No. 705,394. Patented July 22, 1902.

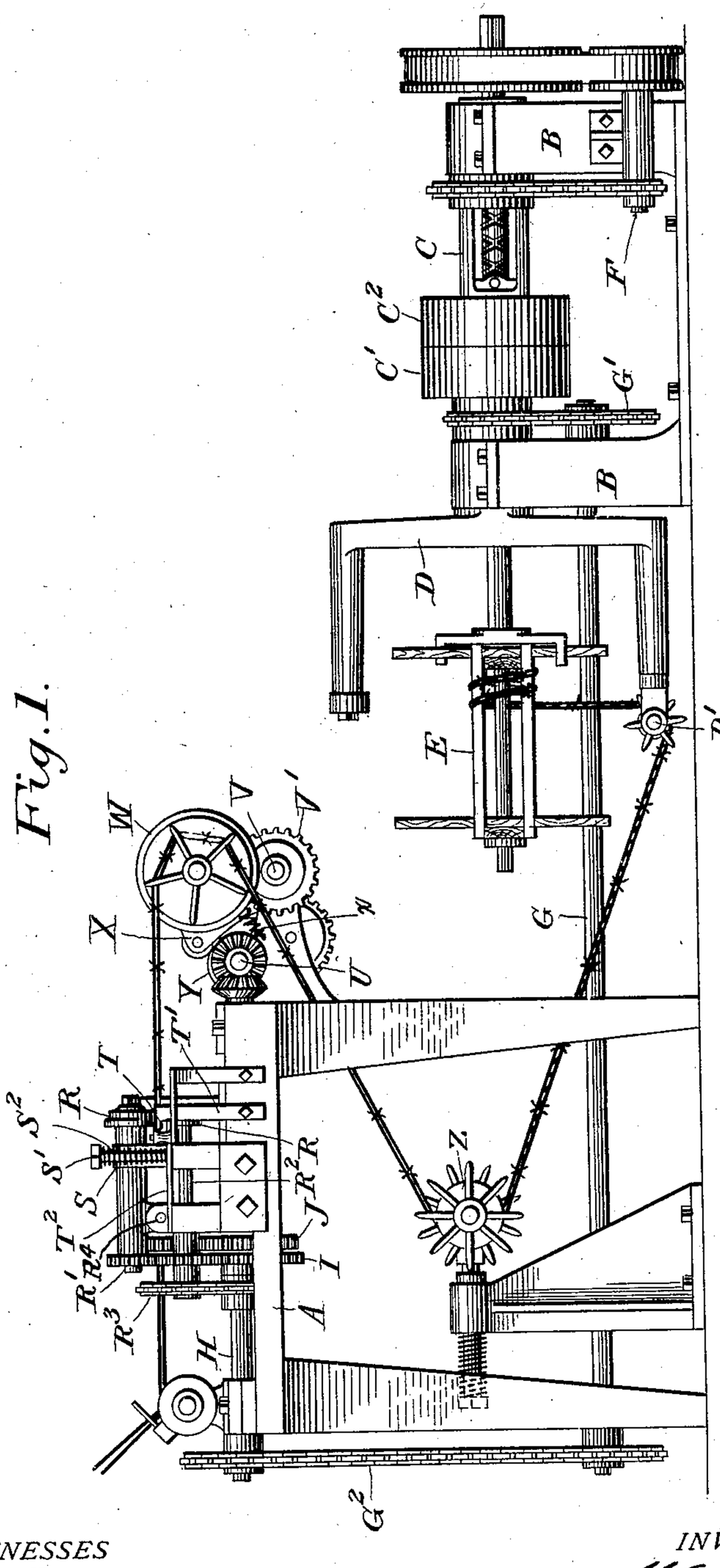
W. EMERY.

BARBED WIRE MACHINE.

(Application filed Mar. 22, 1902.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



WITNESSES

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(No Model.) 3 Sheets—Sheet 2.

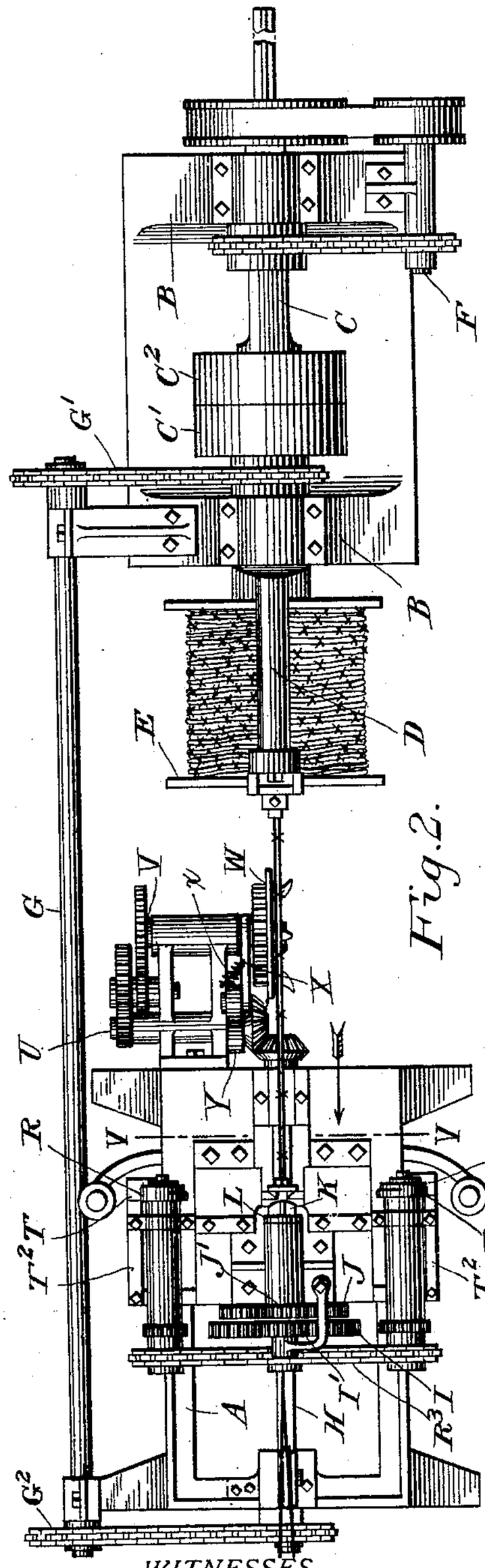

Fig. 2.

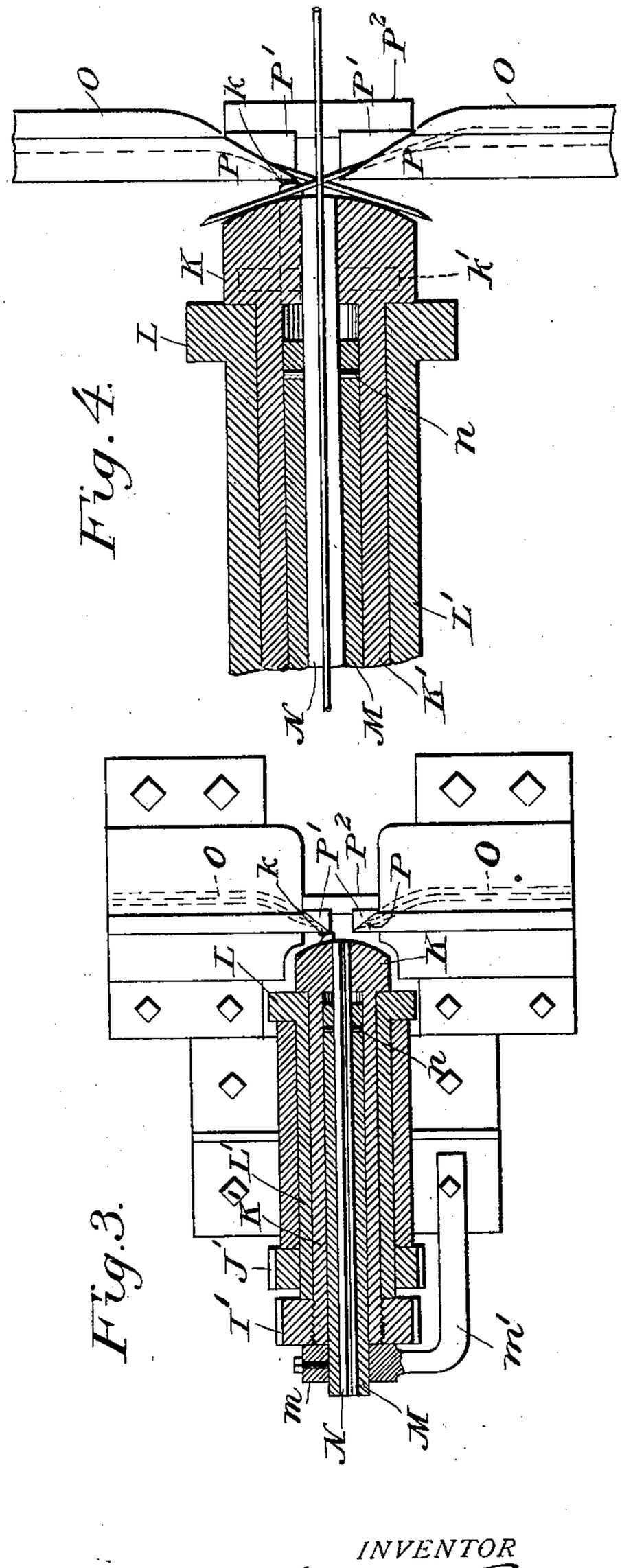

Fig. 4.

Fig. 3.

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(No Model.) 3 Sheets—Sheet 3.

Fig. 7.

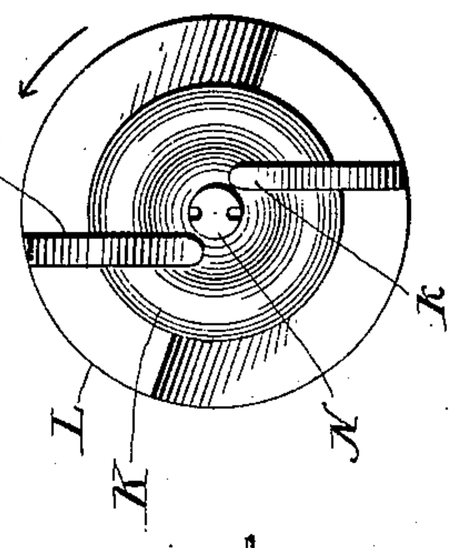


Fig. 8.

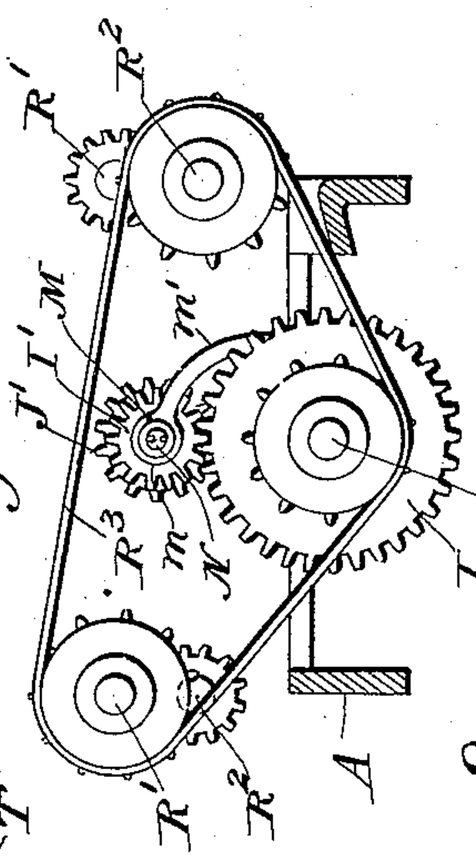


Fig. 9.

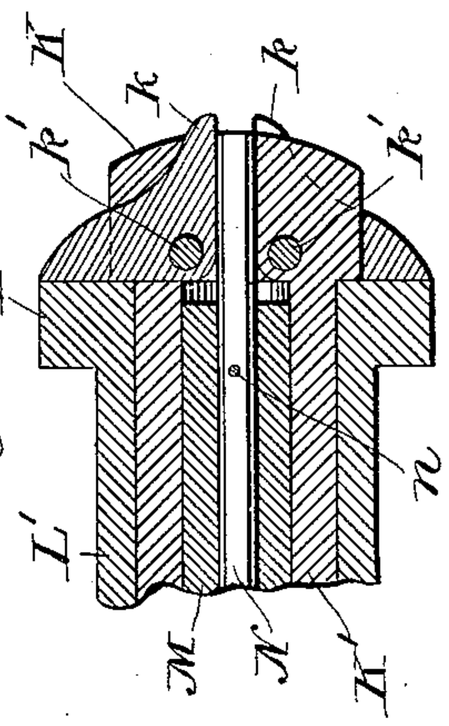


Fig. 5.

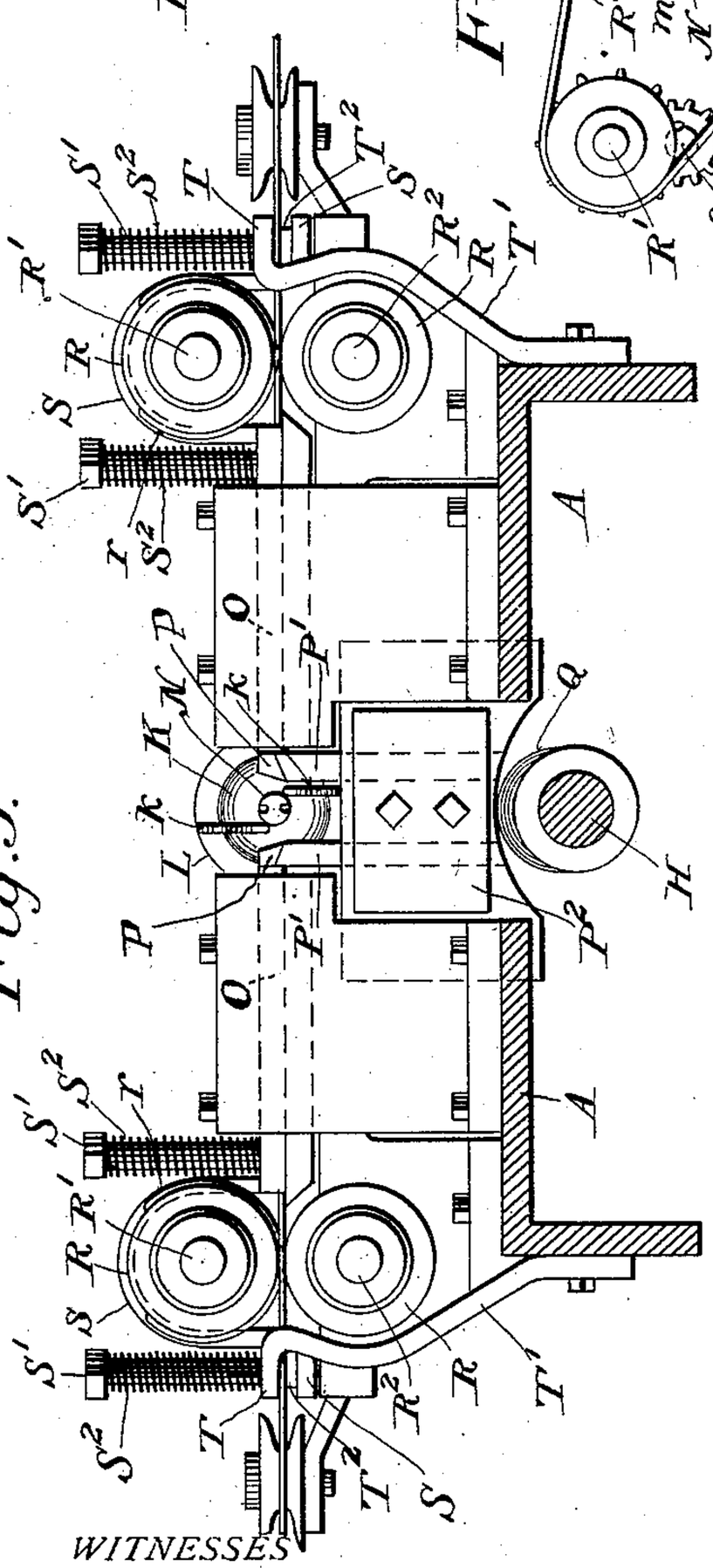
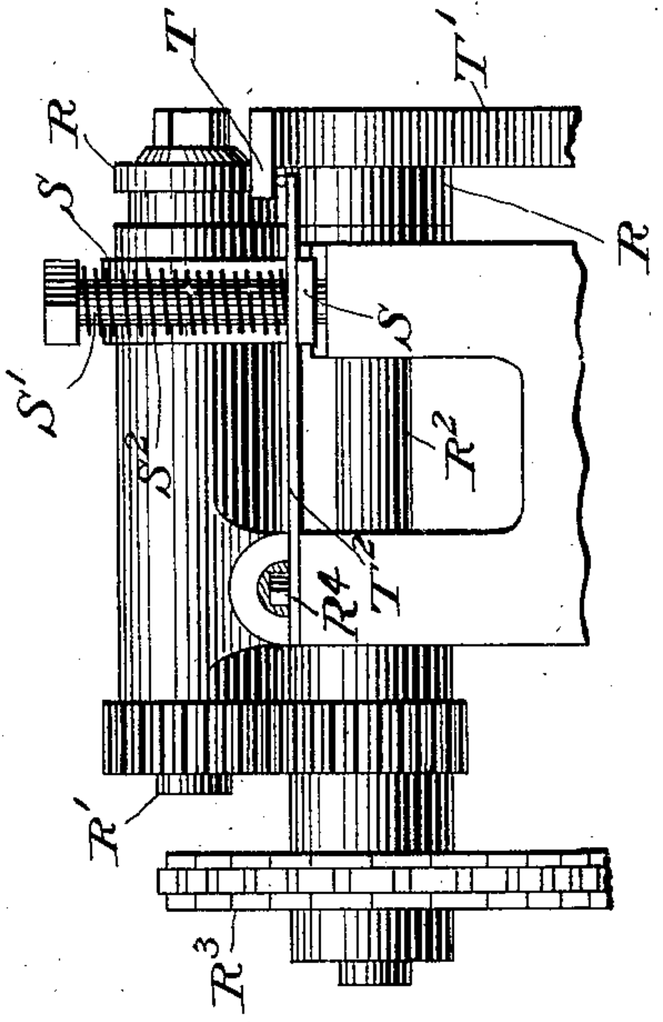


Fig. 6.



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UNITED STATES PATENT OFFICE.

WILBER EMERY, OF ASHLAND, KENTUCKY.

BARBED-WIRE MACHINE.

SPECIFICATION forming part of Letters Patent No. 705,394, dated July 22, 1902.

Application filed March 22, 1902. Serial No. 99,518. (No model.)

To all whom it may concern:

Be it known that I, WILBER EMERY, a citizen of the United States, residing at Ashland, in the county of Boyd and State of Kentucky, have invented certain new and useful Improvements in Barbed-Wire Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to barbed-wire-making machinery, and more particularly to machines of that type in which the barbs are coiled and cut from the successively-presented extremities of continuous barbing-wires, an example of which is shown and described in United States Letters Patent No. 689,712, granted to me on December 24, 1901. My present invention constitutes an improvement upon the machine disclosed in said patent.

The principal objects of the invention are to provide improved coiling devices for applying the barbs to the strand-wires, to provide means for holding the barbing-wire in rigid position during the barb-forming operation, so as to prevent its being pulled inward or otherwise displaced by the coiling devices, to render the machine adaptable for forming either two-point or four-point barbs, to simplify the construction and reduce the number of parts, and to increase the efficiency and durability of the mechanism.

The invention will be hereinafter first fully described with reference to the accompanying drawings, which form a part of this specification, and then more particularly pointed out in the following claims.

In said drawings, in which corresponding parts in the several views are designated by like letters of reference, Figure 1 represents in side elevation a barbed-wire-making machine of the type illustrated in my aforesaid patent, having my improvements embodied therein. Fig. 2 is a top plan view thereof. Fig. 3 is a horizontal sectional view of the barb coiling and shearing mechanism. Fig. 4 is a similar view, enlarged, of a portion of said coiling and shearing mechanism, showing the strand-wires and barbing-wires in proper position for the barbing operation. Fig. 5 represents a vertical section on line V V of Fig. 2 looking in the direction of the arrow. Fig. 6 is a side elevation of the barbing-wire-feed mechanism. Fig. 7 is a detail end view of the coiling-head and coöperating cam-wheel. Fig. 8 is a detail view in front end elevation, showing the gearing and connections for operating the coiling and barbing-wire-feed mechanism; and Fig. 9 is a fragmentary view, in vertical section, of the coiling mechanism.

Referring to the drawings by specific letters of reference, A designates the bed of the machine, which is of suitable construction and mounted on supporting-standards.

The letters B B denote standards located at the rear of the machine or in other suitable relation thereto, and C a hollow shaft or sleeve rotatably mounted in bearings on said standards and having thereon friction-pulleys C′ and C², one of which is loose and the other fast for the application of power to drive the machine.

As set forth in the specification of my aforesaid patent, the hollow shaft or sleeve C carries a spooler and twister D in the form of a yoke or fork, having one arm provided with an idler D′, over which the finished barbed wire paid out by the machine is passed and which in revolving twists the barbed wire and winds it around an axially-disposed reel E. The said reel is carried by a shaft journaled within the sleeve C and formed with a right and left screw portion which is engaged by a fork secured rigidly within the sleeve, as shown in Fig. 1, so as to reciprocate the reel, and thereby distribute the wire uniformly thereon. For the purpose of winding the wire with proper tension and compensating for the increasing diameter of the bale on the reel the reel-shaft is also rotated at a variable speed, the difference in speeds of rotation between the driving shaft or sleeve and the reel-shaft causing reciprocation of the latter. In the construction herein illustrated the sleeve C drives, through suitable sprocket-and-chain connections, a countershaft F, journaled in bearings at the side of one of the standards B and carrying a flanged pulley connected by a belt with a similar pulley secured by a spline or feather on the reel-shaft, the hub of the latter pulley being preferably journaled within the end

of the sleeve to prevent longitudinal movement. The sprocket-wheels on the sleeve C and counter-shaft F are in a different ratio from that of the pulleys on the said counter-shaft and reel-shaft, whereby the reel and spooler are driven at different speeds, and the difference between said ratios is preferably made slightly greater than necessary, whereby the reel-shaft is continuously retarded or driven at less than the required speed, so that the wire being wound upon the reel is continuously kept taut and by reason of its pull turns the reel independently of the driving connections, causing the belt to slip on the smaller pulley. By these means the finished barbed wire is wound with steady motion and uniform tension. However, the reeling and twisting mechanism described constitutes the subject-matter of a separate application filed by me simultaneously herewith, Serial No. 99,517, and therefore further explanation of the same herein is deemed unnecessary.

The letter G denotes a longitudinally-disposed shaft journaled in suitable bearings, said shaft being driven from the shaft C by means of a chain G′, passing over suitable sprockets on both of said shafts and driving in turn, through similar sprockets and connecting-chain G^2, the main driving-shaft H of the barbing-machine. The said shaft H is journaled in suitable bearings at opposite ends of the machine-bed, and power is transmitted therefrom to the barbing, shearing, and wire feeding and pull-out mechanisms.

My improved barbing mechanism is adapted for the production of either two-point or four-point barbs, and the construction thereof is exceedingly simple and efficient, as will appear from the following description. The shaft H has thereon two gears I and J of different diameters, which mesh with a pair of gears I′ and J′, fixed, respectively, upon an inner sleeve or hollow shaft K′ and an outer sleeve or hollow shaft L′, which are thus rotated at different speeds. The outer sleeve or shaft is journaled in a suitable box or bearing mounted on the machine-bed, preferably above the driving-shaft H. A coiling-head K is formed at or secured to the rear end of the inner sleeve K′, the forward annular face of which head confronts and preferably contacts with a cam-wheel L, formed at or secured to the rear end of the outer sleeve L′. (See Figs. 3, 4, 7, and 9.) A stationary sleeve M is preferably fitted within the inner rotating sleeve and incloses an axial rod N, which latter extends also through the centrally-bored coiling-head and is longitudinally slotted at opposite sides or at top and bottom to form guides for the two strand-wires, which are intermittently drawn through the machine by mechanism hereinafter described. The sleeve M, which prevents displacement of the strand-wires in the slotted guide-rod by the inner rotating sleeve K′, is rigidly secured to the rod N by a cotter-pin *n* or other suitable means, and the said sleeve and rod are held from rotating with the other members of the barb-coiling mechanism by means of a collar *m*, rigidly secured on the outer end of the sleeve or on the rod, if preferred, and connected by an arm *m′* or other suitable means to the machine-frame, as shown in Figs. 3 and 8. The coiling-head K is slotted, preferably at opposite sides of the axial guide-rod N, to receive oscillatory coiling-fingers *k*, consisting of levers or plates pivoted on removable pins *k′* within the head and having their points normally projecting beyond the face of the coiling-head for engagement with the barbing-wires and having outwardly-extending bases or tail portions, which revolve in contact with the face of the adjacent cam-wheel L. The said cam-wheel during certain intervals thus maintains the points of the fingers pressed inwardly or toward the center of the coiler, causing them to engage and wrap around the strand-wires the extremities of the barbing-wires, which latter are fed from opposite sides of the machine and directed between the strand-wires, as shown in Fig. 4; but at intervening periods the said cam-wheel by reason of its formation permits the coiling fingers or levers to swing outwardly by centrifugal force and also by the resistance of the wire being bent, thus separating the points of the fingers and releasing the finished barb. The relative rotations of the coiling-head and cam-wheel are so timed that this outward movement of the coiling-fingers occurs immediately after the completion of the barb, which is then severed from the barbing-wires by the shearing mechanism and drawn rearwardly with the succeeding feed of the strand-wires.

The coiling mechanism is above described with reference to the production of four-point barbed wire. When it is desired to manufacture wire with two-point barbs, one of the coiling-fingers may be removed on withdrawing its removable pivot-pin, and a single barbing-wire may be fed from one side of the machine. In this case the barbs may be coiled around both strands or a single strand may be threaded through the coiling mechanism to receive the barbs and the other strand subsequently guided to and twisted with the barbed strand.

The shearing mechanism illustrated is similar to that shown and described in my former patent, with the duplications and improvements necessary for severing the two barbing-wires. (See Figs. 4 and 5.) Said mechanism consists of fixed knives P, arranged above and oblique to the barbing-wires at the inner curved terminals of the guides O therefor, and coöperating vertically-slidable knives P′, bolted or otherwise secured to a slide P^2, mounted in suitable guideways and having its lower edge resting upon a cam Q on the driving-shaft H, whereby at the proper periods the movable knives are forced upwardly and caused to sever the previously-coiled ex-

tremities from the barbing-wires, cutting the latter obliquely to produce barbs properly pointed.

The barbing-wires are fed intermittently to supply the necessary lengths for forming the barbs by the following mechanism. At each side of the coiling mechanism are arranged one above another a pair of oppositely-rotating feed-rollers R, between which the barbing-wire is gripped. The lower one of said rollers is fixed upon a longitudinally-disposed shaft R^2, journaled in a suitable box or bearing mounted in the machine-bed, and the upper one of which is fixed upon a similar shaft R′, journaled in a box or bearing resting upon and hinged, as at R^4, to the box containing the lower shaft, said shafts being suitably geared together, as shown in Fig. 6, and driven from the driving-shaft H by a chain R^3, passing around suitable sprockets on said driving-shaft and one of the feed-roller shafts, as shown in Fig. 8. A strap S passes over the upper roller-shaft boxing, the lower flat ends or bases of which are apertured and fitted over rods S′, upstanding from the lower shaft-boxing or other support, and by means of coiled compression-springs S^2, encircling said rods between their upper enlarged extremities and the bases of the strap, the upper feed-roller is pressed firmly down against the wire upon the lower feed-roller. One of said rollers, preferably the upper one, is provided with a peripheral shoulder *r*, by means of which the upper roller is raised at intervals out of contact with the barbing-wire against force of the springs S^2, thus imparting an intermittent feed to said wire while permitting continuous rotation of the feed-rollers.

For the purpose of holding each barbing-wire firmly in place during the barbing operation, so as to prevent its being pulled inward by the coiling-fingers or pushed outward by resistance to the operation, the following devices are herein employed, which, however, may be variously modified. The barbing-wire is drawn or fed under a stationary plate or lug T, which in the present construction is formed at the upper extremity of an arm or rod T′, rigidly attached to the machine-frame. A movable plate T^2, herein in the form of a lever pivoted on the lower shaft-boxing, passes over one of the bases of the strap S under the spring S^2 and extends under the barbing-wire beneath the stationary plate T. When the upper roller-shaft boxing is raised by action of the shoulders *r* of the upper feed-roller upon the lower feed-roller, the movable plate or lever T^2 is likewise raised and caused to clamp the wire firmly against the plate T, thus preventing the wire from being moved in or out during the coiling operation.

The strand-wires are drawn intermittently through the coiling devices to permit the necessary stops for affixing the barbs, but are delivered continuously from the machine to permit uniform winding upon the reel, the pull-out mechanism herein illustrated being substantially similar to that shown and described in my former patent. A counter-shaft U, journaled in bearings suitably mounted at the rear of the machine, is driven by the main shaft H through suitable bevel-gearing and drives in turn a second shaft V through gears at the outer ends of said shafts and interposed idle gears, as shown more clearly in Fig. 2. The shaft V has fixed on its inner end a gear V′, which meshes with and drives a combined gear and drag wheel W, around which the barbed strand-wires are passed. The wheel W is supported by an arm or lever X, which is mounted on the shaft V as an axis and oscillated by a cam Y on the shaft U, contacting with a roller at the rear side of said lever, a spring *x* or other suitable means being employed to actuate the lever toward the machine-bed. The drag-wheel is thus carried alternately outward and inward or rearward and forward, and this vibratory movement thereof around the gear-wheel V′ causes a variable rotation of said drag-wheel faster when moving rearward and slower when returning, so that by proper ratios of gearing the wire may be drawn intermittently through the coiling-head while moving continuously over the drag-wheel. The amount of wire drawn out by the drag-wheel at each rearward travel or reciprocation compensates for the intermediate stops in the barbing-machine and is taken up by the reel during the forward or inward travel of the drag-wheel, and hence it is apparent that while the wire moves intermittently through the coiler it is wound continuously upon the reel.

The letter Z denotes an idler around which the barbed strands are passed from the drag-wheel and thence to the spooler and twister D, said idler being preferably yieldingly supported with reference to pull on the wire to permit the wire to be drawn uniformly to the spooler and twister. The wire is prevented from turning between the drag-wheel and idler Z, but is properly twisted between the idler Z and idler D′ by reason of the revolution of the latter around the reel in winding the wire thereon.

The operation of the machine may be briefly summarized as follows: Power being applied to the shaft C at pulley C′, motion is transmitted to the various operative mechanisms through the connections above described. The strand-wires are threaded through the coiling-head K, being guided in the axial longitudinally-slotted rod N, and are drawn intermittently through the machine by the drag-wheel W and coöperating parts, while the barbing-wires are simultaneously fed by the feed-rollers R, passing through the guides O beneath the fixed knives P and entering crosswise between the strand-wires, as illustrated in Fig. 4. Immediately following each intermittent movement of the wires the clamp-

ing-plates or jaws T and T^2 grip and hold the barbing-wires, and the rotating cam-wheel L, by engagement with the bases or tail portions of the coiling-fingers *k* in the coiling-head K, which rotates at a different speed from that of said cam-wheel, causes the points of said fingers to move inwardly and engage the pointed extremities of the barbing-wires and coil them around the strand-wires, thus forming the barb, whereupon, the bases of the coiling-fingers being permitted to recede against the depressed portions of the cam-wheel, the points of said coiling-fingers are thrown outwardly by centrifugal force and also by resistance of the wire being bent, while the cam Q operates the slidable knives P′ upwardly against the fixed knives, and thus severs the barbs from the barbing-wires. The strand-wires are then again drawn rearward, carrying the finished barb away from the coiling mechanism, while simultaneously the feed-rollers R feed in the barbing-wires for the succeeding operation. As before described, the strand-wires while being drawn intermittently through the machine move continuously over the drag-wheel W, carried by the oscillating lever X, and are paid out uniformly to the spooler and twister D, which twists the barbed strands on their way from the idler Z and winds the finished wire about the reciprocating reel E.

It will be understood that the mechanism described is susceptible of various modifications in details of construction and arrangement without departing from the scope of my invention.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a barbed-wire machine, the combination with means for intermittently feeding a pair of strand-wires, of means for simultaneously feeding a pair of barbing-wires from opposite directions and directing their ends between said strand-wires, and means for coiling the extremities of said barbing-wires around the strands and severing said coiled extremities during the intervening periods of rest; substantially as described.

2. In a barbed-wire machine, the combination with means for intermittently feeding a strand-wire, and mechanism for successively advancing the extremity of a barbing-wire across the same as previously-advanced portions thereof are severed, of a continuously-rotating member carrying a pivoted coiling-finger, means for moving and maintaining said finger at proper intervals in position to engage and wrap said extremity around the strand-wire, means for severing the barb, and means for periodically releasing said finger to disengage and escape the points of the barb; substantially as described.

3. In a barbed-wire machine, the combination with means for supporting a strand-wire, of a rotary coiling-head carrying a pivoted finger, and means for moving and maintaining said finger at intervals in position to engage and coil the barbs about the strand-wire and for periodically moving said finger outward to disengage the finished barbs; substantially as described.

4. In a barbed-wire machine, a rotary coiling-head having an axial bore for the strand wire or wires, a pivoted finger carried by said head having its point adapted to engage and coil the barbs around the strand or strands, and a cam engaging said finger maintaining it at intervals in position to coil the barbs and periodically releasing the same to escape the finished barbs; substantially as described.

5. In a barbed-wire machine, a rotary coiling-head having an axial opening for the strand wire or wires and longitudinally slotted, a coiling-finger pivoted in said slot having its forward point projecting beyond the face of the head for engaging the barbing-wire, and a cam in contact with the base of said finger maintaining its point inward for intervals to coil the barbs and periodically releasing the same to disengage and escape the barbs; substantially as described.

6. In a barbed-wire machine, the combination with means for supporting a strand-wire, of a continuously-rotating coiling-head, a pivoted oscillatory finger carried thereby, means for maintaining said finger pressed inward at intervals to engage and coil the barbs around the strand, and means for periodically permitting said finger to swing outward by centrifugal force to disengage and escape the barbs; substantially as described.

7. In a barbed-wire machine, a coiling-head and an adjacent cam-wheel adapted to rotate at different speeds, said head carrying a pivoted oscillatory coiling-finger engaged by the cam and periodically moved inward to coil the barbing-wire around the strand and outward to escape the barbs; substantially as described.

8. In a barbed-wire machine, a coiling-head and an adjacent cam-wheel adapted to rotate continuously at different speeds, and a pivoted oscillatory coiling-finger carried by said head, said finger being periodically engaged by the cam and pressed inward to coil the barbing-wire around the strand and periodically released to disengage and escape the points of the barbs; substantially as described.

9. In a barbed-wire machine, the combination with means for intermittently feeding the strand wire or wires and advancing in opposite directions across the same the extremities of a pair of barbing-wires, of a rotary coiling-head having an axial strand-wire opening, oppositely-pivoted coiling-fingers carried thereby, and means for periodically moving said fingers inward to wrap said extremities about the strand wire or wires and outward to disengage and escape the points of the barbs; substantially as described.

10. In a barbed-wire machine, the combination with means for intermittently feeding

the strand wire or wires and advancing in opposite directions across the same the extremities of a pair of barbing-wires, of a coiling-head and an adjacent cam through which the strands are axially threaded, said head and cam being continuously rotatable at different speeds, and a pair of oscillatory coiling-fingers pivoted in said head at opposite sides of its axis, said fingers being engaged by said cam and periodically moved inward to coil the barbing-wires around the strand or strands and outward to escape the barbs; substantially as described.

11. In a barbed-wire machine, the combination with means for intermittently feeding the strand wire or wires and advancing in opposite directions across the same the extremities of a pair of barbing-wires, of a coiling-head and an adjacent cam through which the strands are axially threaded, said head and cam being continuously rotatable at different speeds, and a pair of oscillatory coiling-fingers carried by said head, said fingers being periodically engaged by the cam and pressed inward to coil the barbing-wires around the strand or strands and periodically released and permitted to move outward by centrifugal force to escape the barbs; substantially as described.

12. In a barbed-wire machine, a rotatable coiling-head having an axial bore to receive the strand wire or wires, and a pair of oscillatory coiling-pins secured on removable pivots; substantially as and for the purpose described.

13. In a barbed-wire machine, a guide for the strand wire or wires, an inner rotatable sleeve inclosing the same carrying a coiling-head through which the strand wire or wires are threaded, an outer sleeve rotatable at a different speed from the other carrying an annular cam in proximity to the head, and a coiling-finger pivoted in said head, said finger being periodically engaged by the cam to maintain its forward extremity in engagement with the barbing-wire and periodically released to disengage the finished barb; substantially as described.

14. In a barbed-wire machine, the combination with means for intermittently feeding the strand wire or wires and advancing a pair of barbing-wires across the same from opposite sides of the machine, and mechanism for coiling the successively-advanced extremities of the barbing-wires around the strand wire or wires during the intervening intervals of rest, of the shearing mechanism comprising upper fixed knives and lower coöperating movable knives between which the barbing-wires are guided, a slide secured to said movable knives for operating them simultaneously, and a cam upon which said slide is supported adapted to reciprocate said slide; substantially as described.

15. In a barbed-wire machine, the combination with means for intermittently feeding the strand-wire, the barbing mechanism, and means for intermittently feeding a barbing-wire, of a clamping device distinct from said feeding mechanism adapted to positively grip and hold the barbing-wire against movement in either forward or backward direction during the coiling operation; substantially as described.

16. In a barbed-wire machine, the combination with strand-wire feeding and barbing mechanism, and means for intermittently feeding the barbing-wire, of means distinct from but actuated by the devices for stopping the barbing-wire feed for positively clamping said barbing-wire during the intervals of rest to prevent its displacement by the barbing mechanism or movement in either direction during such intervals; substantially as described.

17. In a barbed-wire machine, a pair of oppositely-rotating rollers between which the barbing-wire is gripped and fed into the machine, means for separating said rollers at intervals so as to feed the wire intermittently, and a clamping device actuated simultaneously with separation of the rollers for holding the barbing-wire in rigid position during the barbing operation; substantially as described.

18. In a barbed-wire machine, a pair of oppositely-rotating rollers between which the barbing-wire is gripped and fed into the machine, means for separating said rollers at intervals so as to feed the wire intermittently, and a clamping device actuated by separation of the rollers for holding the wire rigidly during the barbing operation; substantially as described.

19. In a barbed-wire machine, a pair of oppositely-rotating rollers between which a wire is gripped and fed into the machine, means for separating said rollers at intervals to feed the wire intermittently, gripping members between which the wire is guided, and a suitable connection between one of said members and one of said rollers whereby when the rollers are separated said members are caused to grip and hold the wire; substantially as described.

20. In a barbed-wire machine, a pair of oppositely-rotating rollers between which a wire is gripped and fed into the machine, one of said rollers having a segmental peripheral shoulder for separating the rollers at intervals and thus feeding the wire intermittently, gripping members between which the wire is guided, and suitable connections between said members and rollers whereby when the latter are separated said members are caused to grip the wire; substantially as described.

21. In a barbed-wire machine, a pair of oppositely-rotating rollers which grip and feed a wire into the machine, means for separating said rollers at intervals to feed the wire intermittently, a strap passing over one of said rollers having its ends spring-actuated to force the rollers together, and gripping members between which the wire is guided,

one of which is connected with said strap so as to be forced toward the other to grip the wire when the rollers are separated; substantially as described.

22. In a barbed-wire machine, a pair of oppositely-rotating wire-feeding rollers, means for separating them at intervals to feed the wire intermittently, gripping members between which the wire is guided, and suitable connections between said rollers and members whereby when the former are separated the latter are forced together to grip and hold the wire, substantially as described.

23. In a barbed-wire machine, a pair of oppositely-rotating wire-feeding rollers, one of which is fixed and the other adapted to be separated therefrom, means for separating the latter at intervals to feed the wire intermittently, and fixed and movable clamping members between which the wire is guided, the movable member being connected with the movable roller so as to move toward the fixed member when the rollers are separated and clamp the wire, substantially as described.

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

WILBER EMERY.

Witnesses:
PROCTOR K. MALIN,
ELIZABETH K. MURPHY.