

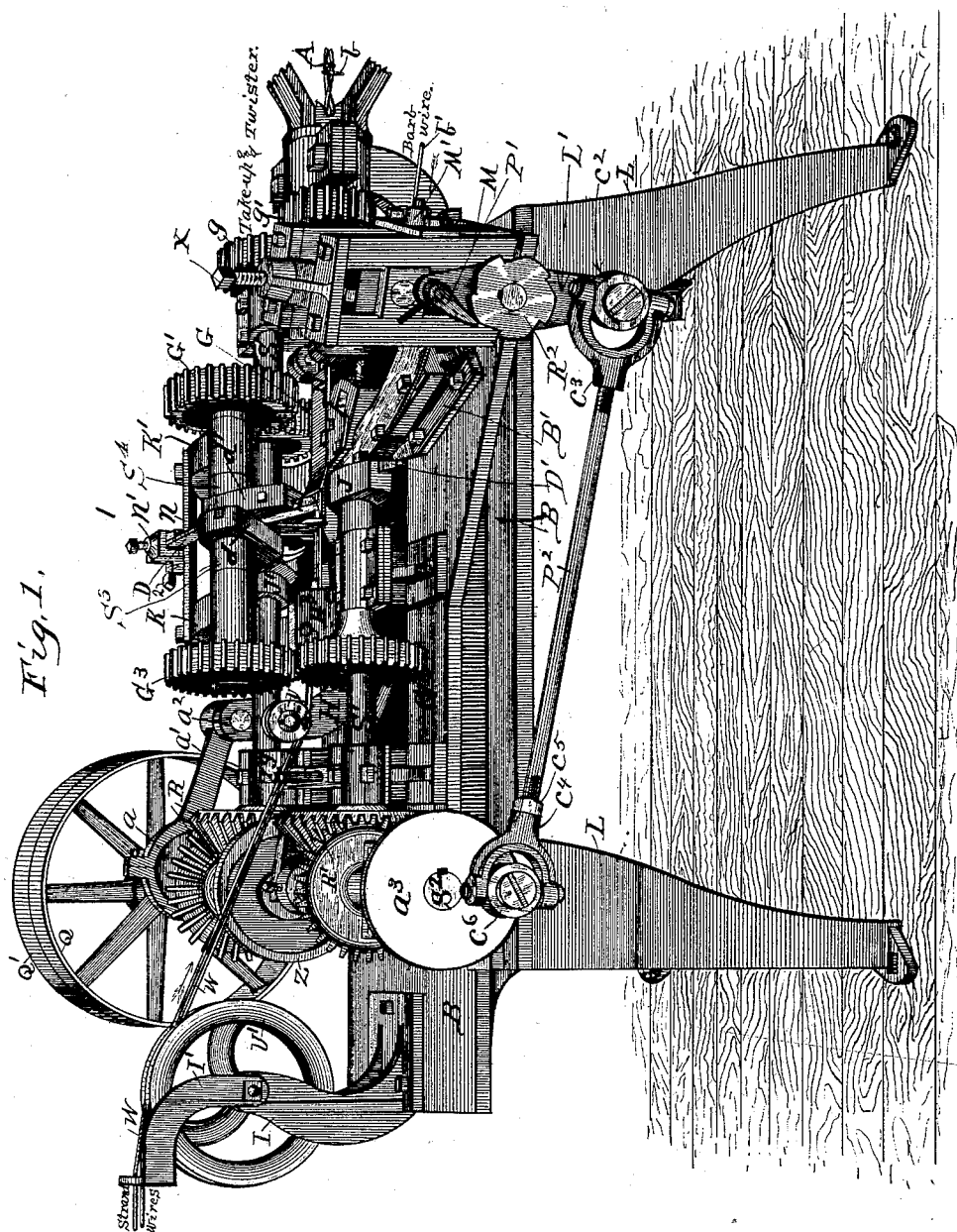
(No Model.)

5 Sheets—Sheet 1.

A. J. BATES.  
WIRE BARBING MACHINE.

No. 345,759.

Patented July 20, 1886.



Witnesses.  
John H. Hutchins  
Wm. J. Hutchins.

Inventor.  
Albert J. Bates.

(No Model.)

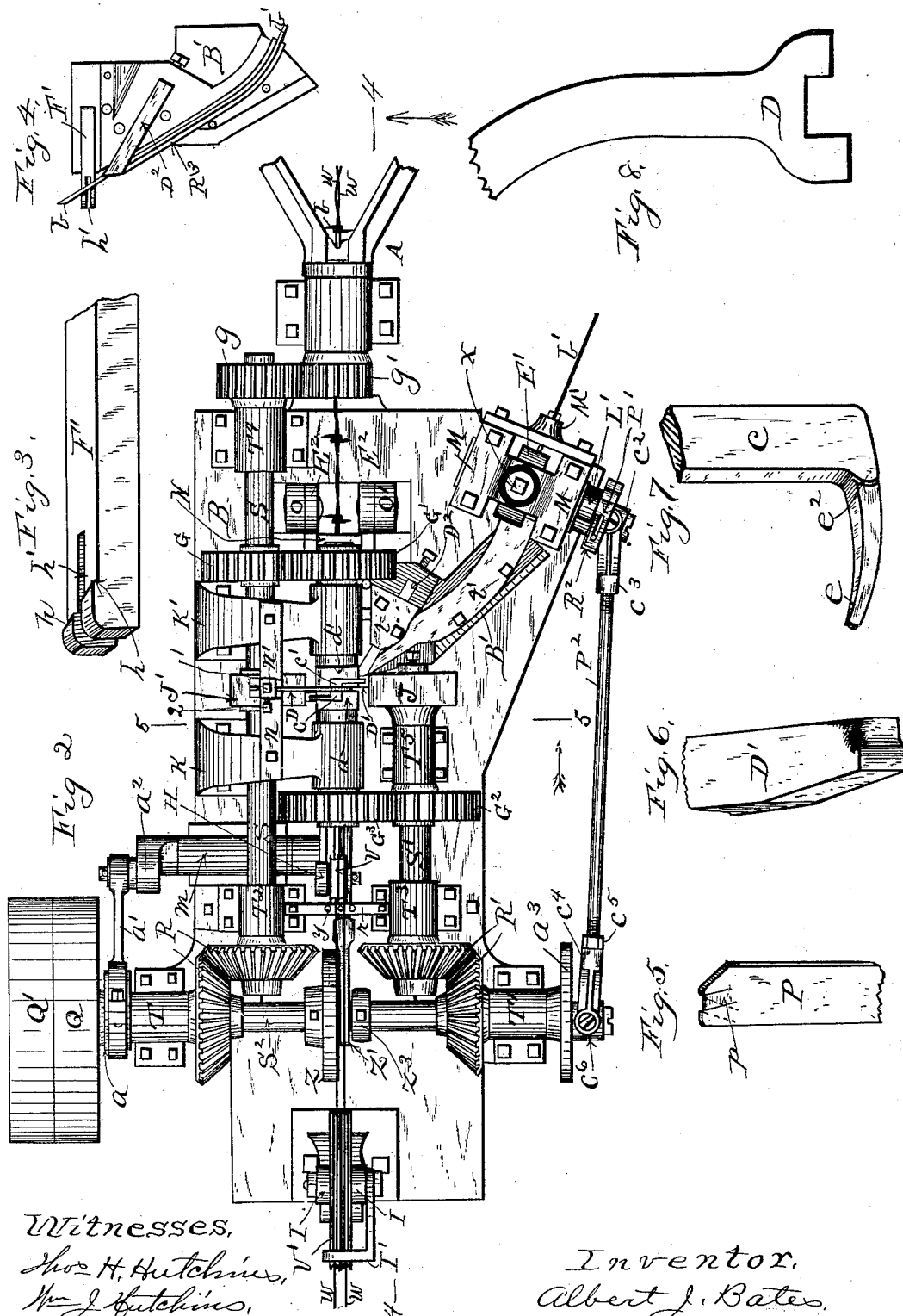
5 Sheets—Sheet 2.

A. J. BATES.

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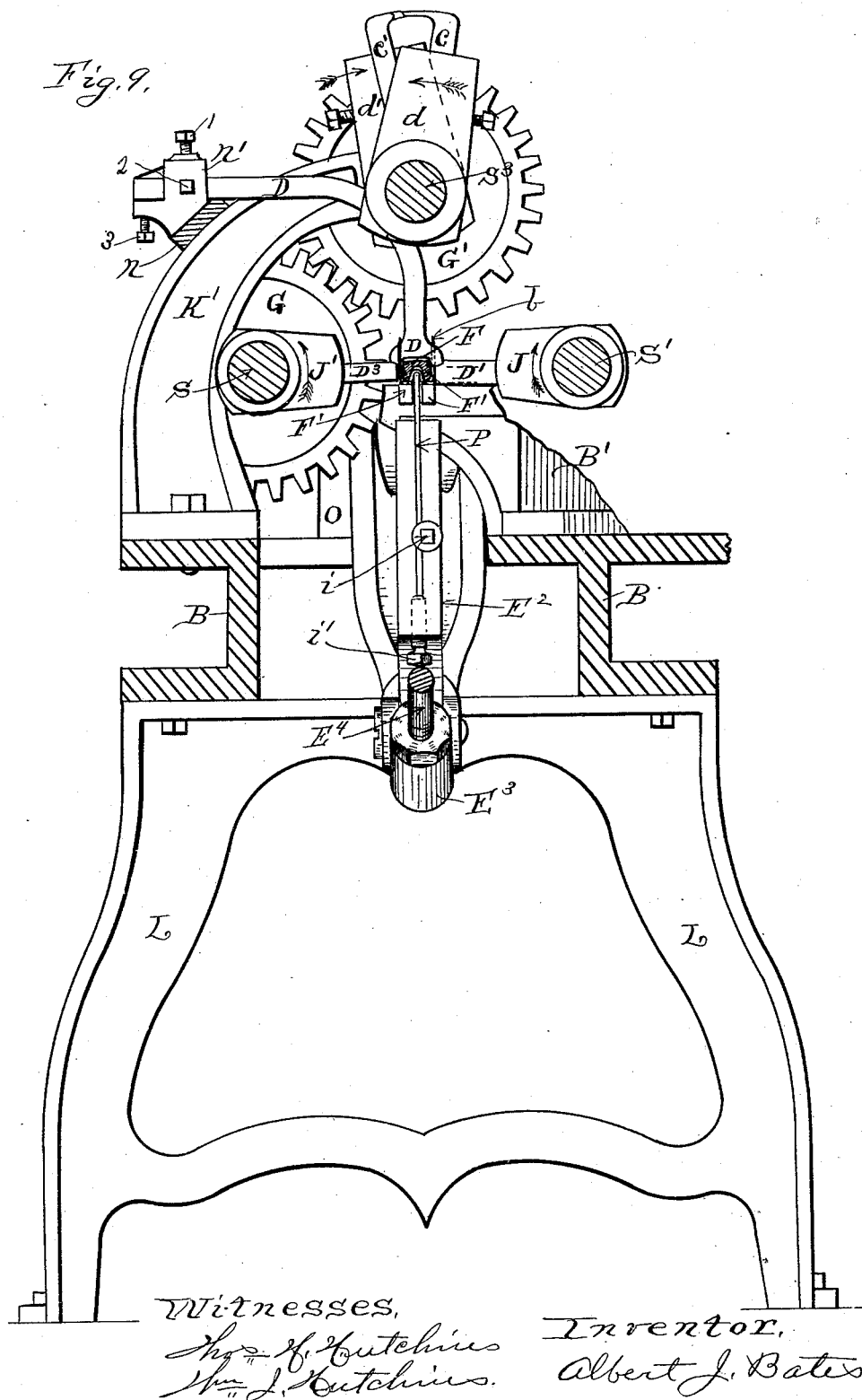


N. PETERS, Photo-Lithographer, Washington, D. C.

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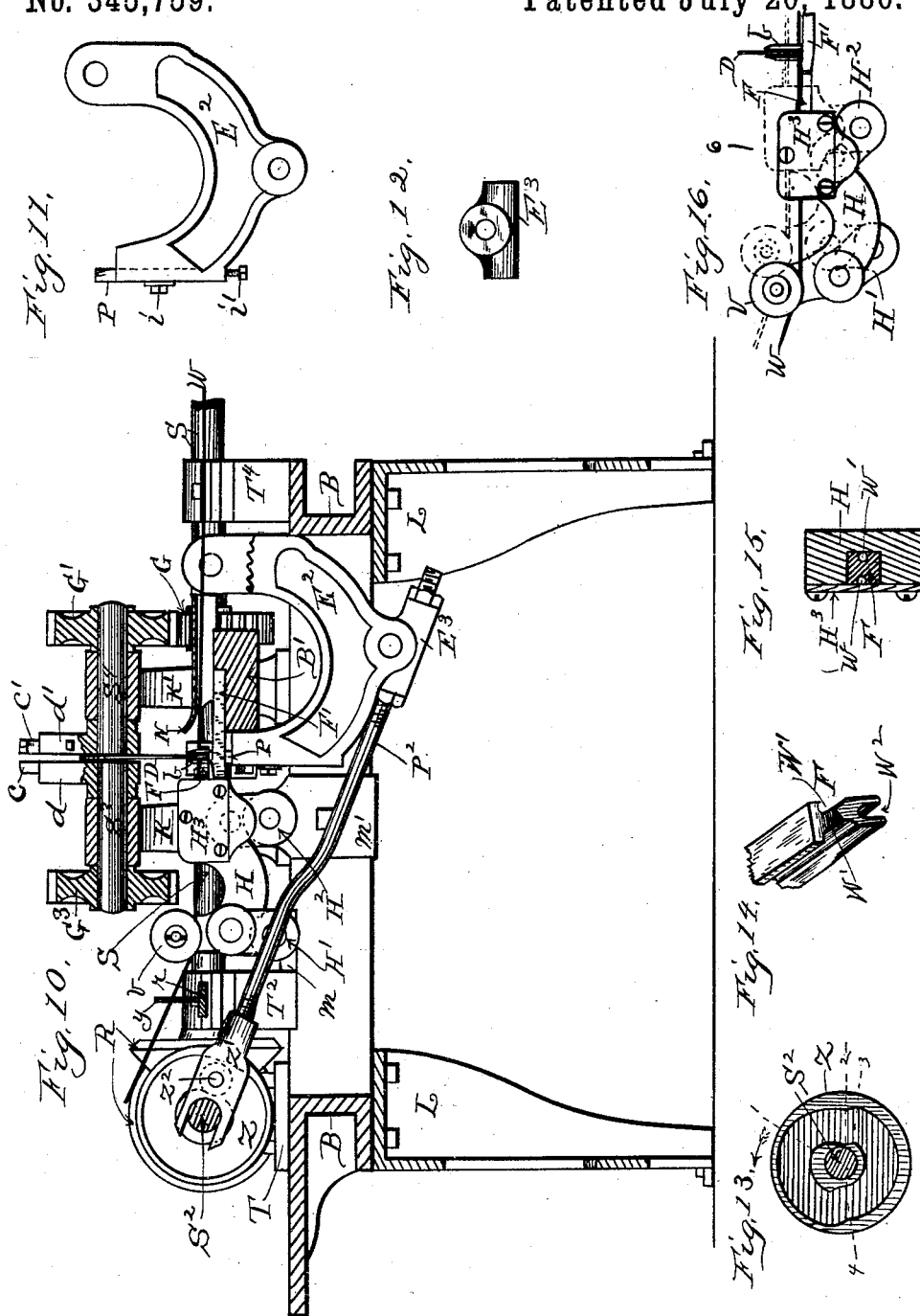
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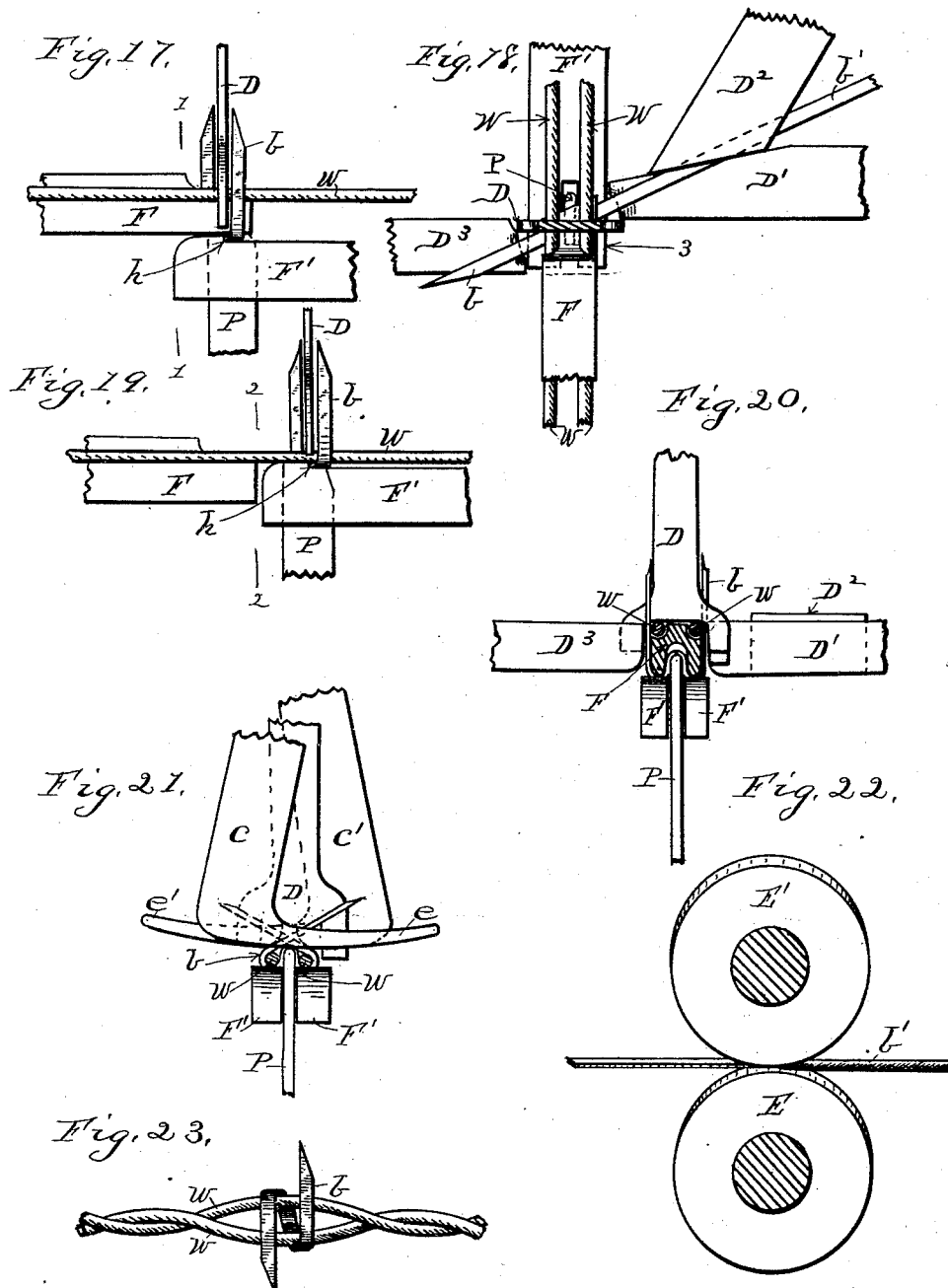
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Witnesses,

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Wm. J. Hutchins,

Inventor,  
Albert J. Bates.

# UNITED STATES PATENT OFFICE.

ALBERT J. BATES, OF JOLIET, ILLINOIS, ASSIGNOR TO THE WASHBURN  
& MOEN MANUFACTURING COMPANY, OF WORCESTER, MASS.

## WIRE-BARBING MACHINE.

SPECIFICATION forming part of Letters Patent No. 345,759, dated July 20, 1886.

Application filed February 26, 1886. Serial No. 193,262. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT J. BATES, a citizen of the United States of America, residing at Joliet, in the county of Will and State of Illinois, have invented certain new and useful Improvements in Wire-Barbing Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to certain improvements in wire-barbing machines of that class adapted to form and apply two pointed-wire barbs to the strand-wires of wire fences, which improvements are fully set forth and explained  
15 in the following specification and claims, reference being had to the drawings, and the letters and figures marked thereon, making a part of this specification, in which—

Figure 1 is a perspective view of the machine, showing a portion of a twisting-yoke attached thereto. Fig. 2 is a top plan view of the same. Fig. 3 is a perspective view of a portion of the slotted stationary barb-support. Fig. 4 is a top plan view of a secondary bed  
25 for supporting the barb-wire guide, stationary barb-cutter, and slotted stationary barb-support. Fig. 5 is a perspective view of the upper end of the punch for forming the central U-shaped bend in the barb. Fig. 6 is a perspective view of the rotating barb cutter and  
30 bender. Fig. 7 is a perspective view of one of the finishing barb-benders. Fig. 8 is a side view of a stationary dividing-plate, showing its end that stands between the prods of the barb to hold them separated while they are  
35 being bent or clasped on the strand-wires. Fig. 9 is a vertical cross-section of the machine, taken on line 5 of Fig. 2, looking in the direction of the arrow. Fig. 10 is a vertical longitudinal section of the machine, taken on line  
40 4 of Fig. 2, looking in the direction of the arrow. Fig. 11 is a side view of the oscillating head for holding and operating the punch for forming the central U-shaped bend in the  
45 barb. Fig. 12 is a detail side view of a pivotal box for connecting said oscillating head with its operating-pitman. Fig. 13 is a face plan view of the channel-cam for operating  
50 said oscillating head through the medium of a pitman and a wrist-roller in its channel. Fig. 14 is a perspective view of the front end

of the reciprocating barb-forming die, which also serves as a strand-wire guide. Fig. 15 is a cross sectional view through the reciprocating head for supporting said die, taken on line  
55 6 of Fig. 16. Fig. 16 is a side view of the reciprocating head for holding said barb-forming die and of the two cranks for supporting and operating said head. Figs. 17, 18, 19, 20, and  
60 21 are detail views showing the several intermediate parts of the machine that cut and form the barb and attach it to the strand-wires, and showing a barb in its several stages  
65 of formation. Fig. 22 is a side perspective view of a pair of feed-rolls for flattening and feeding the barb-wire in the machine; and Fig. 23 is a perspective view of a section of the finished barbed wire, it being the product of the machine.

Referring to said drawings, and the letters  
70 and figures thereon, like letters designating similar parts in the several figures, B is the main frame or bed of the machine, supporting the working parts, and is supported by means of the legs L.

S<sup>2</sup> is the drive shaft, supported in the boxes  
75 T and T' and provided on one end with a fast pulley, Q, to which the power is applied, and a loose pulley, Q'. The said drive-shaft is connected with a pair of side shafts, S and S',  
80 resting in the boxes T<sup>2</sup> T' T<sup>3</sup> T', by means of the miter-gears R and R', by means of which connection the said shafts are caused to rotate in opposite directions from each other. Shaft S  
85 has fixed on its outer end a spur-gear, g, to rotate a twister-yoke, A, only a portion of which is shown, as it forms no part of this invention. Said shaft has also fixed thereon the head J', for holding the primary rotary barb-bender D<sup>3</sup>, and also the spur-gear G.  
90 Shaft S' is about half as long as shaft S, and has fixed on its outer end the head J, for holding the primary rotary barb cutter and bender D'. These two heads J and J' are arranged to stand exactly opposite to each other and in  
95 the relative position shown in Figs. 1, 2, and 9. Said shaft S' has also fixed thereon the spur-gear G<sup>2</sup>.

K and K' are a pair of curved standards secured on the side of bed B, and provided at their  
100 upper ends with boxes for supporting, respectively the short shafts S<sup>3</sup> and S<sup>4</sup>. (Shown particu-

larly in Fig. 10.) Said shaft  $S^3$  has fixed on its outer end the spur-gear  $G^3$ , that meshes with spur-gear  $G^2$ , as shown in Figs. 1 and 2, and has fixed on its inner end the rotating head  $d$ , in which is fixed the secondary barb-bender  $C$ . Shaft  $S^1$  has fixed on its outer end the spur-gear  $G^1$ , that meshes with spur-gear  $G$ , and has fixed on its inner end the rotating head  $d'$ , in which is fixed the secondary barb-bender  $C'$ . Said shafts are set so said rotating heads are a little distance apart and exactly face each other over the central part of the machine, as shown in Fig. 9, and by means of said spur-gears are caused to rotate in opposite directions from each other.

$B'$  is a secondary bed secured to the top of bed  $B$ , and is shown in Figs. 1, 2, and in detail in Fig. 4, and is arranged to support the stationary barb-cutter  $D^2$  in such manner that the rotating cutter and bender  $D'$  will shear therewith to cut off diagonally the barbs  $b$  from the barbing-wire  $b'$ , so they will have sharp prods. The barb-support  $F'$  is also supported by said secondary bed in such manner as to operate in conjunction with the forming-die  $F$  and punch  $P$ , as will hereinafter be fully explained; and a barbing-wire channel-guide,  $R^3$ , is also supported by said bed in such manner as to conduct the barbing-wire from the feed-rolls  $E E'$ , between the cutters  $D'$  and  $D^2$  and diagonally across the slotted end of the barb-support  $F'$ , where the barbs are formed and secured to the strand-wires.

The barb-support  $F'$  is shown in detail in Fig. 3, and has formed on its upper side at its engaging end hooks  $h$ , for retaining the barb in its proper place on its said support while being formed, and is slotted at that end between said hooks, as shown in Fig. 3 at  $h'$ , for the admission of the punch  $P$ , which passes up through said slot to form the central bend in the barb.

$E'$  represents an oscillating head for supporting and operating punch  $P$ , and is shown in Figs. 9 and 10 and in detail in Fig. 11. This head hinges to the ear-lugs  $O$  and  $O'$ , which are integral with the front part of bed  $B$ , and, by means of two ear-lugs of said head, in such manner as to permit finished barbed wire to pass between them, as shown in Fig. 2. The punch  $P$  is secured in said head by means of a cap screw and plate,  $i$ , and is made adjustable vertically by means of the set-screw  $i'$ . The lower side of said head is provided with a pivoted box,  $E^3$ , for the attachment to said head of the lower end of the pitman  $P^2$ . (Shown in Fig. 10.) The head  $Z'$  of said pitman forks over drive-shaft  $S^2$ , and is provided on its side with a friction roller and wrist,  $Z^2$ , for operating in the channel of cam-wheel  $Z$ , fixed on said shaft. Said head  $E^2$  is caused to oscillate to operate said punch by means of said cam through the medium of said pitman. Proper set-nuts on said pitman furnish means to adjust the head  $E^2$ . The upper end of said punch  $P$  is shown in detail in Fig. 5, to show its exact form as having a slight depression,

$p$ , in its upper end and at each side thereof, arranged at an angle from each other to correspond with the form and position of the barb, and for the purpose of assisting to hold the barb in place while its prods are bent.

$H$  is a reciprocating head supported by means of crank  $H'$  on the end of a rock-shaft passing through box  $M$ , Figs. 2, 10, and 16, and idler-crank  $H^2$ , boxed to the machine-bed, as shown at  $M'$ , Fig. 10. Said rock-shaft is provided with a crank,  $a^2$ , at its opposite end, and is connected with eccentric  $a$  on shaft  $S^2$  through the medium of eccentric pitman  $a'$ . Said head  $H$  is caused to reciprocate by means of said eccentric through the medium of said eccentric pitman and cranked rock-shaft, and is shown in Figs. 2, 10, and in detail in Fig. 16, the reverse movement being shown in dotted lines in said figure, and a cross-section of the head taken on line 6 of said Fig. 16 is shown in Fig. 15. In said Fig. 15 the head is shown as having a channel for the reception of the strand-wire guide and forming-die  $F$ , held therein by means of a cap-plate,  $H^3$ .

$W' W'$  represent the channels in the sides of said guide and forming-die for the passage and guidance of the strand-wires  $W W$ . Said guide and forming-die is shown in perspective in Fig. 14, and is represented as having its lower side channelled at  $W^2$  below and between said channels  $W' W'$ . The front end of said die and guide  $F$  projects out beyond and in front of said head  $H$ , as shown in Fig. 16, some little distance, and when the head  $H$  is in the position shown in the full lines in said figure the front end of said die will face the front end of the barb-support  $F'$ , as shown in said figure and in Fig. 19, because of the backward inclination of its supporting cranks. The reverse movement of said head, caused by turning said cranks forward to a perpendicular position, will place the projecting end of said die  $F$  above the slotted end of said barb support  $F'$ , as shown in Figs. 10 and 17 and by dotted lines in Fig. 16, so the channel  $W^2$  in its lower side will be immediately over the slot  $h'$  in the said barb-support, so that when the punch  $P$  passes up through said slot it will drive the central part of the barb upward into said channel  $W^2$  of said die, as shown in Figs. 9, 17, and 20, to form the central U-shaped bend therein. Said head  $H$  also supports the double-grooved sheave-wheel  $V$  on its rear upper side, which wheel serves to hold the strand-wires down on a line parallel with the guideways in said die  $F$ , and to conduct it properly through the machine.

$D$  is a dividing-plate adjustably secured at its upper end in a box,  $n'$ , on the cross-bar  $n$ , attached to the curved standards  $K$  and  $K'$ , as shown in Figs. 1, 2, and 9. The said box  $n'$  is provided with the three set-screws 1 2 3, as shown in Figs. 1, 2, and 9, for securing the dividing-plate  $D$  therein, and for properly adjusting it with relation to the other parts of the machine. The lower end of said dividing-plate is intended to stand over the two strand-

wires between the barb-prods, as shown in Figs. 9, 10, 17, 18, 19, and 20, to hold the barb-prods separated while the barb-benders are bending them. The lower end of said plate D is shown in detail in Figs. 8 and 20, and shows its lower end recessed, to permit the said forming-die F to move under it, as shown in Fig. 20, and its depending sides, which form the principal divides, are arranged with one side shorter than the other, so the rear prod of a finished barb may pass under it as the strand-wires are taken up on the spool.

A large double-grooved guide sheave-wheel, V', supported between the standards I I, is for the purpose of conducting the strand-wires into the machine, they having passed through guide-holes in the standard I'. (Shown in Fig. 1.) Y are guide-pins supported by cross-bar r, between which the strand-wires pass to hold them in place between said sheaves, and assist in guiding them properly through the machine.

E and E' are a pair of feed-rolls for feeding the barb-wire b' into the machine and for flattening it, as shown. These rolls are shown in detail in Fig. 22, and are arranged in the housing M, (shown in Figs. 1 and 2,) the lower roll in permanent boxes and the upper roll in sliding boxes, adjustable vertically, and held adjusted by means of the set-screw X, (shown in said figures,) to give pressure on the wire between them. The outer end of the shaft of the lower feed-roll is provided with a ratchet-wheel, R<sup>2</sup>, and has sleeved loosely on it, between said ratchet-wheel and the housing, the ratchet-lever L', having a wrist bearing the sleeve C<sup>2</sup> at its lower end, and a spring-pawl, P', at its upper end to operate said ratchet-wheel and drive the said feed-rolls. A disk, a<sup>2</sup>, fixed on drive-shaft S<sup>2</sup>, is provided with a similar wrist bearing the sleeve C<sup>2</sup>. Said sleeves on said wrists are connected by means of the pitman P<sup>2</sup>, having forked heads C<sup>2</sup> and C<sup>1</sup>, that fork, respectively, over sleeves C<sup>2</sup> and C<sup>1</sup>, and hinge thereto by means of screws, as shown in Figs. 1 and 2, thus forming universal joints at each end of the said pitman, which is necessary to permit such movement thereof as results from said feed-rolls not being set in a line parallel with the bed B. Said pitman P<sup>2</sup> is screw-threaded at each end for attachment to said forked heads and to regulate their distance apart, and is provided with a set-nut, C<sup>3</sup>, to prevent said pitman from rotating intermittently by means of the cranked disk a<sup>2</sup>, on drive-shaft S<sup>2</sup>, through the medium of said pitman P<sup>2</sup>, crank L', ratchet-wheel R<sup>2</sup>, and pawl P', and flatten and feed in the barb-wire, each partial rotation feeding in enough wire to form a barb.

M' is a plate having a barb-wire guide for conducting the barb-wire to the rolls, as shown in Figs. 1 and 2.

N represents a guide-plate secured to the secondary bed B', and is shown in Figs. 1, 2, and 10, and is for the purpose of covering and properly guiding the finished barbed wire from

the machine, it having a depending side flange to prevent the barbed wire from becoming entangled with gear-wheel G, as shown in Fig. 10.

The rotating primary barb cutter and bender D' (shown in detail in Fig. 6) and the rotating primary bender D<sup>3</sup> (shown in conjunction with said cutter and bender D' in Fig. 18) are each shouldered on their barb-engaging ends for the purpose of gathering in the prods of the barbs and leaving them standing in a perpendicular position, as shown.

The secondary rotating barb-benders C and C' are each formed, as shown in detail in Fig. 7, each having, respectively, a barb-engaging shoulder, as shown at c<sup>2</sup> in said figure, extending fingers c' and c, for gathering in the barb-prods and bringing them to the said rounded barb-bending shoulders, so they may bend the barb-prods down upon the strand-wires, as shown in the process of being so bent in Fig. 21.

The operation of the machine is as follows: Commencing with the two strand-wires W W, they are taken from a coil on a reel, passed thence through the guide-holes in standard I', thence once around sheave-wheel V', a strand-wire in each groove thereof, thence down between the pins Y, and under sheave-wheel V of head H, a strand-wire in each respective groove thereof, thence through the guide-channels W' W' of forming-die F, in head H, in such manner as to pass over the barb-support F, one on either side of its slot, and thence under the guide-plate N out of the machine to a spooler and twister and a take-up. The barbing-wire b' is taken from its coil on a reel, passed through the guide M' of housing M, thence through between the feed-rolls E E', where it is flattened by the rolling pressure of said rolls, thence into and through the curved guide R<sup>2</sup>, to and between the cutter D<sup>2</sup> and cutter and bender D' in a diagonal course, and thence under the strand-wires W W and upon the barb-support F', immediately at the side of its hooks h and over its slot h', in a diagonal position, as shown in Figs. 4 and 18. The parts of the machine are so timed that when the barb is thus located the forming-die F has moved forward over the barb and upon the support F in such manner that its bottom channel rests exactly over the central part of the barb's body, as shown in Fig. 20. At this instant punch P is moved up through slot h' of support F', and forces the body of the barb up into the bottom channel of forming-die F, thus forming the central U-shaped bend in the barb. The barb is then instantly severed from the barbing-wire b' by the rotary action of cutter and bender D', shearing with stationary cutter D<sup>2</sup>, and the two barb-prods are then respectively bent from their horizontal position up to a perpendicular position, one on each side of the forming-die F and strand-wires W W, by the engagement with the barb-prods of said cutter and bender D' and oppositely-rotating bender D<sup>3</sup>, and in such manner that the dividing-plate D will be directly over the cen-



tral U-shaped bend of the barb and between its prods, to prevent said prods from leaning sidewise when the forming-die F changes its position, which takes place immediately after the prods receive their primary bend, as shown in Figs. 17 and 20, and by this reversed position of forming die F on its backward movement lowers the strand-wires W W into the hollows of the barb caused by its bends, one on either side of its central U-shaped bend, to the position shown in Figs. 16 and 19. At the instant the forming-die F has receded, the secondary or finishing oppositely-rotating barb-benders C and C' have rotated to engage the barb-prods, one at each side of divider D, in such manner that the said prods, if not in exact position so the rounded shoulders of said benders will engage them and bend them from their perpendicular position to a horizontal position upon the strand-wires W W, so their prods will point in opposite directions and be clamped upon the said strand-wires and carried on out of the machine by their frictional contact with the strand-wires, which move continuously through the machine as they are taken up by a spooler and twister. Immediately upon the completion of a barb, as described, the feeding mechanism feeds forward enough wire for the next succeeding barb, which is cut and formed in like manner. As the finished barbs pass under the guide-plate N their prods engage therewith, and thereby prevent the strand-wires from being cabled by the twister until they leave said guide N. The cam Z, which operates punch P, is formed as shown in Fig. 13, and is so set and timed with the other mechanisms of the machine that the eccentric portion of its channel from line 1 to line 2 has caused its friction-roller Z<sup>2</sup> to move near the center of the cam, and thus draw on pitman P<sup>2</sup>, which oscillates head E<sup>2</sup>, to move up said punch, as stated, and as the said friction-roller in the cam passes from line 2 to line 3, which is a very short space, said roller is quickly moved from the center of the cam a very little, which will permit the said punch to be slightly lowered sufficient to relieve all pressure on the barb, but not to be withdrawn from the U-shaped bend, and the said punch remains with the barb to assist in its proper support until it is finished, and during that time friction-roller Z<sup>2</sup> travels the cam-channel from line 3 to line 4. When said cam has completed its revolution, the friction-roller Z<sup>2</sup> has passed again into that part of the cam-channel between lines 4 and 1, to withdraw punch P until a new barb is fed in, so another like operation may be performed. By this construction and arrangement the parts of the machine that act directly upon the barbs to bend their prods rotate continuously and very rapidly, so they attach the barb-prods to the strand-wires much more nicely than when they are bent slowly, and form them more accurately.

The finished product of the machine, as

shown in Fig. 23, consists of what is termed a "two-strand two-pointed wire barb," the barb being formed from a short piece of flattened wire pointed at each end, having a central U-shaped bend placed transversely between the strand-wires, so as to form a spring-support to the strand-wires, and having its prods bent in opposite directions to clasp each strand-wire and point in opposite directions from each other, as shown in said figure.

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

1. In a wire-barbing machine, and in combination with each other and with guides for conducting a pair of strand-wires through the machine, a barb-feeding mechanism, a suitable barb-support, and means for drawing the strand-wires through the machine, a rotating barb-cutter shearing with a stationary barb-cutter, a pair of rotating benders for giving the barb-prods their primary bend, and a pair of rotating benders for giving the barb-prods their secondary or finishing bend, constructed and arranged substantially as set forth.

2. The combination, in a wire-barbing machine, of the forming-die F, barb-support F', punch P, cutter D<sup>2</sup>, cutter and bender D<sup>3</sup>, bender D<sup>3</sup>, dividing-plate D, and rotating benders C and C', arranged to operate in the manner and for the purpose specified.

3. In the wire-barbing machine shown and described, and in combination with the slotted barb-support F', punch P, and forming-die F, having the strand-wire guides W' W', and the reciprocating head H, having fixed therein said forming-die, said parts being arranged to operate in conjunction with each other, substantially as set forth.

4. In the wire-barbing machine shown and described, and in combination with the forming-die F and punch P, the stationary barb-support F', having the slot h' and hooks h, substantially as and for the purpose set forth.

5. In the wire-barbing machine shown and described, and in combination with the reciprocating head H, barb-support F', and punch P, the forming-die F, having the rounded-bottom channel W<sup>2</sup>, and strand-wire guide-channels W', substantially as and for the purpose set forth.

6. In the wire-barbing machine shown and described, and in combination with the forming-die F, barb-support F', punch P, bender D<sup>3</sup>, and stationary cutter D<sup>2</sup>, arranged on bed B, the rotating cutter and bender D', substantially as and for the purpose set forth.

7. In combination with the barb-feeding mechanism, guides for properly conducting the strand-wires through the machine, and mechanism for drawing the strand-wires through the machine, mechanisms operating a forming-die and a punch relatively to each other, to form a central U-shaped bend in the barb, mechanism continuously rotating a pair of oppositely-arranged benders to cut off (in conjunction with a fixed cutter) a barb-blank

from the wire and to bend upward the barb-prods, one on either side of the central U-shaped bend and at the outer sides of the strand-wires, mechanism for lowering the strand-wires into the hollows of the barbs and for supporting the barb-prods, and mechanism for oppositely and continuously rotating a pair of benders to bend down the barb-prods upon the strand-wires, all substantially as set forth.

8. In the wire-barbing machine shown and described, and in combination with the bed B, the shafts S, S', and S<sup>2</sup>, miter-gears R R', shafts S<sup>3</sup> and S', spur-gears G, G', G<sup>2</sup>, and G<sup>3</sup>, rotating heads J and J', having, respectively, the barb-benders D' and D<sup>2</sup>, and rotating heads d and d', having, respectively, the barb-benders C and C', as and for the purpose set forth.

9. In the wire-barbing machine shown and described, and in combination with the bed B, cutter D<sup>2</sup>, the shaft S<sup>2</sup>, miter-gears R and R', shaft S, having the rotary head J', provided with the barb-bender D<sup>3</sup>, and the shaft S', having the rotary head J, provided with the barb bender and cutter D', said heads and benders being arranged to rotate in opposite directions to give the primary bend to the barb-prods, substantially as set forth.

10. In the wire-barbing machine shown and described, and in combination with the cam Z, pitman P<sup>2</sup>, head E<sup>2</sup>, forming-die F, and support F', the punch P, arranged to pass through the slotted end of said support and centrally bend the body of the barbs by forcing said portion of the barbs into the bottom U-shaped channel of said forming-die, substantially as and for the purpose set forth.

11. The combination, with the mechanism for intermittently feeding forward the barbing-wires at an angle with the course of the strand-wires, guides for conducting the strand-wires through the machine and over the barbing-wire, a slotted barb-support, a punch and die for forming a central U-shaped bend in the barbs while resting on said support, a pair of rotating benders for severing and bending up the barb-prods, a central barb-prod divider, and a pair of rotating benders for bending the barb-prods down and upon the strand-wires, in the manner substantially as and for the purpose set forth.

12. In a wire-barbing machine, a pair of primary rotating benders, D' D<sup>2</sup>, for bending the barb-prods from a horizontal to a perpendicular position at either side of the strand-wires, in combination with a pair of secondary rotating benders, C C', for bending said barb-prods from their perpendicular position to an opposite horizontal position upon the strand-wires, substantially as specified.

13. In a wire-barbing machine, a pair of oppositely-arranged rotating barb-benders having shoulders, as described, for engaging the barb-prods to give them their primary bend, in combination with a pair of oppositely-rotating barb-benders arranged to swing

from a common center, and having rounded shoulders and gathering-fingers, as described, for giving the secondary or finishing bend to the barb-prods and to clasp them on the strand-wires, substantially as set forth.

14. In the wire-barbing machine shown and described, and in combination with the barb-prod benders C and C', the dividing-plate D, constructed substantially as and for the purpose set forth.

15. In the wire-barbing machine shown and described, and in combination with the forming-die F, support F', and punch P, the head E<sup>2</sup>, having set therein said punch, and arranged to be oscillated to operate said punch by means of cam Z through the medium of the pitman P<sup>2</sup>, in the manner and for the purpose set forth.

16. In the wire-barbing machine shown and described, and in combination with support F', punch P, and forming-die F, the head H, having set therein said forming-die and having the sheave-wheel V studded thereto and mounted upon the cranks H' and H<sup>2</sup> and arranged to be reciprocated by means of the eccentric a, through the medium of pitman a', crank a<sup>2</sup>, and a short shaft connecting said cranks a<sup>2</sup> and H', in the manner and for the purpose set forth.

17. In the wire-barbing machine shown and described, the punch P, having the oppositely-arranged angular side depressions on its working end, substantially as and for the purpose set forth.

18. In the wire-barbing machine shown and described, the barb-benders C and C', respectively having the side projecting fingers, e and e', and each having a rounded shoulder, e<sup>2</sup>, for engaging the barb-prods, substantially as and for the purpose set forth.

19. In the wire-barbing machine shown and described, the secondary bed B', constructed substantially as set forth and supporting the slotted barb-support F', stationary cutter D<sup>2</sup>, and barbing-wire guide R<sup>3</sup>, in the manner and for the purpose specified.

20. In the wire-barbing machine shown and described, and in combination with the rotating head J, having set therein the cutter and bender D', the secondary bed B', having set therein the stationary cutter D<sup>2</sup>, as and for the purpose set forth.

21. In the wire-barbing machine shown and described, and in combination with each other and the heads J J', the barb-benders D' and D<sup>2</sup>, respectively, having rounded shoulders formed on their engaging end in such manner as to properly bend the barb-prods to a perpendicular position, as specified.

22. In the wire-barbing machine shown and described, the combination of the shafts S S', S<sup>2</sup> S<sup>3</sup> S', gears R R', spur-gears G, G', G<sup>2</sup>, and G<sup>3</sup>, cam Z, pitman P<sup>2</sup>, oscillating head E<sup>2</sup>, having the punch P, reciprocating head H, having the channeled die F, and sheave-wheel V, cranks H', H<sup>2</sup>, and a<sup>2</sup>, eccentric a, and eccentric pitman a', barb-support F', having slot h

and hooks *h*, stationary cutter *D*<sup>2</sup>, rotating heads *J*, *J'*, *d*, and *d'*, having, respectively, the barb-benders *D'*, *D*<sup>2</sup>, *C*, and *C'*, dividing-plate *D*, and suitable mechanism for feeding in and flattening the barb-wire and for drawing the strand-wires through the machine, substantially as and for the purpose set forth.

23. The combination, with the bed *B*, having proper supporting-legs *L*, and the secondary bed *B'*, secured upon said bed *B*, of the curved standards *K K'*, secured to bed *B* at one side and arranged to project over secondary bed *B'*, and centrally supporting the sec-

ondary benders *C C'* over the barb-support *F'* of said secondary bed, substantially as set forth. 15

24. In the wire-barbing machine shown and described, the combination of the curved standards *K K'*, cross-bar *n*, dividing-plate *D*, and box *n'*, having the set-screws 1 2 3 for adjusting said dividing-plate in said box, substantially as and for the purpose set forth. 20

ALBERT J. BATES.

Witnesses:

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