

(No Model.)

3 Sheets—Sheet 1.

J. D. CURTIS.
MANUFACTURE OF BARBED WIRE.

No. 491,304.

Patented Feb. 7, 1893.

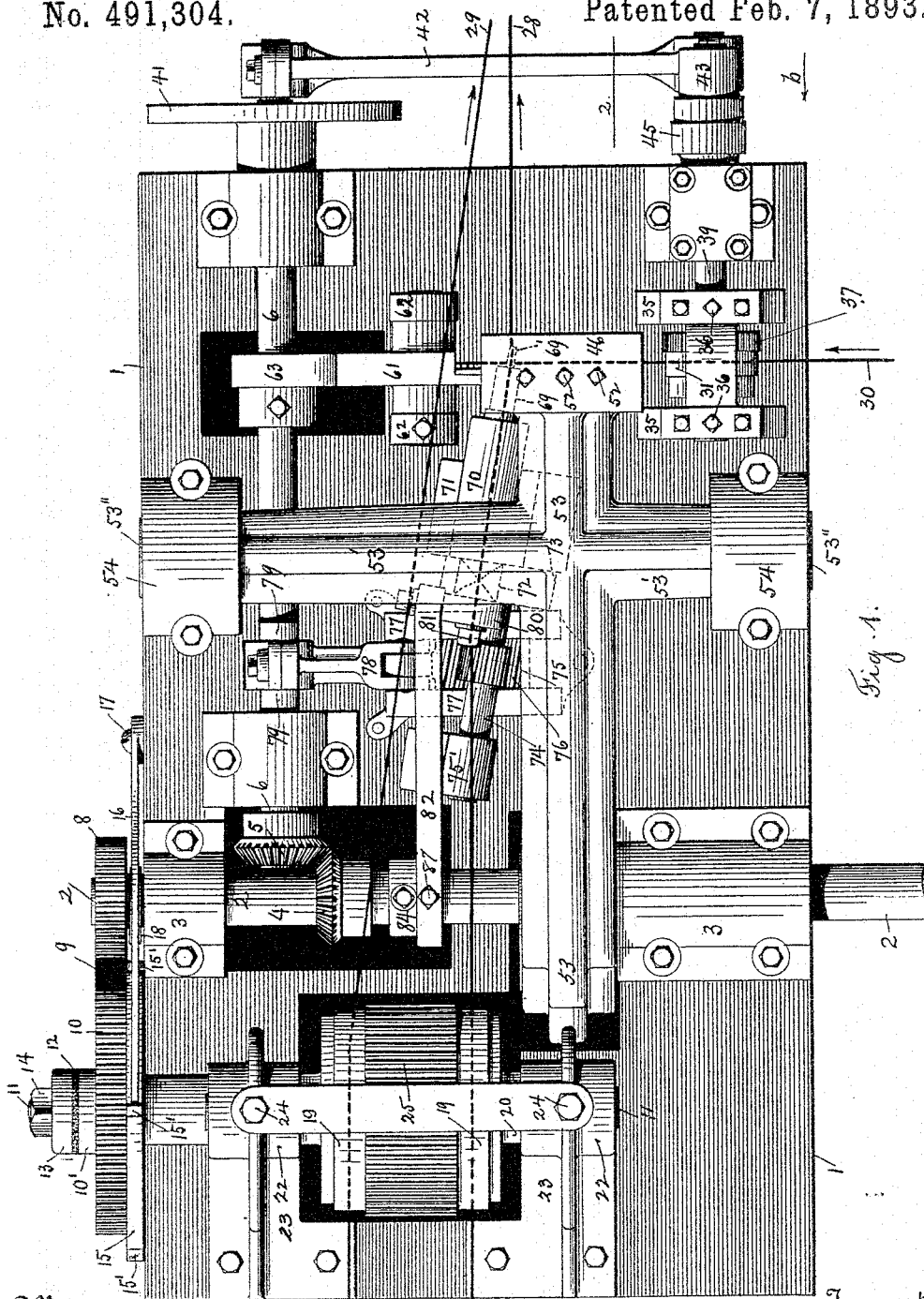


Fig. 1.

Witnesses

Chas. F. Schultz
Katie Farrell

Inventor

John D. Curtis,

By his Attorney

John C. Dewey

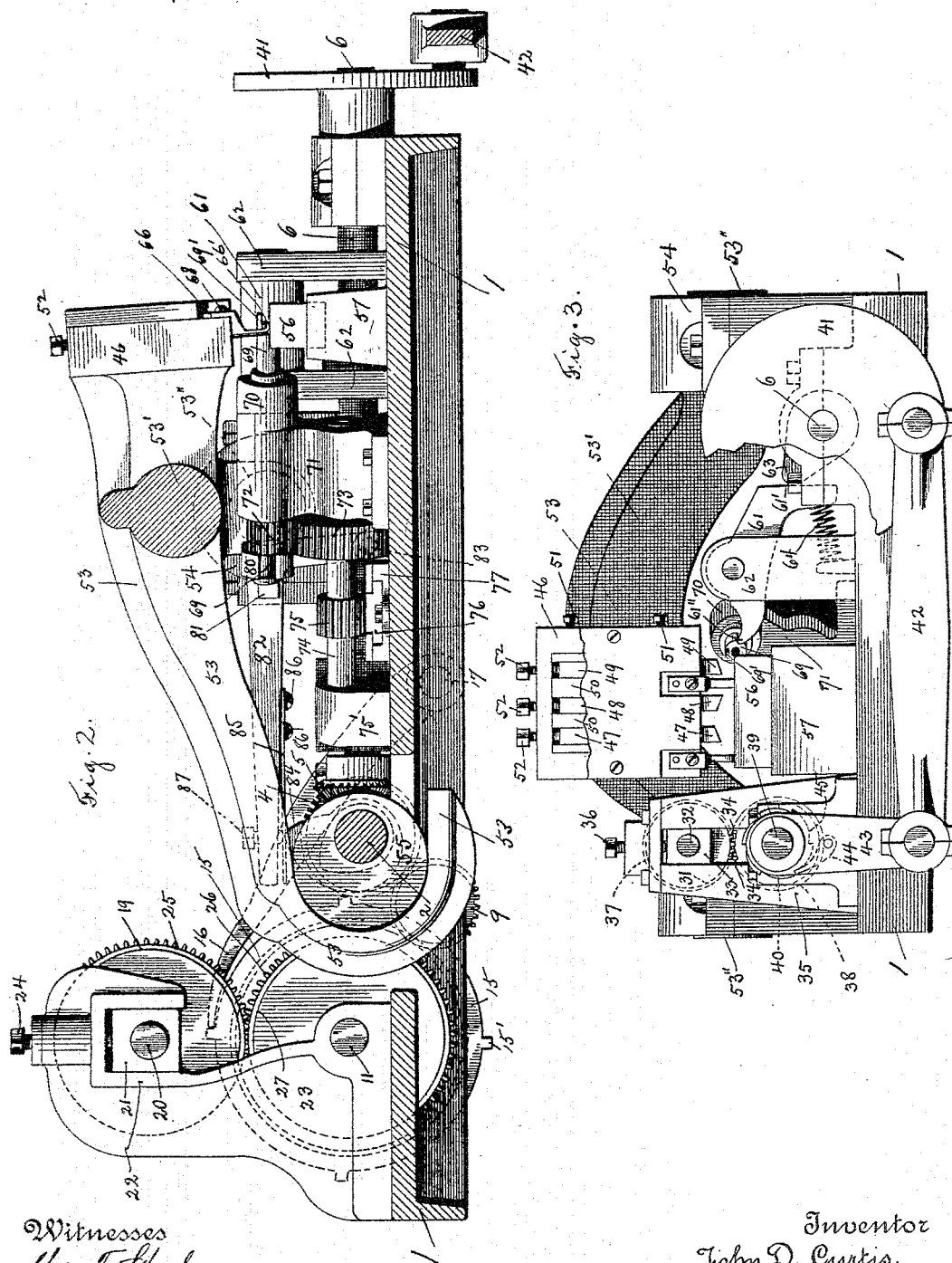
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Witnesses
Chas. F. Schuch
Katie Panell

Inventor
John D. Curtis,

By his Attorney
John C. Dewey

UNITED STATES PATENT OFFICE.

JOHN D. CURTIS, OF WORCESTER, MASSACHUSETTS.

MANUFACTURE OF BARBED WIRE.

SPECIFICATION forming part of Letters Patent No. 491,304, dated February 7, 1893.

Application filed July 16, 1892. Serial No. 440,199. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. CURTIS, a citizen of the United States of America, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in the Manufacture of Barbed Wire; and I do hereby declare that the following is a full, clear, and exact description thereof, which, in connection with the drawings making a part of this specification, will enable others skilled in the art to which my invention belongs to make and use the same.

My invention relates to the manufacture of barbed wire, and more particularly to the manufacture of the four pointed barbed wire shown in Fig. 12 of the drawings, and also shown and described in the Letters Patent of the United States, No. 484,890, dated October 25, 1892, to which reference is hereby made.

The object of my invention is to produce the barbed wire above referred to, and to provide automatic machinery for manufacturing the same; and my invention consists in my method of manufacturing said barbed wire, and in the machinery for carrying out said method, as will be hereinafter fully described.

I have shown in the drawings one form of machine for manufacturing the barbed wire of the description above mentioned, but it will be understood that other forms of machines may be used if desired.

Referring to the drawings:—Figure 1 is a plan view of a barbing machine, embodying my improvements. Fig. 2 is a longitudinal section on line 2, 2, Fig. 1, looking in the direction of arrow *a*, same figure. Fig. 3 is an end view, looking in the direction of arrow *b*, Fig. 1. Fig. 4 is, on an enlarged scale, a front view of the cutter-head, supporting the cutters and the lifters and of the bending lever, which acts to bend the points of the barb, and a sectional view of the die on which the wire is cut. Fig. 5 is a plan view of the die shown in Fig. 4. Fig. 6 is a cross section on line 6, 6, Fig. 5, looking in the direction of arrow *d*, same figure. Fig. 7 is a bottom view of a portion of the barb wire, illustrating the several cuts produced by the cutters in forming the barbs. Fig. 8 is a top view of the barb wire, with the barb points bent out of a horizontal plane. Fig. 9 is an edge view of

the barb wire shown in Fig. 8, looking in the direction of arrow *c*, same figure. Fig. 10 is a cross section on line 10, 10, Fig. 9, looking in the direction of arrow *d'*, same figure. Fig. 11 represents a detached barb before the same is wound upon the wire, and, Fig. 12 represents the barb shown in Fig. 11, after the same is wound upon the fence wire.

It will be understood, that the wire from which the barbs are made, is preferably half round in cross section, as shown in Fig. 10, and that the barb wire is so operated on by the cutters, and the other mechanism of the machine, as to produce a barb with four points, the central portion of which is wrapped or coiled around a fence strand, leaving the four points projecting in opposite directions.

In the accompanying drawings 1 is the bed of the machine, upon which are supported the operating mechanisms of the machine. The main shaft 2 of the machine is driven by belt or gear connection, not shown, and is journaled in bearings 3, on the top side of the bed of the machine. The shaft 2 has a beveled gear 4 thereon, which meshes with, and drives a beveled gear 5, fast on the shaft 6, extending at right angles to the shaft 2, in the direction of the length of the machine. The driving shaft 2, has a pinion 8, fast on the end of said shaft, which meshes with, and drives an intermediate pinion 9, loose on a stud, which pinion 9 in turn meshes with, and drives the gear 10, loose on shaft 11.

The gear 10 is so connected with the shaft 11, as to cause said shaft to have a regular intermittent motion, and give to the main wire feed rolls a regular intermittent motion. The mechanism for connecting the gear 10 to the shaft 11, to give the same a regular intermittent motion, consists in this instance, of a friction washer 12 interposed between the hub 10', of the gear 10, and the collar 13, secured on the end of the shaft 11 by a nut 14, and a locking mechanism consisting of a disk 15 fast on the shaft 11 and provided in this instance with four lugs 15', and a lever 16, pivoted at 17 on the bed 1, and the cam 18 fast on the shaft 2, adapted to engage the lever 16, and disconnect it from the lugs 15' on the disk 15, and allow said disk, fast on the shaft 11, to be revolved by the friction of the gear 10 on the friction washer 12 and the disk

15; said gear 10 is loose on the shaft 11, and is operated by the pinion 8 through intermediate pinion 9, as above stated. When the lever 16 is in engagement with one of the lugs 15', on the disk 15, as shown in Figs. 1 and 2, the shaft 11, and the feeding rolls for the main wires driven thereby, are stationary, the gear 10 turning on said shaft.

The feeding mechanism for the main wires may be of any ordinary construction, and in this instance consists of the upper feed rolls 19, fast on a shaft 20, journaled in the blocks 21, supported within the housings 22, in stands 23, secured to the upper side of the bed of the machine, see Fig. 2. The blocks 21 may be adjusted up or down in the housings 22 to regulate the pressure of the feed rolls on the main wires, in this instance by set screws 24. On the shaft 20 of the upper feed roll 19 is fast a gear 25, which meshes with, and is driven by a gear 26 fast on the shaft 11, on which are fast the lower set of feed rolls 27, (see Fig. 2.)

By means of the mechanism above described, the two main fence wires 28 and 29, upon one of which, 28, the barb wire 30 is coiled, are fed along at regular intervals. The feeding along of the main wires ceases during the operation of coiling the barb wire on one of the main wires, in the ordinary manner.

I will now proceed to describe the mechanism for feeding in the barb wire 30. Said mechanism is located at the opposite end of the machine from the feeding mechanism for the main wires, and in this instance consists of the upper feed roll 31, fast on a shaft 32, supported in blocks 33 which are held in ways 34, in stands 35 secured on the upper side of the bed 1 of the machine. The blocks 33 may be adjusted vertically, to regulate the pressure of the feed rolls on the barb wire 30 passing between them, by set screws 36. A pinion 37 is fast on the feed roll shaft 32, and meshes with, and is driven by a pinion 38, fast on shaft 39, on which shaft is also secured the lower feed roll 40. The shaft 39 is operated, to cause the same to have an intermittent motion to feed in the barb wire a certain fixed distance at regular intervals, in this instance by means of a crank disk 41, fast on the end of shaft 6, a crank connector 42, and arm 43 pivoted at its upper end on shaft 39, and carrying a pawl 44, adapted to engage with the ratchet teeth of the ratchet 45, fast on the shaft 39.

I will now describe the mechanism for cutting the barb wire, and for bending the cut portions to form the prongs or barb points thereon, after the coiling of the free end of the barb wire upon one of the main fence wires.

The mechanism for cutting the barb wire to produce the separate barb points, consists of the cutter-head 46 in which are supported the three vertical cutters 47, 48, and 49, and the removable blocks 50, interposed between the cutters to preserve their proper distance;

the cutters 47, 48 and 49 are held in position in the cutter-head by set screws 51, and are adapted to be adjusted vertically, as desired, by means of set screws 52, supported in the upper end of the cutter-head. The cutter-head 46 is secured to one end of the lever 53. The lever 53 has side arms 53', extending cross-wise of the machine in arch form, as shown in Fig. 3, to extend over and clear the coiling mechanism of the machine; and the ends of the arms 53', are provided with trunnions 53'', which are journaled in bearings 54, on the bed 1 of the machine, see Figs. 1 and 3. The end of the lever 53, opposite from the cutter-head end, is made hook shape as shown in Fig. 2, to extend over and receive the eccentric 55, fast on the shaft 2, and the revolution of the shaft 2, through the eccentric 55, will cause the lever 53 to have a rocking motion on its journaled arms 53', and the cutter-head 46 to move up and down so as to bring the cutters 47, 48 and 49 into operation to cut the barb wire 30, which is supported on the die 56, shown in detail in Figs. 4, 5, and 6, and which in turn is supported on the block 57, on the bed 1 of the machine, see Figs. 2 and 3.

The operation of the cutters 47, 48 and 49 on the barb wire 30, is as follows:—The barb wire 30, which in this instance, is semi-circular in cross section, rests with its flat base upon the top of the die 56. The first cutter 47, makes the cut 58, see Fig. 7, and presses down the barb points 58', as shown in Figs. 8 and 9. The barb wire 30 is now fed along so as to bring cut 58 in line with the second cutter 48, and said cutter 48 makes cut 59 in the barb wire, see Fig. 7, and slightly depresses the barb point 59', see Figs. 8 and 9. The barb wire is again fed along so that the cuts 58 and 59 will come in line with the third cutter 49, and the cutter 49 will make the cut 60, to form the barb points 60' and 60'', and thus sever or cut one barb from the barb wire, which barb will be of a sufficient length to have the central portion thereof, wrapped or coiled once around one of the main wires by the mechanism to be hereinafter described. The third cutter 49, when making cut 60 in the barb wire produces the two barb points or prongs 60'', and 60', the latter of which, 60', is bent upwardly after the operation of coiling the barb on the main wire, by the bender lever 61, see Figs. 3 and 4, which is fulcrumed in the stands 62 on the top of the bed 1. One end of the bender lever 61, is provided with a downwardly extending arm 61', which is adapted to be engaged by a cam 63 on shaft 6, to cause the opposite end 61'' of said lever 61, to engage and bend upwardly the barb point 60', as shown in Fig. 4. The lever 61 is returned to its normal position by a spring 64, see Fig. 3.

It will be understood, that when the barbing machine is in operation, the operation of the cutters on the barb wire to make the respective cuts, and form the barb points there-

on, takes place after the free end of the barb wire, having the two barb points 59' and 60' thereon, has been wrapped or coiled once around the main fence wire 28, so that the third cutter 49, will sever the coiled barb 30' from the barb wire, and leave the end 60' thereof extending in substantially the same plane as the barb wire itself, see Fig. 12.

In the operation of cutting the barb points or prongs on the barb wire, it will be observed by referring to Figs. 4 and 9, of the drawings, that the barb point 58' is pressed down by the cutter 47 below the horizontal plane of the barb wire, and below the top surface of the die 56, see Fig. 4. In order to allow the barb point 58' to clear the upper portion of the die 56, as the barb wire is fed along, I provide means for raising the barb wire 30, sufficiently to allow the barb point 58' to pass by the upper portion of the die; said means consist in this instance, of the lifters 65 and 66. The lifter 65 is secured to one of the removable blocks 50 by the screw 67, and carries at its lower end a roll 65', the face of which is equal to half the width of the wire. The lifter 66 is secured to the cutter-head 46 by a screw 68, and has a projecting lip 66'. The lifters 65 and 66 extend into depressions in the top of the die 56, see Figs. 4 and 5. When the cutter-head 46 is raised by the action of the lever 53, after the cutters have cut the barb points on the barb wire, the lifters 65 and 66, through the roll 65' and the lip 66', will act to raise the barb wire 30, as it is fed along, sufficiently to allow the barb point 58' to pass over the upper portion of the die 56, see Fig. 4. When the cutter-head 46 is lowered by the action of the lever 53, the lifters 65 and 66 will also be lowered, allowing the barb wire 30 to rest on the top of the die 56, while the cutters operate.

I will now proceed to describe the mechanism for wrapping or coiling the forward end of the barb wire upon the main fence wire, preparatory to the severing of the barb from the barb wire by the cutter 49. The wrapping or coiling spindle 69 is provided with a coiling finger 69' at its forward end, which is adapted to extend over the free end of the barb wire when the same projects beyond and over the main wire 28. The coiling spindle 69 is journaled in the bearing 70 in the upper end of the stand 71, bolted on the top of the bed 1 of the machine, and is adapted to have a revolving motion in said bearing, and also a slight longitudinal motion therein, in the manner to be hereinafter described.

On the inner end of the coiling spindle 69 is fast a pinion 72, which meshes with and is driven by a pinion 73, fast on a shaft 74, which has its bearings in the stand 71, and also in a stand 75', see Figs. 1 and 2. On the shaft 74 is fast a second pinion 75, which meshes with and is driven by a rack 76, having a reciprocating motion in ways 77, secured to the top of the bed 1 of the machine, see Fig. 1. A link 78 connects the rear end of the rack

76 with the crank 79 on the shaft 6. It will thus be seen, that by the revolution of the shaft 6, through the crank 79 and link 78, a reciprocating motion is given to the rack 76, and through the pinions 75, 73, and 72, the coiling spindle 69 is revolved, first in one direction, and then in the other, to cause the coiling finger 69', extending over the free end of the barb wire, to wrap or coil the free end of the barb wire once around the main wire 28, as shown in Fig. 12.

I will now describe the mechanism for moving the coiling spindle 69 longitudinally in its bearing, to cause it to move backward, and retain it in its backward position while the barb wire 30 is fed in over the main wire 28, into position to be wrapped or coiled around the main wire, when the spindle is moved forward and revolved to cause the coiling finger to act to coil or wrap the free end of the barb wire around the main wire.

A fork 80 extends over the inner end of the coiling spindle 69, see Fig. 2, between the pinion 72 and the screw washer 81. The fork 80 is attached to the knee portion of the L shaped lever 82; said L shaped lever 82 is fulcrumed at its lower inner end at 83, see Fig. 2. The outer free end of said lever 82 is adapted to be acted on by a cam 84, fast on the main shaft 2. In this instance a spring blade 85, secured by screws 86, on the underside of the lever 82, see Fig. 2, is interposed between the face of the cam and the lever. By means of a set screw 87, the spring blade 84, may be adjusted vertically relative to the end of the lever 82, so that the location of the reciprocating travel of the knee of the lever 82, may be adjusted to regulate the reciprocating motion of the coiling spindle 69. It will thus be seen, that by the revolution of the cam 84, on the shaft 2, a rocking motion is given to the lever 82 on its fulcrum 83, and through the fork 80, on the knee of said lever, and connected with the coiling spindle 69, a reciprocating motion is given to said coiling spindle.

From the above description, in connection with the drawings, the operation of the barbing machine for making the four pointed barbed wire shown in Fig. 12, will be readily understood by those skilled in the art, and is briefly as follows:—The two main wires, 28 and 29, are first drawn through the machine, the main wire 23 on which the barb wire is to be coiled passing through the coiling spindle in the usual way. The barb wire is drawn into the machine at right angles to the main wires, and the free end of the barb wire passed over the main wire 28 on which the barb is to be coiled, and below the coiling finger 69' on the coiling spindle. The machine is put into operation by belt or gear connection with the main shaft 2. The main fence wires 28 and 29, by means of the feed rolls 19 and 27 between which they pass, and the driving mechanism connected therewith, are intermittently fed into the machine at regular intervals, after the barbing operation has taken

place. The barb wire 30 is fed into the machine intermittently at regular intervals, between the feed rolls 31 and 40, operated by the mechanism connected therewith, at the same time of the feeding along of the main wires. The three cutters 47, 48 and 49 supported in the cutter-head 46, which is operated at regular intervals by the mechanism described, make simultaneously three cuts in the barb wire, as illustrated in Fig. 7, each time that the barb wire is fed in. The barb wire 30 is held rigidly between the feed rolls 31 and 40 and the coiling spindle, during the cutting operation, and the last cutter 49 cuts or severs the completed barb from the barb wire, after the free end thereof has been wrapped or coiled once around the main fence wire. It will thus be seen that two of the barb points or prongs will be cut and formed on the barb wire before the barb wire is wrapped or coiled around the main wire, and before the complete severance of the barb from the main wire. The main fence wires, and the barb wire, after the barbing operation are fed forward, and the barbing operation is repeated. The two main fence wires after passing through the machine, are twisted together by any ordinary twisting mechanism not shown.

It will be understood, that the details of construction of the barbing machine shown in the drawings, and above described, may be varied somewhat if desired.

I have described my invention, in connection with barbed wire provided with four pointed barbs made from a single strand of wire, but by slightly changing the construction and arrangement of the barb cutting and forming mechanism of the barbing machine, three barb points or prongs may be cut and formed on the barb wire, instead of four barb points or prongs, to produce barbed wire provided with three pointed barbs, if desired.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. In the manufacture of barbed wire of the class described, the method of forming and

applying the barbs which consists in first partly severing the barb from the main wire to form some of the barb points or prongs, second, wrapping or coiling the free end of the partly severed barb around one of the fence strands, and third, completely severing the barb from the main wire to form the last barb point or prong, substantially as set forth.

2. In machinery for making barbed wire of the class described, the combination with fence strand feeding mechanism and barb wire feeding mechanism, of mechanism for cutting the barb from the body of the wire and forming barb points or prongs thereon, and a coiling spindle arranged and timed in its movement relatively to the cutting mechanism so as to coil the central portion or body of the barb around one of the fence strands, after the barb has been partly severed from the main wire in the operation of forming some of the prongs or points, and before the cutting mechanism operates to completely sever the barb from the wire to form the last barb point or prong, substantially as set forth.

3. In machinery for making barbed wire of the class described, the combination of fence strand feeding mechanism, barb wire feeding mechanism, a series of cutters by which the successive cuts needed to form the points or prongs and sever the barb from the wire are made, and a coiling spindle which operates to coil the body or central portion of the barb around one of the fence strands after the cutters preceding the last one have done their work and before the last cutter has severed the barb from the main barb wire, substantially as set forth.

4. The combination of the barb cutting mechanism, the coiling spindle, and prong bending mechanism which operates upon the barb after it has been coiled upon the fence wire, substantially as and for the purpose hereinbefore set forth.

JOHN D. CURTIS.

Witnesses:

JOHN C. DEWEY,
KATIE FARRELL.