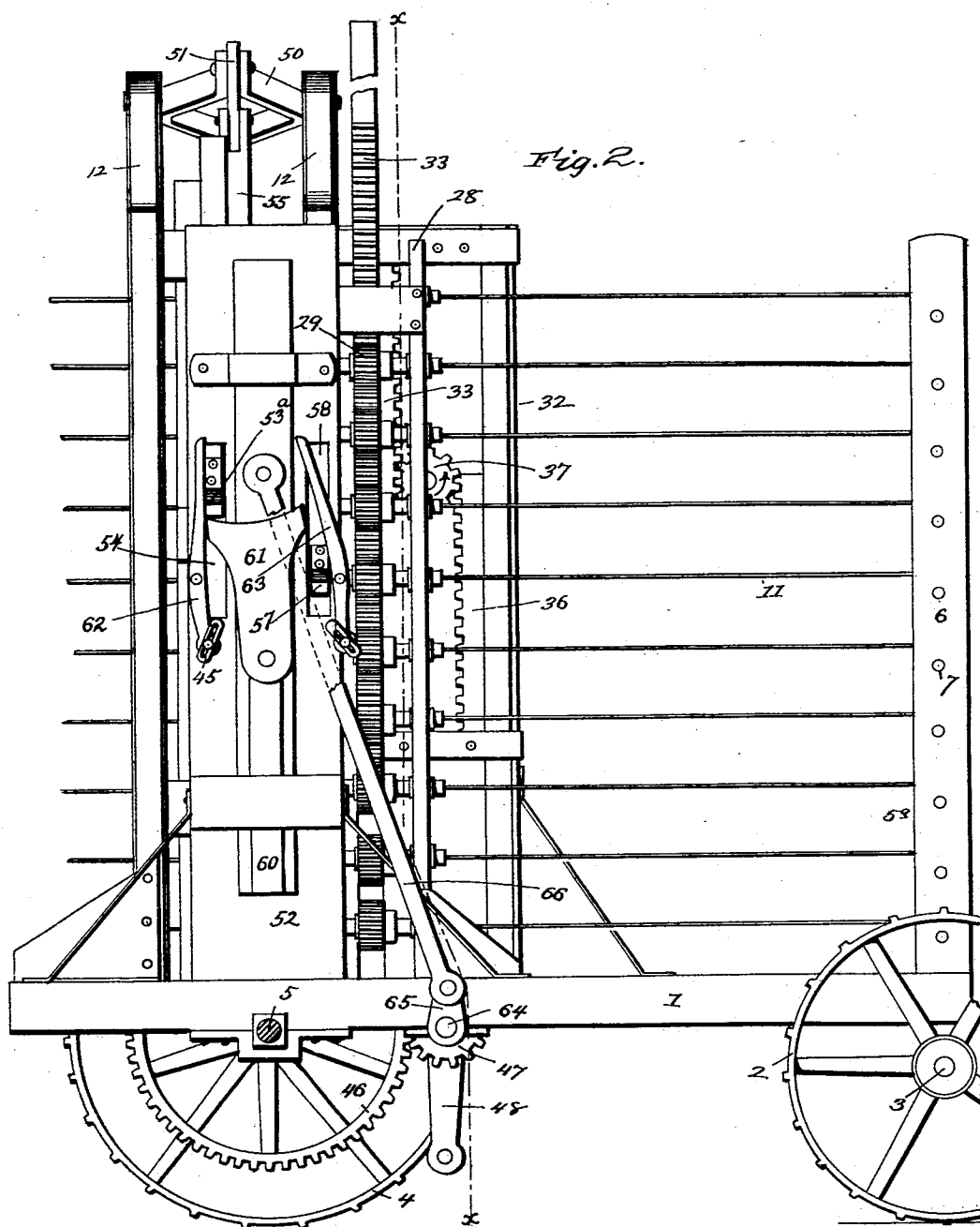
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5 Sheets—Sheet 2.

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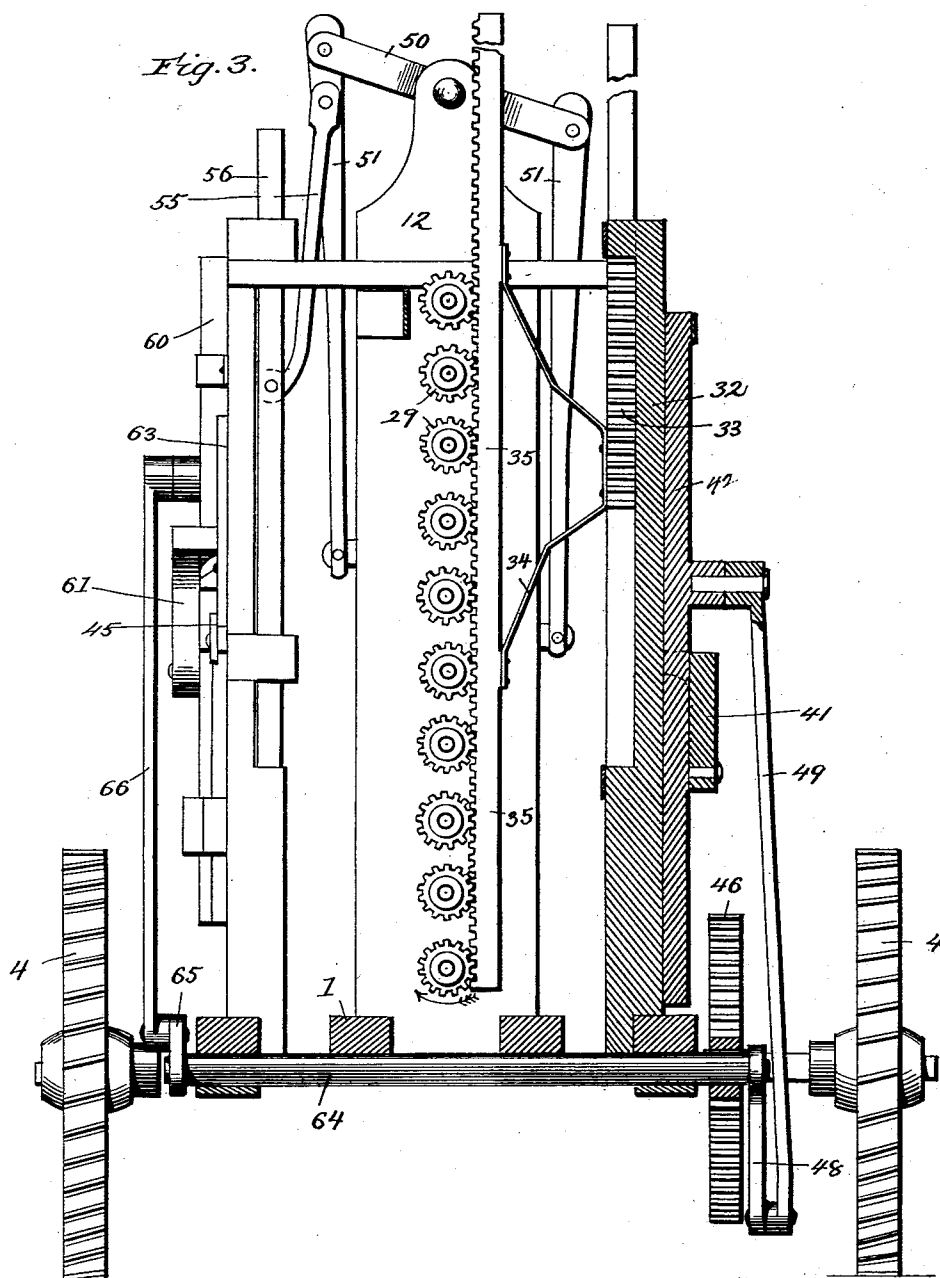
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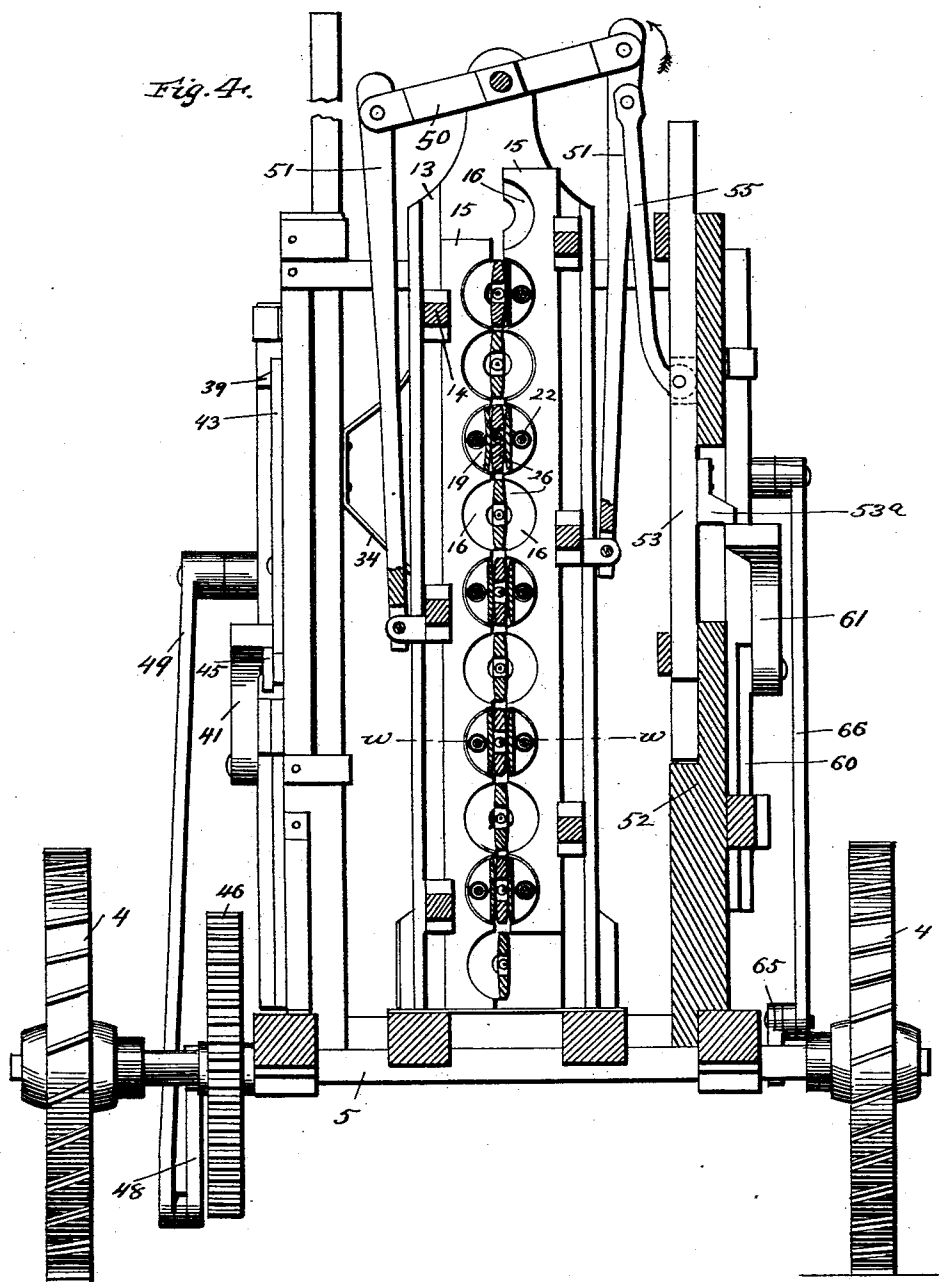
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R. DIAL.
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Patented Dec. 22, 1896.



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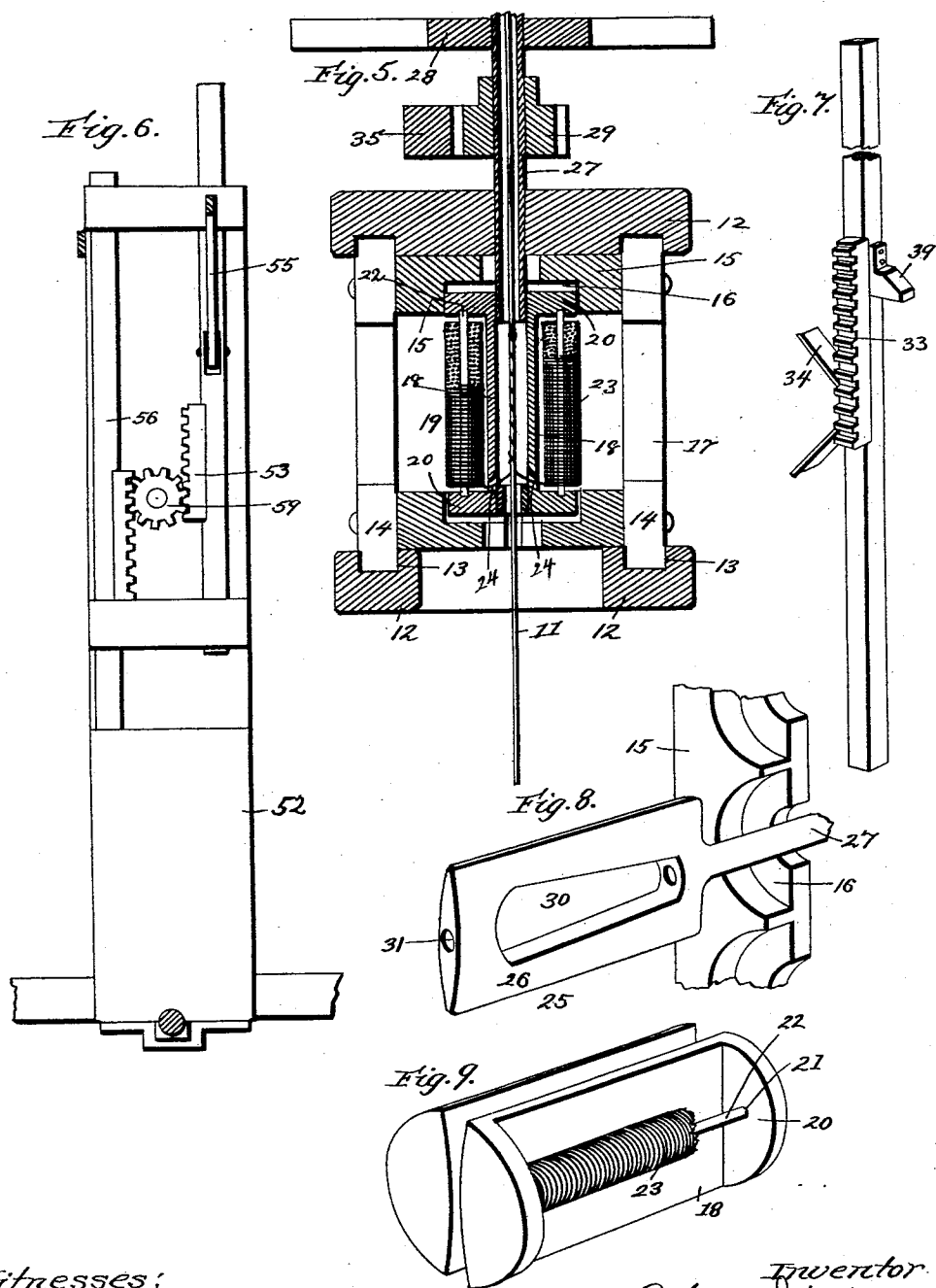
(No Model.)

5 Sheets—Sheet 5.

R. DIAL.
FENCE MAKING MACHINE.

No. 573,815.

Patented Dec. 22, 1896.



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UNITED STATES PATENT OFFICE.

ROBERT DIAL, OF CHELSEA, INDIAN TERRITORY.

FENCE-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 573,815, dated December 22, 1896.

Application filed September 22, 1896. Serial No. 606,626. (No model.)

To all whom it may concern:

Be it known that I, ROBERT DIAL, a citizen of the United States, residing at Chelsea, in the county of Cherokee, Indian Territory, have invented certain new and useful Improvements in Fence-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to machines for making wire fabrics, and more especially to that class designed for weaving wire fences; and its novelty and many advantages will be fully understood from the following description and claims when taken in conjunction with the annexed drawings, in which—

Figure 1 is a perspective view of my improved machine as it appears in operation with some of the parts broken away and other parts omitted. Fig. 2 is a vertical longitudinal section of the machine, taken in the plane inside one of the rear traveling wheels and illustrating the side opposite to that shown in Fig. 1. Fig. 3 is a transverse section taken in the plane indicated by the dotted line *xx* of Fig. 2. Fig. 4 is a transverse section taken in the plane indicated by the dotted line *yy* of Fig. 1. Fig. 5 is an enlarged detail section taken in the plane indicated by the line *ww* of Fig. 4. Fig. 6 is a detail sectional view illustrating a portion of the mechanism for moving the twisting wire from one runner to another. Fig. 7 is a sectional perspective view illustrating a portion of the mechanism through the medium of which the twist-ers are rotated. Fig. 8 is an enlarged detail broken perspective illustrating a portion of the frame and the runner-wire guide and shaft of one of the twist-ers, and Fig. 9 is a perspective view illustrating the spool-carriers of a twister.

In the said drawings similar numerals designate corresponding parts in all of the several views, referring to which—

1 indicates the main frame of my improved machine, which in the present embodiment of the invention is supported by the front wheels 2, arranged on an axle 3, pivotally connected with the body, and the rear traction-wheels 4, fixed on a shaft 5, journaled

in suitable bearings in the main frame, as shown.

The machine is designed to be drawn by draft-animals or by a traction-engine, and power is taken from the shaft 5 to drive the mechanism, as will be presently described.

The main frame 1 may be of any form and construction suitable to the purposes of my invention, but is preferably of a rectangular form, as shown. Said frame is provided at its forward end with an upright spool-rack 5^a, which preferably comprises the upright bar 6, having journaled apertures 7 at intervals in its length, and the upright bar 8, having inclined notches 9 at intervals in its length, and it is designed to receive the spindles of the spools 10, which carry the runner-wires 11 and have their spindles on shafts arranged in the apertures 7 and notches 9 of the upright bars 6 and 8, as shown.

When desirable, two or more spool-racks may be provided upon the frame 1, the said racks being arranged one in front of the other and being designed for use one after the other, that is to say, after the runner-wires are run off the spools of one rack the said wires may be connected with the wires on the spools of the next succeeding rack until the supply of wire on the spools of all the racks is exhausted, when it is necessary, of course, to remove the empty spools from the racks and replace the same with full spools and properly connect the wires before the operation of weaving the wire or building the fence can be resumed.

12 indicates upright guides, which are arranged in the longitudinal center of the frame 1 in rear of the spool-rack 5^a, and are provided with four (more or less) vertical grooves or guideways 13, as shown, for the reception of the vertically-movable slides 14. (Better illustrated in Fig. 5 of the drawings.) There are two of such slides 14 employed, and while they may be of any construction suitable to the purposes of my invention I prefer to have them respectively comprise the upright bars 15, which are recessed in their inner sides at intervals in their length to form bearing portions 16, and the cross-bars 17, which connect the said upright bars and have their ends arranged in the ways or grooves 13 of the up-

right guides 12, as shown. In the bearing portions 16 of the bars 15 are arranged and journaled the semicircular ends of the spool-carriers 18 of the wire-twisters 19. These
 5 spool-carriers 18 are flat at their inner sides and have the semicircular portions 20 at their ends, and they are also provided at their ends with bearings 21 to receive the bobbins 22, upon which the wrapping-wire 23 is wound,
 10 and with the apertures 24 for the passage of the wrapping-wire from the bobbins or spools.

25 indicates what may properly be termed the "shafts" of the twisters, since they transmit rotary motion of the same. These shafts
 15 25 each have the flattened portion 26, which is designed to rest between two spool-carriers 18, and the tubular portion 27, which is journaled in the forward upright 12 and also in an auxiliary forward upright 28, and is provided
 20 with a pinion 29, as shown. The flattened portion 26 of the shaft 25 is provided with the large transversely-disposed aperture 30 to permit of the wire 23 being wrapped around the runner-wire, as shown in Fig. 5, and the
 25 longitudinally-disposed aperture 31, which rests in alinement with the tubular portion 27 and designed like said tubular portion for the passage of a runner-wire.

32 indicates an upright which is connected
 30 to and rises from the frame 1 at one side thereof and preferably at a point slightly in advance of the upright guides 12, as better shown in Figs. 1, 2, 3, and 4 of the drawings. Arranged in suitable guides in this upright 32
 35 is a vertically-movable rack-bar 33, which is connected by arms 34 or otherwise with a rack-bar 35, which is designed and adapted to engage the pinions 29 of the twisters, as better shown in Fig. 3. Also arranged in suitable
 40 guides in the upright 32 (see Fig. 2) is a vertically-movable rack-bar 36, and between this rack-bar 36 and the rack-bar 35 is an idler pinion 37, which meshes with the teeth of both, as shown, and for a purpose presently described. The upright 32 is provided, as better
 45 shown in Fig. 1, with vertical transversely-disposed slots 38, and in these slots are arranged and adapted to move lugs 39 and 40, which are connected to the rack-bars 33 and
 50 36, respectively. These lugs 39 and 40 are designed for the engagement of an arm 41, which is pivotally connected at its lower end to a vertically-movable plunger 42 and at its upper end straddles said plunger, so as to permit
 55 of its being swung first to one side to engage one of the lugs and then to the other side to engage the other lug. The arm 41 is moved first to one side and then to the other by the cam-levers 43, 44, which are fulcrumed
 60 at intermediate points of their length on the uprights 32, and are adapted at their upper ends to be engaged by the lugs 39 and 40, respectively, and are provided at their lower ends with adjustably-connected portions 45, designed
 65 to engage opposite sides of the arm 41, for a purpose presently described.

The plunger 42 is reciprocated by the drive-shaft 5 through the medium of the gear-wheel 46 on said shaft, the pinion 47, which meshes
 70 with said gear-wheel, the crank-arm 48 on the same shaft as the pinion, and the pitman 49, connected at one end to the crank-arm and at its opposite end to the plunger 42, as illustrated. In Fig. 1 of the drawings the
 75 plunger 42 is shown at its lowermost position with the arm 41 in a position to engage the lug 40 of the rack-bar 36. Now when the plunger 42 is moved upwardly the arm 41, engaging the lug 40, will raise the rack-bar 36,
 80 rotate the pinion 37 in the direction indicated by arrow, (see Fig. 2,) and move the rack-bar 33 and the rack-bar 35 downwardly, and consequently rotate the pinions 29 and the wire-twisters 25 in the direction indicated by arrow
 85 in Fig. 3. When the lug 40 is moved upwardly, it engages the upper portion of the cam-lever 44 and presses said upper portion outwardly, and consequently presses and holds the inner
 90 portion of said lever inwardly. In consequence of this it will be seen that when the plunger and the arm 41 are moved downwardly the said arm 41 will be engaged by the
 95 lower end of the lever 44 and move so that on the next succeeding upward stroke of the plunger it will engage the lug 39 of the rack-bar 33. With the parts in this position, when
 100 the plunger is moved upwardly the rack-bar 33 will be moved upwardly, the pinion 37 will be rotated in the direction opposite to that indicated in Fig. 2, the rack-bar 36 will be
 105 moved downwardly, the rack-bar 35 will be moved upwardly, and the pinions 29 of the twisters, and consequently the twisters, will be rotated in the direction opposite to that
 110 indicated by arrow in Fig. 3. As the lug 39 is raised it will engage the upper portion of the cam-lever 43 and press said upper end outwardly, and consequently press and hold
 115 the lower end inwardly, so that when the plunger is moved downwardly the upper end of the arm 41 will be engaged by the said
 120 lower end of the cam-lever 43 and will be moved so that on the next succeeding upward stroke of the plunger it will again engage the lug 40.

It will be observed that when the rack-bar 33 is moved upwardly the rack-bar 35 will
 125 also be moved upwardly and the twisters 25 rotated in a direction opposite to that indicated by arrow in Fig. 3, and it will also be
 130 seen that when the rack-bar 36 is moved upwardly the rack-bar 35 will be moved downwardly and the twisters 25 will be rotated in the direction indicated by arrow in Fig. 3.

It will further be observed that during the
 135 downward strokes of the plunger 42 and arm 41 the rack-bars 33, 36, the pinion 37, the rack-bar 35, and the twisters will remain idle, for a purpose presently to be described.

50 indicates a walking-beam which is ful-
 140 crumed between the upper ends of the uprights 12 and has its opposite ends connected

to the pitmen 51, which are connected to the vertically-movable slides 14, and 52 indicates an upright which is connected to and rises from one side of the main frame 1 and is arranged at one side of the uprights 12, as shown. Arranged in suitable guides in this upright 52 is a vertically-movable rack-bar 53, which has a lug 53^a extending through a vertical slot 54 in the upright, and which bar 53 is connected by a pitman 55 with one of the pitmen 51, and also arranged in suitable guides in said upright 52 is a vertically-movable rack-bar 56, which also has a lug 57 extending through a vertical slot 58 in the upright, as shown. A pinion 59 is arranged between and in mesh with the rack-bars 53 and 56, and consequently it will be seen that when one of the said bars is moved upwardly the other will be moved downwardly.

60 indicates a vertical plunger arranged in suitable guides on the upright 52. 61 indicates an arm pivotally connected to the plunger 60 and adapted at its upper end to engage the lugs 53^a 57 alternately, and 62 63 indicate levers similar to the levers 43 44 before described, which are designed to operate in a manner similar to said levers 43 44 to move the arm 61 to a position so that it will engage the lug of one of the rack-bars after it has engaged the lug of and raised the other rack-bar and returned to its lowermost position. Motion is transmitted from the shaft 64, which carries the pinion 47 and the crank 48, to the plunger 60 through the medium of the crank-arm 65 on said shaft and the pitman 66, which is connected to said crank-arm and plunger, as better shown in Fig. 2. By reason of the construction just described it will be observed that when the plunger 60 is moved upwardly with the arm 61 in engagement with the lug 53^a of the rack-bar 53 said rack-bar will be raised, the walking-beam 50 will be rocked in the direction indicated by arrow in Fig. 4, and one of the slides 14 will be raised and the other lowered, and when the said plunger 60 is moved upwardly with the arm 61 in engagement with the lug 57 of the rack-bar 56 said rack-bar 56 will be moved upwardly, the walking-beam 50 will be rocked in the direction opposite to that indicated by arrow in Fig. 4, and the slides 14 will be moved in directions opposite to their former movements. When the plunger 60 is moved downwardly, the rack-bars 53 56, the plunger 50, and the slides 14 will remain idle, for a purpose presently described.

In the practical operation of the machine the runner-wires are carried from the spools 10 through the tubular portions 27, and apertures 31 of the twister-shafts 25, and are connected to a fixed post or other support. The machine is then started forward, when it will be seen that the twistors will be rotated and the slides 14 will be reciprocated in opposite directions through the medium of the mechanism before described. The movements of the

parts are so timed that while the plunger 60 is moving downwardly and the slides 14 are idle the twistors will be rotated in one direction to twist the wire 23 around the runner-wires 11, as better shown in Fig. 1. At the conclusion of the upward movement of the plunger 42, through the medium of which the twistors are rotated, and while said plunger 42 is moving downwardly the plunger 60 is moved upwardly, and through the medium of the mechanism described one of the slides 14 is moved up and the other down. The movement of the parts is also so timed that this movement of the slides 14 will take place while the flattened portions 26 of the twister-shafts 25 are idle and vertically disposed, as shown in Fig. 4, and consequently it will be seen that such movements of the slides will move those twister-sections 18 which are in one slide up and those which are in the other slide down.

In the present embodiment of the invention the slides 14 are shown as provided, respectively, with ten semicircular portions 16, which serve in conjunction to form ten circular bearings for the twistors. There are, however, but five pairs of twister-sections 18 employed, and they are arranged as better shown in Fig. 4 of the drawings. Consequently it will be seen that, with the parts in the position shown in Fig. 4, when one slide (the left slide, for instance) is moved up and the other slide down the twister-sections 18 of the left-hand slide will be moved upwardly such a distance that the twister-sections will rest alongside the shafts 25 above the shafts alongside of which they are shown in Fig. 4, while the twister-sections of the right-hand slide will rest alongside the shafts 25 below the shafts alongside of which they are shown in Fig. 4. This transfer or movement of the twister-sections 18 will carry the wrapping-wires 23 from one runner-wire 11 to another to form meshes, as shown in Fig. 1, each twister-section 18 serving to wrap the wire 23 around two runner-wires 11 alternately. At the completion of the movements of the slides 14, as described, the twistors will be rotated, through the medium of the mechanism described, in a direction opposite to the direction of the first rotary movement to twist the wires 23 around the runner-wires. The slides 14 will be then returned to the position shown in Fig. 4, and the operation is repeated until the entire fence or fabric is completed.

When my improved machine is to be used for forming a fabric for fence purposes, the traveling wheels may be omitted and any suitable motor may be employed to rotate the shaft 64.

Having described my invention, what I claim is—

1. In a machine for making wire fabric, the combination of a main frame, a drive-shaft journaled therein, reciprocatory slides having bearings, shafts journaled in the frame and

having the tubular portions and the flattened and apertured portions arranged between the slides, spool-carriers arranged in the bearings of the slides and adapted in conjunction with the shafts to form wire-twisters, mechanism intermediate of the drive-shaft and the twisters for rotating said twisters, and mechanism intermediate of the drive-shaft and the slides for reciprocating said slides, substantially as and for the purpose set forth.

2. In a machine for making wire fabric, the combination of a main frame, a drive-shaft journaled therein, reciprocatory slides arranged side by side and having semicircular bearing portions in their inner sides, shafts journaled in the frame and having the tubular portions and the flattened and apertured portions arranged between the slides, the spool-carriers arranged on opposite sides of the flattened portions and serving in conjunction with the same to form twisters on the shafts and having the semicircular end-portions arranged in the bearing portions of the slides and also having apertures for the passage of twisting wire, the spools journaled in said carriers; mechanism intermediate of the drive-shaft and the shafts of the twisters for rotating the latter, and mechanism intermediate of the drive-shaft and the slides for moving said slides simultaneously in opposite directions, the said mechanisms each having a lost motion and being so timed that the twisters will be rotated while the slides are idle and the slides will be moved while the twisters are at rest, substantially as and for the purpose set forth.

3. In a machine for making a wire fabric, the combination of slides having bearings, rotary shafts arranged between the slides and adapted for the passage of wires and having pinions, spool-carriers arranged in the bearings of the slides and adapted to move therewith in planes on opposite sides of the plane of the shafts, a walking-beam, pitmen connecting the opposite ends of said beam and the slides, a rack-bar engaging the pinions of the shafts, and means for rocking the walking-beam and moving the rack-bar, substantially as and for the purpose set forth.

4. In a machine for making wire fabric, the combination of slides having bearings, rotary shafts arranged between the slides and adapted for the passage of wires and having pinions, spool-carriers arranged in the bearings of the slides and adapted to move therewith in planes on opposite sides of the plane of the shafts, a walking-beam, pitmen connecting the opposite ends of said beam and the slides, a rack-bar engaging the pinions of the shaft, a drive-shaft, rack-bars connected by an interposed idler-gear and having lugs, a connection between one of said rack-bars and the walking-beam, a plunger having a swinging arm adapted to alternately engage the lugs of the rack-bars, cam-levers for moving said arm, a connection between the drive-

shaft and the plunger for reciprocating said plunger, a second pair of rack-bars connected by an interposed idler-gear and having lugs, a connection between one of said rack-bars and the rack-bar which engages the pinions of the twister shafts, a plunger having a swinging arm adapted to alternately engage the lugs of the rack-bars, cam-levers for moving said arm, and a connection between the drive-shaft and the second plunger for reciprocating said plunger, the parts being so timed that when the plunger connected with the walking-beam is moved in one direction the other plunger connected with the rack-bar engaging the pinions of the twister-shafts will be moved in the opposite direction, substantially as and for the purpose set forth.

5. In a machine for building wire fences, the combination of a frame, a shaft having traction-wheels at its ends and journaled in the frame, a drive-shaft connected by gearing to said traction-shaft and having oppositely-disposed cranks at its ends, slides having bearings, rotary shafts arranged between the slides and adapted for the passage of wires and having pinions, spool-carriers arranged in the bearings of the slides and adapted to move therewith in planes on opposite sides of the plane of the shafts, a walking-beam, pitmen connecting the opposite ends of said beam and the slides, a rack-bar engaging the pinions of the shaft, a drive-shaft, rack-bars connected by an interposed idler-gear and having lugs, a connection between one of the said rack-bars and the walking-beam, a plunger having a swinging arm adapted to alternately engage the lugs of the rack-bars, cam-levers for moving said arm, a pitman connected at one end to one crank-arm of the drive-shaft and at its opposite end to the plunger, a second pair of rack-bars connected by an interposed idler-gear and having lugs, a connection between one of said rack-bars and the rack-bar which engages the pinions of the twister-shafts, a second plunger having a swinging arm adapted to alternately engage the lugs of the rack-bars, cam-levers for moving said arm, and a pitman connected to one of the crank-arms of the drive-shaft and the second plunger, substantially as specified.

6. In a machine for building wire fences, the combination of a frame, a rack arranged thereon and carrying wire-spools, traction-wheels supporting the frame, slides arranged in the frame in rear of the spool-rack and having bearings, rotary shafts arranged between the slides and adapted for the passage of wires, spool-carriers arranged in the bearings of the slides and adapted to move therewith in planes on opposite sides of the plane of the shafts, mechanism intermediate of one of the traction-wheels and the shafts for rotating said shafts, and mechanism intermediate of one of the traction-wheels and the slides for moving said slides simultaneously in opposite directions, the said mechanisms each having a lost

motion and being so timed that the shafts will be rotated while the slides are idle and the slides will be moved while the shafts are at rest, substantially as and for the purpose set forth.

5 7. The combination of a device to be moved, rack-bars having lugs, a connection between one of the said rack-bars and the device to be moved, a reciprocatory plunger, an arm pivotally connected to said plunger and adapted to engage the lugs of the rack-bars alternately,

and cam-levers arranged to be engaged by the lugs of the rack-bars and adapted to move the pivoted arm of the plunger, substantially as and for the purpose set forth.

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

ROBERT DIAL.

Witnesses:

A. K. DOUGLASS,
ELLIOTT DIAL.