(No Model.)

5 Sheets—Sheet 1.

A. B. WOODARD.

WIRE FENCE MACHINE.

No. 508,074. Patented Nov. 7, 1893.

Fig. 1.

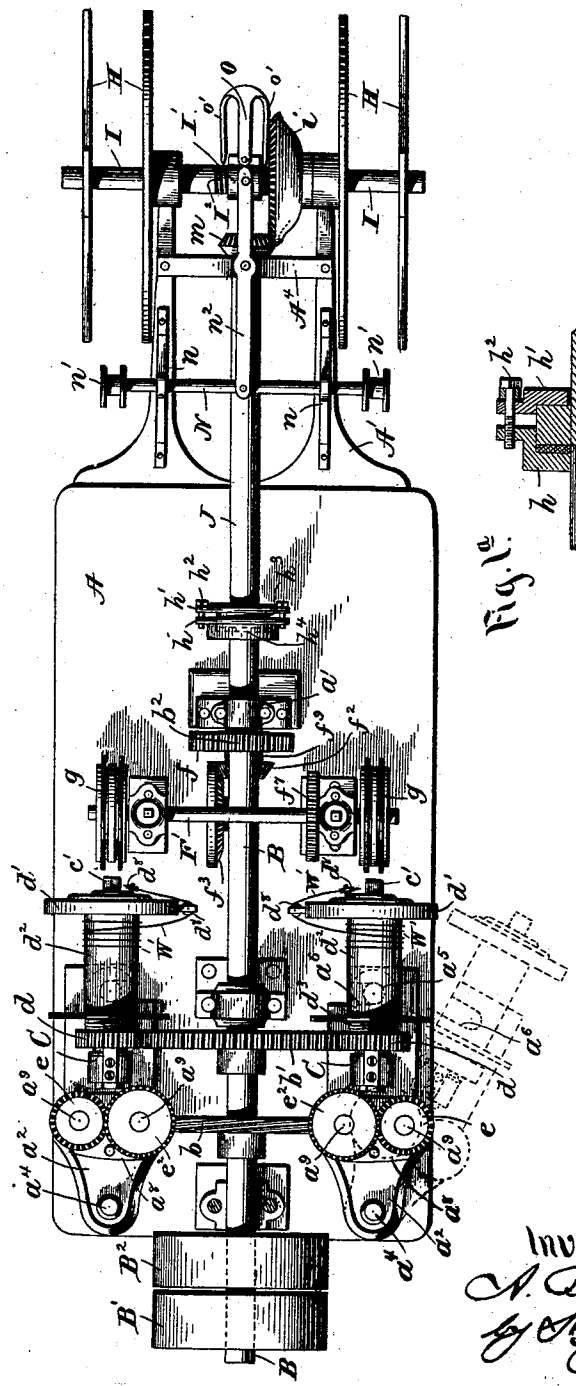
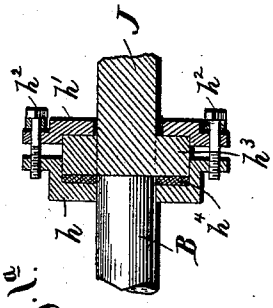


Fig. 2.



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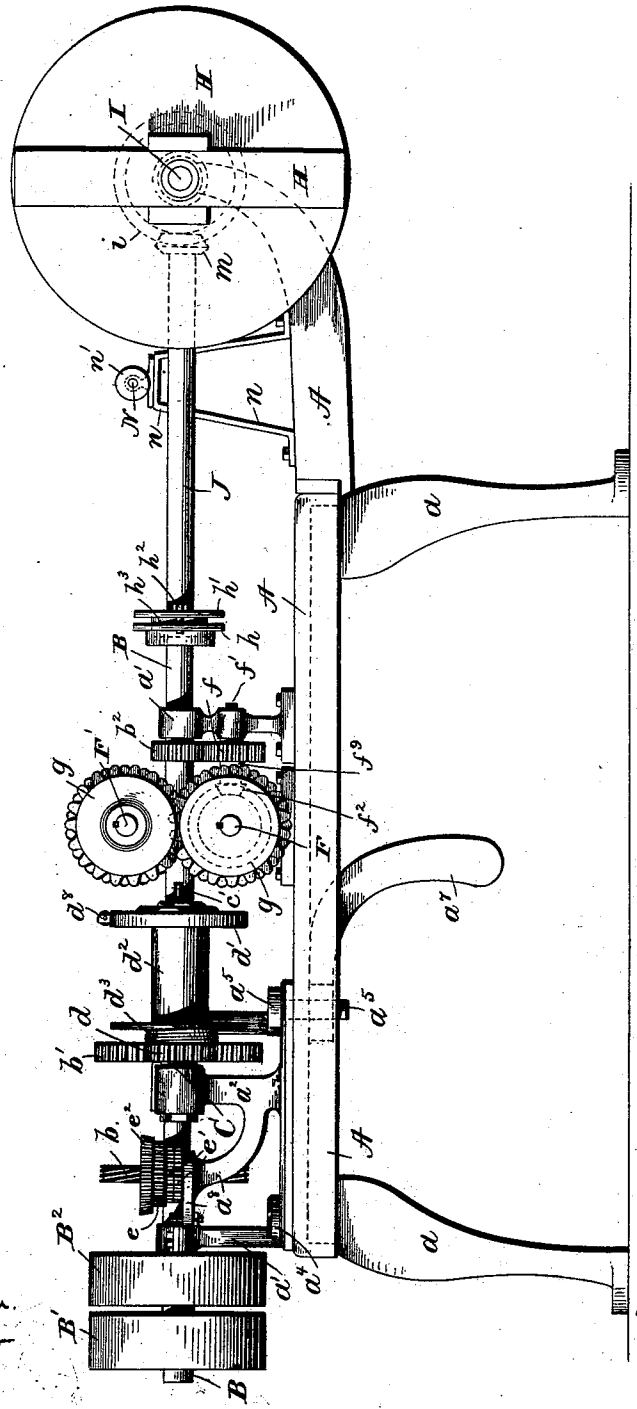
(No Model.) 5 Sheets—Sheet 2.

A. B. WOODARD.

WIRE FENCE MACHINE.

No. 508,074. Patented Nov. 7, 1893.

Fig. 2.



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(No Model.)

5 Sheets—Sheet 3.

A. B. WOODARD.

WIRE FENCE MACHINE.

No. 508,074. Patented Nov. 7, 1893.

Fig. 3.

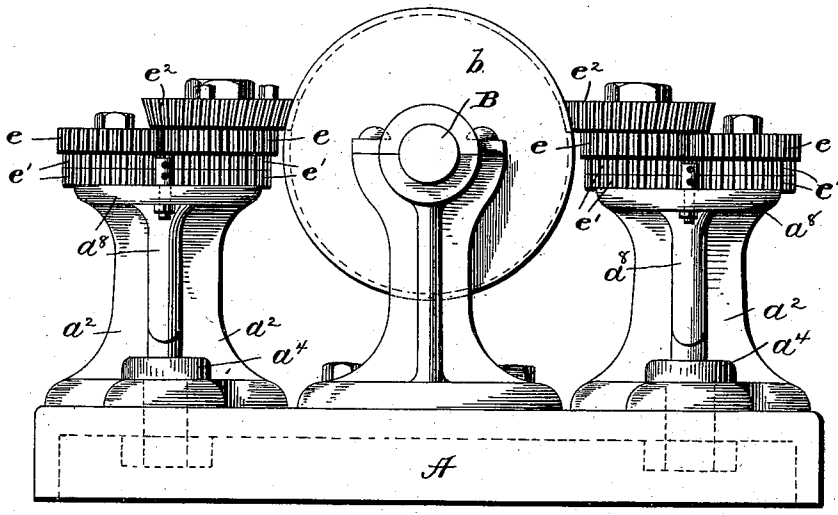


Fig. 4.

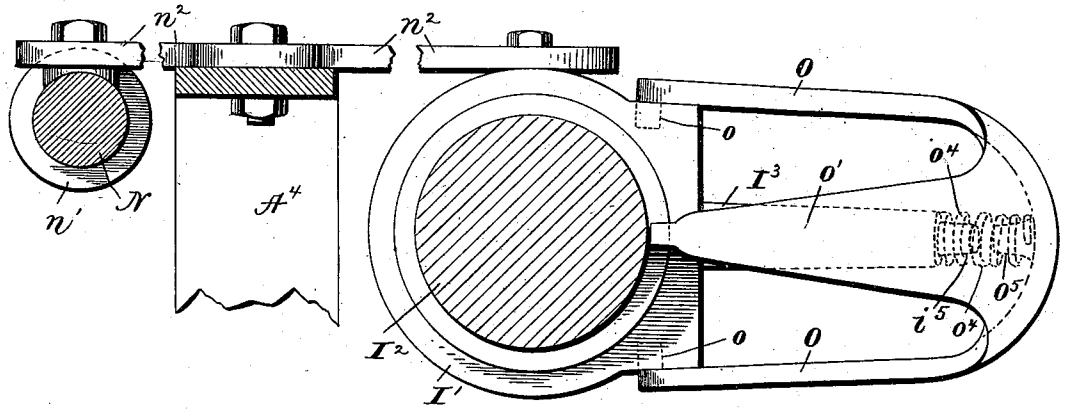
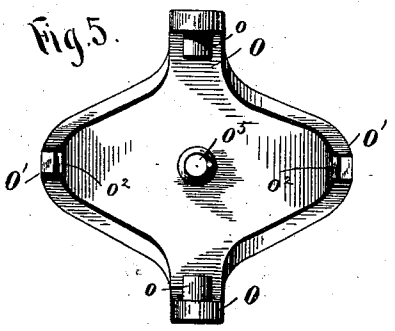


Fig. 5.



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(No Model.) 5 Sheets—Sheet 4.

A. B. WOODARD.

WIRE FENCE MACHINE.

No. 508,074. Patented Nov. 7, 1893.

Fig. 6.

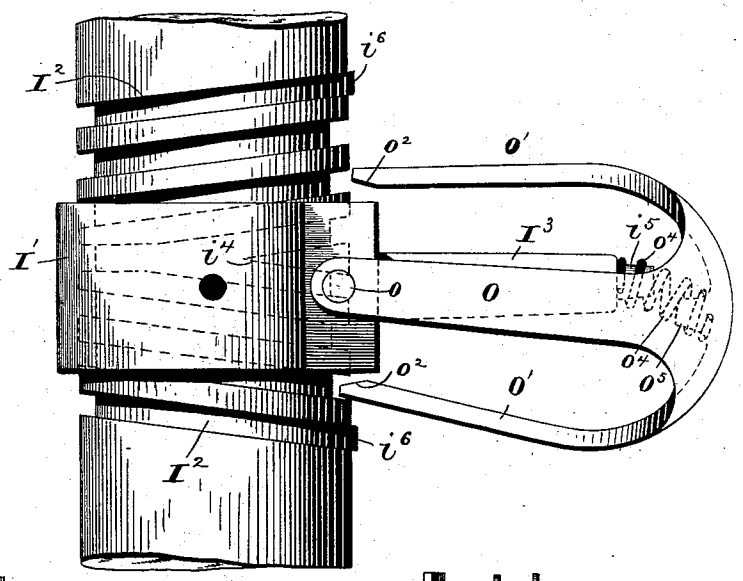


Fig. 7.

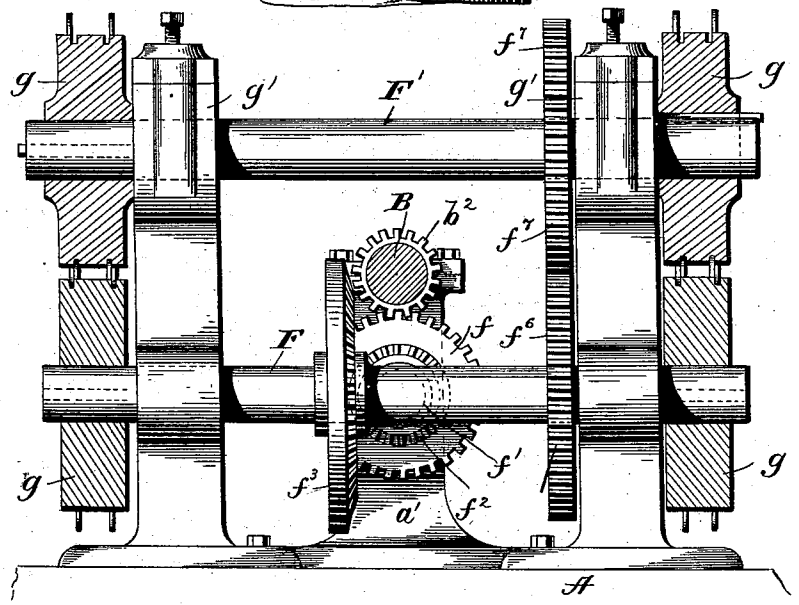
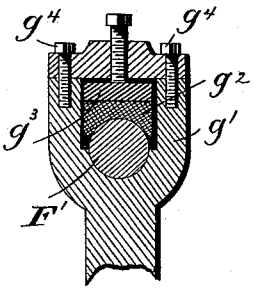


Fig. 8.



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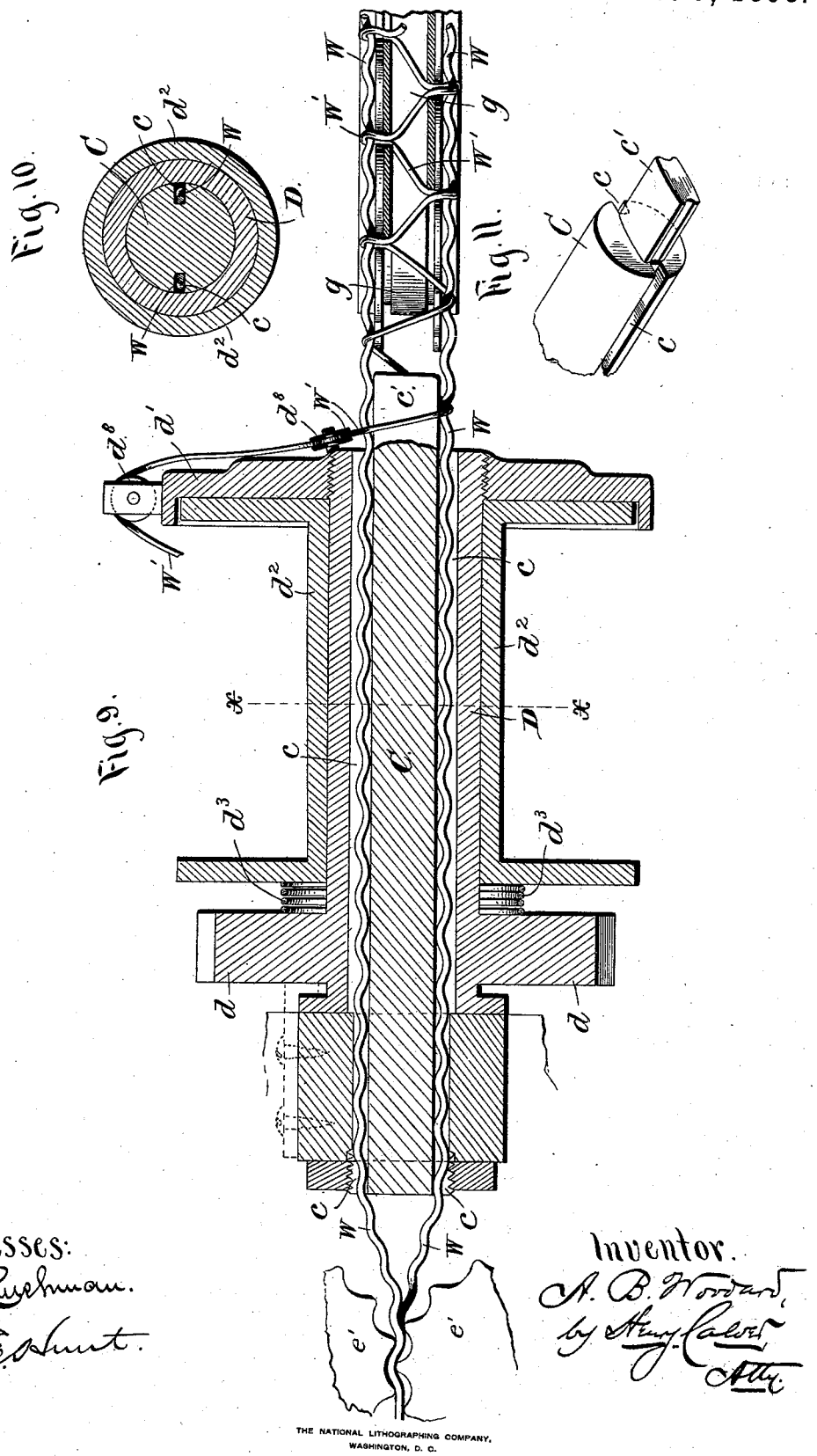
(No Model.)

5 Sheets—Sheet 5.

A. B. WOODARD.

WIRE FENCE MACHINE.

No. 508,074. Patented Nov. 7, 1893.



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UNITED STATES PATENT OFFICE.

ALONZO B. WOODARD, OF HORNELLSVILLE, NEW YORK.

WIRE-FENCE MACHINE.

SPECIFICATION forming part of Letters Patent No. 508,074, dated November 7, 1893.

Application filed February 4, 1891. Serial No. 380,163. (No model.)

To all whom it may concern:

Be it known that I, ALONZO B. WOODARD, a citizen of the United States, residing at Hornellsville, in the county of Steuben and State of New York, have invented certain new and useful Improvements in Machines for Making Wire Fencing, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention has for its object to provide a machine for making a non-barbed wire fencing strand or strip of a strong, elastic and ornamental character, my machine being so constructed that all of its movements, necessary to handle and interweave the wire in the formation of the strand, are rotary, so that it is capable of very high rates of speed, and the structure and arrangement of the mechanism being preferably such that a duplication of the wire interweaving mechanism is easily provided for at but little additional expense.

In the accompanying drawings Figure 1 is a plan view of a machine embodying my invention. Fig. 1^a is a detail section of the clutch connecting the driving shaft with the reel operating shaft. Fig. 2 is a side elevation of my machine. Fig. 3 is an end view of my machine from the left of Figs. 1 and 2. Figs. 4, 5 and 6 are detail views of the traverse mechanism. Fig. 7 is a detail view of the feeding and bending mechanism showing its connections with the driving shaft. Fig. 8 is a detail view of one of the adjustable bearings for the upper shaft carrying the feeding and bending wheels. Fig. 9 is a detail sectional view to show the operation of winding the binding wire on the longitudinal wires and bending or setting the bights of the former wire. Fig. 10 is a section on line 10—10, Fig. 9, and Fig. 11 a detail perspective view of the forward end of the stationary grooved shaft and the separating support and former thereon.

A denotes the bed or table of the machine having suitable legs *a* and provided on its upper surface with standards *a'* in which is journaled the main or driving shaft B having fast and loose pulleys B' B^2, a worm wheel *b*, a gear wheel *b'* and a pinion b^2.

The wire carrying and interweaving or binding mechanism which I will now describe is shown in the present instance as being duplicated and both sets driven from the shaft B, this being the preferable construction of my machine, and I will therefore describe one set of this mechanism, it being understood that the other set is just the same.

To the table A is secured a standard a^2 in which is fixedly mounted a non-rotary wire guide or shaft C having two separated, longitudinal grooves or passages *c* through which the wires W are to be passed, said shaft C terminating at its forward end in a flattened tongue or separating support *c'* of a width about equal to the diameter of the said shaft between the bottoms of the said grooves *c* and of a thickness a little greater than the diameter of the longitudinal wires, said support also serving as a former around which the binding wire W' is bent. The outer edges of the tongue or support *c'* are preferably concaved or slightly grooved to prevent lateral displacement of the wire. Surrounding the stationary shaft C is a rotary sleeve D provided with a pinion *d* fixed thereto and meshing with the gear *b'* of the driving shaft B, the said sleeve D being provided with a flanged disk or wire carrier *d'* which is removably attached thereto in any suitable manner, as by being screwed thereon or keyed thereto.

On the sleeve D between the disk *d'* and the pinion *d* is mounted a wire-carrying spool d^2 which is frictionally connected with the said sleeve so as to rotate therewith but which is capable of turning independently of said sleeve to permit the wire to be drawn off from the said spool. This frictional connection between the spool d^2 and the sleeve D is herein shown as being provided for by the coil spring d^3 interposed between the rear end of said spool and the pinion *d*.

The standard a^2 is preferably so attached to the table A that it may be moved out laterally when it is necessary for a spool of wire to be placed upon, or an empty spool to be removed from, the sleeve D, and I prefer to provide for this lateral movement of the said standard by attaching the rear end of the base thereof to said table by a pivot bolt a^4 and removably securing the front end of said base to said table by a clamping bolt a^5 for the reception of which the base is provided with

an open notch a^6, the said bolt being provided beneath the table with a handle a^7 by which it may be turned to loosen the head of the bolt from the base of the standard or to clamp it tightly against the same. When the bolt a^5 is loosened the standard may be swung outward on its pivot bolt a^4, as shown in dotted lines in Fig. 1, and when the disk d' is removed the spool d^2 may be placed in position on the sleeve D or be removed therefrom. The standard a^2, as herein shown, is provided with an arm a^8 having vertical studs or bolts a^9 on which are mounted intermeshing gear wheels e secured to which, to rotate therewith, are two sets of fluted or toothed crimping wheels e' which also intermesh with each other but without touching. To one of the wheels e is bolted or otherwise secured a beveled worm gear e^2 meshing with the worm wheel b on the driving shaft. In the machine herein shown the mechanism just described is duplicate, both sets or trains of mechanisms being driven from the worm wheel b and the gear wheel b' on the driving shaft. The pinion b^2 on the shaft B meshes with a gear f on a sleeve f^9 mounted on stud or short stationary shaft f' attached to a standard a', said sleeve having a beveled pinion f^2 meshing with a beveled gear f^3 on a transverse shaft F carrying a gear f^6 which meshes with a similar gear f^7 on a second transverse shaft F'. The shafts F and F' are each provided at each end with two toothed feeding and wire bending wheels g so placed relatively to each other that the teeth of the lower and upper wheels overlap, each upper wheel having a corresponding companion or lower wheel running close to it with its overlapping teeth.

The operation of the mechanism thus far described is as follows: Wire being supplied to the crimping wheels is passed forward through the same and is crimped or corrugated and then passes forward through the grooves of the stationary shaft C and as the two wires emerge from the forward end of said shaft and pass over the supporting tongue c' at the forward end thereof the interweaving or binding wire carried by the rotating spool and running over small pulleys d^8 on the disk d' is spirally wound over the longitudinal or crimped wires, the latter being held apart by the said tongue or support while the interweaving or binding wire is spirally wound about them, as represented in Fig. 9, the forward movement of the longitudinal wires, as the binding wire is wound about them, causing this spiral disposition of the latter wire. As the work is passed forward to the toothed feeding and bending wheels g, each set (comprising an upper and lower wheel) of the latter closes in on each bight of the binding or crossing wire just inside of each longitudinal wire, forming the said bights into loops which are closed tightly on the longitudinal wires, both limbs of each loop or bight being at the same time brought into the same vertical plane, or approximately so, so that the work now presents the appearance shown at the right in Fig. 9, forming an ornamental and very strong fencing strip. As the wheels g rotate in engagement with the binding or cross wire their hold thereon pulls on the work and feeds it forward, and thus the operation continues. As all of these movements are rotary the machine may be run at a very high rate of speed. As the fencing strands are made, in the manner above described, they are carried forward and wound on reels H carried by a shaft I, said reels being connected with said shaft, to rotate therewith, in any suitable manner. The shaft I, as herein shown, is journaled in a supplemental frame A' attached to the table A.

J is the driving shaft for the reeling mechanism said shaft being journaled in a cross-bar A^4 arranged in line with the main driving shaft B and connected therewith by means of a friction clutch shown in the present instance as consisting of the collars h and h' the former fast on the shaft B and the latter connected with the former by screws or bolts h^2. The collar h' loosely surrounds the shaft J and the latter is provided with a disk or collar h^3 inclosed between the collars h and h'. Any suitable friction material, as a disk or washer h^4 of brass or leather, may be interposed between the collar h and the collar or disk h^3, and by a suitable adjustment of the screws or bolts h^2 the frictional connection between the shafts B and J may be made as strong or as light as may be desired. The shaft J is provided with a beveled pinion m meshing with a beveled gear i on the shaft I to rotate the latter and the reels carried thereby. It is obvious that as the wire fencing accumulates on the reels they should rotate slower, and this variation in the speed of rotation of the said reels is provided for by the above described frictional connection between the shafts B and J which permits the latter shaft to drag, relative to the former, by the tension or pull on the fencing strands which are being wound on the reels.

N denotes a laterally movable or transverse shaft sustained by supports n and carrying flanged guide wheels or sheaves n' under and in contact with which the fencing strands run as they pass to the reels. The traversing or lateral movements of the shaft n are imparted thereto by a lever n^2 pivoted on the bar A^4 and connected with said shaft and with a sleeve I' loosely surrounding a right and left screw I^2 formed on the shaft I.

O denotes a yoke pivotally connected above and below, as by pins o, to the sleeve I, said yoke having arms o' the ends of which alternately enter the grooves of the said right and left hand screw, the insides of the ends of said arms being beveled or chamfered off at o^2 to properly direct them past the V-shaped dividing ridge i^4 between the parts of said right and left hand screw. The sleeve I' is provided with an arm I^3 having a reduced outer end i^5 between which and the inwardly ex-

tending projection o^5 on the pivoted yoke O is interposed a coil spring o^4 which being somewhat compressed has a tendency to bulge or belly out sidewise at its middle, and this tendency is utilized to exert a reversing stress on the said yoke O and to hold its arms o' alternately in contact with the said right and left hand screws. The grooves at the outer ends of these screws terminate in inclines running out to the surface of the shaft I where slight ridges or projections, as i^6, standing slightly above or out from said surface and located so that as an arm o' runs out of its groove at the outer end of a screw it meets a projection or ridge i^6 and the yoke is turned slightly on its pivots to throw its opposite arm into engagement with the other screw; and this operation is assisted and the yoke held in either position, when reversed, by the action of the spring o^4 which suddenly bulges out the other way as the outer end of the yoke passes its central position. Thus the lever N^2 is vibrated back and forth to traverse the shaft N laterally, causing the guide-wheels or sheaves n', carried by said shaft, to distribute the fencing strands smoothly and evenly on the reels H.

To provide for a proper overlapping adjustment of the bending and feeding wheels g the shaft F' has adjustable bearing blocks g' above it, as shown in Fig. 8. As the pressure of the upper wheels g on the wire has a tendency to lift the shaft F' the position thereof, when in operation, will be determined by the position of adjustment of the bearing blocks g' above which are placed elastic blocks g^2 of rubber or other yielding material and above said elastic block g^2 are placed metal plates g^3 held down by screws g^4, and the position of adjustment of the latter determines the position of the bearing blocks g', and thus the amount of overlap of the wheels g may be regulated as may be required.

Although, for compactness of construction, it may be desirable to mount the reeling mechanism adjacent to the strand forming mechanism, as herein shown, and to drive it from the driving shaft of the latter mechanism, yet it will be understood that the said reeling mechanism may be differently located, as by being placed at a greater distance from the other mechanism, and may be operated separately therefrom, without departing from my invention.

If it be not desired to crimp or corrugate the longitudinal wires w of the fencing strands the crimping wheels e' and their driving mechanism may be omitted altogether, and if it be desired to substitute two or more intertwisted wires, of smaller size, for each of the said wires w suitable means for twisting such wires may be provided.

Although I prefer, and have herein shown, twin strand-forming mechanisms, driven from a common shaft, it will be understood that a machine having a single strand-forming mechanism of the construction shown, may be employed, if desired, without departing from my invention.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The combination with a non-rotary wire guide, having two separated passages for the wire, of a separating support and former at the forward end of said passages and of a width approximately equal to the diametric space between them, and a rotating spool carrier and spool to wind a binding wire spirally around the wires running through said wire guide and over said support and former.

2. The combination with the non-rotary wire guide or shaft C having the wire passages c and provided at its forward end with the tongue or support and former, c', of the rotary sleeve D surrounding said shaft, and the wire-carrying spool mounted on said sleeve to rotate therewith but frictionally connected thereto so as to be capable of turning independently thereof.

3. The combination with a non-rotary wire guide having two separated passages for longitudinal wires, of a support or former at the forward end of said passages to hold said wires separated and to serve as a former for the binding wire, a rotating spool carrier and spool to wind said binding wire spirally around said longitudinal wires, and two sets of over-lapping, toothed bending and feeding wheels, forward of said tongue, for closing the bights or loops of binding wire on to the longitudinal wires, and for feeding the work.

4. The combination with crimping wheels, and a non-rotary wire guide having two separated passages for the longitudinal wires, of a support at the forward end of said passages to hold said wires separated and to serve as a support or former for the binding wire, a rotating spool carrier and spool to wind said binding wire around said longitudinal wires, and two sets of over-lapping, toothed bending and feeding wheels.

5. The combination with the non-rotary guide or holder for the passage of the longitudinal wires, the rotating spool carrier, wire carrier and spool surrounding said guide or holder, bending and feeding wheels and a driving shaft from which wheels, spool carrier, wire carrier and spool are operated, of a reeling mechanism, a driving shaft to operate said reeling mechanism and having a frictional connection with the said first-named driving shaft.

6. In a fencing-strand forming machine, the combination with a non-rotary wire guide having two separated passages for longitudinal wires, of a separating support or former at the forward end of said passages, a rotating spool carrier and spool, two sets of over-lapping, toothed wire-bending and work-feeding wheels, a driving shaft for said spool carrier and bending and feeding wheels, a reeling mechanism for the fencing strand or

strands and a driving shaft for said reeling mechanism having a frictional connection with the said first named driving shaft.

7. The combination with the non-rotary wire guide, its tongue or separating support, and the rotating spool carrier and spool, of a laterally movable standard by which said parts are supported and which may be moved out sidewise when it is necessary to place a spool of wire in position or remove an empty spool.

8. The combination with the non-rotary wire guide or holder, its tongue or former, the rotating spool carrier, the removable disk or carrier and the spool, of the standard a^2 by which the said parts are carried, the table A to which one end of the base of said standard is pivoted, and a clamping device for removably securing the other end of said base to said table.

9. The combination with the shaft B provided with worm wheel b, of the beveled worm gear wheel meshing with said worm wheel, two sets of crimping wheels and intermeshing gear wheels operated from said worm gear wheel and serving to drive said crimping wheels, a non-rotary wire guide or holder, through which the crimped longitudinal wires pass, and a rotating spool carrier, wire carrier and spool for winding a binding or filling wire around the crimped longitudinal wires.

10. The combination with the driving shaft B having the gear wheel b', of the non-rotary wire guiding shaft C having the separated wire passages c and provided at its forward end with the tongue or former c' and the rotary spool-carrying sleeve D surrounding said shaft C and having a pinion meshing with said gear wheel.

11. The combination with the driving shaft B having the gear wheel b' and the pinion b^2, of the non-rotary wire guiding shaft C, the rotary spool carrying sleeve D having a pinion meshing with said gear wheel, the transverse shafts F and F′ geared to and driven from said pinion b^2, and the overlapping, toothed wire bending and feeding wheels carried by said transverse shafts.

12. The combination with the standard a^2 having arm a^8, of the non-rotary wire guiding shaft C mounted in said standard and having support or tongue c', the rotary spool carrying sleeve D provided with a pinion, the driving shaft B having gear wheel b' and worm wheel b, the former meshing with said pinion, and the crimping wheels mounted on said arm a^8 and driven from said worm wheel b.

13. The combination with the driving shaft B having the gear wheel b' and the pinion b^2, of the twin sets of strand-forming and wire bending and feeding mechanisms driven from said gear wheel and pinion, each set of strand-forming mechanism consisting of a stationary wire guide, with separated longitudinal passages for the wire, a separating wire support or tongue at the forward end of said passages and a rotary spool carrier and spool for carrying the binding wire.

14. The combination with the driving shaft B having the worm-wheel b, the gear wheel b' and the pinion b^2, of the twin sets of wire-crimping, strand-forming and wire bending and feeding mechanisms driven from said gear wheel and pinion, each set of strand-forming mechanism consisting of a non-rotary wire guide, with separated longitudinal passages for the wire, a separating wire, support or tongue at the forward end of said passages and a rotary spool carrier and spool for carrying the binding wire around said separating wire support or tongue.

15. The combination with the reel carrying shaft I provided with a right and left hand screw, of the traverse shaft provided with one or more strand guides, the lever for moving said shaft laterally of the reel or reels, the sleeve surrounding said shaft I, and to which said lever is connected, a pivoted yoke having arms to engage the grooves of said screw, and a spring to assist in throwing said yoke past a central position and to hold said arms in engagement with said screw.

16. The combination with the non-rotary wire guide having two separated passages for longitudinal wires, of a separating support and former at the forward end of said passages, a rotating spool carrier and spool, two sets of overlapping toothed wire bending and feeding wheels, two shafts, F and F′ by which said wheels are carried, and adjustable bearings g' for one of said shafts.

17. The combination with the non-rotary wire guiding shaft or holder C having the wire passages c and provided at its forward end with the tongue or former c', of the rotary sleeve D, the disk or wire carrier d' removably attached to said sleeve and the spool retained in place on said sleeve by said disk or wire carrier.

18. The combination with a guide or holder through which the longitudinal wires pass, of a spool carrying the binding or filling wire, a rotating wire carrier for laying said binding or filling wire around said longitudinal wires, and crimping or bending wheels which gather and compress the filling wire and which feed or draw the longitudinal wires along lengthwise.

19. The combination with a guide or holder through which the longitudinal wires pass, of a spool carrying the binding or filling wire, a rotating wire carrier for laying said binding or filling wire around said longitudinal wires, crimping or binding wheels which gather and compress the filling wire and which feed or draw the longitudinal wires along or lengthwise, and a reeling mechanism for taking up the completed fence strand.

20. The combination with the main driving shaft, of a guide or holder through which the longitudinal wires pass, a rotating sleeve geared to said driving shaft, a spool mounted

on said sleeve and carrying the binding or filling wire, and a rotating wire carrier operated by said sleeve and serving to lay said filling wire around said longitudinal wires.

21. The combination with the main driving shaft, of a guide or holder through which the longitudinal wires pass, a rotating sleeve geared to said driving shaft, a spool mounted on said sleeve and carrying the binding or filling wire, a rotating wire carrier operated by said sleeve and serving to lay said filling wire around said longitudinal wires, and bending or compressing and feeding wheels driven by a gear connection with said driving shaft.

22. The combination with the main driving shaft, of a guide or holder through which the horizontal wires pass, a rotating sleeve geared to said driving shaft, a spool mounted on said sleeve and carrying the binding or filling wire, a rotating wire carrier operated by said sleeve and serving to lay said filling wire around said longitudinal wires, bending or compressing and feeding wheels driven by a gear connection with said driving shaft and a rotating and lengthwise moving reel for taking up the completed fence strand.

23. The combination with the main driving shaft, of a guide or holder through which the longitudinal wires pass, a rotating sleeve geared to said driving shaft, a spool detachably mounted on said sleeve and carrying the binding or filling wire, a rotating wire carrier operated by said sleeve and serving to lay said binding or filling wire around said longitudinal wires, bending or compressing and feeding wheels driven by a gear connection with said driving shaft, and a rotating and lengthwise moving reel for taking up the completed fence strand.

In testimony whereof I affix my signature in presence of two witnesses.

ALONZO B. WOODARD.

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