(No Model.) 4 Sheets—Sheet 1.

I. N. ELLIOTT.

FENCE MACHINE.

No. 343,232. Patented June 8, 1886.

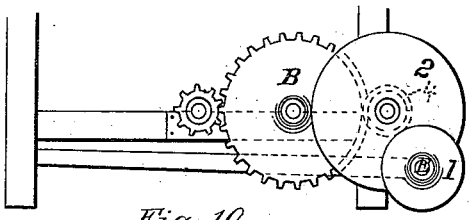

Fig. 10.

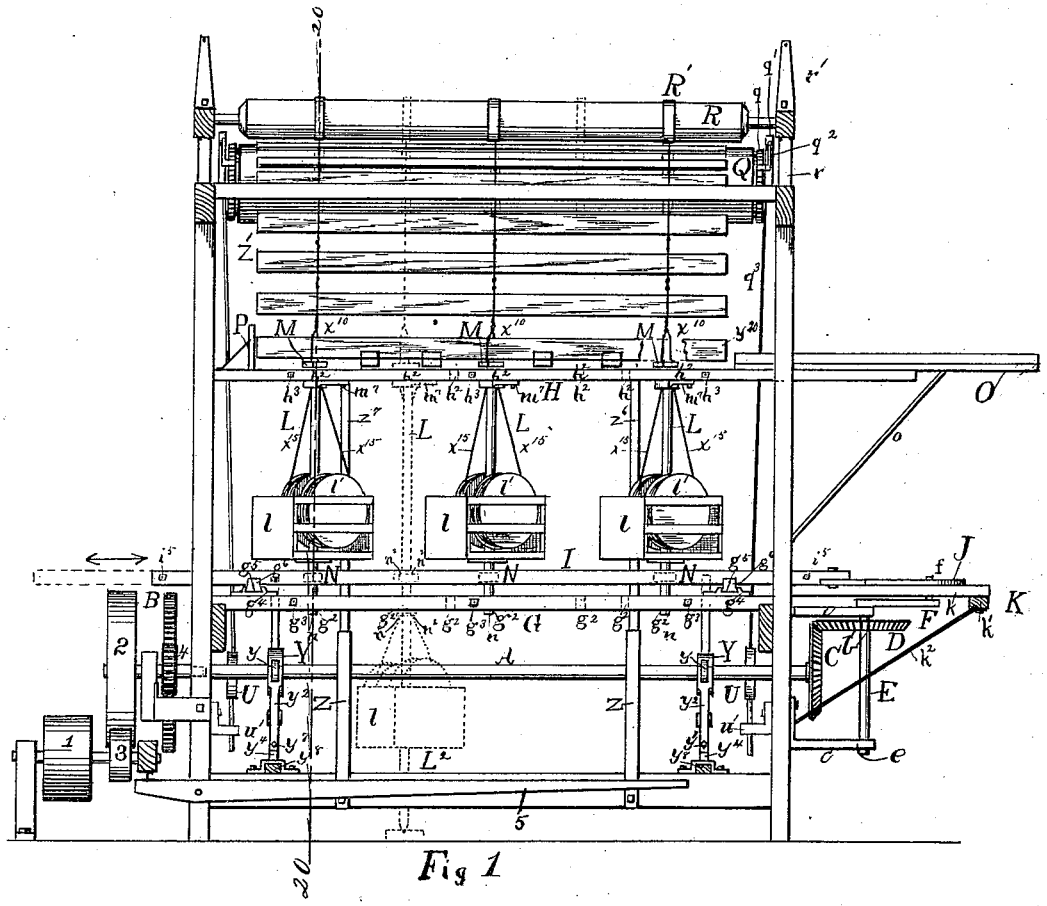

Fig 1

WITNESSES:

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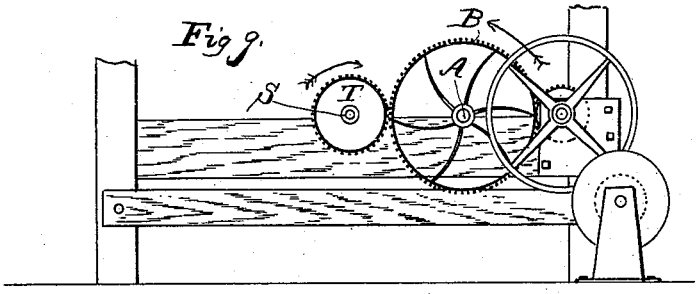
I. N. ELLIOTT.

FENCE MACHINE.

No. 343,232. Patented June 8, 1886.

Fig. 1.



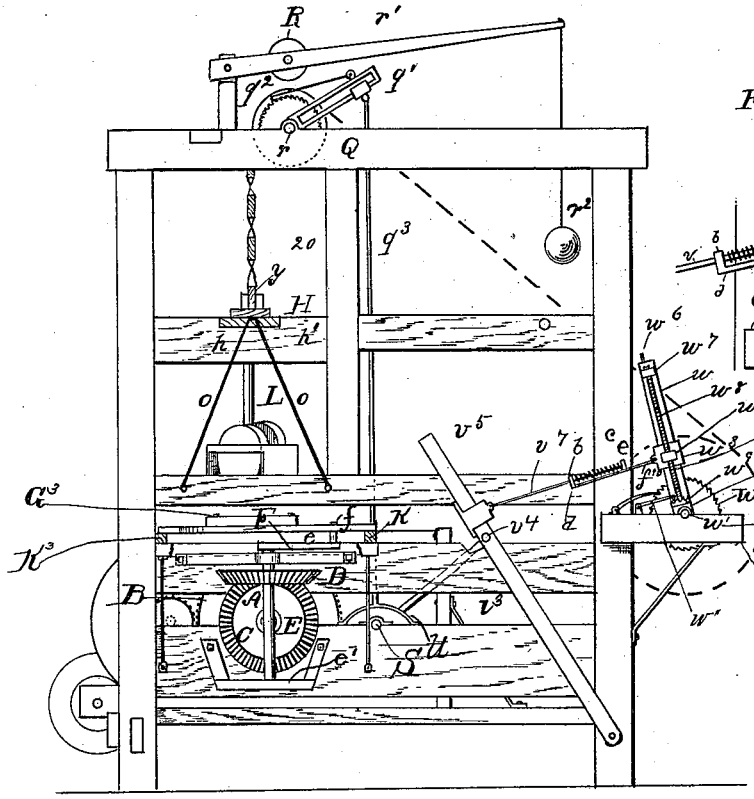


Fig. 11.

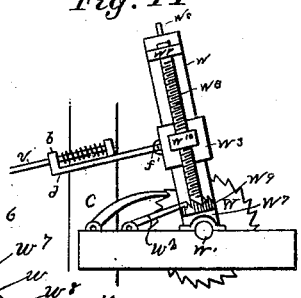


Fig. 2.

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(No Model.) 4 Sheets—Sheet 3.

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FENCE MACHINE.

No. 343,232. Patented June 8, 1886.

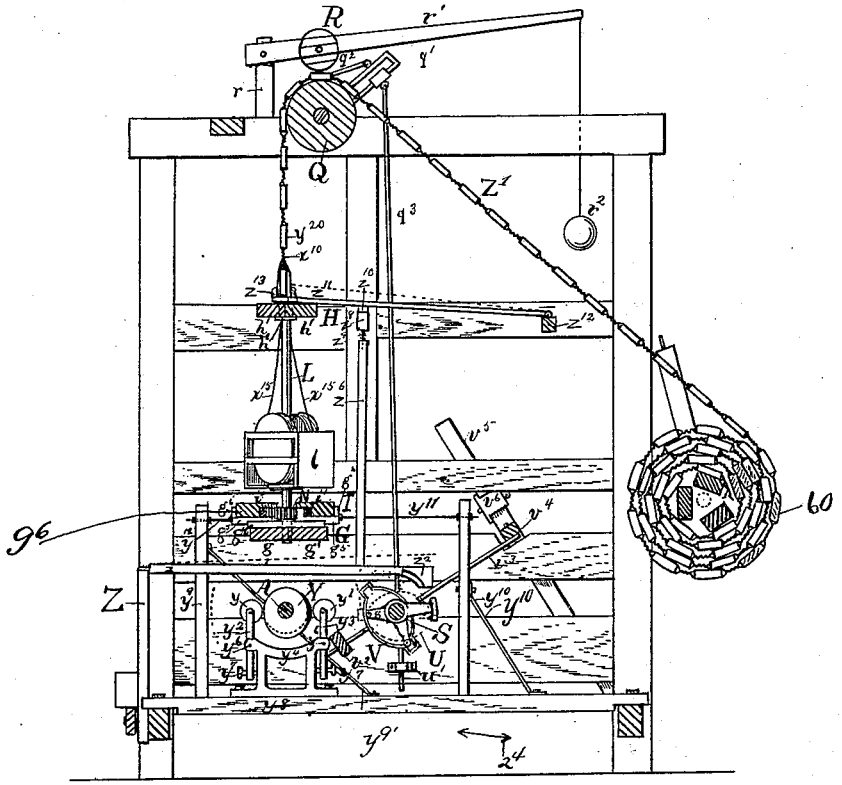

Fig. 3

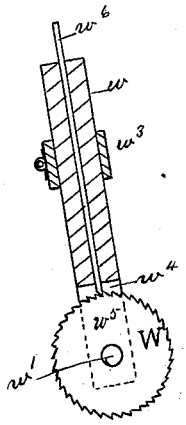

Fig. 5.

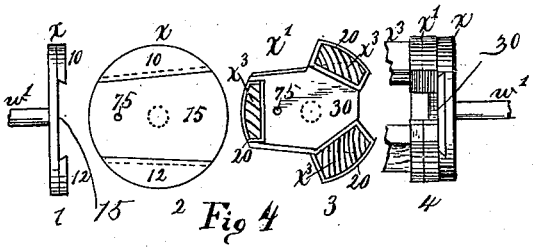

Fig. 4

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FENCE MACHINE.

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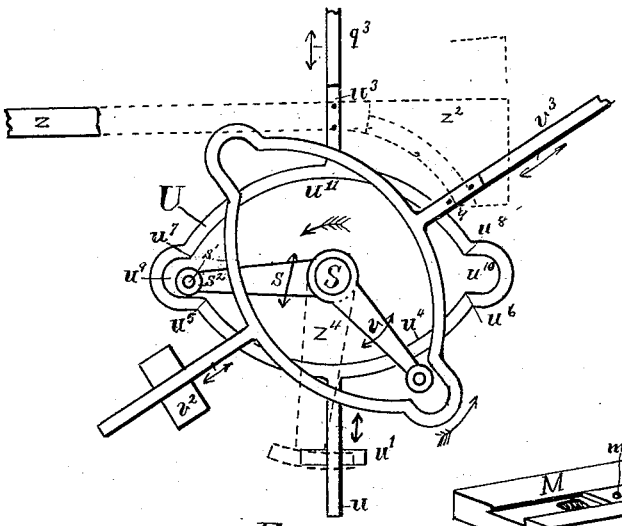

Fig 6.

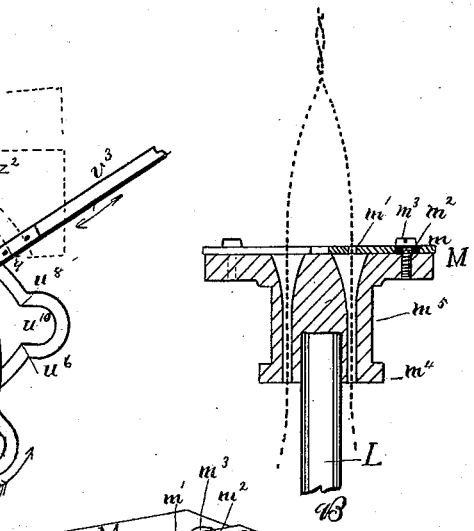

Fig. 7.

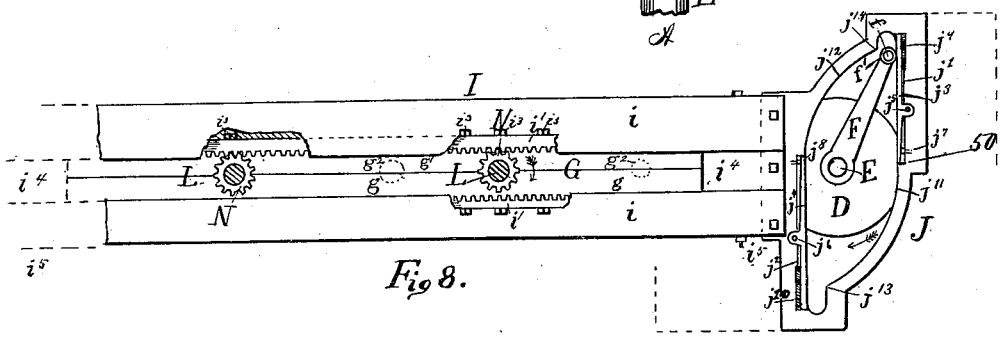

Fig 8.

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Attorney.

UNITED STATES PATENT OFFICE.

ISAAC N. ELLIOTT, OF COX'S MILLS, INDIANA.

FENCE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 343,232, dated June 8, 1886.

Application filed June 24, 1885. Serial No. 169,674. (No model.)

To all whom it may concern:

Be it known that I, ISAAC N. ELLIOTT, of Cox's Mills P. O., in the county of Wayne and State of Indiana, have invented a new and useful Improvement in Fence-Machines, which improvement is fully set forth in the following specification and accompanying drawings.

My invention is an improvement in the class of fence-machines which produce what is classed a "combination fence," consisting of a series of wires in pairs, forming a warp interwoven with wood or metal palings.

Heretofore it has been difficult to weave a fence consisting of the heavy No. 8 or 9 wires and three or three and a half by one or one and a half inch palings, and the twist, feed, and bale independently of the operator, all of which I accomplish by the peculiar construction and arrangement of the different parts of my machine, which is capable of being operated by hand, steam, or any other kind of power.

With my machine each pair of wires is always twisted in the same direction, whereas many of the machines now in use twist each alternate pair of wires in opposite directions, or else reverse the twist after the introduction of each paling.

With my machine I can limit the number of pairs of wires to two at any distance apart, taking from the machine entirely the mechanism for manipulating the wires when not needed or used. Not only when two pairs of wires are used may the distance between them be varied, but also when more than two pairs are used, which permits of the use of any length of paling.

My machine is provided with two or more rolls having metal bearings adjacent to the wires of the woven fence, the said fence passing between the rolls, which causes the wires to be embedded in the palings, thereby preventing the palings from passing from between the wires.

In the accompanying drawings, Figure 1 is a front elevation; Fig. 2, a side elevation, partly in section. Fig. 3 is a central sectional view taken on the line 20 20, Fig. 1, showing the various mechanical parts within the frame on the left, while within the frame, to the right of the line 20 20, are similar parts similarly arranged. Fig. 4 shows in detail the different elevations of the baling-reel, partly in section. Fig. 5 is a sectional side elevation of the baling-reel, ratchet-wheel, lever, and pawl. Fig. 6 is a side outline elevation of the feed take-up or baling and knocker cranks with their auxiliary parts, showing their position with relation to each other, as well as their respective disks. Fig. 7 is a perspective view, with one twister-plate removed, of a twister-head and a sectional view of the same. Fig. 8 is a ground plan of the twisting-frame. Fig. 9 is a sectional side view showing the gearing and relative positions of the main and counter shafts. Fig. 10 is a detail side view of the gear-wheel pulleys moved by the treadle. Fig. 11 is a detail enlarged to show means for actuating the screw to lift the collar on the lever.

Similar letters of reference indicate corresponding parts.

I shall use either or both wood and metal in the construction of the main frame, and when I shall refer to any particular part of said frame in the following description it will be termed "main frame."

Referring to the drawings, A represents the main shaft, to which are attached at or near its opposite ends, respectively, a gear-wheel, B, and a miter-wheel, C. The shaft A is journaled to the main frame in the two opposite sides, and lies perpendicularly to said sides, and extending beyond the sides to permit all necessary gearing to be attached thereto, as shown in Fig. 1.

I shall not limit myself to any particular method of attaching the power to the shaft A, except that it shall be by the use of any number of gear-wheels attached to either end of the shaft A, or geared into the gear B, and connected with a pair of friction-pulleys and lever in the usual manner, for the purpose of securing perfect control over the machine.

The miter-gear C is geared with the miter D, which is securely attached to the upper part of the vertical shaft E, which is journaled to the main frame at *e e'*, and has attached to its upper end above the bearing *e* a crank, F, in the opposite end of which crank F there is

inserted, and extending upward, a vertical wrist-pin or axis, *f*, Fig. 1, said pin forming an axis for the small roller *f'*.

The plates G and H are each composed of two parts—a front and rear part, *g g'* and *h h'*, Figs. 3 and 8. The rear plates of each *g'* and *h'* are made fast to the main frame, *h'* being vertically over *g'*, with its corresponding edges and sides parallel with those of *g'*, and each of said rear plates, *g'* and *h'*, have in their front edges a series of semi-boxings, g^2 and h^2, vertically ranged for the reception of the vertically-suspended twisting-shafts L, Fig. 1. The front sections, *g* and *h*, have similar semi-bearings, g^2 and h^2, in their rear edges, corresponding in size and distance with those in *g'* and *h'*, composing a complete bearing for the reception of the journals g^2, &c., of the vertically-suspended twisting-shafts, Fig. 1. The respective sections *g* and *g'* and *h* and *h'* are firmly held together by the bolts g^3 g^3 g^3 and h^3 h^3 h^3, thus forming a series of adjustable bearings at g^2, &c., and h^2, &c., and also rendering it very easy to remove the twisting-shafts L. The slotted bearings g^4 g^4 are securely fastened to the plate G, transversely and at right angles to it, and are constructed so as to allow only a horizontal motion of the slides g^5 g^5, Fig. 3.

The rack-frame I is composed of two longitudinal bars, *i i*, facing each other edgewise, the space between them being equal to or greater than the diameter of the pinions of the twisting-shaft L, said pinions N being geared to the racks *i' i'*. The racks *i' i'* are held in a recess cut in the lower inside corner of each bar *i* of such dimensions as to admit the whole of the racks *i' i'* within the planes of the sides and edges of the bars *i i*. The racks are secured in these recesses by the bolts i^3 i^3 i^3, &c. The bars *i i* are held in position by the blocks i^4 i^4 and the transverse bolts i^5 i^5 near their ends. The inner edges of the racks *i' i'* and bars *i i* are flush, to protect them from accumulating dirt or foreign substances, Fig. 8.

To the end of the rack-frame I is attached an adjustable cam-frame, J, which is a metallic plate, having the two inner sides, *j'* and j^2, parallel and diagonal, and of such a length that if a line be drawn from the two opposite ends nearest, it will pass directly over or near the center of the shaft E, allowance being made for the shifting of the rack-frame I, noticed further on. The sides *j'* and j^2 are the longest sides of recesses, forming receptacles for the adjustment devices j^3 and j^4, which are pivoted at their centers to the disk J at j^5 and j^6. Near the ends that are opposite, and abutting against the rear edges of j^3 and j^4, are placed partly within the adjacent edges of the disk J, adjusting-screws j^7 and j^8, provided with a tap, which, upon being turned, forces the adjacent ends of the adjustment devices j^3 and j^4 out toward the crank F and diminishing the space between the said ends, consequently increasing the stroke of the crank F and permitting a fine adjustment of the racks *i' i'* and pinions N. It also permits an adjustment to take up the loss of stroke occasioned by the wear of the roller *f'*. At the opposite ends of j^3 j^4 from the adjusting-screw j^7 and j^8, and placed between said ends and the disk J adjoining, are cushions j^9 and j^{10}, of metal or rubber, to deaden the force of the stroke of the crank F at the time of coming in contact with j^3 and j^4. It will readily be seen that if the adjusting-screws j^7 and j^8 be turned in an opposite direction the adjustment process will be changed conversely to that described above.

Beginning at the opposite ends of j^3 j^4, and in or near the plane of their inner faces, the arcs j^{11} and j^{12} are described, having radii equal to the distance from the center of the shaft E to the farthest point of the perimeter of the roller *f'*, and ending at j^{13} and j^{14}. Between the points j^{13} and j^{14} and the ends of j^3 and j^4, adjacent to the cushions j^9 and j^{10}, a recess is formed for the entrance and exit of the cam *f'*, the said recess being necessary, because the total length of the crank F is greater than the distance between j^7 and j^8.

The cam-frame J is supported by the support K, which is composed of longitudinal bars *k k*, parallel to the twisting-rack I, having one end secured to the main frame and the other bound by the cross piece *k'*, all of which is supported by the braces k^2 k^2. The opposite part of the combined cam-frame J and rack-frame I from the disk proper rests upon the afore-described sliding plates g^5 g^5, and all side motion of said combination on said plates g^5 g^5 is prevented by the adjustable ears g^6 g^6 g^6 g^6, attached to the extremities of said plates g^5 g^5, Figs. 1 and 2.

Now, by examining Figs. 1 and 8 it will be seen that the combined cam-frame J and rack I is propelled horizontally back and forth by the roller *f'* being forced against the plates j^3 and j^4 alternately during a revolution of the crank F, which moves in the direction indicated by the arrow. It will also be seen that the cam-frame J moves only when the cam *f'* is in contact with the straight faces, said motion being imparted to the pinions N by the rack *i'*, thereby causing the twisting of the wires around the palings, (shown hereinafter,) and that while the cam *f'* is describing the arcs j^{11} and j^{12} the disk and rack are at rest, which gives time for the disengagement of one rack *i'* from the pinion N and the engagement of the opposite rack, said engagements of the racks and pinions always producing a continuous twist of the wires, which will be described further on. The feed and baling operations also occur while the cam describes the aforesaid arcs.

The twisting-shafts L, Fig. 1, are journaled into the plates G and H, as aforesaid. Those extending only between the journal-bearings G and H consist of a shaft, L, to the upper end of which is attached the twister-head M,

which is a solid piece of metal having within its upper face a dovetailed groove to permit the insertion of two "twisting-plates," *m m*, which are provided with two holes each, one hole, M′, being circular, through which the wires pass and are twisted, and the other, M^2, being slotted for the adjustment of the wires to suit palings of various thicknesses, the said plates being firmly secured to the head M by screws or bolts m^3, through the slots m^2, Fig. 7. In a plane with the circular holes *m′* are holes extending downwardly and parallel with the shaft L, through the head M, being conical with the base of the cone above, thus permitting an adjustment of the wires without any interference with the head M, Fig. 7^B. The lower end of the head M is formed with a projecting ring, m^4, forming a depressed bearing or journal, m^5, in conjunction with the upper end, the said ring m^4 having at any point of its perimeter a notch, m^6, for the reception of the latch m^7, Fig. 1. At any point between the head M and the pinion N is fastened to the shaft L the spool-box *l*, which is a simple box open at the top and having two longitudinal compartments, each being a receptacle for one spool, *l′*, which is held there by gravitation. The pinion N is attached to the lower end of the shaft L, and consists of a pinion and journal, *n*, with an intervening part forming a shoulder which rests upon the bar G, with the bearing or journal *n* within the bearing *g*, thus, in conjunction with the head M, retaining the shaft L in a vertical position. In the extension of the twister-shaft L below G the construction of the shaft L is the same, with the exception that the spool-box *l* is secured to the extension-shaft L^2. The shaft L^2 is connected with the end of the journal *n*, in the usual manner for making connections, at its upper end, while the opposite end is journaled into a piece made secure to the floor; and further that two holes, n^2, pass through the pinion N on opposite sides of the shaft L, to allow the passage of the wires from the spools upward and through the twister-plates *m* uninterruptedly, Fig. 1.

In the above description of the twister-shaft L and component parts, only one of each kind was described, but a description of one will answer for all; nor will I limit myself to any number of each.

In the present arrangement of the spool-racks with relation to the plates G, it will be observed that as the spools are arranged or secured to shafts which stand vertically, no tension is required to make a close twist of the wire other than the weight of the spools within said box, loosely placed, and the friction of said spools *l′ l′* and the box *l*. This is one of the features of this invention, immediately when the roller *f′*, Fig. 8, comes in contact with the arcs j^{11} and j^{12} the latch m^7 passes into the notch m^6 and prevents any backlash of the pinion N, the said backlash being caused by the twisted condition of the wires at x^{10}, the said latch m^7 holding firmly the pinion N, while the shifting of the racks *i′ i′* takes place, as mentioned above and explained further on in this description.

While the twisted head M is in the position just described, the line drawn from the front wire, x^{15}, to the rear one adjacent to and above said head M will be parallel to the sides of the main frame from front to rear, and the distance between the wires x^{15} x^{15} will be graduated by the plates *m m*, so as to permit the passage of the plates between them of the slat or paling y^{20}, which rests within the trough O, said trough being fastened to the plate H and supported by the braces *o o*, Figs. 1 and 2. The ends of the slat y^{20} abut against the gage P, which is secured to the plate H, thereby producing a fence, Z, with a uniform edge, Fig. 2.

The feed-roll Q is journaled to the top of the main frame at *r′ r*, so that the point of its perimeter farthest forward shall be vertically above the twister-shafts L, Figs. 1 and 2. On the axis *r r*, near each end and between the roll Q and the main frame, are secured the ratchet-wheels *q q;* also on the same axis *r r*, and between the ratchet-wheels *q q* and the main frame, are the levers *q′ q′*, composed of two links joined at their extremities. The pawls q^2 q^2 are pivotally joined to the upper limb and are to operate the ratchet-wheels *q q*. The connecting-rods q^3 q^3 are attached to any point of the lower arms, *q′ q′*, the said point being determined by the amount of stroke it is desired for the pawls q^2 q^2 to have, Fig. 2.

Embracing the roll Q, and at any number of points corresponding in number and facing the twisted wires *x′*, are rigidly attached metallic faces Q′, which, in conjunction with similar ones around the friction-roll R, embed the wires x^{10} in the palings y^{20}, thereby preventing the palings from slipping endwise, Fig. 1.

In front of the feed roll Q, and attached to the main frame and opposite each other, are two vertical posts, *r r*, Figs. 1 and 3. The levers *r′ r′* have one end pivoted to said posts *r r*, while to the opposite ends are supported the weights r^2. Journaled into said levers *r′ r′* are one or more friction-rolls R, provided with metallic faces R′, corresponding with those on Q, Fig. 1. The rolls R are over roll Q and located so as to press the woven fence Z against the faces of Q, thereby facilitating the feeding of the fence between said rolls Q and R and the baling operations. The said rolls R are longitudinally parallel with the roll Q.

The mechanism used to operate both the feed and take-up or baling processes is dual in construction and is located within the main frame, and is connected with or operated by the counter shaft S. Each system is located toward the opposite ends of the counter-shaft S, and in the following description only one of each will be described.

The counter-shaft S is geared with the main shaft A, Fig. 9, by the gear-wheels B and T,

T being attached to the counter-shaft S, and of one-half the diameter of B.

The counter-shaft S runs parallel with A, and is journaled to the sides of the main frame, in the rear of A, in the usual manner.

At or near one end of the counter-shaft S is firmly attached a crank, *s*, provided with a horizontal wrist-pin or axis, *s'*, on which is journaled the roller s^2. To the lower end of the connecting-rod g^3 is attached, and encircling the counter-shaft S, cam-frame U, said frame being a flat plate having an irregularly-shaped rim or edges and of a thickness equal to or greater than that of the roller s^2, Fig. 6. The disk is so placed and held in position by the stationary guide *u'*, (the extension *u* which plays longitudinally back and forth within the guide *u'* being an extension of the rim opposite the connecting-rod connection w^3 and in place of said w^3,) that the inner faces of the cam-frame U shall at all times be in contact with the roller s^2 on its outer edge or perimeter. The inner face of the cam-frame U, opposite the connection w^3, is an arc, u^4, of a circle whose radius is equal to the distance from the center of the shaft S to the farthest point of the perimeter of the cam s^2, and terminating at u^5 and u^6, and extending outwardly from the points u^5 and u^6 are recesses u^9 and u^{10}, terminating at u^7 and u^8, respectively, for the entrance and exit of the roller s^2 while being driven along the inner faces of the cam-frame U in the direction of the arrow by the crank *s*. The sides of the recesses that terminate at u^5 and u^8 are longer than the sides opposite each terminating at u^7 and u^6. The side described by the arc u^{11} is equal to u^4, and terminates at u^7 and u^8. Now, it will be seen in Figs. 2 and 3, 6 and 8, that if the driver *s* be so timed on the counter-shaft S that it just comes in contact with the longer side, u^8, of the recess u^{10}, it will raise the cam-frame U until it (the driver) shall pass the point u^8, consequently forcing the pawl q^2 up and engaging it with the ratchet *q*, Fig. 2; and, furthermore, while the driver *s* passes from u^8 to u^9, the cam-frame U and connections are at rest. Now, at the same time that the driver does as just described, the driver F, Fig. 8, comes in contact with the disk J at j^9, and driving the twisting-rack I endwise, consequently causes a twisting of the wires around the paling at x^{10}, until the crank or driver F shall have reached the dead-point 50, but with a diminishing speed. At the same instant that the driver F reaches the dead-point 50 the driver *s* comes in contact with the cam-frame U at u^9, and drives it down until it passes the point u^5, when the pawl q^2, being engaged with the ratchet-wheel *q*, turns the roller *q*, which in turn, in conjunction with the roll or rolls R, feeds the fence Z over it and in the direction of the reel W; but until the driver *s* reaches u^{10} the disk *u* and connections remain at rest. Now, again, while the driver *s* passes from u^9 to u^{10}, as just shown, the driver F passes from the dead-point 50 to j^0, and the twisting-rack and connections are at rest. So it will be seen that the twisting and feeding are done alternately at all times.

The crank *v* and cam-frame V are identical in every respect with the crank *s*, and cam-frame U, respectively, in size and construction, Fig. 6. The cam-frame V is connected with the cross-bar v^4 by the connecting-bar v^3, the said cross-bar extending through horizontally from side to side of the main frame and pivoted at each end with the levers v^5, Fig. 3. The lever v^5, Fig. 2 is, on the outside of the main frame, and at its lower end is pivoted to said main frame. The sliding collar v^6 embraces the lever v^5, and may be secured to it at any point adjustably. The connecting-rod v^7 is connected with the collar v^6 pivotally. The said rod v^7 consists of a shaft having a permanent shoulder, *b*, against which the spiral spring *c* abuts, and the said shaft extends longitudinally through the guide *d*, spiral spring *e*, said guides *d* and *e* being securely attached to the bar f^{10}, the said guide *e* being a point of resistance to the spring *e*, Fig. 2.

Firmly secured to each of the rear posts of the main frame are two journal-boxes horizontally ranged and of a distance apart sufficient only to admit the ratchet-wheel W and lever *w*. The ratchet-wheel is fastened to the shaft *w'*, said shaft revolving within the journal-boxes w^2 w^2. The lever *w* has its two opposite sides parallel, which permits a free movement of the collar w^3, and at its lever end has a recess, w^4, extending rearwardly its whole width and upwardly a distance greater than the radius of the ratchet-wheel W, the jaws w^5 thus formed being journaled to the shaft *w'* and on opposite sides of the ratchet-wheel W. Through the interior of the lever *w*, from the top to the recess w^4, Fig. 5, is a slot of a size sufficient to admit freely the pawl w^6, said pawl being a long straight piece of metal, chisel-shaped at its lower end to engage the rachet-wheel W, and held within said recess or slot and resting on the ratchet W by gravitation. To the collar w^3 is attached the connecting-rod v^7. To the upper side of the lever *w* is attached a bearing, w^7, ranged longitudinally with a similar one on or near the opposite end, in which is journaled the screw w^8, provided at its lower end with a crown ratchet-wheel, w^9, Fig. 2. The said screw manipulates the collar by means of a nut, w^{10}, attached thereto, and is rotated by the vibratory motion of the lever *w* in conjunction with the pawl w^{11}, adjustably attached to either the main frame or bearing w^2.

Referring to Figs. 3 and 6, it will be seen that the crank, in conjunction with the cam-frame V, connecting-bar v^3, cross-bar v^4, lever v^5, connecting-rod v^7, lever *w*, and pawl w^6, imparts the motion to the reel X, Fig. 4, and that said stroke or motion is regulated primarily by the collar v^6, and secondarily by the collar w^3, regulated as aforesaid, to agree with the increasing diameter of the web 60, the said

motion or stroke being in unison with that of the feed-roll Q. Firmly attached to the end of the shaft w', and adjacent to the inside bearing, w^2, is the head x, having upon its face two cleats, 10 and 12, so fastened that if produced they will meet at a point without, and having their lower inside edges beveled, Figs. 4, 1, and 2. The slat-head x' is formed with a wedge-shaped slide, 30, equal in dimensions to 15, into which it is fastened by a bolt through 75, Figs. 4, 2, and 3. On the opposite side of the head x' are recesses 20, for the insertion of the reel bars or slats x^3, all being shown relatively in Fig. 4. The above is so constructed to be readily disengaged from the bale 60 when removed, Figs. 3 and 4.

To the main shaft A are fastened two cams, Y, each having the same function—namely, the shifting of the rack-frame I—a description of one's connections answering for both. The said cam Y, whose perimeter for the half or more of its entire distance, has a longer radius than that of the remaining distance, revolves between and drives two rollers, y and y', said rolls being connected with the rack y^4 by the connecting-arms y^2 and y^3 at the pivotal points y^6. The wear of the rolls, &c., is taken up by the screw y^7 in y^2, and abutting against the rack y^4. The rack y^4 is firmly secured to the sliding bar y^8, said bar being confined to the main frame. Securely fastened to the bar y^8 are two upright posts, y^9 y^{10}, and braced by $y^{9'}$ and $y^{10'}$. The rods y^{11} and y^{12}, respectively, are attached to the opposite ends of the slide g^5, and pass through the upper ends of the posts y^9 and y^{10}, being secured thereto by nuts on each side of the posts y^9 and y^{10}, for the purpose of regulating the depth of the engagement of the rack i' and pinion N, Figs. 8 and 3. The cam Y is so timed on the shaft A that the shifting of the rack I is at the time that the driver F describes the arcs j^{11} and j^{12}, and the feeding and baling is being done, heretofore described.

Attached to a cross-piece of the main frame, and extending upward vertically, are two posts, Z, to the top of which are hinged two arms, z and z', which extend rearwardly over and a short distance past the counter-shaft S, where they terminate. To this termination are attached the blocks z^2 and z^3, each block having its extreme outer lower edge straight and parallel with the shafts z and z', respectively, from 9 outwardly. Commencing at 9 and extending rearwardly and upwardly arcs are described whose radii are equal to the length of the drivers z^4 z^5, (over which the blocks z^2 and z^3 are suspended,) the said drivers being attached to the counter-shaft S and formed with a circular head or face corresponding with the arcs above described, Figs. 1 and 3. Pivoted to the shafts z and z', extending vertically upward, are the connecting-bars z^6 and z^7, and connected loosely at their upper extremities with the cross-bar z^8, with a spring, z^9, between, forming a cushion for the bar z^8, to which on its upper face, with washers z^{10} between, are fastened the slat-knockers z^{11}, &c., said knockers z^{11}, &c., being at right angles to said cross-bar z^8, and having their rear ends fastened to the bar z^{12}, and to the opposite ends of said knocker-bars z^{11}, &c., are attached on their upper faces transversely the troughs z^{13}. The bar z^{12} is pivoted in the main frame, and lies parallel with the bar z^8, Fig. 3. Now, it will be seen by examining Figs. 3, 6, and 8, that if the knocker z^4 be so timed on the shaft S that it shall come in contact with the block z^2, and continue so while the drivers s and v, respectively, describe a part of the arcs of the cam-frames U and V, or, in other words, when the rollers Q and R and the baling-reel are at rest, the troughs, Fig. 3, z^{13} will elevate the paling y^{20} closely within the wires at x^{10} and hold the said paling until at least one twist of the wires beneath it shall have been made; hence it will be seen that by the peculiar construction of my machine it is perfectly automatic in its work from the time the paling is inserted between the wires until ready to remove from the machine a bale of combination fence.

When this machine is operated by the treadle 5, the arrangement of it and its connecting, parts may be as shown in Figs. 1 and 10; but this arrangement may of course be changed to suit convenience.

Having described my invention, what I claim as new is—

1. In a fence-machine, the wire-twisting shafts vertically disposed and having the wire coils resting in a controlling-box loosely, so that the weight of the said coils acts as a tension in the operation of twisting said wires around the paling, substantially as herein set forth.

2. The twister-head having adjustable wire-guides and vertical apertures for the passage of the wires, in combination with the spool-box on the vertical twister-shaft, substantially as herein set forth.

3. The combination, with the vertical shafts carrying twisters and having pinions, of rack-frames having rack-bars facing each other and so arranged that they may be alternately brought into contact with the opposite sides of the pinions on the vertical twisting-shafts, and having cam-frames at their ends and cranks for reciprocating the rack-bars, and means for shifting the racks, substantially as hereinbefore set forth.

4. In a wire-fence machine, the twister-plates I, having two rack-bars facing each other, and provided with means, substantially as described, whereby they are caused to alternately come in contact with the opposite sides of the pinions on the vertical twisting-shafts, in combination with suitable cams on both ends of these plates, constructed and combining to operate as set forth, whereby the rotation of the operating-crank will move the rack-bars laterally and alternately engage on

the pinions, substantially as and for the purposes set forth.

5. In a fence-machine, a twister-head having within its upper face a slotted groove and provided with a projecting ring having a notch at any point of its perimeter with an intermediate bearing and traversed by two conical holes, as described, and the latch M', in combination with the apertured twisting-plates and adjusting-screws, substantially as described and set forth.

6. In a fence-machine, a vertical twisting-shaft having attached to its lower end a pinion, in combination with the spool-box and spools held therein by gravitation, as shown and described.

7. In a fence-machine, the combination, with the main frame, of the twister-head M, having adjustable twisting-plates, and the notch m^6, shaft L, spool-box l, pinion N, the plates G and H, and spring-latch m^7, constructed substantially as herein shown and described.

8. In a combination-fence machine, the combination, with the main frame, of the twister head M, having the twisting-plates, shaft L, pinion N, perforated as described, the shaft L^2, connected with the pinion N, as shown, and revolving in a bearing attached to the floor, as aforesaid, the plates G and H, spring-latch m^7, and spool-box l, substantially as shown and described.

9. In a fence-machine, the combination, with the main frame, of the plates G and H, twister-heads M, having twisting-plates, spool-boxes l l, shafts L L^2, pinions N N^2, bearing L^3, and double twisting-rack I, the said rack being free to slide endwise upon the plates g^5, and confined to said plates by the ears g^6, the said plates g^5 having a transverse motion for the purpose of engaging the racks i' i' and pinions N N^2, substantially as shown and described.

10. In a fence-machine, the combination, with the main frame, of the twisting-heads M, having the twisting-plates, shafts S, spool-boxes l, pinions N, rack-frame I, and racks, and adjustable cam-frame J and crank F, as shown and described.

11. The combination, with the rack-frame I and racks i' i', of the adjustable cam-frame J, crank F, shaft E, having bearings e e, attached to the main frame, and the miter-wheel D, attached thereto, and the miter-wheel C, rigidly attached to the main shaft A, the said main shaft A being journaled to the sides of the main frame and having at its opposite end from C a gear-wheel, B, connecting with a system of gear and friction wheels, substantially as herein shown.

12. In a combination-fence machine, the combination, with the main frame, of the twister-heads M, having twisting-plates, shafts L, spool-boxes l, pinions N, rack-frame I and racks i' i', plates G and H, and latches, substantially as herein set forth.

13. In a fence-machine, the combination, with the main shaft A, of the cams Y, attached thereto, and as described, operating the rollers y y, attached to the connecting-arms y^2 y^3, provided with adjusting-screws y^7, and connected with the sliding bars y^8 y^8 by the rack y^4, and the movement thus effected being communicated to the rack-frame I by the posts y^9 and y^{10} and adjustment rods y^{11} and y^{12}, the said adjustment being obtained by the manipulation of the nuts on said rods y^{11} and y^{12}, substantially as described and shown, and for the purpose set forth.

14. In a fence-machine, the counter-shaft S, having a gear-wheel, T, of one-half the diameter of a gear-wheel, B, attached to the main shaft A and operated by said gear-wheel B, attached to it, in combination with a driver, s, provided with a roller, s', as described, and operating the cam-frame U, as described, which in turn operates the feed-roll Q by means of the connecting-rod g^3, adjustably attached to the lever g', which is pivoted to the axis and revolves the feed-roll Q by means of a ratchet-wheel firmly attached thereto, and pawl q^2, substantially as described and shown, and for the purpose set forth.

15. In a fence-machine, the combination, with the main frame, of a feed-roller, Q, having a series of metallic bands, R', encircling the same, and of one or more friction-rollers, R, having a similar series of metallic bands, R', adjacent to those on the feed-rolls Q and corresponding in distance with that between the twisted wires x^{10}, for the purpose of embedding the wires in the paling, the said friction-rolls R being parallel with the feed-roll Q and journaled in the levers r', which are connected with the main frame by the posts r, substantially as described and shown, and for the purpose set forth.

16. In a combination-fence machine, the counter-shaft S, having a gear-wheel, T, of one-half the diameter of a gear-wheel, B, attached to the main shaft A and operated by said gear-wheel B, attached thereto, in combination with a driver, v, provided with a roller and operating the cam-frame V, as described, which operates the baling-reel x by means of a connecting-rod, v^3, cross-bar v^4, levers v^5, sleeves v^6, connecting-bar v^7, collar w^3, lever w, pawl w^6, ratchet-wheel W, and shaft w', all connected and operated substantially as described and shown, and for the purpose set forth.

17. In a lever, the combination, with the shafts w', of a lever, w, pawl w^6, resting within the lever w and engaging the ratchet-wheel W by gravitation and the vibratory motion of the lever w, and screw w^8, which elevates the collar w^3 on the lever w by the vibratory motion of the said lever in conjunction with the pawl and ratchet-wheel w^9, substantially as described and shown, and for the purpose set forth.

18. In a combination-fence machine, the main frame, in combination with the shaft w', ratchet-wheel W, and actuating-connections,

the baling-reel head x, the slat or bar head x', and slats x^3, the said heads x and x' being placed and held in position by the bolt through 75, substantially as described and shown, and for the purpose set forth.

19. In a combination-fence machine, the combination of the counter-shaft S, knockers z^1, blocks z^2, attached to the bars z and z', connecting-bars z^6 and z^7, the cross-bar z^8, springs z^9, washers z^{10}, the slat-knockers z^{11}, the bar z^{12}, and the troughs z^{13} with the posts Z, the whole arranged as and for the purpose substantially as herein set forth and described.

In testimony that I claim the foregoing I have hereunto set my hand, this 9th day of May, 1885, in the presence of two witnesses.

ISAAC N. ELLIOTT.

Witnesses:

JAMES A. WINEBURY,

LEONIDAS M. HARLAN.