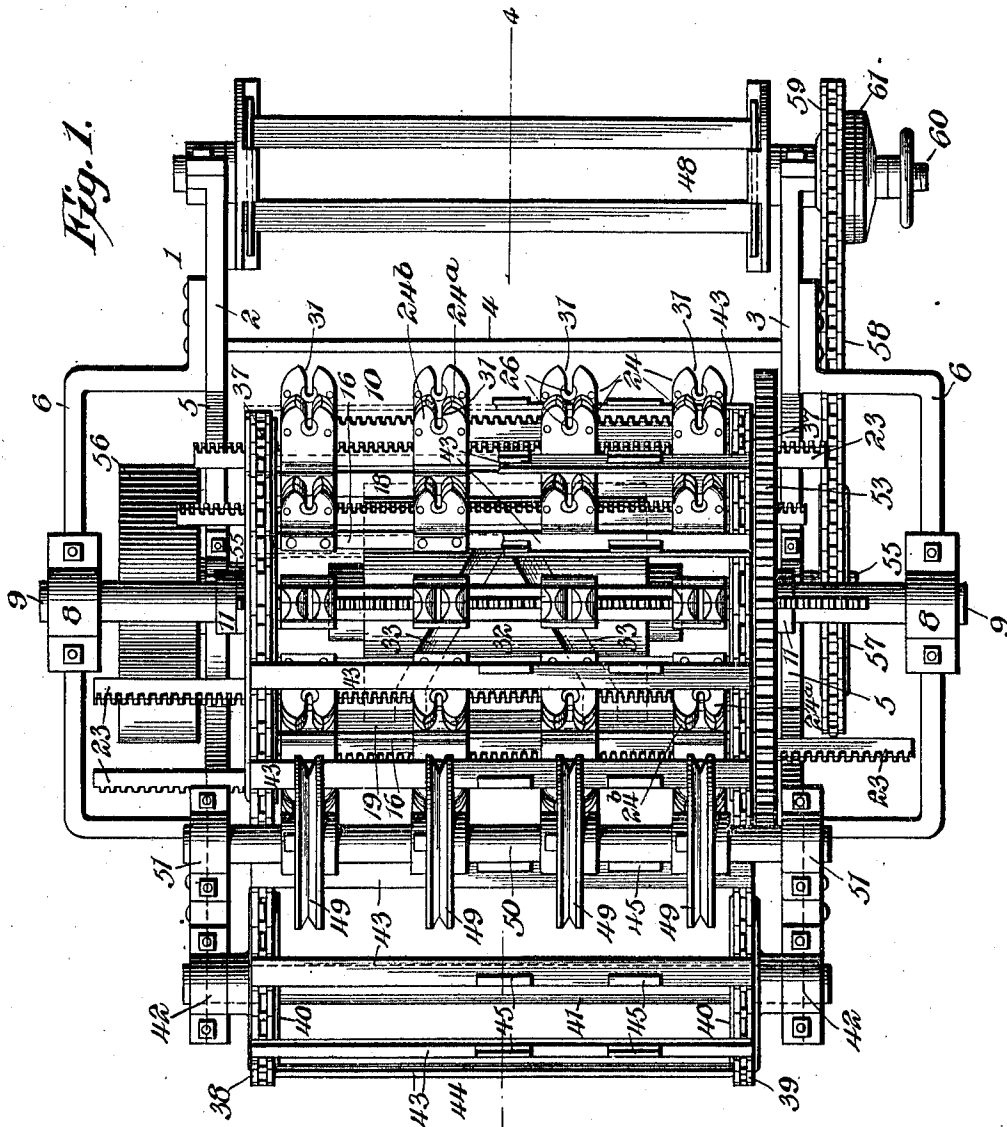


A. L. KITSELMAN.
FENCE MACHINE.
APPLICATION FILED JUNE 11, 1904.

980,105.

Patented Dec. 27, 1910.

6 SHEETS—SHEET 1.



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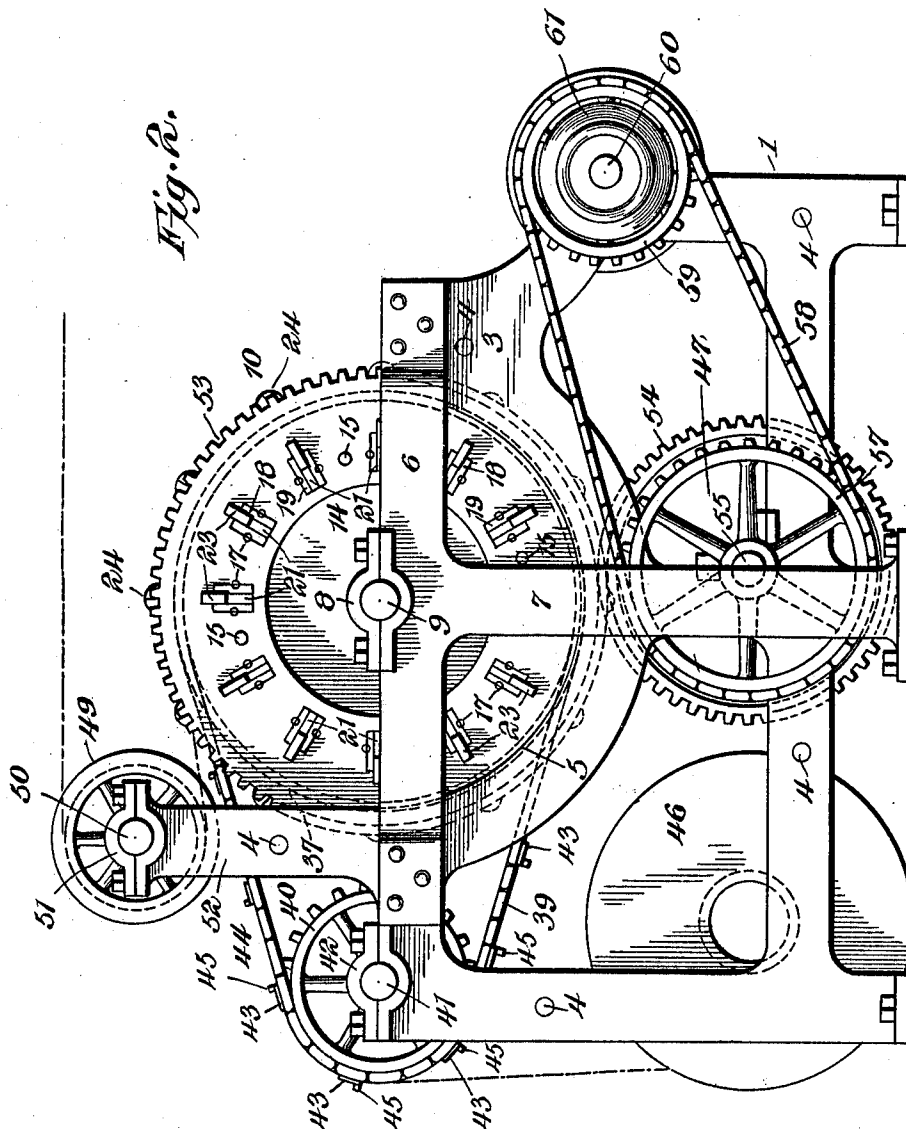
Witnesses
Howard D. Orr.
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6 SHEETS—SHEET 3.

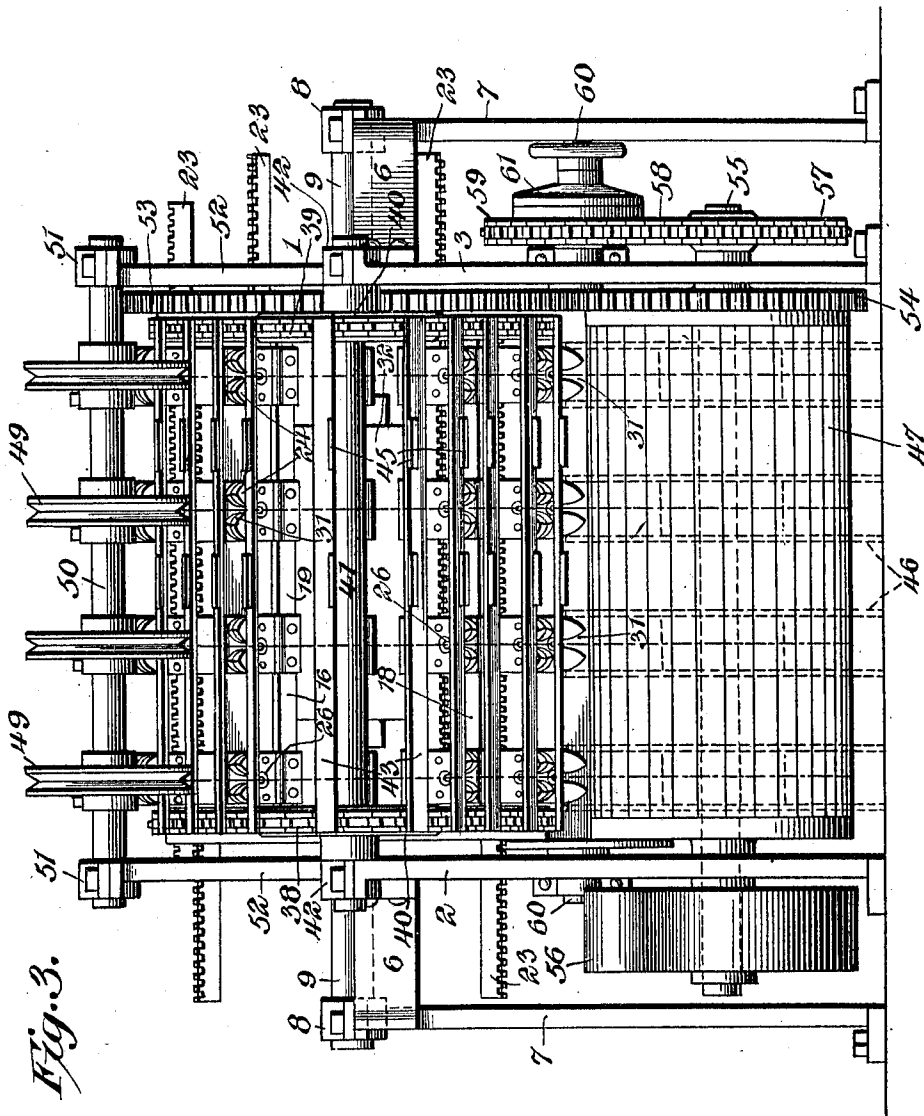


Fig. 3.

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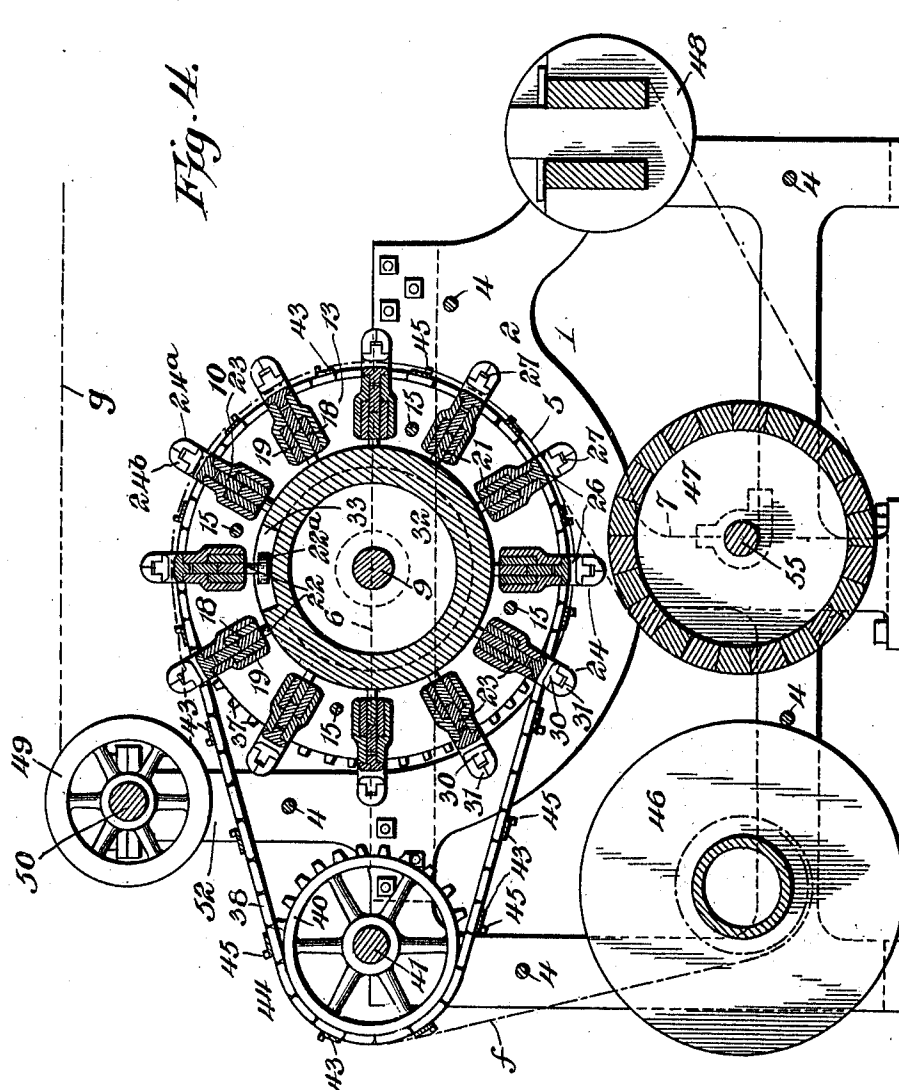
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6 SHEETS—SHEET 4.



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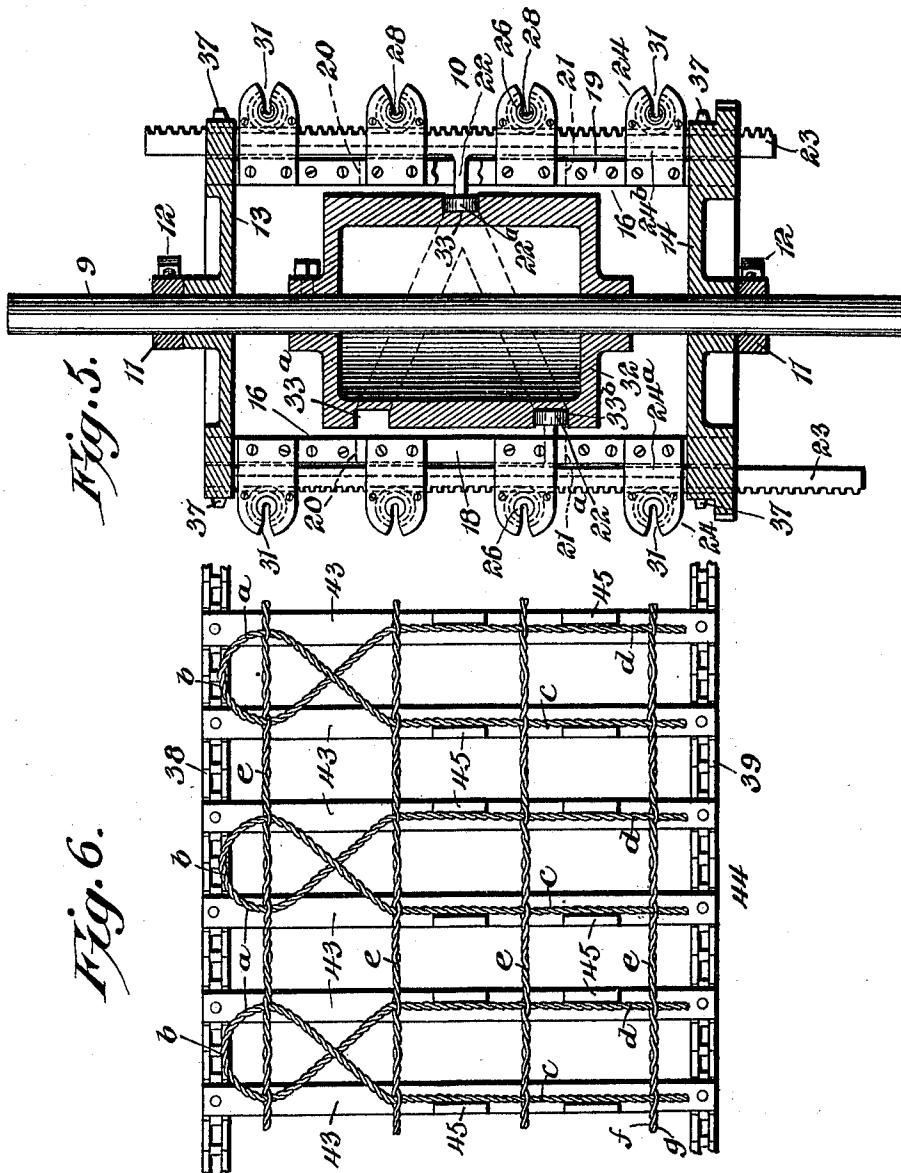
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6 SHEETS—SHEET 5.



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6 SHEETS—SHEET 6.

Fig. 7.

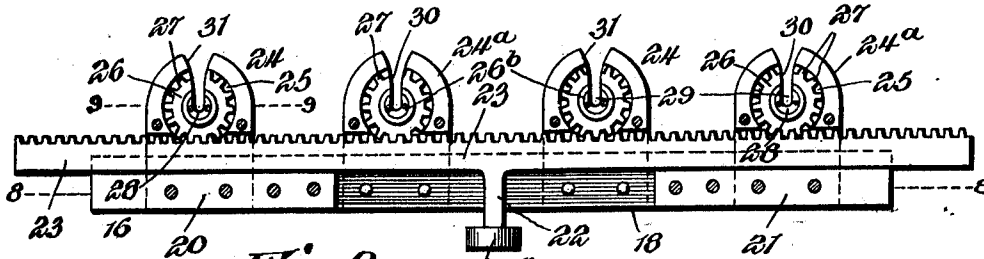


Fig. 8.

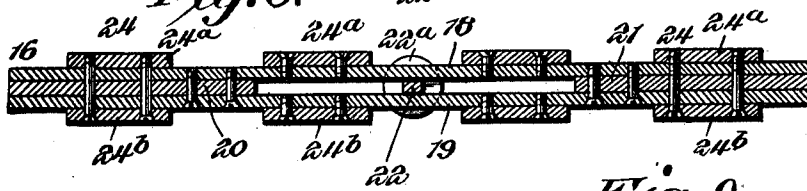


Fig. 10.

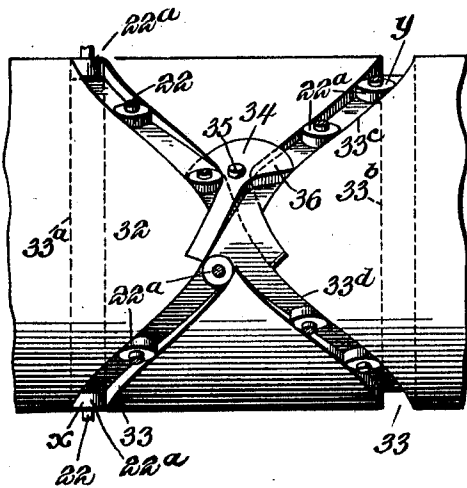


Fig. 9.

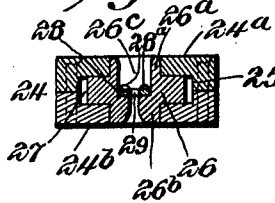
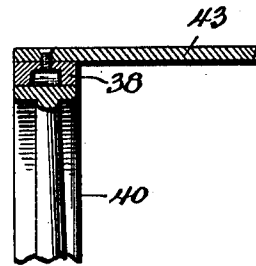


Fig. 11.



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UNITED STATES PATENT OFFICE.

ALVA L. KITSELMAN, OF MUNCIE, INDIANA, ASSIGNOR TO INTERLOCKING FENCE COMPANY, OF MORTON, ILLINOIS, A CORPORATION OF ILLINOIS.

FENCE-MACHINE.

980,105.

Specification of Letters Patent. Patented Dec. 27, 1910.

Application filed June 11, 1904. Serial No. 212,198.

To all whom it may concern:

Be it known that I, ALVA L. KITSELMAN, a citizen of the United States, residing at Muncie, in the county of Delaware and State of Indiana, have invented a new and useful Fence-Machine, of which the following is a specification.

This invention relates to a machine for making wire fabric, but more particularly fabric of that character which is especially adapted for use as fencing.

The object of the invention is to produce a simple, inexpensive machine arranged to operate upon continuously advancing line wires for the purpose of connecting the latter by means of transverse stays or pickets without interrupting the operation of the machine or the continuous advance of the completed fabric.

A subordinate object of the invention is to provide a machine for intertwisting a plurality of continuously advancing strands to produce multiple line wires connected by stays or pickets secured between the strands by the intertwisting thereof to produce the line wires.

Another object of the invention is to combine in a machine of this character a plurality of traveling twisters with a traveling stay or picket carrier, so related that the stays or pickets will be continuously fed into such relation with the twisters that the intertwisting of the longitudinal strands will incidentally effect the attachment of the pickets to the line wires without interrupting the advance of the latter.

Another object of the invention is to provide for the continuous feed of the wires and to avoid lost or retractile movement of the parts by organizing the wire twisting and stay attaching mechanism in a continuously rotating structure.

Still another object of the invention is to adapt the machine for the manufacture of ornamental fencing by providing the stay or picket carrier with means for positively holding double stays or pickets in proper position until the connection thereof with the line wires has been effected.

To the accomplishment of the recited objects and others subordinate thereto, the preferred embodiment of the invention resides in that construction and arrangement of parts hereinafter described, illustrated in the

accompanying drawings, and succinctly defined in the appended claims.

In the said drawings—Figure 1 is a plan view of the machine. Fig. 2 is a side elevation thereof. Fig. 3 is an end elevation. Fig. 4 is a longitudinal vertical section on the line 4—4 of Fig. 1. Fig. 5 is a transverse section of the weaving drum. Fig. 6 is a plan view of a portion of the stay carrier with a section of completed fencing mounted thereon. Fig. 7 is a detail view of a series of twisters and their operating rack. Fig. 8 is a longitudinal section on the line 8—8 of Fig. 7. Fig. 9 is a detail sectional view on the line 9—9 of Fig. 7. Fig. 10 is a detail view of the twister cam showing the disposition of a number of rack rollers and illustrating the arrangement of the switch, and Fig. 11 is a detail sectional view showing a portion of the stay carrier and one of its supporting sprockets.

Like characters designate corresponding parts throughout the views.

1 indicates the machine frame, including side castings 2 and 3 of suitable form, laterally spaced and connected by tie-rods 4. The upper edges of the castings 2 and 3 are formed with semi-circular depressions 5 opposite which are horizontal yokes 6 bolted to the castings of the frame and additionally supported by standards 7. The yokes 6 are provided with clamps 8 for the rigid retention of the opposite ends of a fixed drum shaft 9 rotatably supporting the weaving drum 10 located between the side castings of the frame. The drum 10 is retained between bearing collars 11 secured to the shaft 9 by set screws 12 and opposed, as shown in Fig. 5, to the hubs of the drum-heads 13 and 14. The heads 13 and 14 are spaced apart, connected by tie-rods 15 and formed with series of openings for the reception of the ends of channel bars 16 arranged in a circular series co-axial with the drum and retained by screw keys 17 screwed into the heads and engaging the bars. These channel bars 16 are susceptible of wide structural variation, but are preferably of sectional form, each comprising a pair of parallel side sections or plates 18 and 19 spaced, to form an intermediate channel, by a pair of short bottom sections 20 and 21 extending inwardly from the heads, as shown, to provide an interval between their

inner ends for the accommodation of an arm 22 extending toward the axis of the drum from a twister operating rack 23 disposed lengthwise of and guided in the channel bar.

5 The several channel bars and racks are of identical construction, and, in the illustrated embodiment of the invention, are twelve in number. Along each channel bar 16 are arranged a series of twister brackets 10 24, each comprising a pair of plates 24^a and 24^b, connected by bolts, as shown in Fig. 7, and having their inner ends separated to straddle the channel bar and the rack associated therewith and bolted or otherwise secured to the side members or plates of the 15 bar, as shown in Figs. 4 and 5. Beyond the toothed face of the adjacent rack 23, each bracket 24 is formed with a socket 25 for the reception of a rotary twister 26 having its 20 axis transverse to the rack and provided with peripheral teeth 27 meshing with the teeth of the rack. It will be seen, therefore, that each rack constitutes an operating device common to a set of twist- 25 ers extending across the drum, since the reciprocation of the rack in a manner to be described, will simultaneously rotate the several twist- 30 ers to effect the intertwisting of a plurality of wires, as hereinafter more fully explained. Each twister 26 is constructed substantially as shown in Figs. 4, 7 and 9, having the general form of a pinion provided with hubs 26^a and 26^b journaled in the 35 side plates of its twister bracket.

40 Extending through each twister is an axial opening 26^c enlarged at one end to permit the introduction of a detachable gripper plate 28, co-axial with the twister and secured thereto as by screws 28^a. This gripper 45 plate 28 is preferably constructed of steel and is provided, as shown in Figs. 7 and 9, with a radial slot or wire seat 29 extending from its periphery to a point slightly beyond its center and constituting a continuation of a radial opening 30 extending there- 50 from to the periphery of the twister. The slot 29 in the gripper plate is designed to receive a plurality of wires or strands, but its width is only slightly greater than a single strand so that, when several strands are seated in the plate, they will be located at different distances from its axis and will necessarily be twisted one upon the other 55 when rotary movement is imparted to the twister by the movement of its rack.

Each bracket 24, in addition to its function as a twister support, serves as a wire guide and its outer end is therefore bifurcated to form a flared throat 31, see Fig. 7, 60 the walls of which converge toward the radial opening 30 in the twister and the wire slot or seat in the gripper plate thereof when the twister occupies its normal position, to-wit, that position in which the wires 65 are passed therein. The twist- 70 ers of the sev-

eral sets occupy corresponding positions so that the drum will be equipped with several annular series of twist- 75 ers arranged in the same plane. Thus, as the drum rotates, the several throats 31, of the guides associated with the twist- 80 ers of an annular series, will be successively presented to a wire directed over the drum.

It will, of course, be understood that in making that type of fabric or fencing illus- 75 trated in Fig. 6, the drum will be equipped with as many series of twist- 80 ers as there are line wires, each twister of a series serving to twist a plurality of strands at successive points to produce the multiple strand line 85 wire shown.

Since it is desirable to eliminate all lost retractile movement in the operation of the various machine elements, I propose to utilize each longitudinal movement of a rack 85 after a separate twisting operation. To attain this end, each rack is given sufficient throw in one direction to cause one or more, preferably two, complete rotations of the 90 associated twist- 95 ers, each of which will thus be caused to effect a complete right and left twist of the strands or wires engaged by it, the twister being left in position to permit the release of the intertwisted wires from the twister as the drum continues to 95 rotate. The rack and the associated twist- 100 ers then remain stationary, relative to the drum, until the twist- 105 ers have again received their complement of wires at which time the rack moves back in the opposite direction for the 110 purpose of rotating the twist- 115 ers in the opposite direction to effect the formation of additional twists. The reciprocatory movement of the racks is imparted thereto by the rotation of the drum in coöperation with a 120 twister operating cam 32 having the form of a fixed cylinder mounted within the drum upon the shaft 9, see Figs. 4 and 5.

The peripheral face of the cam 32 is 110 formed with a cam-way 33 in which are guided anti-frictional rollers 22^a mounted at the lower ends of the projections 22 of the 115 twister operating racks. This cam-way 33 is of novel form, the requirements thereof being that each rack shall effect its complete 120 movement in one direction during approximately one-half of the complete rotation of the drum, that said rack shall remain stationary relative to the drum while the lat- 125 ter is completing its rotary movement, and that finally, the rack shall complete its throw in the reverse direction during the succeeding one-half rotation of the drum. In order to effect these movements, the cam-way 33 comprises a pair of dwell channels 33^a 130 and 33^b, arranged in parallel relation and separated by an interval equal to the desired throw of the racks. These dwell channels extend approximately half way around the cam and at the opposite sides thereof the 135

way 33 includes a pair of intersecting spiral channels 33^c and 33^d, each of which connects one end of a dwell channel with the opposite end of the other dwell channel. By reference to Fig. 10, the manner in which any given roller 22^a traverses the cam-way to effect the reciprocation of the associated rack will be apparent. For instance, the roller marked *x* is associated with a rack which is about to move to the right for the purpose of operating its twisters, said roller being located at the intersection of the dwell channel 33^b, which it has just traversed, and the spiral channel 33^c, which it is about to enter. As the drum continues to rotate, the roller *x* will be forced to travel along the channel 33^c until it reaches the receiving end of the dwell channel 33^b, the spiral form of the channel 33^c causing the roller to progress longitudinally of the cam the distance of the rack throw while the drum is making approximately one-half of a complete rotation. When this movement of the roller *x* has been completed, it stands a little beyond the position of the roller *y* in Fig. 10, or in other words, at the receiving end of the dwell channel 33^b, the rack having completed its throw and a series of twists having been formed by the associated set of twisters. As the drum continues to rotate, the twisters will be withdrawn from the twisted wires and the rack and its twisters will remain relatively stationary during the travel of the roller *x* along the dwell channel 33^b, which permits no progressive movement of the rack in either direction. When, however, this roller reaches the discharge end of the dwell 33^b, the associated twisters will again receive their complement of wires and will twist the same in the reverse direction as the roller enters and traverses the reverse spiral channel 33^d. When this traverse has been completed, a second series of twists will have been formed by the set of twisters associated with the roller *x* and the roller will now traverse the dwell channel 33^a preparatory to a repetition of the described operations.

For certain reasons, which will appear hereafter, it is desirable to move alternating racks in opposite directions to reverse the direction of each transverse series of twists, or in other words, to reverse each alternate twist in a given line wire. To accomplish this purpose, the rollers of each alternate rack at the active side of the drum are located in one spiral channel of the cam-way 33, as for instance, the channel 33^c, while the rollers of the other racks at the active side of the drum are located in the other spiral channel 33^d, the rollers in the two channels being arranged in alternating order as to progressive position around the drum, see Fig. 10. As the channels 33^a and 33^c intersect, the rollers are kept in their

proper channels by an automatic switch 34 pivoted as indicated at 35 and provided with a segmental trip 36 disposed beyond its axis. The face of the cam 32 is cut away, as shown in Fig. 10, to accommodate the switch 34 and its trip. In one position, to-wit that shown in full lines in Fig. 10, the switch is disposed across the channel 33^d for the purpose of preventing a roller traversing the channel 33^c from being deflected from its proper path as it passes the point of intersection of the two channels. In this position of the switch one end of the trip 36 projects across the channel 33^c at a point beyond the intersection so that when the roller has passed along the switch and thus successfully crossed the channel 33^d, it will come in contact with the trip 36 and automatically shift the switch to the dotted position shown in Fig. 10.

As the rollers located in the two spiral channels are in alternating arrangement as to progressive position, it will be apparent that the next roller to approach the switch will be traversing the channel 33^d and as the switch has now been thrown across the channel 33^c, said roller will pass along the switch and after safely crossing the channel 33^c will strike the other end of the trip 36 and thus restore the switch to its initial position for the proper guidance of the next succeeding roller traversing the channel 33^c.

Having completed the description of the drum, the twisters associated therewith, and the twisters operating mechanism, it is next in order to describe those instrumentalities whereby the wires and the stays or pickets are fed to the drum to permit the intertwisting of the strands to form line wires and to effect the attachment of the stays or pickets thereto. Each of the drum-heads 13 and 14 is provided, as shown in Figs. 4 and 5, with a peripheral series of sprocket teeth 37 so that each head constitutes a sprocket wheel engaging one of a pair of endless sprocket chains 38 and 39 passed around somewhat similar sprockets 40 fixed to a shaft 41 mounted in suitable bearings 42 at the upper front corners of the frame and preferably located in the horizontal plane of the drum axis. The chains 38 and 39 constitute elements of an endless stay or picket carrier which also includes a series of transverse slats 43 extending between the chains and secured thereto in any suitable manner. The slats 43 of the carrier, which latter is indicated as a whole by 44, are equidistant and are so spaced that the slats of that portion of the carrier extending around the drum will alternate with the sets of twisters extending across the drum. Each successive pair of slats 43 is designed to support a double stay or picket *a* formed, as shown in Fig. 6, with a looped end *b* and with parallel side members or legs *c* and *d*. These

stays or pickets are usually composed of several intertwisted strands of wire and the side members *c* and *d* thereof have a normal tendency to spring apart. In order to resist
 5 this tendency and to at the same time utilize it to effect the retention of the stay or picket in proper position on the carrier, the slats 43 of each pair are provided with a plurality of lugs or projections 45 disposed
 10 along the remote longitudinal edges of the slats. As shown in Fig. 6, each of these stays or pickets is supported by a pair of slats with its parallel side members *c* and *d* located between the lugs which thus frictionally retain the same and constitute
 15 means for holding the stay or picket in place.

In the particular type of fabric or fencing with reference to the manufacture of which
 20 the machine has been especially designed, the line wires *e* are each composed of a plurality of intertwisted strand wires *f* and *g* between which the stays or pickets are held. What may be termed the lower strand wires *f* are
 25 carried up from spools 46 and are led around the front end of the carrier 44, over the upper run thereof and around the active side of the weaving drum to a friction drum 47 around which the completed fabric or fencing
 30 passes in transit to the reel 48, located at the rear end of the machine. What may be termed the upper strand wires *g* are led from a suitable source of supply around the front sides of a plurality of guide wheels 49,
 35 located above the upper run of the carrier and are thence led back, as shown in Fig. 4, and around the active side of the weaving drum and thence around the drum 47 to the reel, as stated. It may be noted in passing
 40 that the guide wheels 49 are carried by a shaft 50 mounted in suitable bearings 51 at the upper ends of a pair of supports 52 rising from the frame of the machine at points somewhat in rear of the front end thereof.
 45 The upper and lower strand wires *f* and *g* are thus located in the same vertical planes so that an upper and lower strand will pass into the throats 31 of one annular series of guides 24 mounted on the drum, and will
 50 thence be directed to an annular series of twist-ers as the drum rotates.

By leading the upper and lower strands to the drum from points above and below the upper run of the carrier, and by locating
 55 the rotary guides 50 in rear of the front end of the carrier, it will be seen that those portions of the upper and lower strands in advance of the drum will converge and that the stays or pickets placed upon the upper
 60 run of the carrier above the lower strand wires will be conveyed to the drum and when delivered thereto will be located between the strand wires. Attention is directed to the fact that the lower sides of the
 65 rotary guides 49 are so disposed that those

portions of the wires *g* extending between said guides and the uppermost twist-ers will be disposed substantially horizontal or perhaps with a slight forward and downward inclination.

As the slats 43 of the carrier 44 are disposed at opposite sides of each set of twist-ers, it follows, that, as the pickets pass around the drum, the sides or stay forming
 70 portions thereof will alternate with the twist-ers and it therefore follows that, as the twist-ers operate to intertwist each pair of strand wires, the double stays or pickets will be securely connected to the line wires thus
 75 formed, each line wire being composed of strands having those portions lying between the stays or stay forming sides of the pickets tightly intertwisted.

By reference to Fig. 6, the utility of the reverse twists heretofore referred to will
 85 be understood. Obviously, each twister effects a double or right and left twist and if all of these twists were produced by turning the twist-ers in the same direction the tendency of the strand wires to untwist
 90 would serve to throw the tops or looped ends of the pickets out of line, that is to say, out of the plane of the fabric. By reversing the twists, however, this tendency is exerted in opposite directions at opposite sides of these
 95 loops and the strains in opposite directions are counter-active.

Power may be applied to the machine in a variety of ways, but by preference the drum-head 14 is formed with a gear-wheel
 100 53 meshing with a somewhat smaller gear-wheel 54 fixed at one end of the tension drum 47. The shaft 55 of the drum 47 is extended beyond opposite sides of the frame, that is to say, beyond the side castings, and
 105 is equipped at one end with suitable means, as for instance a band-wheel 56, for the application of power thereto. At the opposite end of the shaft 55 the latter is equipped with a sprocket wheel 57 geared as by a
 110 chain 58 to a somewhat smaller sprocket 59 mounted on the shaft 60 of the reel. By this arrangement movement will be transmitted from the shaft 55 to the weaving drum and reel respectively, the rotation of
 115 the drum serving to operate the stay carrier and twist-ers and the rotation of the reel serving to wind thereon the completed fabric or fencing continuously withdrawn from the weaving drum. The reel 48 is of usual construction and need not be specifically described. Suffice it to say, that in the line
 120 of connection between the reel and its operating mechanism is located a friction clutch 61 which will slip in order to prevent the exertion of excessive strain on the fabric as the diameter of the accumulating roll on the reel increases.

While I have shown one type of fabric or fencing which may be produced by the
 130

illustrated embodiment of the invention, the manufacture of other forms of fabric, without departing from the spirit of the invention, is contemplated. For instance, instead of utilizing pickets in the form of double stays, separate single stays may be utilized or, if desired, several stays may be grouped together and connected to the line wires, or a plurality of pickets may be grouped and so connected. In fact, it is believed to be within the purview of the present invention to construct any form of fabric or fencing of this general type without interrupting the feed of the line wires, and another broadly novel characteristic appears to be the feeding of the stays or pickets laterally to a plurality of longitudinally moving wires subsequently operated upon in transit to secure the stays or pickets in position.

It is thought that from the foregoing, the construction and operation of my fabric weaving machine or loom will be fully comprehended; but, while the present embodiment of the invention appears at this time to be preferable, I wish to reserve the right to effect such changes, modifications and variations thereof as may come fairly within the scope of the protection prayed.

What I claim is:—

1. In a machine for making wire fabric, the combination with means for guiding a plurality of wires, of means including twisting mechanism for applying a previously formed stay to said wires during the movement of the latter.

2. In a machine for making wire fabric, the combination with means for advancing a plurality of line wires, of continuously operating means for moving a stay laterally to present the same to the line wires, and twisting means for connecting the wires and stay.

3. In a machine for making wire fabric, the combination with means for continuously advancing a plurality of line wires, of means for moving a stay sidewise to present the same to the wires during the advance movement of the latter, and wire twisting means for connecting the wires and stay.

4. In a machine for making wire fabric, the combination with means for advancing a plurality of line wires, of mechanism operating during the movement of said wires to feed a stay laterally thereto and to connect the stay and wires said mechanism including a twister.

5. In a machine for making wire fabric, the combination with means for leading a plurality of wires longitudinally, of means for moving a stay laterally to present it to the wires, and twisting means for connecting the wires and stay during their movement in unison.

6. In a machine for making wire fabric,

the combination with supporting means for a plurality of line wires, of a stay carrier arranged to move a stay sidewise to present it to said wires, and twisting means for connecting the wires and stay without interrupting the movement of the stay.

7. In a machine for making wire fabric, the combination with means for continuously advancing a plurality of line wires, of a stay carrier movable with the wires to present a previously formed stay thereto and means independent of the stay carrier for effecting the connection of the wires and stay.

8. In a machine for making wire fabric, the combination with means for continuously advancing a plurality of line wires longitudinally, of an endless stay carrier movable with the line wires.

9. In a machine for making wire fabric, the combination with a moving stay carrier over which the line wires are led in the direction of the movement thereof, of means for causing the line wires and the stay carrier to move continuously in unison.

10. In a machine for making wire fabric, the combination with means for advancing a series of line wires, of a moving stay carrier over which the line wires are led, and means movable with the carrier for connecting the stay and line wires during the movement of the latter.

11. In a machine for making wire fabric, the combination with wire connecting mechanism continuously movable in an endless orbit, of means for leading a plurality of line wires to said mechanism, and a stay carrier movable to present stays to the wire connecting mechanism.

12. In a machine for making wire fabric, the combination with wire connecting mechanism continuously movable in an endless orbit, of means for leading a plurality of line wires to said mechanism, and a stay carrier movable with the wires to present previously formed stays to the wire connecting mechanism.

13. In a machine for making wire fabric, the combination with wire connecting mechanism movable in an endless orbit, of means for leading a plurality of line wires to said mechanism, and an endless stay carrier movable with the wires to present previously formed stays to the wire connecting mechanism.

14. In a machine for making wire fabric, the combination with a rotary weaving drum, of an endless stay carrier movable with the drum, and means for leading a plurality of line wires to the drum.

15. In a machine for making wire fabric, the combination with a traveling set of twistors, of means for leading line wires to the twistors, and means for moving the stays sidewise to present the same to the wires said

twisters operating to twist the line wires together during the advance movement of said wires.

16. In a machine for making wire fabric, the combination with a continuously traveling set of twisters, of means for leading line wires to the twisters in the direction of their travel, and a stay carrier movable with the line wires to present the stays thereto.

17. In a machine for making wire fabric, the combination with a set of traveling twisters, of means for leading a plurality of line wires in proximity thereto, and an endless stay carrier for presenting stays to the wires and movable in the direction of travel of the twisters.

18. In a machine for making wire fabric, the combination with a rotary drum equipped with a set of twisters, of means for advancing a plurality of line wires with the twisters, and means for moving a stay sidewise to present the same to the line wires.

19. In a machine for making wire fabric, the combination with a rotary drum equipped with a set of twisters, of means for leading line wires to the twisters, and a traveling carrier for presenting the stays to the line wires.

20. In a machine for making wire fabric, the combination with a rotary drum equipped with a set of twisters, of means for leading line wires to the twisters, and an endless stay carrier movable with the wire to present the stays thereto.

21. In a machine for making wire fabric, the combination with a plurality of sets of continuously traveling wire connecting mechanisms, of means for leading the line wires thereto, and means for presenting the stays across the line wires at points intermediate of the wire connecting mechanisms.

22. In a machine for making wire fabric, the combination with a plurality of continuously moving sets of wire connecting mechanisms, of means for moving a plurality of line wires with said sets, and a stay carrier for presenting successive stays to the line wires at points intermediate of the several sets of wire connecting mechanisms.

23. In a machine for making wire fabric, the combination with a plurality of continuously moving sets of wire connecting mechanisms, of means for moving a plurality of line wires with said sets, and a stay carrier movable with the wires.

24. In a machine for making wire fabric, the combination with a plurality of moving sets of wire connecting mechanisms, of means for moving a plurality of line wires with said sets, and an endless stay carrier movable with the wires.

25. In a machine for making wire fabric, the combination with a rotary drum equipped with a plurality of sets of wire

connecting mechanisms, of means for leading line wires to the drum, and means for moving stays sidewise to present them in position to be connected to the line wires.

26. In a machine for making wire fabric, the combination with a rotary drum equipped with several sets of wire connecting mechanisms, of means for leading line wires to the drum, and an endless stay carrier associated with said drum.

27. In a machine for making wire fabric, the combination with a rotary drum equipped with several sets of twisters, of means for leading line wires to the twisters, and means for leading previously formed stays to the wires.

28. In a machine for making wire fabric, the combination with a rotary drum equipped with several sets of twisters, of means for leading line wires to the twisters, and a stay carrier associated with the drum.

29. In a machine for making wire fabric, the combination with a rotary drum equipped with several sets of twisters, of means for leading line wires to the twisters, and an endless stay carrier movable with the line wires to present stays thereto in alternating arrangement with the sets of twisters.

30. In a machine for making wire fabric, the combination with a rotary drum equipped with wire connecting mechanism, of means for leading line wires to the drum, and an endless stay carrier passed around the drum and extending therefrom whereby stays may be deposited upon the carrier and conveyed to the line wires passing around the drum.

31. In a machine for making wire fabric, the combination with means for connecting a plurality of moving line wire strands, of means for moving a stay laterally to present it between the strands.

32. In a machine for making wire fabric, the combination with means for twisting a plurality of moving line wire strands to connect the same, of strand guiding means for causing the strands to converge toward the twisting means, and means for moving a stay laterally between the converging strand wires whereby said stay will be connected to the line wire by the twisting of the strands.

33. In a machine for making wire fabric, the combination with a set of twisters, of means for presenting a plurality of continuously moving line wire strands to each twister, and means for introducing stays between the line wire strands during the movement of the latter.

34. In a machine for making wire fabric, the combination with a set of twisters, of means for presenting a plurality of continuously moving line wire strands to each twister, and means for moving a stay later-

ally to present it between said strands while the latter are advancing.

35. In a machine for making wire fabric, the combination with a set of continuously traveling twist- 5
ers, of means for presenting a plurality of line wire strands to each twister, and a stay carrier movable with the twist-
ers to present stays between the strands.

36. In a machine for making wire fabric, 10
the combination with a traveling set of twist-
ers, of means for presenting a plurality of line wire strands to each twister, and an endless stay carrier movable with the strands during the travel of the twist-
ers.

15 37. In a machine for making wire fabric, the combination with a series of twist-
ers movable in an endless orbit, of means for leading a plurality of line wire strands into position to be engaged by successive twist-
ers and twisted thereby one upon another 20
in transit, and means for presenting stays between the strands prior to the twisting of the latter.

38. In a machine for making wire fabric, 25
the combination with a series of twist-
ers continuously movable in an endless orbit, of means for presenting a plurality of line wire strands in position to be engaged and
intertwisted by successive twist- 30
ers, and means for moving a stay laterally in the direction in which the strands are advancing to position said stay between the strands prior to the intertwisting of the latter.

39. In a machine for making wire fabric, 35
the combination with a series of twist-
ers moving in an endless orbit, of means for presenting a plurality of line wire strands in position to be engaged and intertwined by
successive twist- 40
ers as the latter and the strands advance in unison, and a stay carrier for conveying stays to positions between the strands prior to the intertwisting thereof.

40. In a machine for making wire fabric, 45
the combination with a plurality of twist-
ers movable in an endless orbit, of means for presenting a plurality of line wire strands in a position to be engaged by successive
twist- 50
ers, and an endless carrier disposed to convey the stays laterally to position the same between the strands.

41. In a machine for making wire fabric, the combination with a rotary drum, of an
endless stay carrier associated therewith, 55
and twist-
ers distributed about the periphery of the drum.

42. In a machine for making wire fabric, the combination with a rotary drum pro-
vided with a plurality of sets of twist- 60
ers, of means for presenting a plurality of line wire strands to corresponding twist-
ers of the several sets, and means for feeding stays between the strands.

43. In a machine for making wire fabric, 65
the combination with a rotary drum pro-
vided with a plurality of sets of twist-
ers,

of means for presenting a plurality of line wire strands to corresponding twist-
ers of the several sets, and means for feeding stays laterally to position the same between the strands.

44. In a machine for making wire fabric, 70
the combination with a rotary drum, of sev-
eral corresponding sets of twist-
ers movable with the drum, means for leading line wire strands to the twist-
ers, and a stay carrier 75
associated with the drum.

45. In a machine for making wire fabric, the combination with a rotary drum, of sev-
eral corresponding sets of twist- 80
ers movable with the drum, means for leading line wire strands to the twist-
ers, and an endless stay carrier associated with the drum.

46. In a machine for making wire fabric, the combination with an endless stay carrier,
of means for leading line wires over the car- 85
rier, and wire connecting devices extending outwardly through the carrier to engage and connect the stays and line wires during the movement of the latter.

47. In a machine for making wire fabric, 90
the combination with a continuously travel-
ing stay carrier having transverse stay sup-
ports, of means for leading line wire strands over the carrier with the stays interposed between the strands, and twisting mecha- 95
nism arranged to engage and intertwist the strands between the stays.

48. In a machine for making wire fabric, the combination with a row of twist-
ers, of means for presenting a plurality of continu- 100
ously moving line wire strands to each twister to be intertwined thereby, and a stay carrier arranged to support a stay in position to be engaged between the several sets of line wire strands intertwined by the 105
twist-
ers.

49. In a machine for making wire fabric, the combination with a twister support and a stay carrier moving together in the direc-
tion of the line wire feed, of a twister 110
mounted on the moving twister support and extended through the carrier to engage the line wires.

50. In a machine for making wire fabric, the combination with a rotary drum, of a 115
stay carrier extending around the same, means for leading line wire strands oppo-
site the carrier, and twist-
ers carried by the drum and arranged to extend through the carrier to engage the strands. 120

51. In a machine for making wire fabric, the combination with a twister, of means
for guiding a pair of continuously moving line wire strands to the twister from points 125
above and below the same, and means for passing a stay between the strands during their movement to the twister.

52. In a machine for making wire fabric, the combination with a rotary weaving
drum, of rotary supporting means in ad- 130

vance of the drum, an endless stay carrier passed around the drum and said supporting means, to constitute the upper run of said carrier, a moving feed table for the stays, and means for leading line wire strands around a portion of the drum with the stays interposed between the strands.

53. In a machine for making wire fabric, the combination with a weaving drum equipped with sprocket wheels and with annular series of twisters, of other sprocket wheels mounted in advance of the drum, and a stay carrier including endless chains gearing the sprockets of the drum to the other sprockets, and transverse stay supports connecting the chains.

54. In a machine for making wire fabric, the combination with a rotary weaving drum, of an endless stay carrier cooperating therewith and extended in advance thereof, means for leading a plurality of line wire strands to the drum by way of the carrier, and rotary guides located above the upper run of the carrier to guide other line wire strands to the drum.

55. In a machine for making wire fabric, the combination with a frame, of a rotary weaving drum mounted therein, means for leading line wire strands and stays to the drum, a tension drum around which the completed fabric passes from the weaving drum, a reel to receive the fabric from the tension drum, means for applying power to the tension drum, and gearing connecting said drum with the weaving drum and reel respectively.

56. In a machine for making wire fabric, the combination with means for continuously advancing a plurality of line wires, of means including wire twisting mechanism for applying a previously formed stay to said wires during the movement thereof.

57. In a machine for making wire fabric, the combination with means for continuously advancing a plurality of line wires, of means for feeding stays between the line wires, and means movable with the line wires for twisting the same together.

58. In a machine for making wire fabric, the combination with means for continuously advancing a plurality of line wires, of means for moving a stay laterally to a position between the wires, and means movable with the line wires for twisting the same together.

59. In a machine for making wire fabric, the combination with means for continuously advancing a plurality of line wires, of an endless stay carrier for presenting stays between the line wires, and means for twisting the line wires together without interrupting their movement.

60. In a machine for making wire fabric, the combination with means for advancing

a plurality of line wires, of a continuously operating stay carrier for moving stays to positions between the line wires, and means for twisting the line wires together.

61. In a machine for making wire fabric, the combination with means for advancing a plurality of line wires, of an endless stay carrier continuously moving in the direction of feed of the line wires, and means for twisting the line wires together.

62. In a machine for making wire fabric, the combination with a moving stay carrier over which the line wires are led in the direction of movement thereof, of line wire twisting means, arranged to twist the line wires together during the movement thereof.

63. In a machine for making wire fabric, the combination with means for continuously advancing a series of line wires, of a moving stay carrier over which the line wires are led, and means for twisting the line wires together during the movement thereof.

64. In a machine for making wire fabric, the combination with twisting means mounted to travel continuously in an endless orbit and arranged to twist a plurality of line wires together, of means for feeding a stay between the line wires to be secured by the twisting of the latter.

65. In a machine for making wire fabric, the combination with means for continuously advancing a plurality of line wires, means operating during the movement of said wires to place a stay between the same, and means for twisting the line wires together during the movement thereof to secure the stay.

66. In a machine for making wire fabric, the combination with means for continuously advancing several pairs of line wires, of means for presenting a stay between the wires of the several pairs, and means for twisting each pair of wires together to secure the stay.

67. In a machine for making wire fabric, the combination with means for advancing several pairs of line wires longitudinally, of means for presenting a stay between the wires of the several pairs, and twisting mechanism movable with the line wires and operating during such movement to twist each pair of line wires together.

68. In a machine for making wire fabric, the combination with means for continuously advancing several pairs of line wires, of means for presenting a stay between the wires of the several pairs during the advance movement of the latter, and means for twisting together each pair of line wires to secure the stay.

69. In a machine for making wire fabric, the combination with several twisting devices continuously movable in an endless

orbit, of means for presenting a pair of line wires to each twisting device, and means for presenting a stay wire between the line wires of each pair.

5 70. In a machine for making wire fabric, the combination with means for continuously advancing a plurality of line wires, of a set of twisters mounted to travel with the wires, and means for presenting a stay
10 between the line wires.

71. In a machine for making wire fabric, the combination with means for continuously advancing several pairs of line wires, of means for moving a stay laterally to present it between the line wires, and a set of twisters mounted to travel with the line wires and each arranged to twist a pair of wires together.

72. In a machine for making wire fabric, 20 the combination with a series of twisters continuously movable in an endless orbit, of means for leading a plurality of line wire strands into position to be engaged by successive twisters and twisted thereby one
25 upon another, and means for presenting stays between the line wire strands.

73. In a machine for making wire fabric, the combination with a series of twisters movable in an endless orbit, of means for
30 presenting a pair of line wires in position to be engaged and intertwisted by successive twisters of the series, and means for moving a stay laterally in the direction in which the strands are advancing to position said stay
35 between the strands.

74. In a machine for making wire fabric, the combination with means for advancing a plurality of line wires, of means for feeding stays to the wires, and means operating
40 during the advance of the line wires to twist the same together.

75. A machine for making wire fence, comprising a revoluble frame, a plurality of twisters arranged in a plurality of rows on the said frame adapted to retain and advance a series of strand wires, and means for feeding stay wires to the twisters of each row as they successively follow each other in the movement of the revoluble frame.

50 76. A machine for making wire fence, comprising a revoluble frame, several sets of wire twisters mounted on said frame adapted to receive and advance strand wires, means for feeding stay wires to each set of
55 twisters as they successively follow each other in the movement of the frame, and means for operating the said twisters to connect the strand and stay wires in transit.

77. In a machine for making wire fabric, 60 the combination with means for moving line wires endwise and stays sidewise at the same time, of means operating during such movement to connect the line wires at points intermediate of the stays.

78. In a machine for making wire fabric, 65 the combination with means for moving line wires endwise and stays sidewise at the same time, of means operating during such movement to intertwist the line wires at points intermediate of the stays. 70

79. In a machine for making wire fabric, the combination with means for continuously moving a plurality of line wires endwise, of twisting mechanism movable with the line wires, and means for moving a stay
75 sidewise to present the same to the moving line wires.

80. In a machine for making wire fabric, the combination with means for advancing a plurality of line wires, of means for feeding
80 a stay to the wires during the advance of the latter, and means for twisting the wires together during their advance to secure the stay.

81. In a machine for making wire fabric, 85 the combination with means for advancing a plurality of line wires, of means for feeding a stay to the wires during their movement, and means operating during the movement of the line wires to twist the same together. 90

82. In a machine for making wire fabric, the combination with means for advancing a pair of line wires, of means for feeding a stay between said wires, and means operating during the advance of the wires to connect
95 the same at opposite sides of the stay.

83. In a machine for making wire fabric, the combination with means for advancing a plurality of line wires, of means for intertwisting such wires during their advance, 100 and means for feeding a stay to the wires.

84. In a machine for making wire fabric, the combination with means for advancing a plurality of line wires, of means for connecting said wires at separated points during
105 their advance, and means for feeding a stay to the line wires between their points of connection.

85. In a machine for making wire fabric, the combination with means for connecting a 110 plurality of moving line wires, of means for feeding a stay between said wires.

86. In a machine for making wire fabric, the combination with means for continuously advancing a pair of line wires, of 115 means movable with the wires to connect the same, and means for feeding stays between the wires.

87. In a machine for making wire fabric, the combination with means for advancing a 120 pair of line wires, of means movable with said wires to present a stay between the same, and means for connecting the line wires during the movement thereof to secure the stay. 125

88. In a machine for making wire fabric, the combination with means for advancing a pair of line wires, of means movable with

said wires to present a stay between the same, and means for connecting the line wires during the advance thereof to secure the stay.

5 89. In a machine for making wire fabric, the combination with a rotary support, of wire connecting mechanism movable therewith, and a stay carrier inclosing the support.

10 90. In a machine for making wire fabric, the combination with a rotary drum and wire connecting mechanism movable therewith, of a stay carrier extending around a portion of the periphery of the drum, to
15 maintain the stay in proper position relative thereto during the operation of the wire connecting mechanism.

91. In a machine for making wire fabric, the combination with a support and a stay carrier movable in unison, of wire connecting mechanism mounted on the support.

92. In a machine for making wire fabric, the combination with a support and a stay carrier movable in unison, of twisting
25 mechanism mounted on the support.

93. In a machine for making wire fabric, the combination with a support and a stay carrier movable in the same direction, of
30 twistors mounted on the support, and means for leading line wires to the twistors.

94. In a machine for making wire fabric, the combination with a rotary drum, of twistors mounted thereon, means for leading
35 line wires to the twistors, and a stay carrier cooperating with the drum.

95. In a machine for making wire fabric, the combination with a continuously rotating drum, of rows of twistors distributed
40 about the periphery of the drum, means for leading a plurality of wires to each twister to be intertwined thereby, and a stay carrier cooperating with the drum.

96. A machine for making wire fabric, comprising a revoluble support, twistors arranged in parallel rows on the support and
45 adapted to receive line wires, and means for feeding stays to the support.

97. A machine for making wire fabric, comprising a revoluble support, several sets
50 or rows of wire twistors mounted on the support and adapted to receive line wires, means for feeding stays to the support during the movement of the latter, and means for operating the twistors to connect the line wires
55 and stays.

98. In a wire fence machine, a fence forming drum, means for holding the running wires of the fence fabric circumferentially
60 on said drum, and twistors mounted on said drum and operated during the movement thereof to unite the running wires with palings extending longitudinally of the drum.

99. In a wire fence machine, a revoluble
65 drum, means for continuously drawing the

running wires of the fence fabric circumferentially over and from said drum, and twistors mounted on said drum in position to engage said running wires and unite them with the palings extending longitudinally
70 of the drum.

100. In a wire fence machine, a revoluble drum, a reel for drawing the running wires of the fabric over and away from said drum, means continuously driving said drum and
75 reel, and twistors mounted on said drum in position to engage said running wires and unite them with the palings.

101. In a wire fence machine, a revoluble drum over which the running wires of the
80 fence fabric pass, twistors mounted on the drum and operating during the movement thereof to unite the running wires with the palings, and means on the drum for holding and alining the palings.

102. In a wire fence machine, a revoluble fence forming drum, suitable twister mechanism mounted thereon, a continuously operating reel for drawing the running wires
90 over said drum, means below the horizontal plane through the axis of the drum for guiding one running wire of each strand so that it feeds upward over the drum, and means immediately over the drum under which the running wires coming down from
95 above pass to the drum.

103. In a wire fence machine, a continuously revolving fence forming drum, suitable twisting mechanism mounted thereon, a reel for drawing the running wires over
100 said drum, means below the horizontal plane through the axis of the drum for guiding one running wire of each strand so that it feeds upward over the drum, and means above the drum for guiding the remaining
105 running wires so that the palings may be placed in upon the running wires passing up from below and in advance of the running wires that are fed down from above.

104. In a wire fence machine, a revoluble
110 fence forming drum, twister mechanism mounted thereon and operating during the movement thereof, a reel for drawing the running wires of the fence fabric about and away from said drum, and means for revolving both the drum and the reel.

105. In a machine for making wire fabric, the combination with wire-connecting mechanism movable in an endless orbit, of means for leading a plurality of line wires to said
120 mechanism, and a stay carrier movable to present stays to the wire-connecting mechanism.

106. In a wire fence machine, a fence forming drum, means for holding the running wires of the fence fabric circumferentially on said drum, and twistors mounted on said drum for uniting the running wires with the palings extending longitudinally
130 of the drum.

107. In a wire fence machine, a revoluble drum, means for drawing the running wires of the fence fabric circumferentially over and from said drum, and twisters mounted
5 on said drum in position to engage said running wires and unite them with the palings extended longitudinally of the drum.

108. In a wire fence machine, a revoluble drum, a reel for drawing the running wires
10 of the fabric over and away from said drum, a single means for driving said drum and

reel, and twisters mounted on said drum in position to engage said running wires and unite them with the palings.

In testimony, that I claim the foregoing 15
as my own, I have hereto affixed my signature in the presence of two witnesses.

ALVA L. KITSELMAN.

Witnesses:

JOHN H. SIGGERS,
FLORENCE WALTER.