

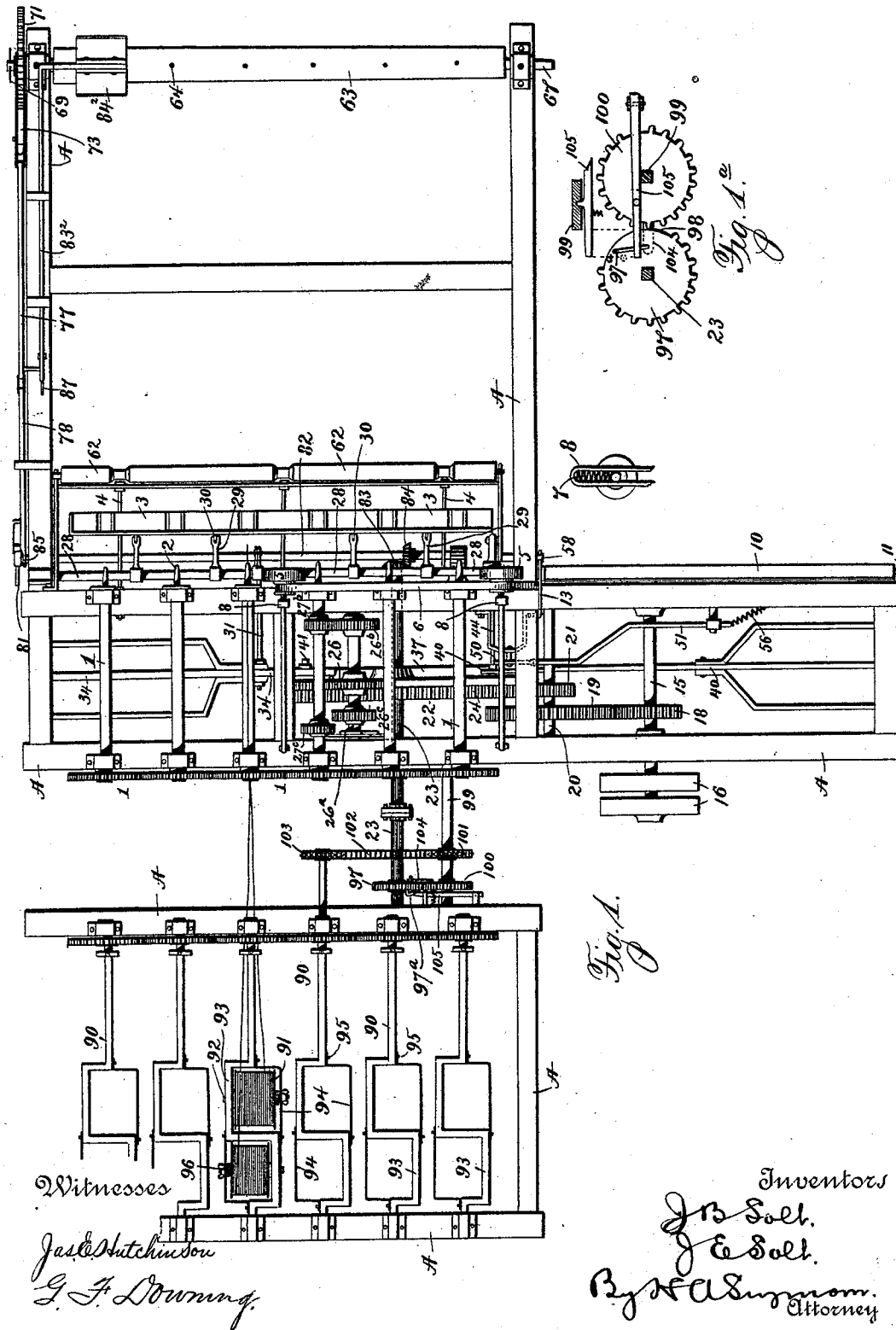
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7 Sheets—Sheet 1.

J. B. & J. E. SOLT.
SLAT AND WIRE FENCING MACHINE.

No. 499,353.

Patented June 13, 1893.



(No Model.)

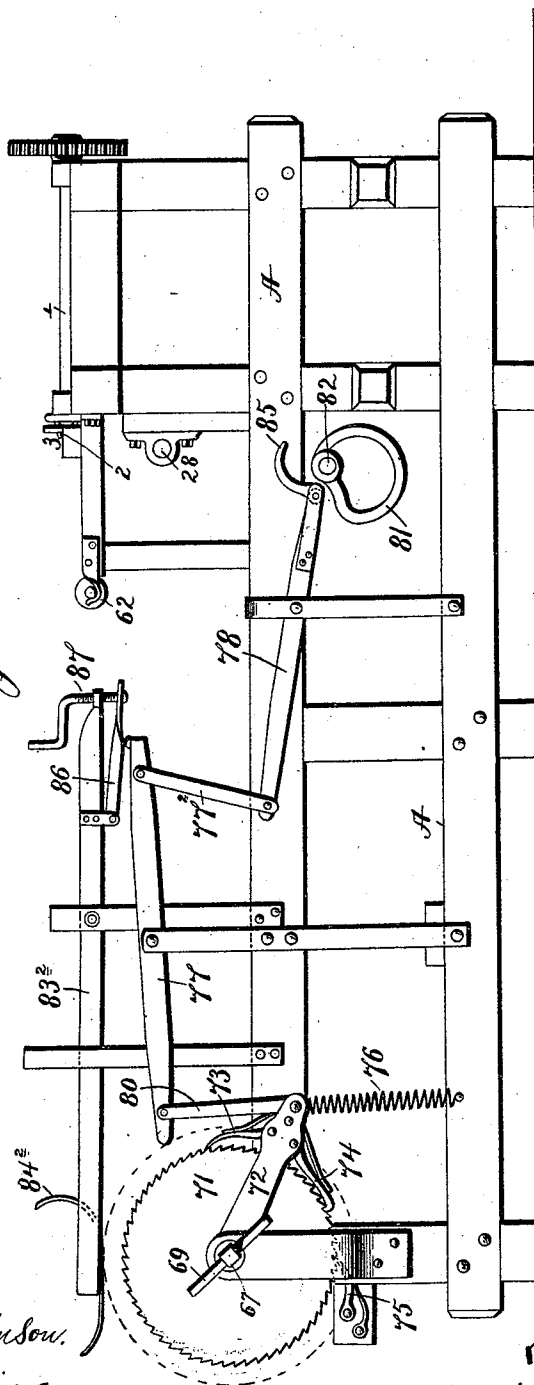
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Fig. 2.



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(No Model.)

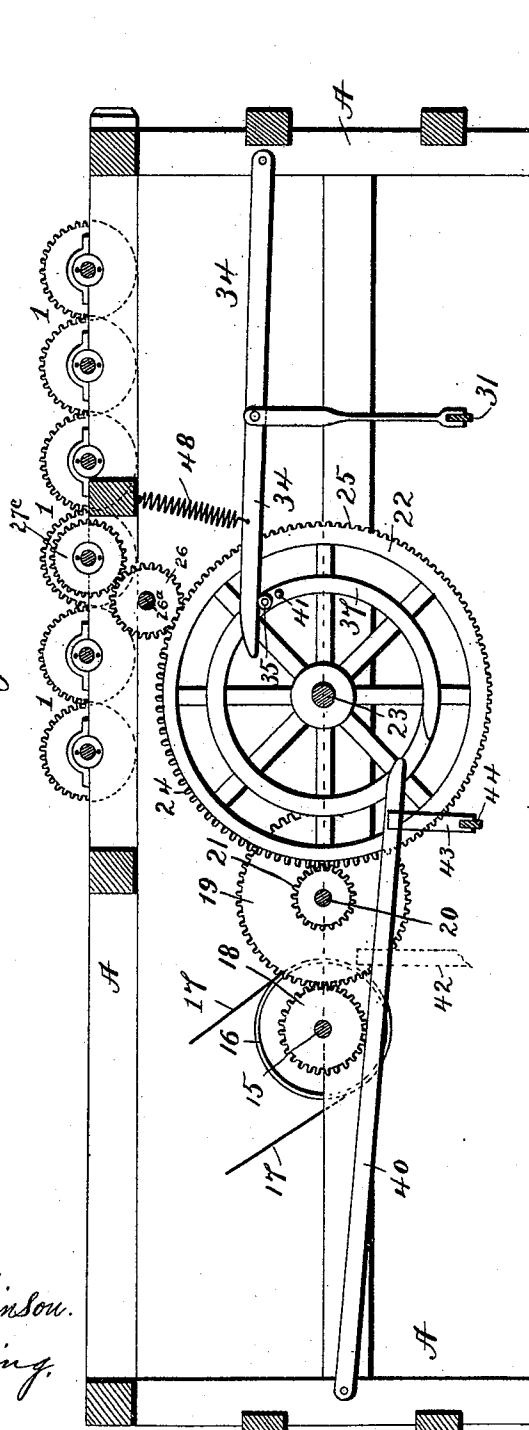
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Fig. 3.



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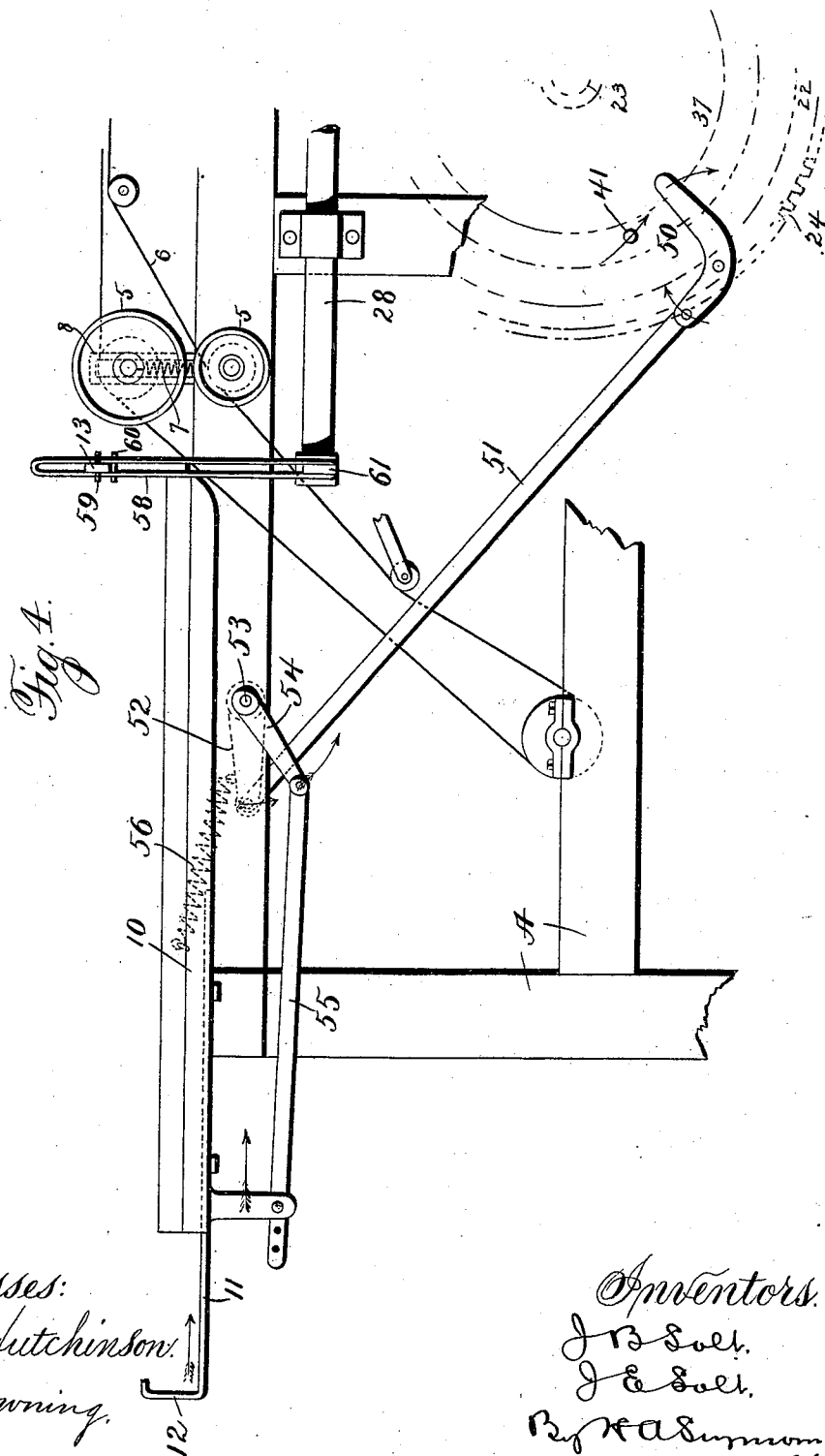
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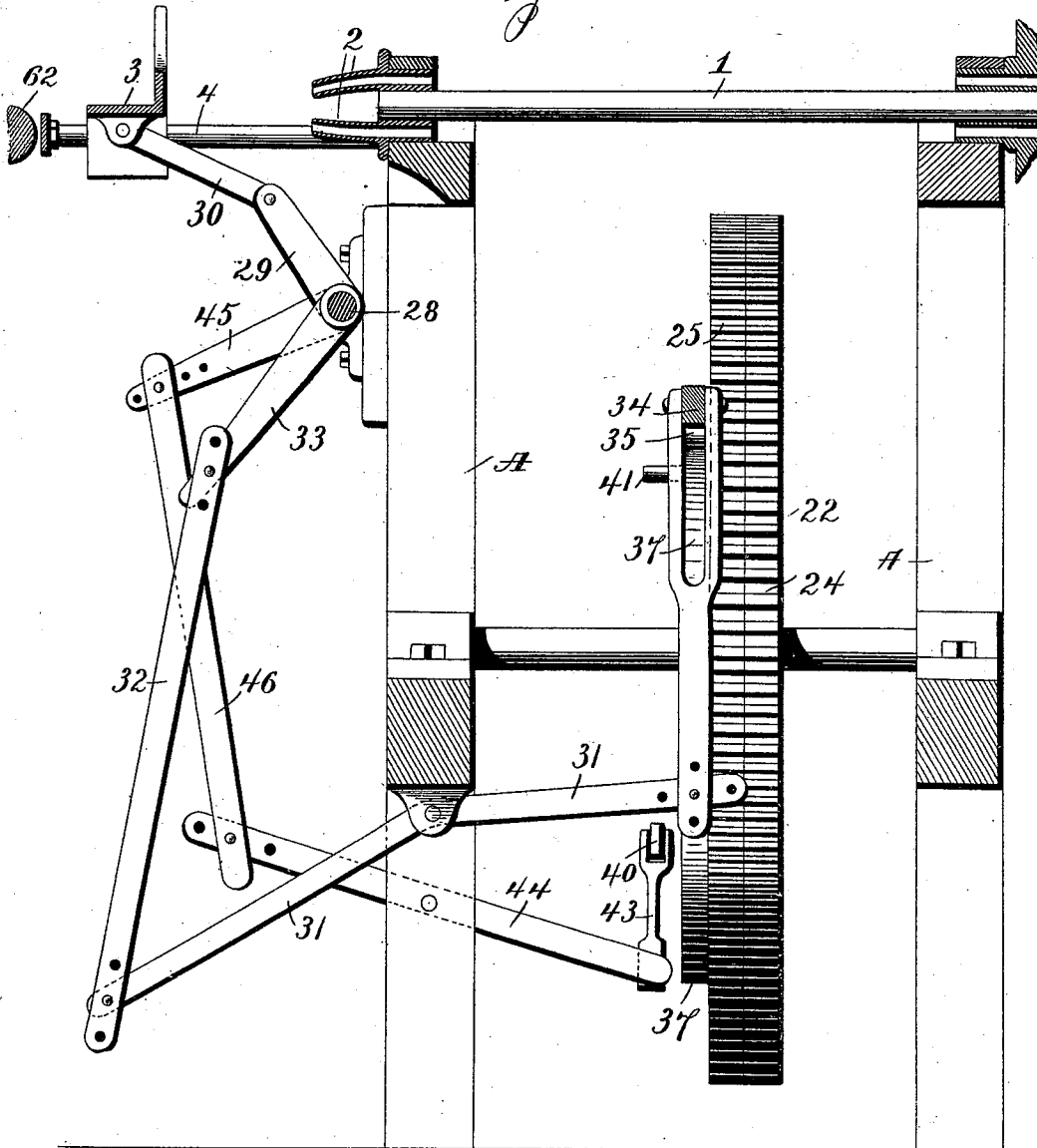
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Fig. 5.



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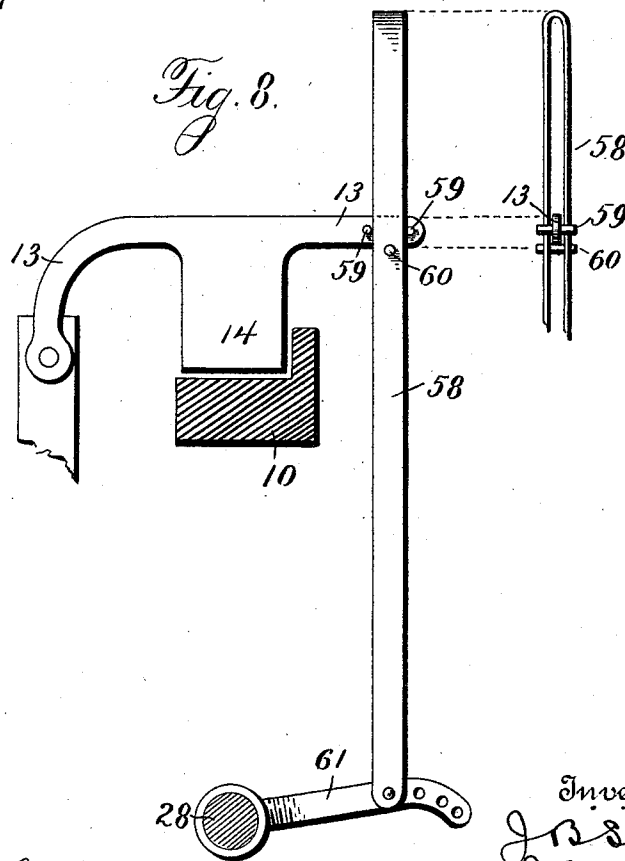
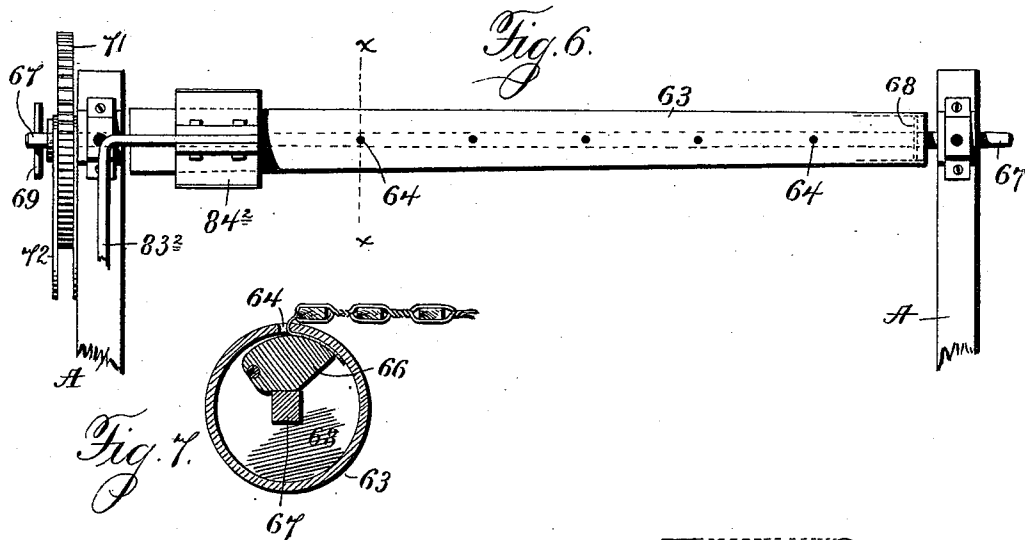
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UNITED STATES PATENT OFFICE.

JACOB B. SOLT AND JAMES E. SOLT, OF FREDERICK, MARYLAND.

SLAT-AND-WIRE-FENCING MACHINE.

SPECIFICATION forming part of Letters Patent No. 499,353, dated June 13, 1893.

Application filed October 14, 1892. Serial No. 448,849. (No model.)

To all whom it may concern:

Be it known that we, JACOB B. SOLT and JAMES E. SOLT, of Frederick, in the county of Frederick and State of Maryland, have invented certain new and useful Improvements in Fence-Making Machines; and we do hereby 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.

Our invention relates to an improvement in power fence making machines, the object being to provide novel means for feeding the slats and wire and twisting the latter around the slats; to provide novel mechanism for reeling the completed fencing and removing it from the machine; and to provide various other novel details to the end that an organized machine of novel structure and simplified parts is produced whereby the time required in the manufacture of fencing and cost of production are greatly lessened.

With these objects in view our invention consists in certain novel features of construction and combinations of parts which will be hereinafter described and pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of the entire machine. Fig. 1^a is a detail of mechanism employed for transmitting periodical motion from one part of the machine to the other. Fig. 2 is a side elevation of the reeling end of the machine. Fig. 3 is a transverse section of the main frame taken on the right side of wheel 22 and looking toward the latter. Fig. 4 is a side elevation of the feed end of the machine. Fig. 5 is a longitudinal section of a portion of the machine showing wheel 22 in end elevation. Fig. 6 is a view of the reel. Fig. 7 is an enlarged section on line $x-x$ of Fig. 6. Fig. 8 is a detail view of the cut-off the upper right hand portion showing the mechanism from a different point of view; and Figs. 9 and 10 are plan and side elevations respectively of the spool frames, which supply the wires between the slats.

The twistors are all geared together so that uniform motion is imparted to them all.

A A represent the frame of the machine. This frame may be made in one section or if

desired may comprise two or more sections. In this particular instance it is composed of two sections, one of which supports the spool mechanism and the other the balance of the machinery including the wire-twisters the object of making the frame in sections being simply to afford greater convenience and facility in moving the machine, which if made in a single section would be very awkward and cumbersome as the machine is necessarily large and heavy. For convenience in describing the various parts, these sections will therefore be designated the spool frame and the twister frame. When made in the two sections, as shown, they are somewhat separated and the wires are drawn across the space between them as fast as required in the twisting process.

Starting with the twistors 1, 1, as they are perhaps the most essential part of a machine of this variety, although not new, it may be said that they are revolvably supported on top of the twister frame. Any number of these twistors may be employed. In the present instance there are six. They are arranged side by side and comprise shafts having perforated hubs on each end through which the wires are passed. On one end short hollow fingers 2, 2, are formed through which the wire is fed and between which the slats are first fed preparatory to their having the wires twisted about them. On their opposite ends, these shafts are furnished with gear wheels of uniform size, they being intermeshed with one another whereby motion from one is communicated to the other. The slats are received one at a time upon a narrow table 3. This table is mounted on guide rods 4, 4, which extend outwardly a short distance from the main body of the machine. The table comprises preferably a vertical and horizontal plate, the former being provided with slots adapted to receive the twister fingers when the table is in its inward position. Directly over the table when in this position are located one or more feed rollers, they being revolvably supported on the free ends of the hinged arms 5, 5, and driven by an endless belt 6. The rollers are retained yieldingly in their place by springs 7, 7, and they are guided in their vibratory movements by the guides 8, 8.

Thus far we have described features which have been set forth in our Patent No. 480,391 and they have been briefly described in this connection simply because they are necessary to a proper understanding of the machine.

The first novel feature of the present invention consists then in the slat feed which is as follows: An extension table 10 is for convenience formed on the front or feed end of the machine. A rod 11, has sliding connection with this table, passing conveniently through a recess or groove on the under surface of the extension table. On the outer end of this rod is formed an upturned hook or plate 12 adapted to engage and feed forward the slats as they are placed by the operator upon the extension table, by striking their butt ends and forcing them forward onto the slide table 3 which is in alignment with this extension table. A stop mechanism is located between these two tables for the purpose of preventing a second slat being fed to the slide table while another one is on it and also to form an abutment against which the operator may place each slat preparatory to its being forced forward into the machine. This stop mechanism consists in an arm 13 hinged at one side of the extension table and extending across the table. At a point directly over the table this arm has a depending plate which forms the stop 14 (see Fig. 8). These several parts, that is to say, the twisters, the slide table, the feed mechanism, and the stop mechanism are operated by the following mechanism:

I. *The twisters.*—A main drive shaft 15 has the usual belt wheels 16, 16, thereon over one of which the drive belt 17 passes. This shaft has a pinion 18 keyed thereon and the teeth of the pinion are intermeshed with the teeth of a larger gear wheel 19 on a shaft 20 and shaft 20 is furnished with a pinion 21. A large mutilated gear wheel 22 is carried on a shaft 23 and this wheel is provided with a double set of teeth, one set 24 of which extends entirely around the wheel and meshes with the teeth of wheel 21 from which it receives motion and the other set 25 extends say two-thirds around this wheel and the teeth of this set are adapted to periodically engage the teeth of a gear wheel 26 located on shaft 26^a. This shaft is provided with two gear wheels 26^b, 26^c of different sizes. Also an adjacent twister 1 is furnished with two gear wheels 27^b and 27^c of different sizes. The shaft 26^a is adapted to be shifted endwise relative to the wheel 26 or the wheels 26^b and 26^c may be adjustable on this shaft to throw wheels 26^b and 27^b or wheels 26^c and 27^c into mesh as the case may be, the object being to provide for changing the twists in the wires between slats.

II. *The slide table.*—A rock shaft 28 is supported in suitable boxes at a convenient distance below the slide table. On this rock shaft are secured a number of arms 29, 29, the outer ends of which are connected by links

30, 30 to the slide table 3 so that as the shaft is rocked back and forth it gives a positive outward or inward slide to the slide-table as the case may be. Rocking motion is given to the shaft 28 through the following: A rock lever 31 is pivoted to the frame at some convenient point and one end of this lever is connected by a pitman 32 to an arm 33 on the rock-shaft 28. The opposite end of rock-lever 31 is connected by links or equivalent means to a lever 34 at a point preferably between its pivotal connection with frame A and its free end, so that when this lever 34 is raised it will force the slide table outward. Lever 34 is raised by means of devices on the wheel 22 and this means consists preferably of an anti-friction roller 35 or other projection on the side of the wheel, which is located in position to strike the lower edge of the free end of lever 34 and raise it. It is quite essential that the slide table should be held outward a sufficient length of time after the table has been slid outward to admit of the strands of wire being twisted behind the last slat. As an approved means for accomplishing this a curved cam 37 is secured to the side of wheel 22 extending from roller 35 concentric with shaft 23 and for a sufficient distance to allow time for the twisting. When the end of the cam is reached, some means has to be provided for sliding the table 3 inward again. This, we accomplish by lever mechanism now to be described. A lever 40, in many respects resembling lever 34 is pivoted to the frame A at a point about opposite lever 34. This lever projects inwardly toward wheel 22 its free end lying alongside the latter in position to be struck by a projection 41 on the adjacent face of the wheel just as the end of lever 34 leaves the cam 37. By this engagement lever 40 is depressed it being guided in its movement by an upright 42. An arm 43 extends downward from the free end of this lever 40 and its lower end is pivotally connected with one end of a rock lever 44 and the opposite end of the rock lever is connected to an arm 45 extending outward from rock shaft 28 by pitman 46. By this means the rock-shaft is rocked back in the opposite direction from which it is rocked by lever 34 and the slide table 3 is moved inward. Thus positive motions are given to the slide table in each direction at predetermined intervals, or at times when the twisters are stationary, all twisting taking place between the outward and inward movements of the slide table. To prevent lever 34 from dropping too hard and also incidentally to assist in raising it a stiff spiral spring 48 extends from it upward to some point on the frame.

III. *The feed mechanism.*—A trip lever 50 conveniently of the bell crank variety is pivoted to the frame of the machine at a point below the free end of lever 40, its free end being in position to be struck by projection 41 as the latter continues downward after striking lever 40 and forcing the slide table

3 back to receive another slat. A pitman 51 extends from the opposite end of the bell crank or trip lever to a crank 52 on shaft or pin 53 and another crank 54 on this same pin or shaft has connection with rod 11 through a pitman 55. In this manner when bell crank 50 rocks in the direction indicated by the arrow the rod 11 is drawn inward carrying with it a slat providing one has been placed on the extension table in front of it. To instantly throw the rod 11 back when projection 41 has passed over trip lever 50, a spring 56 is extended from crank 52 or some other convenient point to the frame.

5 IV. *The stop mechanism.*—A link 58 consisting it may be of a strip of metal doubled, has a loose sliding connection with the lever or arm 13 between the pins or projections 59, 59 on the arm 13. This link is closed at its upper end and a pin 60 passes through it beneath the lever or arm. The lower end of this link is pivotally connected with an arm 61 on the rock-shaft 28, the arrangement being such that the stop is dropped the moment the slide table is forced outward. (See Figs. 4 and 8.)

Thus it will be seen that all of these parts, namely, the twistors, the slide table, the feed mechanism, and the stop mechanism receive their motion from the mutilated gear wheel 22. The loose connection between the link 58 and the arm or lever 13 is such that the arm or lever 13 may be raised and lowered by hand if occasion requires it independently of the link which loosely connects it. As fast as the fencing is made it passes over a roller 62 and thence to the reel. As the reel constitutes a part of our present invention it will be described in detail. The fencing is wound on a roller 63. This roller is hollow and preferably tapers slightly from one end to the other so that it may be easily removed from the completed roll of fencing. Several holes 64, 64 are formed in the roller to receive the ends of the wires. Inside of the roller, a clamp bar 66 preferably of wood is hinged and this is forced in place to clamp the ends of the wires by means of the rod 67 which acts as a cam. The rod is inserted through an axial opening through the axial center of the roller, it being held by a web 68. The rod has a handle 69 on one end to facilitate in its removal from the roller. The ends of the rod serve as trunnions for the support of the reel as it turns. The ends of the wires are first inserted in the holes in the roller tangentially and then the roller is turned in the opposite direction. To remove the roll the rod is drawn out, the rolled fencing is cut off from the rest and the roller is turned inside of the roll in a direction to cause the ends of the wire to leave the holes in the roller. This may be done by inserting a rod in the roller and turning the latter thereby. Then the roller is replaced as before for another roll of fencing.

The reeling of the fencing is done by the

following means which while capable of more or less variation is deemed most expedient. A ratchet toothed wheel 71 has its hub journaled at one end of the frame. Through this hub, the rod 67 which carries the roller passes, the rod being angular or provided with a spline whereby the two are made to rotate together. This ratchet toothed wheel with the rest of the reel is actuated periodically to wind the fencing and gather up the slack in it as fast as it is formed, by means of a kind of escapement. This consists of a vibrating lever 72 pivoted on the hub of the ratchet toothed wheel and a pair of spring actuated pawls 73, 74 pivoted to the lever and operating in connection with the teeth. One pawl is constructed and adapted to push and the other to pull. A third pawl 75 is pivoted to the frame and rides over the teeth and is adapted to lock the wheel 71 against backward movement.

A spring 76 automatically depresses the lever 72 or returns it to its normal position and the wheel is turned forward by means of one or more levers preferably two. These levers 77 and 78 are connected at adjacent ends by link 77² and lever 77 is similarly connected to the escapement by link 80. Lever 78 is actuated by a cam 81 on the outer end of rotary shaft 82 and the latter shaft is driven by a bevel pinion 83 on shaft 23 meshing with bevel pinion 84 on shaft 82. A hook 85 on the free end of the lever 78 prevents its dropping beyond a predetermined point. At first the reel must necessarily be turned farther in order to wind properly; afterward very much less. This is regulated automatically by the following: On one end of a lever 83² a floater 84² is secured. This floater rests upon the roll of fencing being in consequence gradually elevated as the roll increases in size. The opposite end of the lever is adapted to strike the end of or a projection on lever 77. This end forms a stop for lever 77 thus gradually limiting the vibrations of the escapement. To regulate this movement and make it exact a plate 86 is pivoted to lever 83² and a screw 87 is provided for adjusting this plate to the proper position to cause lever 77 to be struck at precisely the right time.

The spool frame has revolvably supported thereon a series of shafts 90, 90. These are preferably square in cross section and we prefer to have them bent as shown into a kind of crank shape and in the frames thus formed the spools 91, 91 are held. To do this bolts 92, 92 are secured at one end to the parts 93 of the shafts and the spools are placed on them. Plates 94, 94 are then placed over the free ends of the bolts, a hole being formed to receive each bolt and the ends of the plates also have holes to receive pins 95, 95. Then the plates are retained in place by thumb nuts screwed on the ends of the bolts. The proper tension is given to the spools by springs 96, 96. The object of this arrangement is to facilitate the removal of the spools. Each

shaft is provided with a gear wheel and these are intermeshed whereby to communicate motion from one to another. Motion from the main drive shaft may be communicated in various ways to these spool shafts and their motion may be continuous or intermittent. When intermittent we provide substantially as follows: The shaft 23 which for the purpose of separating the sections of the frame is made in sections bolted or otherwise secured together (see Fig. 1), is provided with a gear wheel 97. Several of the teeth of this wheel are wanting thus forming the delay shoe 98. A short shaft 99 (see Fig. 1^a) opposite shaft 23 and journaled in the two frames, is provided with a gear wheel 100 the teeth of which are engaged by the teeth of wheel 97. Shaft 99 also has a sprocket wheel 101 and a chain 102 passing over this wheel also passes over a wheel 103 on one of the spool shafts. The object of the delay shoe is to permit the shaft 99 and consequently all of the spools to stop momentarily as the wire can thus be drawn off easier; and to insure a perfect operation of these parts and relieve the teeth of sudden jars, the wheel 100 is furnished with an arm 104 which strikes a pin on wheel 97 just before the teeth are re-engaged. Also to lock the wheel 100 at the proper point, a spring actuated arm or pawl 105 is adapted to enter an opening in the wheel 100. A cam 97^a on wheel 97 opposite the pin is adapted to strike this pawl or arm and throw it out of the notch in the wheel 100 just before the wheel is started again. (See Fig. 1.)

In operation the slats are fed in as rapidly as required by the feed mechanism, the slide table is forced outwardly with each slat, the wires are twisted together and the slide table returned for another slat, and so the operation continues, wire being fed intermittently as required and the finished fencing being reeled as rapidly as completed so that every part acts harmoniously and the entire machine combines to produce the fencing.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination with a frame, and a slide table adapted to receive and conduct the staves to a proper position to be operated upon, of a rock shaft connected with the table, a rotary wheel, and a pair of levers connected with the rock shaft and adapted to be struck by a projection on the wheel whereby they are alternately moved to cause the shaft to rock in opposite directions, substantially as set forth.

2. The combination with a frame and slide table, of a rock shaft having arms thereon, rock levers 31 and 44 connected with arms of the shaft, levers 34 and 40 connected respectively with the rock levers, and a rotary wheel adapted to engage said levers 34 and 40 alternately, whereby the rock shaft is caused to rock back and forth, substantially as set forth.

3. The combination with a frame and slide table, of a rotary wheel, and a pair of levers connected with the slide table, said levers adapted to be struck by a projection on the rotary wheel, whereby to slide the table in and out, substantially as set forth.

4. The combination with a frame, a sliding table, and a shaft connected with the table for sliding it outward and inward, of lever mechanism connected with the frame and the shaft, and a cam wheel for swinging the lever mechanism whereby to slide the table in one direction, the cam on the wheel being adapted to retain the lever mechanism in position to lock the table temporarily, substantially as set forth.

5. The combination with a frame, a sliding table, and a rock shaft having arms thereon connected with the table, of a pair of levers pivoted to the frame and connected to each other, one lever connected to the rock shaft, and a wheel having a cam thereon adapted to engage one of the levers whereby the slide table is moved in one direction and retained for a predetermined period of time, substantially as set forth.

6. The combination with a suitable frame, slide table, and rock shaft connected with the slide table, of a wheel having a projection thereon, and lever mechanism connected with the frame and slide table for forcing the table in both directions during a revolution of the wheel, and a cam on the wheel adapted to retain the lever mechanism in position to lock the table temporarily substantially as set forth.

7. The combination with a frame, a slide table, and a rock shaft connected with the table, of a wheel having a projection and a cam thereon, a pair of main levers pivoted to the frame, their free ends terminating in proximity to the wheel, one of these main levers adapted to rock the shaft in one direction and the other lever to rock it in the opposite direction, and secondary levers connecting these main levers to the rock shaft, substantially as set forth.

8. The combination with a table, a slide rod, and spring for throwing the slide rod in one direction, of a rock arm connected with the slide rod, and a wheel having a projection thereon adapted to strike the rock arm whereby to move the slide rod in one direction opposite the tension of the spring, substantially as set forth.

9. The combination with a frame, of a wheel having a projection thereon, a slide rod for feeding slats forward, a rock arm pivoted in position to be struck by the projection on the wheel, and means connecting this rock arm to the slide rod, substantially as set forth.

10. A stop mechanism consisting of a pivoted arm, a rock shaft, and pitman having a loose connection with the arm and connected with the shaft whereby motion from the shaft is imparted to the arm, substantially as set forth.

11. The combination with a table and a rod, having sliding connections, of a rock arm, a wheel having a projection in position to strike the rock arm and vibrate the latter, a shaft or pin having arms projecting therefrom, and a pair of pitmen, one extending from one of these arms to the rock arm, and the other one from the other arm to the slide rod, substantially as set forth.

12. The combination with an arm hinged to a suitable support, of a rock shaft, a link or pitman pivoted to an arm on this shaft, said pitman having loose sliding connection with the hinged arm, and pins on the hinged arm and pitman for limiting the sliding movement of the parts, substantially as set forth.

13. The combination with stop mechanism, feed mechanism, and sliding table, of a rock shaft connected with the latter, and means for connecting the rock shaft with the slide table and the stop mechanism, and a wheel having means thereon for operating the lever and feed mechanism, substantially as set forth.

14. A reel comprising a hollow roller, said roller having holes formed therein adapted to receive the ends of wires, and a clamp bar or plate hinged in the roller for clamping the wires in the roller, substantially as set forth.

15. A reel comprising a hollow roller having perforations therein adapted to receive the ends of wires, a clamp in the roller, and a slide rod adapted to lock the clamp in place against the wires, substantially as set forth.

16. The combination with a reel having a toothed wheel connected therewith and an escapement connected with the wheel, two rock levers, means for connecting them at adjacent ends, one lever connected to the escapement, a spring for returning the escapement to its normal position, and a cam for positively vibrating one of the connected levers, substantially as set forth.

17. The combination with a reel, a ratchet toothed wheel connected therewith, and means for locking the wheel, of an escapement operating in connection with the toothed wheel,

a spring for yieldingly retaining the escapement in its normal position, a pair of rock levers, a link connecting said levers together, a link for connecting the end of one lever to the escapement, a cam for rocking the levers, a floater, a lever to which the floater is connected, and adjustable means connected with the floater lever for regulating the vibrations of the several levers and the escapement, substantially as set forth.

18. The combination with reel, escapement, and lever mechanism for periodically rotating the reel, of a floater adapted to bear on the reeled fencing at one end and on the lever mechanism at the opposite end, and adjustable mechanism for regulating the vibrations of the escapement, substantially as set forth.

19. The combination with spool shafts crank-shaped substantially as described, of screws or pins adapted to receive spools of wire, plates held on the outer ends of the screws or pins, tension devices, and means for securing the plates on the pins or screws, substantially as set forth.

20. The combination with spool shafts, and gearing, of a drive shaft having a mutilated gear wheel thereon, and provided with a projection on one side, a gear wheel adapted to be driven periodically by this mutilated gear wheel, an arm secured to this wheel, its free end in position to be struck by the pin to relieve the teeth of the wheel of sudden jars, and means for communicating motion to the spool shafts, substantially as set forth.

21. The combination with twistors and spools, of gearing for operating said twistors and spools periodically and alternately, substantially as set forth.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

JACOB B. SOLT.
JAMES E. SOLT.

Witnesses:

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IRA TYLER,