(No Model.) 4 Sheets—Sheet 1.

W. P. SHATTUCK.

AUTOMATIC FENCING MACHINE.

No. 454,530. Patented June 23, 1891.

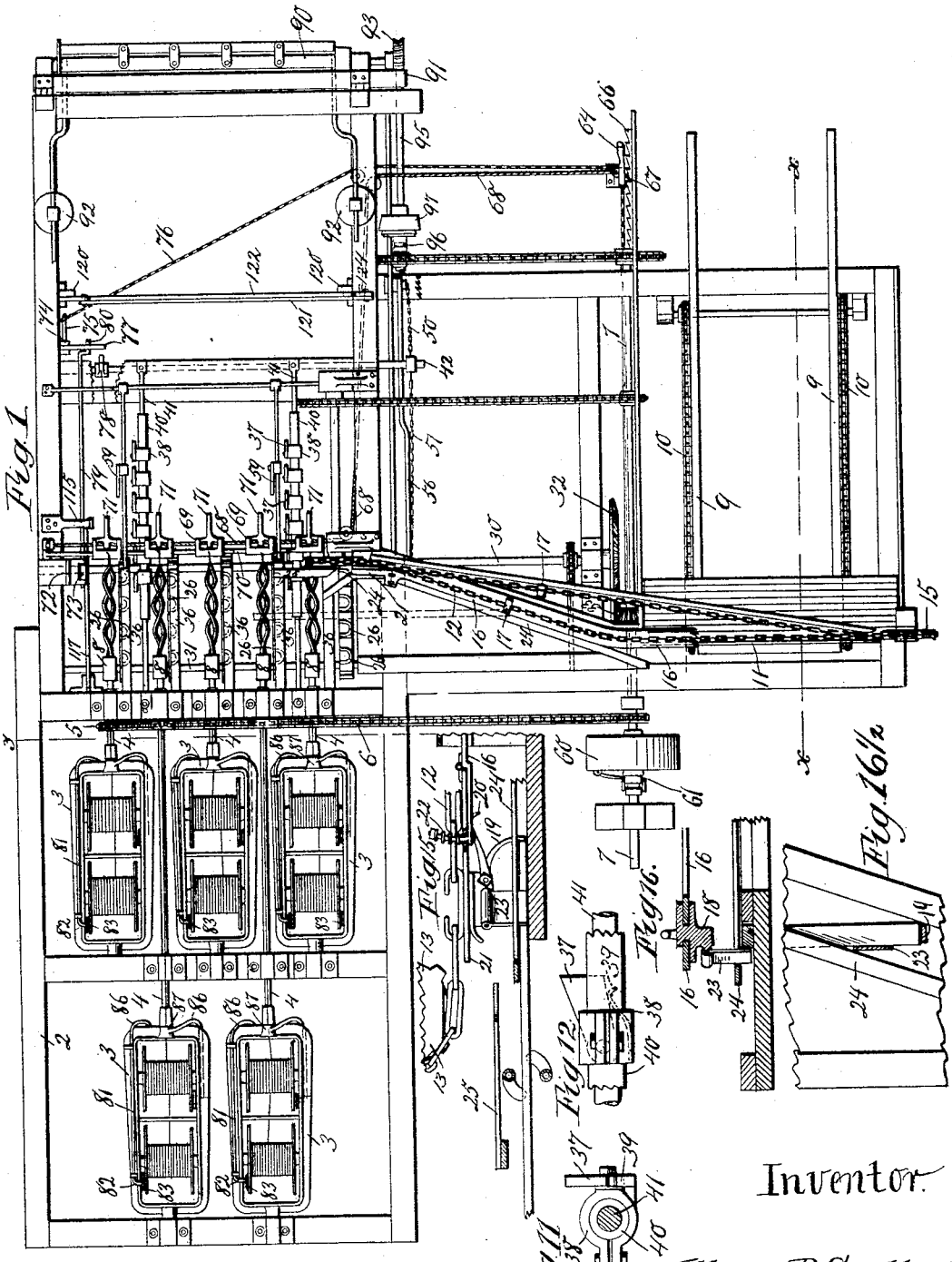

Fig. 1

Fig. 16½

Fig. 15

Fig. 16.

Fig. 12.

Fig. 11

Witnesses.
J. Jessen
R. H. Sanford

Inventor.
William P. Shattuck.
By Paul & Merwin Attys.

(No Model.) 4 Sheets—Sheet 2.

W. P. SHATTUCK.

AUTOMATIC FENCING MACHINE.

No. 454,530. Patented June 23, 1891.

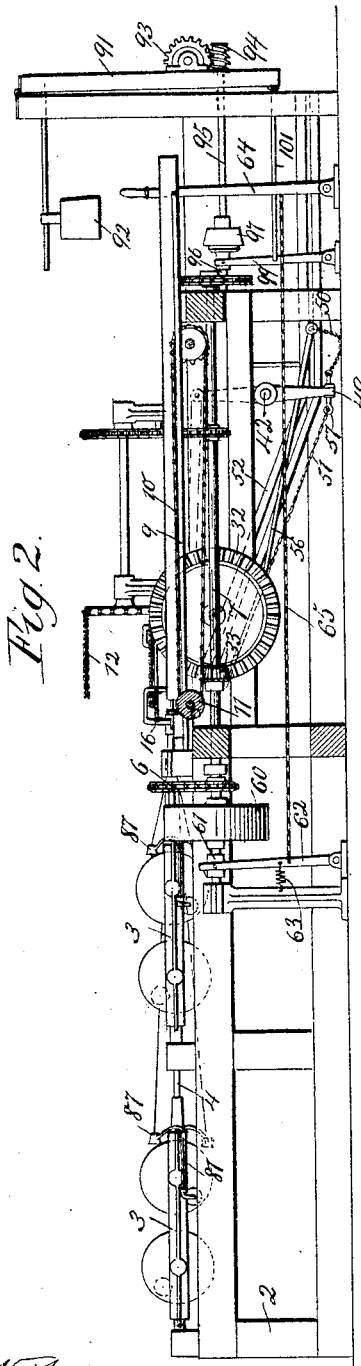

Fig. 2.

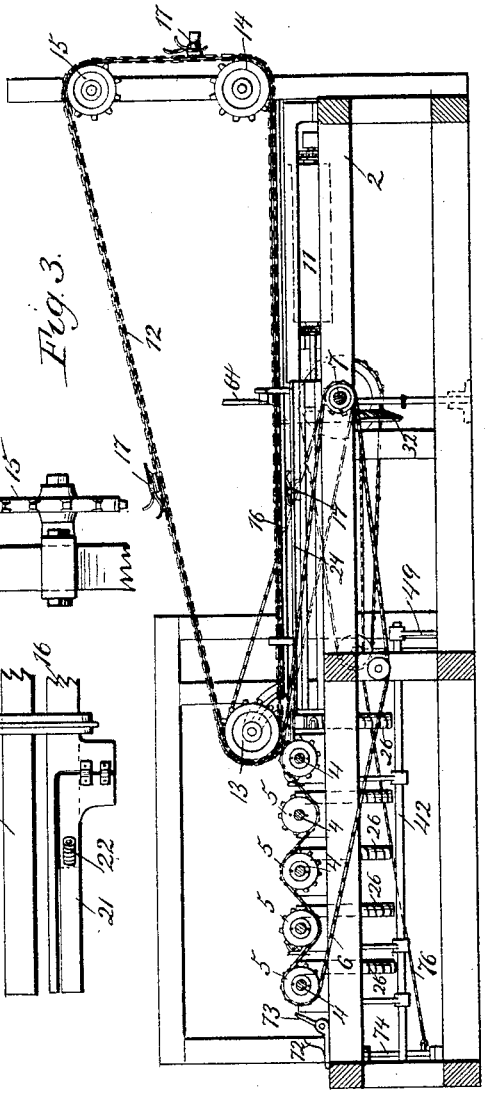

Fig. 3.

Fig. 25.

Fig. 26.

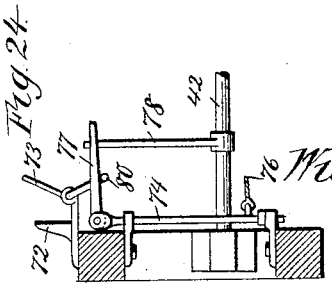

Fig. 24.

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W. P. SHATTUCK.

AUTOMATIC FENCING MACHINE.

No. 454,530. Patented June 23, 1891.

Fig. 4.

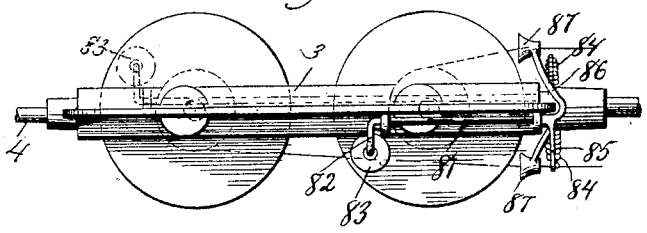


Fig. 5.

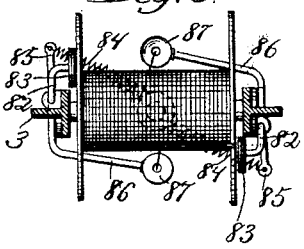


Fig. 6.

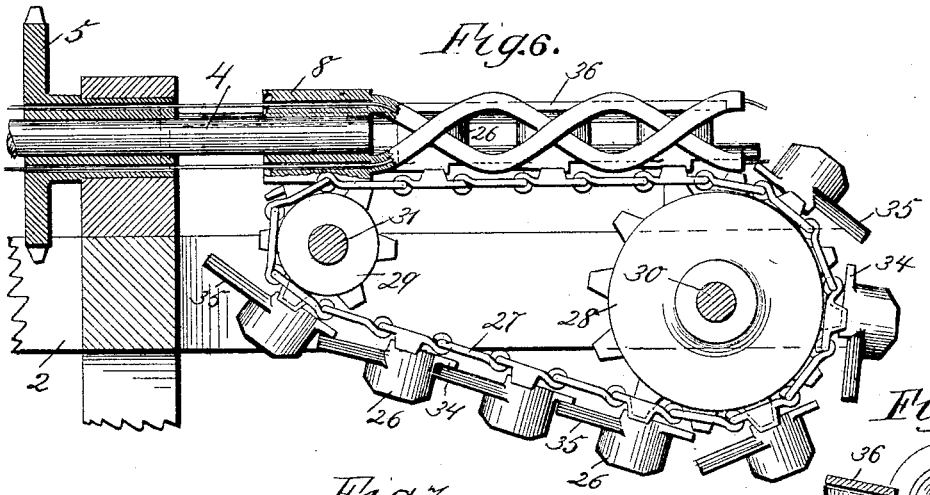


Fig. 23.

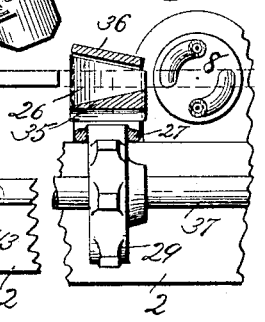


Fig. 7.

Fig. 8.

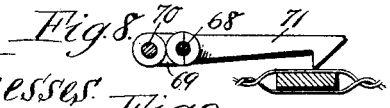


Fig. 9.

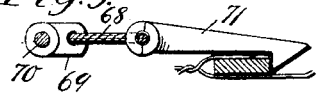
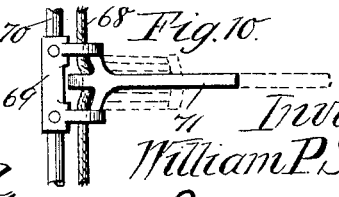


Fig. 10.



Witnesses.
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William P. Shattuck
By Paul & Mennin attys

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W. P. SHATTUCK.

AUTOMATIC FENCING MACHINE.

No. 454,530. Patented June 23, 1891.

Fig. 13

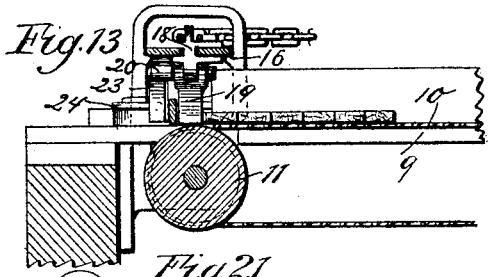


Fig. 20.

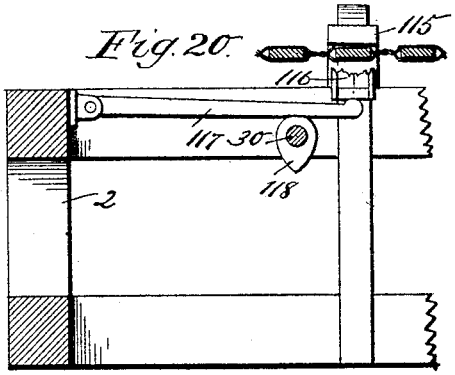


Fig. 21

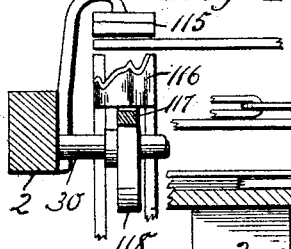


Fig. 14

Fig. 22.

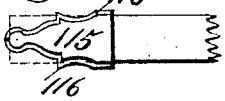


Fig. 17

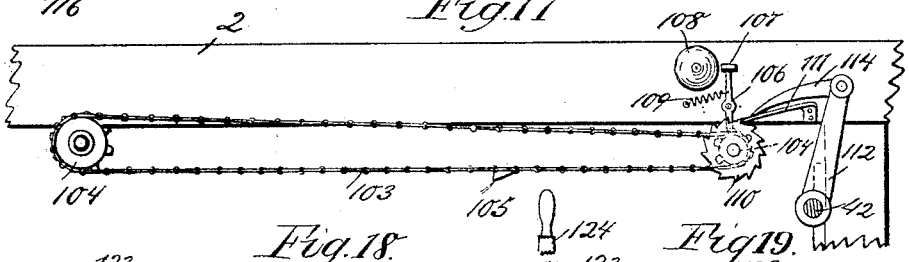


Fig. 18.

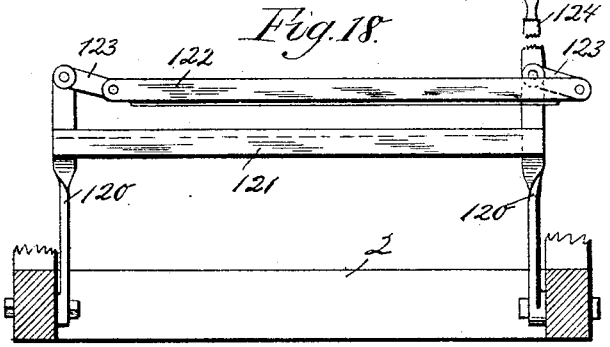
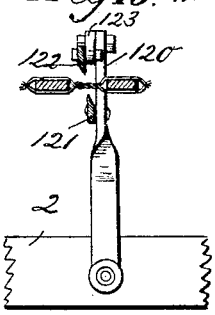


Fig. 19.



Witnesses:
J. Jessen.
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Inventor
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UNITED STATES PATENT OFFICE.

WILLIAM P. SHATTUCK, OF MINNEAPOLIS, MINNESOTA.

AUTOMATIC FENCING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 454,530, dated June 23, 1891.

Application filed March 31, 1890. Serial No. 345,994. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM P. SHATTUCK, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain Improvements in Automatic Fence-Machines, of which the following is a specification.

This invention relates to improvements in machines designed especially for constructing wire-and-picket fences, though the machines are also applicable for making any kind of fabric that is formed of a twisted warp of wires or other material and a woof of slats or strips of any kind and of any material. Such fabric may be used for making barrels, boxes, or shipping-crates, as well as for other purposes.

As high-speed machines of this class have heretofore generally been constructed they are provided with a series of rotating twisters, through which the wires forming the warp pass and by which they are twisted. In order to insert the pickets or slats forming the woof, it has been necessary to stop the twisters or reduce their speed almost to a complete stop, and then suddenly to shoot the pickets between them while they are at rest. This operation is objectionable for several reasons. One of the main objections arises from the fact that the stopping and starting of the twister cause a great deal of strain upon the machine. Another objection is that with such a construction only a limited speed can be attained, as the twisters must remain stationary during the entire time that the picket is passing between them. In order to reduce this time to a minimum, it has been necessary to move the picket very quickly across the machine. This has usually been accomplished by striking a sharp blow upon the end of the picket, and thereby the picket was often bruised or marred and sometimes broken. I obviate these objections by providing a machine in which the twisters are rotated continuously and with a uniform motion, and in which the pickets are fed between the twisters while they are in motion. To accomplish this result each twister is provided with a pair of spiral twister-fingers by which the wires are guided and between which the pickets are fed, each picket being given a simultaneous transverse movement across the machine and a movement longitudinally thereof.

Another object is to provide improved means for feeding the pickets with a positive feed and at a uniform speed and releasing them when the forward end reaches the desired point, no matter what may be the length of the picket.

Other objects I have in view are to provide improved tension devices for the spools, improved means for regulating the twist of the warp and the distance between pickets, improved means for automatically winding the fence or fabric, an improved device for measuring the length of the fabric, a device for stopping the machine in case of the breaking of a wire, and a device for stopping the machine in case a picket fails to reach its proper position.

Another feature of the invention is a device for cutting or shaping the pickets while in the machine, and a further feature is a device for cutting off the fence while it is being moved along in the machine.

Other objects will appear from the following detailed description, taken in connection with the accompanying drawings, in which—

Figure 1 is a plan of my new machine. Fig. 2 is a longitudinal vertical section on line $x\,x$ of Fig. 1. Fig. 3 is a transverse vertical section on line $y\,y$ of Fig. 1. Figs. 4 and 5 are details showing the tension device on the spools. Fig. 6 is a detail section of the twister and elevation of the traveling picket-guide. Fig. 7 is a detail side elevation showing the fence-advancing mechanism and the means for regulating its movement. Figs. 8, 9, and 10 are details of the device for stopping the machine in case of breakage of a wire by the twisters. Figs. 11 and 12 are details of the dog on the fence-advancing mechanism. Figs. 13, 14, 15, 16, and 16½ are details of the means for feeding the pickets between the twisters. Fig. 17 is a side elevation of the measuring device. Figs. 18 and 19 are details of the wire-cutters. Figs. 20, 21, and 22 are details of the picket-shaper. Fig. 23 is a detail section of the traveling picket-guide and section of the twister-fingers, and showing the manner of passing the picket between them. Fig. 24 is a detail of the device for stopping

the machine when the picket fails to reach its position in the machine. Fig. 25 is a detail of the movable sprocket-wheel that carries the sprocket feeding-chain. Fig. 26 is a detail of a portion of the picket-feeding device.

In the drawings, 2 represents the frame of the machine, which may be of any preferred construction and of any suitable material. Mounted in suitable bearings, preferably arranged upon this frame, are suitable spool-frames 3, that carry the spools of wire or other material to form the warp of the fence or other fabric. These frames are provided with shafts 4, having sprockets 5, by which they are driven, preferably by a chain 6 from the main shaft 7 of the machine.

Twister-heads 8 are arranged, preferably, on the shafts 4 of the spool-frames, though they might obviously be mounted and driven separately from the spool-frames and produce the same result. The twisters have spiral twister-fingers, by which the wire is guided. The twisters are given a continuous movement, preferably by the means described, though they may be driven by any other suitable means. The pickets are fed between the revolving twisters while they are in motion, and are given simultaneously a movement across the machine and a movement lengthwise thereof, so that as they pass through the twisters they also move lengthwise of the twisters, this forward movement being timed to correspond to the twist or spiral of the twisters.

The pickets are preferably placed on a feed-table 9, provided with belts or carriers 10, by which the pickets are carried forward to the point where they are taken hold of by the feed-carrier. At the end of the table, where they are brought by the belts 10, is a roll 11, on which the end picket rests. This roll supports the picket for its full length and keeps it in position to be engaged by the feed-carrier. The feed-carrier consists of an endless chain 12, that passes over sprockets 13, 14, and 15. There are preferably three of these sprockets, one located nearly over the first twister and substantially in line with the front end of the twisters and the others located at some distance from the twisters and substantially in line with their rear ends. The sprockets 13 and 14 are arranged at substantially the same height, while the sprocket 15 is arranged above the sprocket 14. The wheel 15 is preferably secured upon a band or loop that surrounds the supporting-post, and is adapted to be moved up and down thereon. By loosening the bolts shown in Fig. 25 this wheel can be adjusted and again secured in position by tightening these bolts. A slotted guide 16 is arranged beneath the lower part of the chain, and it supports the chain and guides it in its movement. The first portion of this guide is at right angles with the axes of the twisters, and the rest is on a diagonal line from this point to the sprocket 13 at the front end of the twisters.

Secured upon the chain or carrier 12 are a series of tripping-dogs 17. These dogs are hinged upon a plate 18, that is secured to the chain and project through the guide 16. Each dog 17 consists, preferably, of a piece of spring metal having two arms 19 and 20, the arm 19 being arranged to engage the rear end of the picket and the arm 20 being arranged to bear against the under side of the guide, and thus to prevent the dog from turning on its pivot as long as the arm 20 remains in contact with the under side of the guide. As the chain comes along, the dog engages the rear end of the picket and moves the picket toward the twisters. This movement is in a straight line until the end of the picket comes between the fingers of the first twister, and then the picket begins to advance and the chain travels over the diagonal part of the guide, the dog still remaining in engagement with the rear end of the picket.

At the end of the guide 16 is a yielding plate 21, that forms a continuation of the guide, and against which the arm 20 on the dog bears after leaving the guide. This plate is held in position by a spring 22. The tension of this spring is sufficient to hold the dog down while the picket is moving forward. As soon, however, as the picket reaches the end of its movement and strikes the picket-stop the resistance is sufficient to overcome the tension of the spring-plate and the dog releases the picket. It will be seen that with this device the pickets are fed to the twisters with a positive, regular, and uniform movement, and that this movement continues until the picket reaches its position, and no matter where the rear end may be the picket will then be released. It makes no difference, therefore, in the feeding of the pickets whether the pickets are all of the same length or not. The upper sprocket 15 may be raised or lowered and additional links inserted, or a part of the links removed between every two dogs, and by this means I may increase or decrease the number of pickets fed to the machine in any given time without increasing or decreasing the speed at which the pickets are moved.

Hinged upon the plate 16, to which the picket-moving dog is secured, is a plate 23, whose hinge is nearly at right angles to that of the dog. This plate is in advance of the dog, so that it stands at the side of the picket as it is advanced to the machine. A guide-bar 24 is arranged parallel to the diagonal portion of the chain and far enough above the picket to permit the picket to pass beneath it. When the guide-plate 23 strikes this bar, it travels along by it, and the bar prevents the plate from turning on its hinge. The end of this guide-bar extends close to the first twister and is inclined backward. A bar 25, having an inclined end, is arranged

over the first twister, so that when the plate 23 reaches this point it strikes the inclined end of this bar, and is thereby turned upward on its hinge to permit it to pass over the twister without striking it. The plate 23, engaging the side of the picket near its rear end, causes this end of the picket to travel longitudinally of the machine at the same speed as its forward end, and thus keeps the rear end of the picket in contact with the dog. As the pickets pass between the twisters, they are moved forward at the desired rate of speed. For this purpose I prefer to use a series of traveling guides, which both advance the pickets and at the same time guide them properly through the twisters. This device consists of a series of guide-blocks 26, secured upon endless chains 27, that pass over the sprockets 28 and 29 upon the shafts 30 and 31. The shaft 30 has a bevel-gear 32, that meshes with a pinion 33 on the main shaft of the machine and is driven therefrom. Each block 26 has beveled or rounded ends, so as to guide the pickets between them, and each block has a short, preferably beveled, projection 34 extending from one side and a longer beveled projection 35 extending from the other side. These projections overlap each other when the blocks are moving horizontally and form bottoms for the spaces that receive the pickets. The bars 36, having inclined faces, are arranged above the traveling blocks, and they aid also in guiding the picket across the machine. The beveled ends of the blocks, the inclined or beveled surfaces of the projections 34 and 35, and the inclined bar 36 together form rectangular funnel-shaped openings to act as guides for the pickets. A set of traveling guides is preferably arranged alongside of each twister, and the motions of the twisters and the guides are so timed with respect to each other that the spaces between each two blocks is always opposite a vertical opening between the spiral fingers, as shown in Fig. 6. These guides both direct the pickets across the machine and carry them lengthwise of the twisters toward their forward ends. When the pickets pass out from between the twisters, they are between the wires, and a further movement of the twisters causes the wires to be twisted behind and close to the pickets, thereby securely holding the pickets between the wires.

I also provide means for advancing or pulling along the fence, and thereby propelling the wire through the twisters. This mechanism consists, preferably, of a series of reciprocating and yielding dogs that engage several pickets in the completed fence or fabric and thereby move it forward. These dogs may be arranged in any suitable manner. I have shown each dog 37 pivoted upon a split collar 38 and held in an elevated position by a spring 39. These collars are clamped upon pieces of tube or gas-pipe 40 and may be adjusted thereon. There are preferably two series of dogs arranged near opposite sides of the machine. The tubes 40 are arranged upon rods 41, upon which they are adapted to slide. A rock-shaft 42 is supported in bearings on the frame of the machine and is provided with arms 43, that are connected with collars 44 on the tubes 40 by means of connecting-rods 45. The springs tend to hold the dogs in an elevated position. As they move forward they engage the pickets. As they move back they are depressed and pass under the pickets. It is desirable to give to each picket a quick movement as it approaches the end of the twisters that throws it forward away from the twisters and close to the twists in the wires. For this purpose I arrange, preferably upon the reciprocating tubes that support the yielding dogs, pivoted dogs 46, having their lower ends 47 arranged to engage stops 48. As the ends 47 strike these stops the upper ends of the dogs are suddenly moved forward, engaging the picket and pushing it forward away from the twisters and against the twists in the wires and holding it in this position while the twists are being formed behind it, and thus insuring the pickets being closely bound by the wire at both edges. The dogs 46 are preferably pivoted upon the collars 44, to which the rods 45 are connected. It will be understood that the number of twists between the pickets depends upon the length of time that elapses between the operation of the sliding dogs by which the fence is pulled along, and that the distance between the pickets depends upon the length of stroke of said dogs, the feed of the pickets being made to correspond to the operation of these parts.

I provide means by which without increasing the speed of any of the parts of the machine I am enabled to regulate at will the number of twists between the pickets and also the space or distance between the pickets. For this purpose the rock-shaft 42 is provided with a depending arm 49. A chain 50 is connected to the lower end of this arm at one side and a chain 51 to the opposite side. A slotted bar 52 is arranged in proximity to this arm, and is preferably provided with one horizontal portion and an inclined portion. The shaft 31 carries the sprockets 29, over which the chains 27 pass, and extends through the upper end of the bar 52, being provided with a sprocket-wheel 53. A sprocket-wheel 54 is mounted in the slot in the inclined portion of the bar 52 and is capable of being set at any point in the slot in said bar. An endless chain 55 passes around these sprocket-wheels, and said chain and sprocket-wheels are driven from the shaft 31. A rod 56 has its upper end connected to the chain 55, so that it travels with said chain around said sprocket-wheel. The other end of the rod 56 is provided with a stud which travels in the slot in the bar 52. The chains 50 and 51 are connected to the rod 56, the chain 50 being preferably connected to the lower end of said rod and the chain 51 at a

point near the upper end. The chains 50 and 51 are preferably connected to the lower end of the arm 49 by means of adjustable hooks 57 and 58. With this construction and arrangement the rock-shaft remains stationary all of the time, while both chains are slack. Just before, however, the end of the rod 56 reaches the upper limit of its movement with the chain 55 the chain 51 will be drawn tight and will cause the shaft 42 to be rocked, thereby moving the dogs and drawing out the fence. The distance that the rock-shaft will be moved will depend upon the length of the chain 51 or the adjustment of its hook 57. This chain may be lengthened or shortened and the hook may be adjusted, thereby regulating the pull out of the fence. After the end of the rod has passed around the sprocket-wheel 53 the dogs will remain stationary until the end of the rod approaches the downward limit of its movement, when the chain 50 will be tightened and the rocker-arm will be thrown in the other direction and the dogs will be moved toward the twisters, passing under the pickets. When it is desired to have more twists between the pickets, the chain 55 is lengthened, and the idler sprocket-wheel 54 is moved farther down in the slotted bar 52, as indicated by dotted lines in Fig. 7, and there will now be a longer time between the movements of the rocker-arm, and consequently more twists between the pickets. By this means a fence having any desired number of twists between the pickets may be formed.

In order to prevent any backward movement of the fence, I provide one or more pivoted dogs 59, that are arranged above the fence and engage the pickets and prevent any backward movement thereof.

I also prefer to provide means for stopping the machine in case of breakage of a wire in the twisters. The main driving-shaft is provided with a pulley, as 60, to which power may be applied. A clutch 61 is arranged upon the shaft and engages this pulley. A lever 62 controls this clutch, and a spring 63 engages the lever and tends to throw the clutch out of engagement with the driving-pulley. A hand-lever 64 is connected by suitable means, as a cord 65, with the lever 62. A ratchet-bar 66 is arranged in proximity to the lever 64, and said lever is provided with a lug 67, that is adapted to engage one of the notches in the ratchet-bar 66. When the lever is drawn back, so as to cause the clutch to engage the driving-pulley, its lug 67 is engaged with the ratchet-bar and the machine is put in motion. When the lever 64 is moved so that its lug is disengaged from the ratchet-bar 66, the spring 63 disengages the clutch and the machine stops. A cord 68 is connected to the lever 64 and extends across the machine in front of the twisters and passes through lugs 69 on a rod 70. Dogs 71 are mounted on this cord between the lugs 69 and rest on the wires, as shown in Fig. 8. Should a wire become broken, the corresponding dog will drop down and engage the picket, as shown in Fig. 9. The dog will then be drawn along with the picket, and through the means described will release the lever 64 and stop the machine. The dogs may be arranged to engage both wires.

I also prefer to provide means for stopping the machine in case a picket fails to reach the proper position in the machine. A projection 72 on the frame of the machine forms the picket-stop. In front of this is a pivoted plate 73, against which the end of a picket strikes if the picket reaches the proper position in the machine. A vertical shaft 74 (see Fig. 1) is mounted on the frame of the machine, and is provided with an arm 75, that is connected to the lever 64 by a cord 76. Upon the upper end of the shaft 74 is an arm 77, pivoted thereto on a horizontal pivot and capable of being raised without turning the shaft. If, however, this arm is turned horizontally, it turns the shaft 74 with it. The arm 77 projects into the path of an arm 78 on the rock-shaft 42. The plate 73 is connected to a shaft 79, that has a crank-arm 80 connected to the arm 77. Each time a picket strikes the plate 73 it is turned on its pivot, thereby turning the shaft 79 and raising the arm 77. While the arm 77 is in an elevated position the arm 78 on the rock-shaft moves beneath without touching it. If, however, the picket has failed to reach its position in the machine, the arm 77 will be in the path of the arm on the rock-shaft and will be moved by it, and thereby through the shaft 74 and cord 76 the lever 64 will be released and the machine will be stopped.

I also provide means for regulating the tension upon the spools while the wire is being drawn from them. For this purpose a shaft 81 is mounted on the spool-frame at the side of each spool, and is provided with an arm 82, carrying a friction-plate 83, that is adapted to bear on the end plate of the spool. A spring 84 is connected to an arm 85 on the shaft 81 and to the spool-frame and tends to hold the friction-plate in engagement with the end of the spool-frame, and thereby to prevent the spool from rotating. An arm 86 projects from the shaft 81 in front of the spool and carries a wire-guide 87, through which the wire passes. A pull on the wire turns the shaft 81 and carries the friction-plate away from the spool, thus leaving the spool free to turn. As soon as the pull on the wire ceases the spring brings the friction-plate again into contact with the spool and causes it to stop.

I provide means by which the fence will be automatically wound up as fast as made. For this purpose I mount the reel 90 upon a swinging frame 91, which is preferably arranged to be swung away from the twisters by a weight 92 or equivalent device. The reel-shaft is provided with a worm-wheel 93, which engages a worm 94 upon a shaft 95. This shaft carries one part 97 of a clutch, the other part 98 being carried by a shaft 96, that is driven by

suitable means. A lever 99 controls one part of the clutch, which is preferably an ordinary friction-clutch, so that by moving the lever in one direction the two parts of the clutch are engaged and by moving it in the other direction they are separated. A rod 101 is connected to the lever 99 and to the swinging frame carrying the reel. As the frame becomes slack between the advancing mechanism and the reel, the swinging frame is moved out by the weight, and the lever controlling the clutch is moved so as to bring the two parts of the clutch into engagement, and the reel is operated to wind up the frame, and the swinging frame is thereby drawn back toward the machine, the clutch is released, and the reel stops. By using a worm and wheel to connect the reel with its operating-shaft any back movement of the reel is prevented. Although the shaft 95 has a slight longitudinal movement in its bearing with the swinging frame, the movement of the lower end which is connected to the clutch-lever is greater, and thereby the clutch will have its two parts brought into engagement. It will be seen that this means for winding the fence is entirely automatic and that the fence is wound as fast as made.

I may also provide a measuring or counting device for measuring the fence as it is made. This consists of a chain 103, capable of being shortened or lengthened, arranged upon sprocket-wheels 104, one of which is adjustable and provided with a lug 105, that is adapted to engage and move a pivoted lever 106, that is provided with a hammer 107, adapted to strike a bell 108. A spring 109 is connected to the lever 106. A ratchet-wheel 110 moves the chain. A spring-dog 111 engages this ratchet-wheel and prevents any back movement thereof. An arm 112 is carried by the rock-shaft 42, and is provided with a pawl 114, that rides upon the spring-dog 111, and is adapted to engage the same tooth that is engaged by the spring-dog. This permits a large movement of the pawl with a small ratchet-wheel. At each movement of the rock-shaft the ratchet-wheel is moved one notch. At each complete revolution of the chain the lug 105 engages the lever 106, draws it back, and then releases it, thus permitting the spring to draw the hammer against the bell. In this way the attendant will be notified when a given amount of fence has been made. (In order not to obscure the drawings I have not shown this device in the general view of the machine.)

I may also provide means for cutting or shaping the pickets while in the machine. (See Figs. 20 and 22.) This consists of die 115, of the shape desired for the picket, secured upon a suitable support on the frame of the machine, preferably above the pickets, and in such relation to the fence-advancing mechanism that each picket will stop directly under the die. A knife 116 is arranged below this die in position to be raised against it and is supported by a lever 117. A cam 118 on the shaft 30 operates in conjunction with this lever to raise the knife against the die, and thereby the picket beneath the die is trimmed and shaped. The knife preferably has the part of its edge that cuts nearest the edge of the picket of the greater height, so that the knife makes a shearing cut on the picket from the outer edge toward the center. By this means any desired ornamental shape may be given to the pickets.

I also prefer to provide means for cutting off the fence while it is in the machine. This consists of standards 120, pivoted upon the frame of the machine and carrying a transverse knife 121, above which the fence passes. A knife 122 is mounted upon links 123, secured on the upper ends of the standards. A hand-lever 124 is connected to one of these links, so that by depressing this lever the upper knife is brought down to the other knife. The fence passes between the knives and they are arranged so as to shear past each other, so that as the upper knife is depressed all of the wires are simultaneously cut. As the knives are operated the end of the movable knife nearest the handle will be first depressed and this knife will move past the other, thus cutting the wires with a shearing cut. The standards upon which the knives are mounted may be swung toward the reel while the knives are being operated, thus cutting the wires while the fence is in motion.

It will be seen that this machine possesses many advantages, the most important of which arise from the fact that the twisters have a continuous movement, the pickets are fed regularly and evenly between them, and several pickets may be in the process of being fed into the machine at the same time. The pickets are always handled in an easy manner, and all of the movements of the machine are even and regular.

I claim as my invention—

1. In a machine of the class described, the combination, with the spiral twisters and means for rotating them with a continuous and uniform movement, of means for feeding the slats or pickets transversely between said twisters while they are in motion, and means for moving the pickets lengthwise of the twisters simultaneously with their transverse movement between the twisters.

2. In a machine of the class described, the combination, with the spiral twisters and means for rotating them, of means for feeding the slats or pickets between the twisters, and the traveling guides for directing said pickets in their passage between the twisters and giving them simultaneously a movement lengthwise of the twisters.

3. In a machine of the class described, the combination, with the spiral twisters, of the endless chains or belts arranged in proximity to said twisters and provided with the series of guides for directing the pickets between the twisters, means for rotating said twisters,

and means for giving said chains and guides a continuous movement, substantially as described.

4. In a machine of the class described, the combination, with the twisters, of the chains or belts 27, and the blocks 26, having beveled ends secured on said chains and provided with the overlapping beveled projections, substantially as described.

5. In a machine of the class described, the combination, with the series of spiral twisters, of the funnel-shaped guides arranged to move longitudinally of said twisters, substantially as described.

6. In a machine of the class described, the combination, with the series of spiral twisters, of the chains or belts 27, arranged alongside of said twisters, the guides secured upon said chains, and the inclined guide-bars arranged above said guides, substantially as described.

7. The combination, with the twisters, of the picket-feeding mechanism comprising an endless chain having dogs arranged to engage the rear ends of the pickets, and means permitting said dogs to disengage the pickets automatically when the forward ends of the pickets reach the limit of movement, without regard to the position in which the rear ends of the pickets may be, substantially as described.

8. The combination, with the twisters, of the picket-feeding chain, means for moving said chain continuously, a series of dogs secured to said chain, and means for tripping said dogs to disengage them from the pickets, substantially as described.

9. The combination, with the spiral twisters and means for moving the pickets longitudinally thereof, of the picket-feeding chain provided with dogs adapted to engage the pickets, and the diagonally-arranged guide, over which said chain passes.

10. The combination, with the twisters, of the feed-chain, the guide 16, the plate 18, engaging said guide, the dog pivoted on said plate and having an arm engaging said guide, and an arm engaging the end of the picket, substantially as described.

11. The combination, with the twisters, of the reciprocating bars arranged in front of said twisters, the adjustable collars arranged upon said bars, and the yielding dogs arranged upon said collars, substantially as described.

12. The combination, with the twisters, of means for moving the pickets from between the ends of the twisters, consisting of the reciprocating pivoted pawls and the fixed stops, against which the ends of said pawls are adapted to strike, for the purpose set forth.

13. The combination, with suitable twisters, of means for advancing the fence, and independently-operating means for moving the picket from between the twisters and into the bight of the wires while the fence is advancing.

14. The combination, with suitable twisters, of means for advancing the fence, and means for moving the picket from between the twisters after the fence has begun to advance and at a greater speed than the fence is moved, whereby the picket is brought into the bight of the wires.

15. Means for operating reciprocating mechanism in a fence-machine, comprising, in combination, an endless chain, wheels supporting said chain, a reciprocating rod attached to and moving with said chain, and suitable connections between said rod and said reciprocating mechanism.

16. The combination, with a reciprocating mechanism of a fence-machine, of an endless chain capable of being shortened or lengthened, wheels supporting said chain, one of which is adjustable, and a reciprocating rod attached to and moving with said chain and operating said reciprocating mechanism, substantially as described.

17. The combination, with a fence-advancing mechanism, of an endless chain capable of being shortened or lengthened, a connection between said chain and said advancing mechanism, and wheels supporting said chain, one of said wheels being adjustable, substantially as described.

18. The combination, with the rock-shaft 42, connected with the fence-advancing mechanism and provided with the arm 49, of the wheel 53, the adjustable wheel 54, the chain 55, supported on said wheel, the rod 56, connecting with said chain, and chains 50 and 51, connecting said rod 52 with the opposite side of said arm 49, for the purpose set forth.

19. Means for stopping the machine in case of the breakage of a wire, comprising dogs bearing upon the wires and held out of engagement with the pickets by said wire and adapted to engage the picket upon the breakage of the wire and then to be moved with the picket, and means connecting said dogs with the machine-operating mechanism.

20. The combination, with means for advancing the fence or fabric, of the dogs bearing upon the wires and thereby held out of engagement with the pickets, and adapted to engage the picket upon the breakage of the wire and then to be moved with the picket, and means connecting said dogs with the machine-controlling mechanism.

21. The combination, with the twisters, the fence-advancing mechanism, and the reel, of the die arranged between said twisters and said reel, the knife arranged to operate in connection with said die, and means for operating said knife, whereby the pickets are shaped after they are secured to the wires and before they are wound upon the reel.

22. The combination, with the fence-advancing mechanism and the reel, of the wire-cutters arranged between said fence-advancing mechanism and said reel, and means for operating said cutters, whereby the wires may be cut as the fence advances.

23. The combination, with the machine-

controlling mechanism, of a pivoted plate arranged in the path of the picket and adapted to be turned on its pivot to permit the picket to pass, and a stop mechanism connected with and controlled by said plate and connected to the machine-controlling mechanism.

24. The combination, with the spool, of the shaft provided with a friction-plate adapted to engage said spool, the spring holding said plate in engagement with the spool, and an arm on said shaft carrying a guide for the wire, for the purpose set forth.

25. The combination, with the reel, of a movable frame supporting the reel, and a reel-operating mechanism connected with and controlled by said frame.

26. The combination, with the reel, of the swinging frame supporting said reel, and the clutch connected with and controlled by said frame, substantially as described.

27. The combination, with the reel provided with the worm-wheel, of the shaft having a worm engaging said wheel, a clutch controlling said shaft, and a movable frame supporting said reel and controlling said clutch, substantially as described.

28. The combination, with the fence-advancing mechanism, of the counting device comprising the endless chain 103, supported on suitable wheels, provided with the lug 105, the rock-shaft 42, by which the fence-advancing mechanism is moved, having the pawl 114 and arm 112, the ratchet 110, the bell 108, and the lever 106, all substantially as described.

29. The combination, in a fence-machine, with the roll 11, on which the pickets are successively supported, of the picket-feeding mechanism arranged above said roll and extending lengthwise of said roll and adapted to engage the pickets and move them longitudinally over said roll, substantially as described.

30. The combination, with the fence-advancing mechanism, of the adjustable counting device comprising the alarm, the chain capable of being shortened or lengthened and carrying a lug adapted to operate said alarm, and means supporting said chain, substantially as described.

In testimony whereof I have hereunto set my hand this 25th day of March, 1890.

WILLIAM P. SHATTUCK.

In presence of—

BESSIE BOOTH,

A. C. PAUL.