

R. W. HALLIDAY.
FENCE MAKING MACHINE.

APPLICATION FILED JUNE 24, 1907. RENEWED JULY 2, 1909.

946,353.

Patented Jan. 11, 1910.

3 SHEETS—SHEET 1.

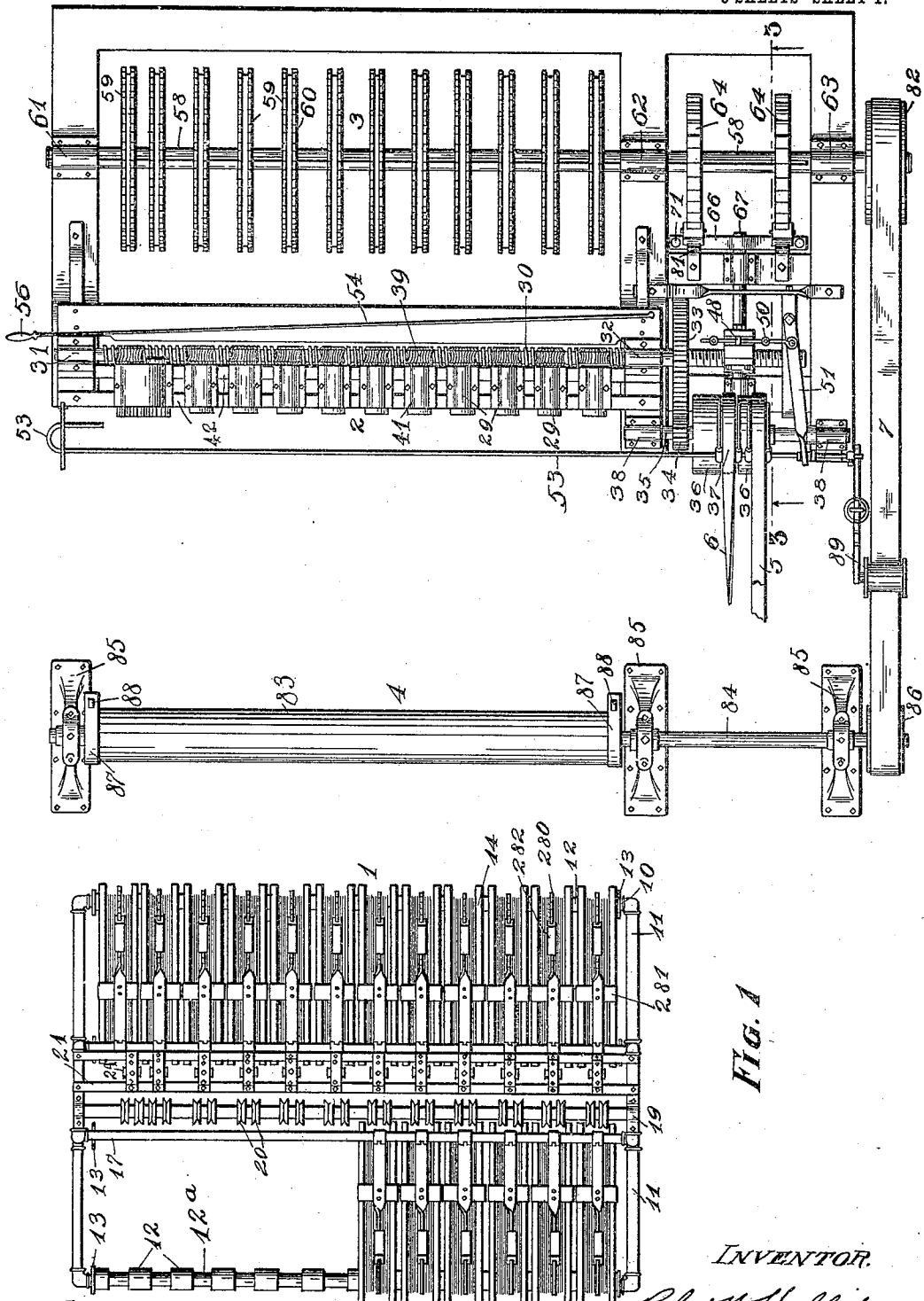


Fig. 1

INVENTOR.

Robert W. Halliday

By Bates, Fouts & Hull

ATTY'S.

WITNESSES:
Foreman B. Beck
Nathan F. Fetter

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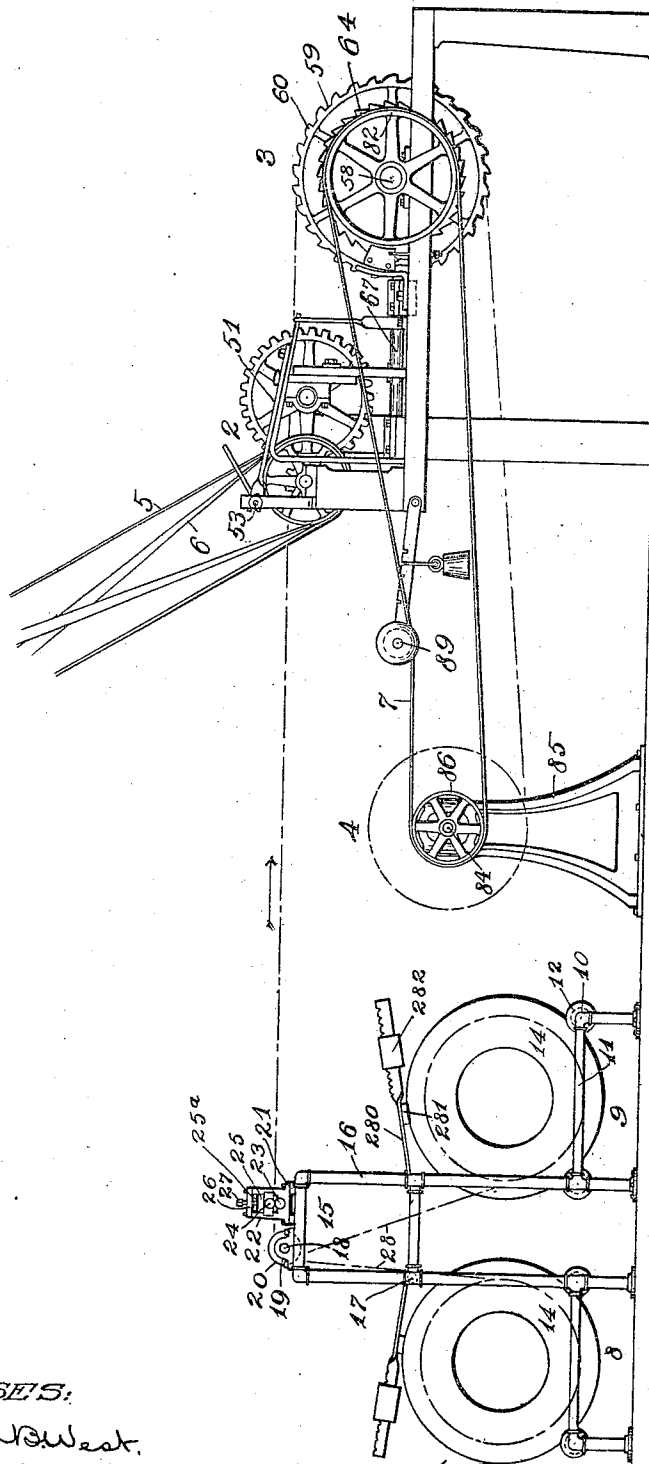


FIG. 2

WITNESSES:

Brennan West.
Nathan F. Fretten.

INVENTOR,

Robert W. Halliday
By Bates, Fento & Hall
Attys.

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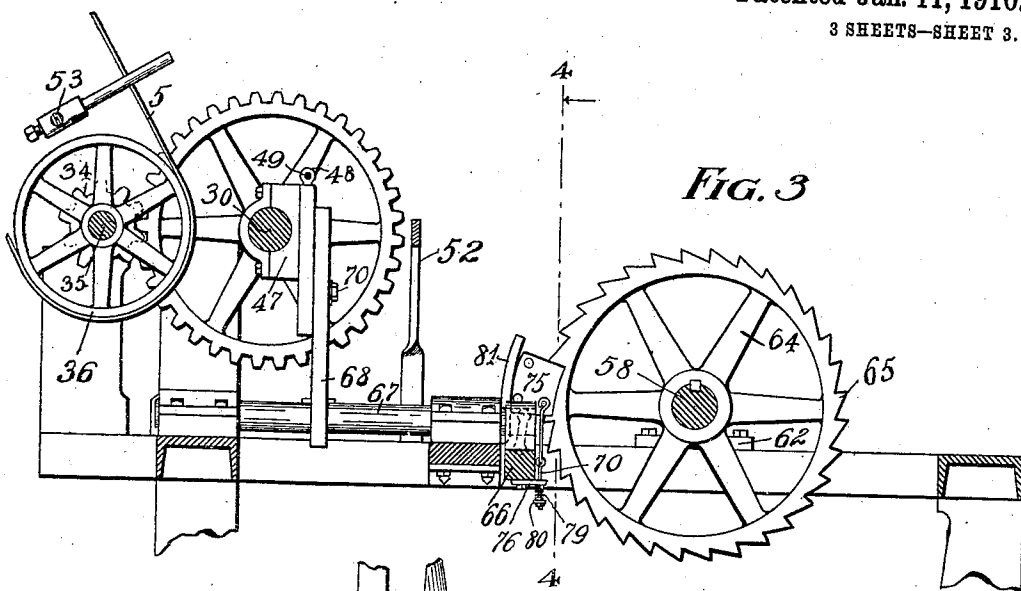


Fig. 3

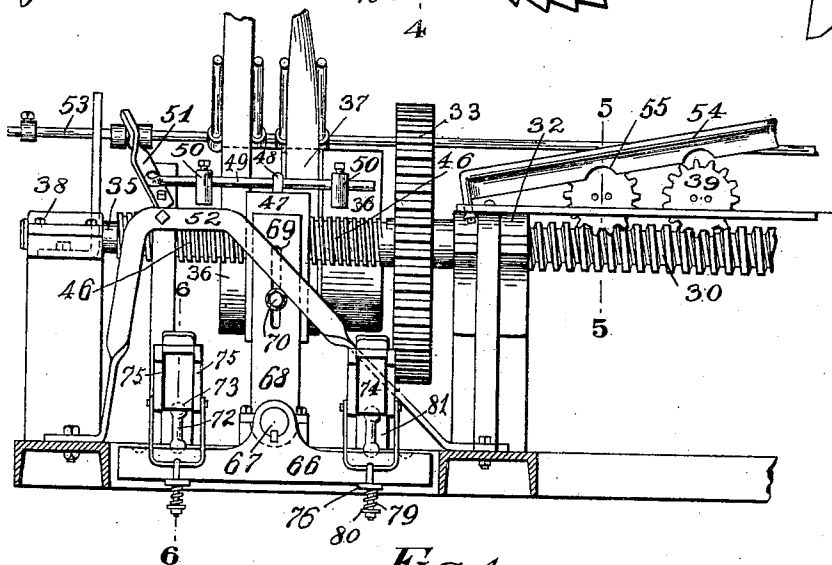


Fig. 4

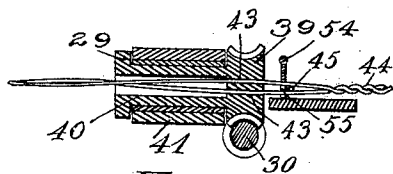


Fig. 5

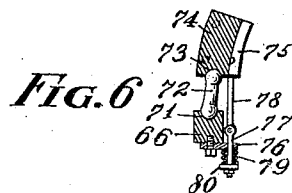


Fig. 6

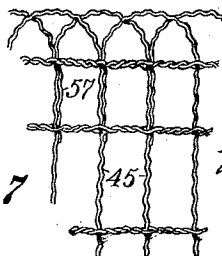


Fig. 7

WITNESSES:

Brennan & Sweet
Nathan F. Fretter

INVENTOR.
Robert W. Halliday
BY
Bates, Fouts & Hull,
ATTYS.

UNITED STATES PATENT OFFICE.

ROBERT W. HALLIDAY, OF CLEVELAND, OHIO.

FENCE-MAKING MACHINE.

946,353.

Specification of Letters Patent.

Patented Jan. 11, 1910.

Application filed June 24, 1907, Serial No. 380,381. Renewed July 2, 1909. Serial No. 505,626.

To all whom it may concern:

Be it known that I, ROBERT W. HALLIDAY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Fence-Making Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to an apparatus for making wire fencing and particularly fencing consisting of a number of longitudinal cables formed by twisting together two or more wires, with vertical pickets or cross wires inserted at definite intervals of the length of said cables and retained by twisting the strands or wires of the cables into gripping engagement with said pickets.

The objects of my invention are to provide an apparatus of this character that may be operated continuously without the necessity for working upon a table or delaying the progress of the work when once begun, and one which, while automatic in its operation as to certain features of construction, will be completely under the control of the operator at all times.

Generally speaking, the invention may be defined as consisting of the combinations of elements embodied in the claims hereto annexed and illustrated in the drawings, wherein—

Figure 1 represents a plan view of a machine constructed in accordance with my invention, Fig. 2 represents a side elevation of said machine, Fig. 3 represents an enlarged sectional view taken on the line 3—3 of Fig. 1. Fig. 4 represents a sectional view on the line 4—4 of Fig. 3, Fig. 5 represents an enlarged sectional detail on the line 5—5 of Fig. 4, illustrating the manner in which the strands of wire are twisted to form a cable and the manner in which the pickets are inserted in place. Fig. 6 represents an enlarged sectional detail on the line 6—6 of Fig. 4, and Fig. 7 shows a portion of a fence as woven by my machine.

The apparatus comprises generally wire supplying mechanism, wire twisting mechanism, mechanism for feeding the wire through the twisting mechanism, a drum on which the fence is wound, and means for driving the different mechanisms.

1 denotes the wire supplying mechanism, 2 the wire twisting mechanism, 3 the wire feeding mechanism, and 4 the drum on

which the completed fence is wound. These mechanisms are driven by means of belts 5, 6 and 7, and suitable pulleys and shafting.

Wire supplying mechanism.—The wire supplying mechanism comprises a suitable number of spools supported by a pair of frames 8 and 9, each frame comprising a pair of longitudinal members 10 connected by cross members 11. Each of the members 10 is provided, substantially throughout its entire longitudinal extent, with rollers 12, washers 13 being provided adjacent to the ends of the longitudinal members and spacers 12^a being provided between the rollers. Each roller receives the side flanges of adjacent spools 14 on which the wire is wound, the width of the frames being sufficient to enable the spools to project below the cross members and obtain a firm seat on the rollers 12.

15 denotes a central frame which is provided between the side frames 8 and 9, preferably by upright members 16 extending therefrom and supporting cross bars 17.

18 denotes a longitudinal shaft supported at one side of the top of the frame 15 and carrying bearings 19 for rollers 20.

21 denotes a pair of longitudinal bars or members extending across the top of the vertical frame 15 at the other side thereof. Bars 21 carry a suitable number of tension devices 22. These tension devices comprise each a frame having at the lower end thereof a roller 23 journaled in the frame and a roller 24 journaled in a vertically adjustable journal box, a pad 25 of rubber or similar yielding material being interposed between the top of 24 and the cross bar 26, there being an adjusting screw 27 extending through said cross bar and bearing against each of the rubber blocks 25 through plate 25^a. A pair of wires 28 from the oppositely arranged spools extends over one of the rollers 20 and between the adjacent rollers 23 and 24 of the tension device, whence the pair of wires is led to the twisting mechanism.

A tension-adjusting device or brake is provided to engage the rims of each of the spools 14, each of said devices consisting of a flat plate 280 having on its under surface a block 281 of a length to rest on top of the said rims at a point between the axes of the spools and the central frame. The outer end of the plate 280 is given a quarter

turn and is provided with a weight 282 which is adjustable thereon to vary the tension exerted on the rims of the spools.

Wire twisting mechanism.—The wire-
5 twisting mechanism comprises a plurality of individual twisters 29, with a common operating shaft 30 therefor, and means for operating said shaft. The opposite ends of shaft 30 are carried by journal boxes 31
10 and 32 provided respectively at one side of the main frame, and near the opposite side thereof. The shaft 30 is a worm shaft and has one end extended beyond journal box 32 and is provided with a gear 33 mesh-
15 ing with a reduction gear 34 on the shaft 35, the latter shaft being provided with a pair of idle pulleys 36 and an intermediate fixed pulley 37 whereby the shaft 35 is driven by belts 5 and 6. The shaft 35 is
20 mounted in journal boxes 38 carried by the main frame.

Each twisting device of the twisting mechanism comprises a worm gear 39 (see Fig. 5) which is provided with a hollow
25 shaft 40 rotatably mounted within a journal box 41 carried by a cross bar 42. The rear end of the hollow shaft 40 will be flanged outwardly to retain the shaft in place within the journal box. At its inner end and
30 preferably corresponding to the body of the worm gear proper, each gear is provided with a pair of apertures 43 extending therethrough.

It will be apparent that, by the rotation
35 of the worm shaft 30, the worm gears 39 will be rotated and each will twist the pair of wires extending therethrough in the manner illustrated in Fig. 5. The apparatus is so constructed that, when the wires are
40 twisted to form a desired length of cable 44, the operation of the twisting mechanism will be automatically stopped to permit the insertion of the picket in place. This suspension of operation is particularly desirable
45 where the picket is of twisted wire, as shown at 45 in Fig. 7, the operation of inserting the picket requiring some measurable interval of time. I therefore provide mechanism for automatically stopping the operation of the
50 twisting mechanism when a certain length of cable has been formed by twisting the individual strands thereof together. A convenient distance between pickets in fences of this kind is about two or three inches. To
55 cause this automatic cessation of the twisting mechanism, I provide the end of the shaft 30 which projects beyond the journal box 32 with a thread 46 thereon and with a head 47, which is threaded onto said
60 portions 46 and is adapted, by the rotation of the shaft, to traverse on such threaded portion. This head is provided with an eye-bolt 48, through which projects a rod 49 having a pair of adjustable stops 50
65 thereon. One end of rod 49 is connected

with a lever 51, which is pivoted at one end to a bracket 52 and has its other end connected with the belt shifter 53. By adjusting the stops 50 a suitable distance apart,
70 when the head 47 has been moved a predetermined distance in either direction by the rotation of shaft 30, the eye-bolt 48 engages an appropriate stop and quickly shifts the belt which is on the driving pulley 37 onto one or the other of the loose pulleys 36. It
75 will be observed that belts 5 and 6 are so arranged that whichever one may be thrown upon the fixed pulley 37 will reverse the direction of rotation of shaft 35 with respect to the direction in which it was previously
80 rotated by the other belt. By suitably adjusting the stops 50, the action of the twisting mechanism will be suspended when any predetermined length of cable 44 has been
85 formed. As soon as the twisting operation is stopped, the operator inserts a picket 45 into the V-shaped shed between the strands adjacent to the worm gear 39 (see Fig. 5)
90 and then, by means of the pivoted batten 54, forces the picket into the apex of the V. It will be observed, from Figs. 4 and 5, that this batten is provided with recesses 55 which enable it to straddle the longitudinal wires with the body portion of the batten in
95 engagement with the picket. The operator grasps the handle 56 and by swinging the batten on its pivot, forces the picket in position. For the purpose of forming an ornamental top for the fence, the ends of the
100 pickets are bent in the manner shown in Fig. 7, preferably on a former which is used by the operator at his side of the machine, and the end 57 of said picket is placed on the apex of the V formed between the strands
105 just previously to the insertion of the body of the second succeeding picket into such apex. Then, when the pickets are properly adjusted, the operator, by means of the belt shifter 53 moves the appropriate belt onto
110 the fixed pulley 37 to cause the worm shaft 30 to be operated in a direction the reverse to that formerly given to said shaft. It will thus be seen that provision is made for automatically stopping the operation of the
115 mechanism to permit the insertion of pickets, and, as the time consumed for such insertion may vary considerably with different pickets, the starting of the mechanism is entirely under the control of the operator.

Wire feeding mechanism.—This mechanism comprises a drum on which the completed fence is received and by the rotation of which tension is exerted on the wires to feed the same from the spools 14 to the
120 twisting mechanism, together with means for driving said drum. This drum comprises a drum shaft 58 to which are keyed a plurality of wheels 59, each wheel being provided with a suitable number of teeth 60
125 so spaced as to engage the pickets 45 of

the fence and thus draw or feed the wires through the twisting mechanism. The shaft 58 is suitably journaled in boxes 61, 62 and 63 carried by the main frame. The portion of the shaft between boxes 62 and 63 is provided with a pair of ratchet wheels 64 slidably keyed thereto. These ratchet wheels are provided each with teeth 65 adapted to be engaged and operated by pawl mechanism, which will now be described. This pawl mechanism comprises a frame 66 keyed to a rock shaft 67 which may be supported in any suitable manner in the frame.

68 denotes an arm, the lower end of which is rigidly connected to rock shaft 67 and the upper portion of which is provided with a slot 69 which is connected to the head 47 by means of a bolt 70, whereby the movement of the head in traversing the threaded portion 46 of the shaft which operates the twisting mechanism will rock the shaft 67 and the frame 66 thereon.

The frame 66 has toward each end thereof a pair of rounded seats 71 for the reception of the correspondingly rounded lower end of a link 72, the upper end of which engages a corresponding recess 73 in the bottom of a pawl 74. (See Figs. 4 and 6.) This pawl is provided at each opposite edge thereof with a metallic plate 75. The frame 66 is provided with a plate 76 projecting rearwardly from the bottom thereof through which plate extends a bolt 77, the upper end of which is connected to a bail 78, the opposite branches of which are in turn pivotally connected to the plates 75. A spring 79 interposed between the plate 76 and a washer 80 on the bolt serves to retain the pawl 74 in engagement with the link 72. The plates 75 are so spaced as to bear against opposite sides of a wheel 64, and by means of the flexible connection between the same and the frame 66 and a retaining plate 81 at the front thereof, each of said pawls is retained in proper operative relation to its ratchet wheel and at the same time there is secured for the pawls such flexibility or adaptability of operation as to enable them to engage the ratchet wheels, notwithstanding the oscillation of frame 66 by the shaft 67. By means of the two sets of recesses 71 and 73 and the elongated slot 69, the pawls may be so adjusted as to vary the throw thereof and the amount of rotation of the shaft 58, the ratchet wheels 64 being longitudinally adjustable on the shaft to permit their engagement by the pawls when so shifted. By suitably adjusting the stops 50, the length of the cable twisted before throwing the twisting mechanism out of operation can be adjusted in accordance with the throw of the pawls 74. Shaft 58 is extended beyond the side of the frame and is there provided with a pulley 82, by means of which the

drum for reeling up the completed fence is operated.

Winding drum.—The winding drum 83 is carried by a shaft 84 which extends through journals carried by brackets 85. Three such brackets are shown, the drum proper extending between two of the brackets, and the third bracket forming a support for the end of the shaft, which carries a pulley 86 by means of which the shaft is rotated from shaft 58. The drum is preferably a split drum, the ends of the sections being secured together by means of U-shaped shells 87 each having a wedge pin 88 driven through the ends thereof. The end of the fence is inserted between the halves of the drum sections and the fence is wound upon the drum. As will appear from Figs. 1 and 2, pulley 82 is sufficiently larger than pulley 86 to enable the drum 83 when first started to wind up the fence as fast as it is fed by means of the shaft 58. As the diameter of the drum with the fence thereon increases, the belt 7, being a slack belt provided with a tightener 89, may slip on pulley 86, until such time as the decreased resistance of drum 83 permits the said pulley to be rotated.

From the above description, the operation will be readily understood. The wheels 59, through their engagement with the completed fence, feed the wires from the spools through the twisting mechanism. As soon as the twisting mechanism has formed the wires into cables of the desired length, the head 47, through the rod 49 and lever 51, shifts one of the driving belts 5 or 6 onto a loose pulley and the operation of the apparatus is suspended to permit the operator to insert a picket in place. The operator then moves the belt shifter 53 in a proper direction to throw onto the fixed pulley the belt which at the previous operation was running idly. This reverses the direction of movement of the twisting mechanism. After the twisting mechanism has operated a sufficient distance in its new direction, the operation is again automatically stopped by the action of the head 47, the operator inserts the next picket and starts the twisting mechanism in a direction the reverse of the previous direction by means of the shifter 53. Meanwhile, through the connection of the head 47 with the rock shaft 67, the pawls 75 are operated to rotate the feeding drum a distance corresponding to the length of the cables which have been twisted. The rotation of the shaft 58 operates the drum 83 in the manner hereinbefore described to reel up the finished fence.

Having thus described my invention, I claim:

1. In an apparatus for making wire fencing, the combination of mechanism for twisting the wires into cables, a shaft for operat-

ing said mechanism, means for driving said shaft, a head adapted to traverse said shaft in opposite directions, and a connection between said head and the shaft-operating means and adapted to render the latter inoperative when said head has traversed a predetermined distance in either direction, substantially as specified.

2. In an apparatus for making wire fencing, the combination of mechanism for twisting the wires to form cables therefrom, a shaft for operating said mechanism, a second shaft geared to the former shaft and having thereon a pair of outer loose pulleys and an intermediate fixed pulley, belts adapted to drive said fixed pulley in reverse directions, a traversing head on the first mentioned shaft, a belt shifter, a lever connected with said shifter, and a connection between said head and said lever adapted to move the lever when said head has moved a predetermined distance in either direction, substantially as specified.

3. In an apparatus for making wire fencing, the combination of mechanism for twisting the wires to form cables therefrom, a shaft for operating said mechanism, a second shaft geared to the former shaft and having thereon a pair of loose pulleys and a fixed pulley, belts adapted to drive said fixed pulley in reverse directions, a traversing head on the first-mentioned shaft, a belt shifter, and a connection between said head and said belt shifter and adapted to move either belt from the fixed pulley onto a loose pulley when the head has moved a predetermined distance in either direction, substantially as specified.

4. In an apparatus for making wire fencing, the combination of wire twisting mechanism, a drum adapted to feed wires through said mechanism, a shaft for rotating said mechanism, a pair of ratchet wheels for rotating said drum, a frame pivoted intermediate of such ratchet wheels and having at each side of the pivot a pawl for each of said ratchet wheels, a rock shaft for rocking said frame, a traversing head on the first mentioned shaft, and a connection between the same and said rock shaft, substantially as specified.

5. In an apparatus for making wire fencing, the combination of wire twisting mechanism, a drum adapted to feed the wire through said mechanism, a shaft for rotating said mechanism, a ratchet wheel for rotating said drum, a frame pivoted adjacent to such ratchet wheel and having a pawl for said ratchet wheel, a rock shaft for rocking said frame, a traversing head on the first mentioned shaft, and an adjustable connection between the same and said rock shaft.

6. In an apparatus for making wire fencing, the combination of twisting mechanism, a shaft for operating said mechanism, a

traversing head on said shaft, a second shaft for driving the former shaft and provided with a pair of loose pulleys and a fixed pulley, a pair of belts arranged to reverse the rotation of said second shaft, a belt shifter for moving said belts into and out of operative relation to the fixed pulley, a rod having thereon a pair of stops adapted to engage a portion of the traversing head, and a connection between said rod and the belt shifter, substantially as specified.

7. In an apparatus for making wire fencing, the combination of twisting mechanism, a shaft for operating said mechanism, a traversing head on said shaft, a second shaft for driving the former shaft and provided with a pair of loose pulleys and a fixed pulley, a pair of belts arranged to reverse the rotation of said second shaft, a belt shifter for moving said belts into and out of operative relation to the fixed pulley, a lever connected to said belt shifter, and a rod having thereon a pair of stops adapted to engage a portion of the traversing head, said rod being connected to said lever, substantially as specified.

8. In an apparatus for making wire fencing, the combination of wire twisting mechanism, a shaft for operating the same, a second shaft for operating the first mentioned shaft and having thereon a fixed and a loose pulley, a belt for operating the second shaft, a belt shifter for said belt, a traversing head on the first mentioned shaft, and a connection between said belt shifter and said head adapted to move the belt when the head has been moved a predetermined distance by the rotation of its shaft, substantially as specified.

9. In an apparatus for making wire fencing, the combination of wire twisting mechanism, a shaft for operating the same, a second shaft for operating the first mentioned shaft and having thereon a fixed pulley and a pair of loose pulleys, a pair of belts for operating the second shaft and arranged to reverse the rotation thereof, a belt shifter for said belts, a traversing head on the first-mentioned shaft, and a connection between said belt shifter and said head adapted to move the belt when the head has been moved a predetermined distance by the rotation of its shaft, substantially as specified.

10. In an apparatus for making wire fencing, the combination of twisting mechanism, a shaft for driving the same, a second shaft geared to the former shaft, means for driving the second shaft, a traversing head on the first shaft, connections whereby the movement of said head automatically suspends the operation of the second shaft, wire feeding mechanism, and a connection between said head and the latter mechanism, substantially as specified.

11. In an apparatus for making wire fence-

ing, the combination of wire-twisting mechanism, a shaft for operating the same, a traversing head on said shaft, wire-feeding mechanism, and connections between said traversing head and the latter mechanism whereby the movement of the said shaft may be automatically transmitted to the feeding mechanism, substantially as specified.

12. In an apparatus for making wire fencing, the combination of wire-twisting mechanism, a shaft for operating the same, a traversing head on said shaft, wire-feeding mechanism, and a pawl-and-ratchet connection between said traversing head and the latter mechanism, whereby the movement of the said shaft may be automatically transmitted to the feeding mechanism, substantially as specified.

13. In an apparatus for making wire fencing, the combination of wire-twisting mechanism, a shaft therefor, a traversing head on said shaft, a rock shaft, an arm rigid with said rock shaft and connected to said traversing head, wire-feeding mechanism, a ratchet for operating the latter mechanism, and a pawl operated by the rock shaft and adapted to engage said ratchet, substantially as specified.

14. In an apparatus for making wire fencing, the combination of wire-twisting mechanism, a shaft therefor, a traversing head on said shaft, a rock shaft, an arm rigid with said rock shaft, a pin-and-slot connection between said arm and said head, wire-feeding mechanism, a ratchet for operating the latter mechanism, and a pawl operated by the rock shaft and adapted to engage said ratchet, substantially as specified.

15. In an apparatus for making wire fencing, the combination of wire-twisting mechanism, a shaft for operating the same, a traversing head on said shaft, a rock shaft, an arm connecting said rock shaft with said head, a rocking frame carried by the rock shaft, a pair of pawls on said frame located on opposite sides of the rock shaft, mechanism for feeding wire, a shaft for operating said mechanism, a pair of ratchet wheels on the last-mentioned shaft arranged to be engaged by said pawls, and means for reversing the direction of rotation of the first-mentioned shaft, substantially as specified.

16. In an apparatus for making fencing, the combination of wire-twisting mechanism, wire-feeding mechanism, and means for operating the latter mechanism from the former mechanism, said mechanism comprising a ratchet and a pawl, a rocking frame supporting said pawl, and means for rocking said frame from the first-mentioned mechanism, the pawl being flexibly connected to the rocking frame, substantially as specified.

17. In an apparatus for making wire fencing, the combination of wire-twisting mechanism, wirefeeding mechanism, and connections whereby the movement of the former mechanism may operate the latter mechanism, said connections comprising a rock shaft operated by the former mechanism, a pair of ratchet wheels connected with the latter mechanism, and a rocking frame having thereon a pair of pawls for engaging said ratchets, each of said pawls being adjustably supported by the rocking frame, substantially as specified.

18. In an apparatus for making wire fencing, the combination of wire-twisting mechanism, wire-feeding mechanism, and means for operating the latter mechanism by the former mechanism, said means comprising a ratchet wheel connected to the latter mechanism, a pawl operated by the former mechanism, a rocking support for said pawl, and a universal joint connection between the pawl and its frame, substantially as specified.

19. In an apparatus for making fencing, the combination of wire-twisting mechanism, wire-feeding mechanism, and means for operating the latter mechanism by the former mechanism, said means comprising a ratchet wheel connected to the latter mechanism, a pawl operated by the former mechanism, a rocking support for said pawl, a universal joint connection between the pawl and its frame, and a flexible connection between said pawl and its frame, substantially as specified.

20. In an apparatus for making wire fencing, the combination of wire-twisting mechanism, wire-feeding mechanism, and connections between said mechanisms, said connections comprising a rocking frame, a rock shaft for said frame operated by the former mechanism, a pair of pawls on said frame, a pair of ratchet wheels on the latter mechanism, each of said pawls having a rounded bearing, a pair of links having rounded ends, one end fitting into the rounded bearing in a pawl and the other fitting into a rounded bearing in the frame, and means for retaining said pawls in operative relation to the frame, substantially as specified.

21. In an apparatus for making wire fencing, the combination of wire-twisting mechanism, wire-feeding mechanism, and connections between said mechanism, said connections comprising a rocking frame, a rock shaft for said frame operated by the former mechanism, a ratchet wheel on the latter mechanism, and a pawl flexibly supported on said frame, said pawl having cheek pieces, substantially as specified.

22. In an apparatus for making wire fencing, the combination of a frame having thereon a plurality of spools, tension devices engaging the wires as they pass from said spools, wire-twisting mechanism, wire-feeding mechanism driven from said wire-twisting

mechanism, and connections whereby the movement of the former mechanism may operate the latter mechanism, said connections comprising a rock shaft operated by the former mechanism, a pair of ratchet wheels connected with the latter mechanism, and a rocking frame having thereon a pair of pawls for engaging said ratchets, each of said pawls being adjustably supported by the rocking frame, substantially as specified.

ing mechanism; a drum, and means for driving the same from the former mechanisms to reel the fencing thereon, substantially as specified.

5 23. In an apparatus for the purpose specified, the combination of a frame comprising a pair of longitudinal members having rollers thereon, spools resting on said rollers, twisting mechanism, and means for supplying wire from said spools to said mechanism, substantially as specified.

10 24. In an apparatus for the purpose specified, the combination of a frame comprising a pair of longitudinal members, rollers on said members, spacers between said rollers, a plurality of spools carried by said frame, the flanges of adjacent spools resting on a common roller, twisting mechanism, and means for feeding wire from said spools to said mechanism, substantially as specified.

20 25. In an apparatus for the purpose specified, the combination of a frame comprising a pair of longitudinal members, rollers on said members, a plurality of spools having their flanges resting on said rollers, tension devices each consisting of a pivoted plate having a brake shoe arranged to engage the flanges of a spool, and means for feeding the wire from said spools, substantially as specified.

30 26. In an apparatus for the purpose specified, the combination of a central frame, tension devices carried thereby, a pair of frames one at each side of the central frame, a plurality of spools supported by each of

the latter frames, a plurality of tension adjusting devices pivoted to the central frame and adapted to engage said spools, and means for feeding wire from said spools through the tension-adjusting devices carried by the central frame, substantially as specified. 40

27. In an apparatus for making wire fencing, the combination of mechanism for twisting the wires to form cables therefrom, means for operating said mechanism, feeding mechanism adapted to feed wires through the twisting mechanism, and means directly operated by the twisting mechanism for automatically suspending the rotation of said twisting mechanism after it has formed a predetermined length of cable. 50

28. In an apparatus for making wire fencing, the combination of mechanism for twisting the wires to form cables therefrom, means for operating said mechanism, feeding mechanism adapted to feed the wires through the twisting mechanism, and means comprising a belt shifter directly operated by the wire twisting mechanism for automatically suspending the rotation of said twisting mechanism after it has formed a predetermined length of cable. 60

In testimony whereof, I hereunto affix my signature in the presence of two witnesses. 65

ROBERT W. HALLIDAY.

Witnesses:

J. B. HULL,
J. L. TRAUB.