

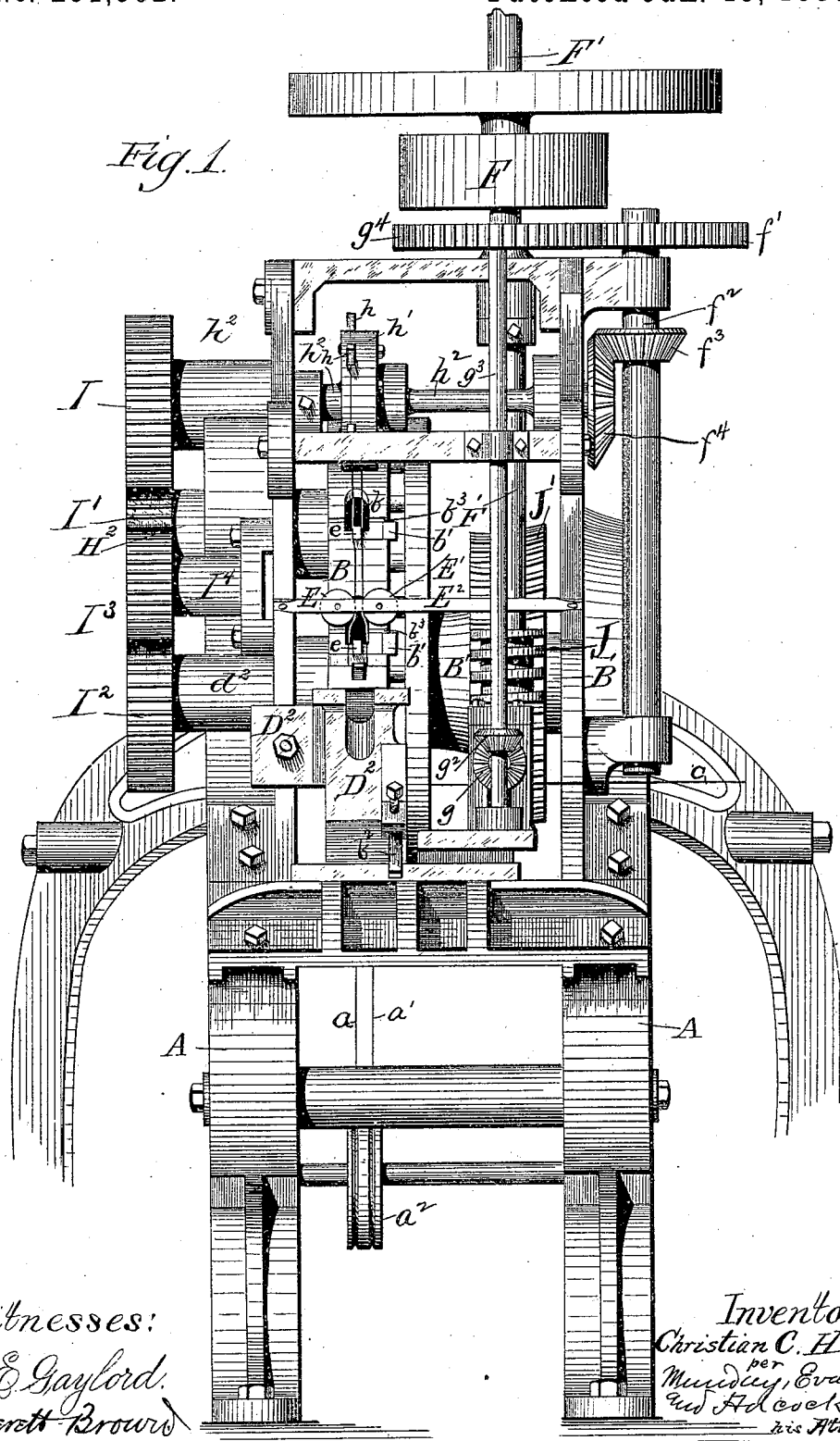
(No Model.)

3 Sheets—Sheet 1.

C. C. HILL.  
BARB FENCE MACHINE.

No. 291,902.

Patented Jan. 15, 1884.



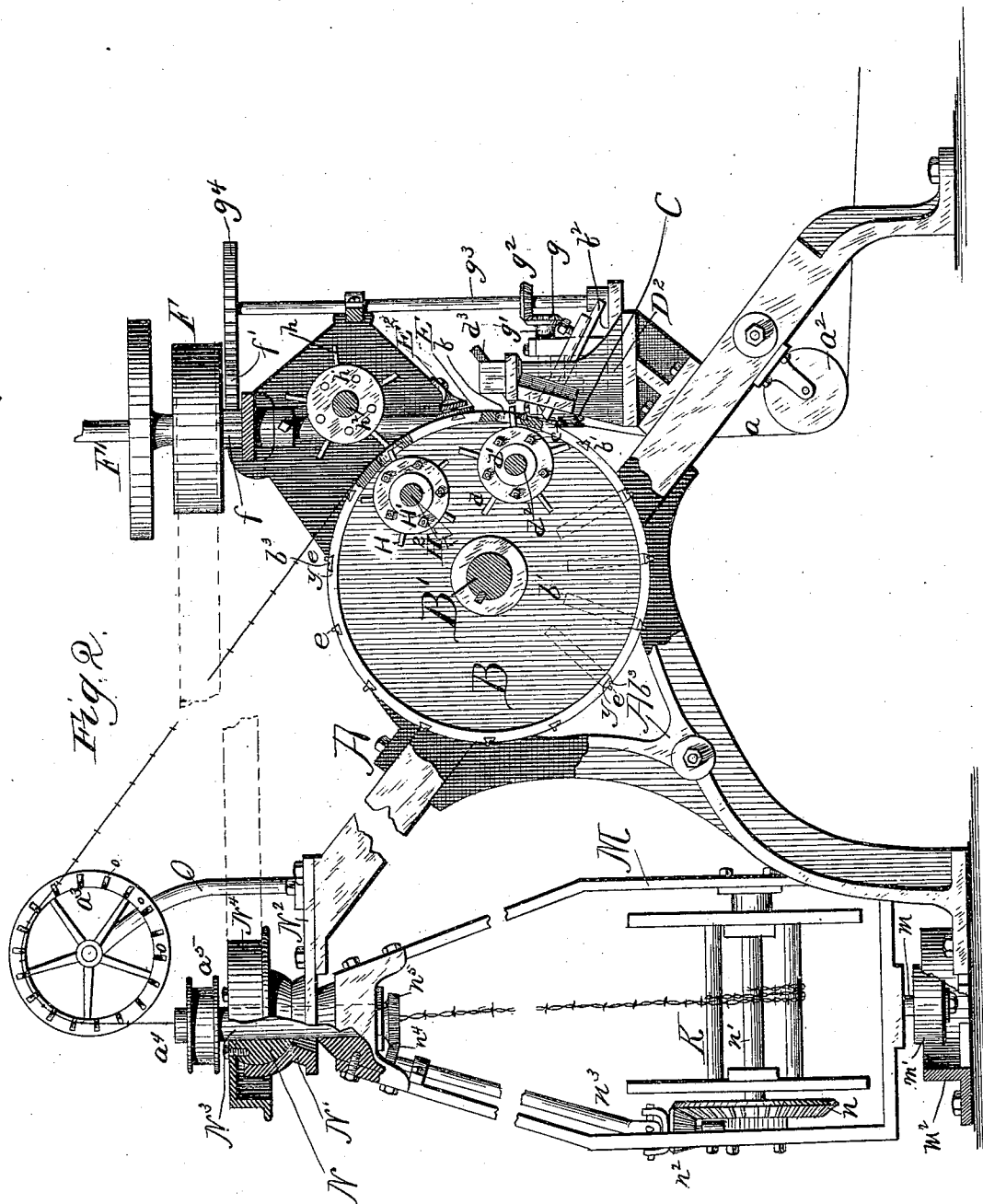
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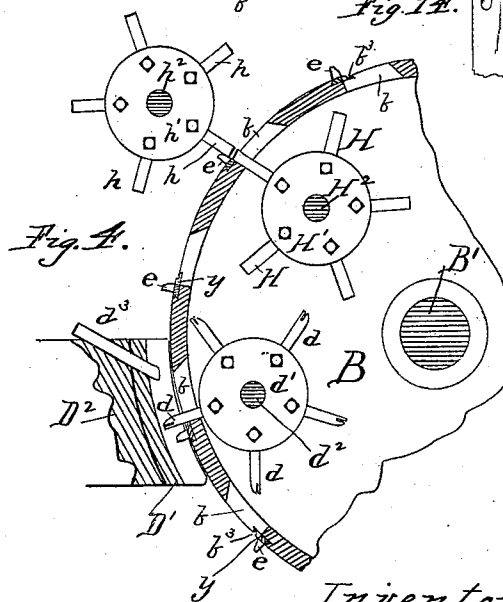
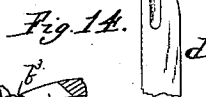
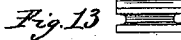
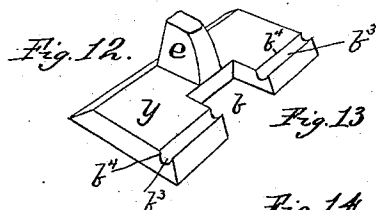
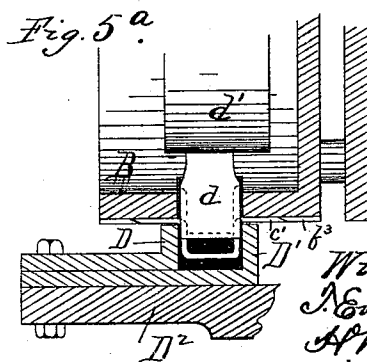
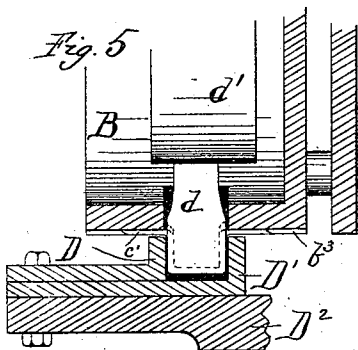
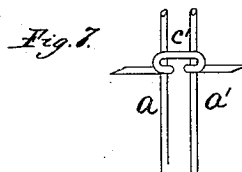
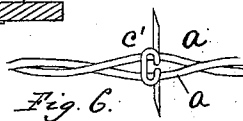
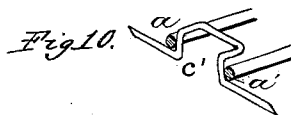
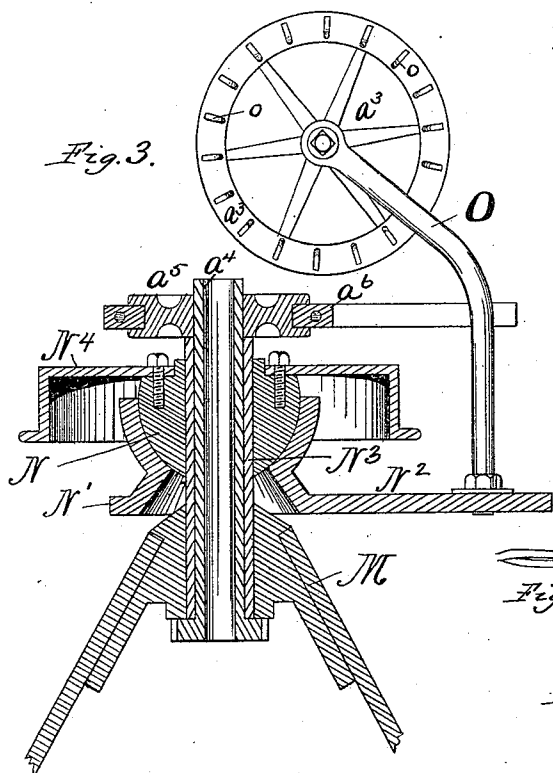
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J. Everett Brown.

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his Attorneys.

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# UNITED STATES PATENT OFFICE.

CHRISTIAN C. HILL, OF CHICAGO, ILLINOIS.

## BARB-FENCE MACHINE.

SPECIFICATION forming part of Letters Patent No. 291,902, dated January 15, 1884.

Application filed June 18, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, CHRISTIAN C. HILL, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Barb-Fence Machines, of which the following is a specification.

My invention relates to improvements in machines for applying barbs to fence-wire.

The object of the invention is to provide a machine of simple and durable construction, which will apply barbs to fence-wires with much greater rapidity and facility than machines heretofore commonly in use.

In barbed-fence machines heretofore in use the fence-wires and the barb-wire have generally, one or both, been fed intermittently through the machine, and the barb-applying device and other moving parts of the machine have been given a variety of stop motions, reciprocations, oscillations, &c., by means of cams and other devices, so that ordinarily such machines have been very liable to get out of order or repair, and have not been capable of being run at a high rate of speed. In the present invention both the barb-wire and the fence-wires are passed through or fed to the machine continuously from their appropriate reels or spools, and all the barb-applying devices and moving parts of the machine have a simple continuous rotary motion without any stops or interruptions. It will readily be understood, therefore, that a barb-fence machine constructed in accordance with my invention may be run at very high speed and be made to apply the barbs with very great facility. In my invention the fence-wires are carried over a continuously-revolving wheel or drum located between the delivery and receiving spools or reels for said wires, and the barb-wire is fed continuously transversely across the face or periphery of said revolving drum and the fence-wires thereon. A series of knives fixed in the periphery of said drum, at or near one edge thereof, opposing themselves to a stationary tangential knife fixed in the frame-work of the machine, severs the barb as the drum revolves into the length necessary to form the barbs. The knives are so set as to sever the barb-wire on a diagonal cut, and thus point the barbs. Each barb as it is severed drops or is forced into one of a series of trans-

verse grooves or holding devices in the periphery of the drum, wherein the barb is held and carried on the drum while the barb-applying devices are affixing it to the fence-wires. The barb-applying devices consist of rotary tools journaled inside or outside the drum, and operating on the barb through suitable slots in the drum.

In the accompanying drawings which form a part of this specification, I have shown a machine embodying my invention which is particularly adapted to apply the particular form of barb shown in Fig. 6 of said drawings—that is to say, a barb having a C-shaped loop at its middle portion, the twisted fence-wires being embraced between said loop and the points of the barb.

In said drawings, Figure 1 is an end view of the machine. Fig. 2 is a vertical longitudinal section, partly in elevation. Fig. 3 is an enlarged detail sectional view of the twisting device. Fig. 4 is an enlarged detail sectional view of the drum and barb-applying devices. Fig. 5 is a detail radial section of same; and Fig. 5\* is a similar view, showing the rotary tool partially retracted from the recess between the chucks. Fig. 6 is a view of the completed barb-fence wire which the machine shown in the drawings is designed to make. Fig. 7 is a view of same before the fence-wires are twisted together. Figs. 8, 9, 10, and 11 are views of the barb in the successive stages of its formation and application to the fence-wires. Fig. 12 is an enlarged detail perspective view of the steel plate or block inserted in the drum, so as to form part of its periphery, and in which the transverse grooves for carrying the barbs are cut; and Figs. 13 and 14 are respectively enlarged detail end and side views of one of the rotary tools.

As the barb is severed, as shown in Fig. 8, it falls or is caught in one of the series of transverse grooves in the periphery of the drum, being forced or guided into said groove by a pair of concave cheeks outside the drum and concentric therewith, fixed to the stationary frame of the machine. The lower extremity of the concave cheeks, where the barb is fed across the drum, is slightly beveled or rounded off, so as to crowd the barb toward the drum, when it is caught by the back edge or wall of the transverse groove on the pe-

riphery of the drum, the back edge of the transverse groove being higher than the front edge, or projecting out farther on the periphery, so as to catch the barb in the groove as the drum revolves the instant the barb is severed from the wire by the knives; and at the same time one of a series of revolving tools or formers journaled inside the hollow drum on fixed bearings, projecting through one of a series of slots in said drum, forces the middle portion of the barb between the stationary concave cheeks outside the drum, thus giving the barb the form shown in Fig. 9. The rotary tool or former describes a circle much less in diameter than that of the drum, so that the tool after it passes the common radial line will recede from the drum and the barb thereon as the tool and drum continue to revolve. After the tool has receded from the barb sufficiently to allow the extreme part of the bend thus formed in the barb to be bent again at right angles to the plane of said bend, the revolving tool, opposing itself to a stationary tool projecting from between the concave cheeks, bends the barb into the form shown in Fig. 10. The rotary tool is geared, so that its surface speed is about the same as that of the drum or the barb carried thereon. The fence-wires lie on the drum on each side of the bend formed in the middle portion of the barb, which bend projects between the fence-wires, and as the drum continues to revolve the fence-wires are crowded nearer together on the surface of the drum by means of a pair of small rollers grooved to fit the wires journaled on the frame-work of the machine, thus bending the barb into the form shown in Fig. 11. As the drum continues to revolve, a pair of rotary swages or tools, one journaled inside and one outside the drum, projecting through the slot in the drum, and opposing each other, force the bent middle portion of the barb down flat upon the fence-wires, as shown in Fig. 7. The two fence wires are then twisted together by the twisting device, thus giving the barb the form shown in Fig. 6, and securely affixing the wires in the opposite shoulders or notches formed by the C-shaped loop and the ends of the barb. The twisting and spooling device is suspended in a vertical position from a ball-and-socket joint, the lower end of the frame being loose or unconfined, so that the revolving spool and frame may always instantly adjust itself to its center of gravity or rotation as the same changes from the changing shape and size of the growing spool of wire. The twisting-frame may therefore be revolved at a very high speed without any danger or injury or causing any vibration.

In the drawings, A represents the frame of the machine, and B is the revolving drum or wheel fixed to a shaft, B', suitably journaled in said frame. The fence-wires  $a$   $a'$  pass from their delivery-spools parallel to each other over a grooved guide-pulley,  $a^2$ , and thence side by side over the drum B to the wire pul-

ley  $a^3$  at the mouth of the twisting device. The drum B is provided with a series of slots,  $b$ , through its rim. These slots are equidistant apart, and may preferably be in the central portion of the rim. In the rim of the wheel B, near one edge thereof, are fixed rigidly a series of knives,  $b'$ , for severing, in connection with the opposing stationary knife  $b^2$ , the barb from the barb-wire as the wheel B revolves.  $b^3$  represents a series of transverse grooves in the periphery of the wheel or drum B, extending centrally across the slots  $b$ . The barb-wire  $c$ , from which the barbs are cut, is fed continuously transversely across the periphery of the wheel B, immediately under the stationary knife  $b^2$ , by means of a pair of constantly-revolving feed-rolls or other suitable mechanism. The knives  $b'$  and  $b^2$  have their cutting-edges set to sever the barbs from the barb-wire on a diagonal cut. The rim of the wheel B should preferably be about as wide as the severed barb-pieces are long.

D and D' are a pair of parallel concave cheeks or flanges concentric with the drum B, and fixed rigidly to a bracket, D<sup>2</sup>, which is secured by suitable bolts to the frame of the machine. As the barb  $c'$  is severed by the knives  $b'$   $b^2$  from the barb-wire  $c$ , it is forced or guided by the concave cheeks D D' into one of the transverse grooves  $b^3$  in the periphery of the drum as the drum revolves, and there retained by said concave cheeks until the barb is partially formed, as hereinafter explained. The concave cheeks D D' have their faces slightly inclined or beveled toward the drum at the point where the barb-wire is fed across, so as to guide the barb into the transverse groove in the drum as the barb is caught by the projecting back edge or wall,  $b'$ , of the groove  $b^3$ , which is somewhat higher than the front edge of said groove.

$d$   $d$  are a series of revolving tools fixed rigidly in the periphery of a wheel,  $d'$ , fixed to a shaft,  $d^2$ , which is journaled on the frame of the machine, inside the peripheral line of the drum or wheel B, so that the barb formers or tools  $d$   $d$  may project through the slot  $b$  in the drum B as the drum and tools revolve around their respective centers. As the barb is severed from the barb-wire, one of the revolving tools  $d$ , projecting through the slot  $b$ , forces the middle portion of the barb between the cheeks D D', thus bending it into the form shown in Fig. 9. The tools  $d$   $d$  have longitudinal grooves in their opposite edges or faces for the barb-wire, into which grooves the bent middle portion of the barb, as shown in Fig. 9, rests, and is held. The bend in the barb (shown in Fig. 9) is completed when the revolving tool  $d$  reaches in its revolution the common radial line passing through the centers of the shafts  $d^2$  and the shaft B' of the drum. After passing this point, the tool begins to recede from the recesses between the concave cheeks D D'.

Fixed in the bracket D<sup>2</sup>, and projecting between the cheeks D and D', is a tool,  $d^3$ , which

serves to bend the fold already formed in the barb at right angles to its plane, as the revolving tool  $d$  and the drum continue their revolutions past this projecting tool  $d^3$ . The form given the barb by this operation is shown in Fig. 10 in perspective. The position of the barb and of the tool  $d$  at the time or just before the second bend is formed is shown in Fig. 5<sup>a</sup>. When the projecting portion of the barb, as shown in Fig. 5<sup>a</sup>, strikes the stationary tool  $d^3$ , the longitudinal or radial grooves in the tool  $d$  serve to hold the barb while the projecting portion is bent down at right angles across the end of the tool  $d$ . After the barb is carried by the revolution of the drum past the concave cheeks  $D D'$ , the fence-wires  $a a'$  lying on the drum will serve to retain the barb in position in its transverse groove. The bend formed in the middle portion of the barb projects up between the fence-wires, which lie side by side on the smooth surface of the drum.

$E$  and  $E'$  are a pair of small rolls, having their peripheries grooved to fit the wires  $a a'$ , located tangentially to the drum  $B$ , and journaled on a cross-bar,  $E^2$ , secured to the frame of the machine. The purpose of these rolls is to crowd the two fence-wires nearer together as the drum revolves, and thereby force the barb into the form shown in Fig. 11.

$e e$  are guides projecting between the fence-wires from the central portion of the periphery of the drum, to keep the fence-wires apart, and to regulate the action of the rolls  $E$  and  $E'$  in crowding the fence-wires together. The projecting guides  $e$  also serve as supports for the bent middle portion of the barbs, as shown in Fig. 10, to rest against, and thus prevent the barbs from slipping back as the fence-wires are crowded together by the rolls  $E$  and  $E'$ . For convenience of construction the projection  $e$  and the transverse grooves  $b^3$  can best be made, as shown in Fig. 12, in a single steel block or dovetail piece,  $y$ , secured in a suitable dovetail slot or mortise in the face of the drum, so that the piece  $y$  will be flush with the periphery of the drum or form part thereof. Part of the slot  $b$  will of course appear in this dovetail piece.

$H H$  represent a series of revolving swages or tools secured in the periphery of a wheel,  $H'$ , secured to a shaft,  $H^2$ , which is journaled in suitable bearings on the frame of the machine, so as to project inside the drum  $B$ ; and  $h h$  are a series of similar revolving swages or tools fixed in a wheel,  $h'$ , secured to a shaft,  $h^2$ , which is journaled outside of the drum  $B$  in suitable bearings on the framework of the machine. As the drum  $B$  continues its revolution, the barb, as shown in Fig. 11, is carried between a pair of these revolving tools  $H h$ , and the loop or bent middle portion of the barb is thereby swaged or pressed down flat upon the fence-wires, as shown in Fig. 7.

$F$  represents the drive-wheel of the machine on the shaft  $F'$ . The revolving tools  $h h$  are driven from shaft  $F'$  by means of gears

$f$ , meshing with gear  $f'$  on shaft  $f^2$  and beveled gear  $f^3$  on said shaft, which meshes with beveled gear  $f^4$  on shaft  $h^2$ , to which the tool-wheel is secured. The revolving tools  $H$  and  $d$  are operated from the shaft  $h^2$  by intermeshing gears  $I I' I^2 I^3$  on the shafts  $h^2$ ,  $H^2$ ,  $d^2$ , and  $I^4$ , respectively. The drum  $B$  is operated from the shaft  $F'$  by means of the worm  $J$  on said shaft meshing with the worm-wheel  $J'$  on the drum-shaft  $B'$ . The feed-rolls  $C$  for the barb-wire are revolved by means of the beveled gear  $g$  on the feed-roll shaft  $g'$  meshing with the beveled gear  $g^2$  on the vertical shaft  $g^3$ , which is operated from the driving-shaft  $F'$  by means of the intermeshing gears  $g^4$  and  $f' f$ .

The cheeks or flanges  $D$  and  $D'$  are secured in position by bolts passing through slots in the same, so that they may be adjusted to different distances apart, as may be desired. The knives  $b'$  are adjustably secured by suitable keys or screws in radial slots or grooves in the wheel  $B$ , and the stationary knife  $b^2$  is also secured adjustably by suitable keys in a slot in the bracket  $D^2$ . The fence-wires, with the barbs secured thereon, as shown in Fig. 7, pass from the wire-pulley  $a^2$ , through the hollow shaft  $a^4$ , to the spool  $K$ , which is mounted in the twisting-frame  $M$ . The twisting-frame  $M$  is supported and suspended from a ball,  $N$ , which rests in a ball-socket,  $N'$ , secured to the bracket  $N^2$ , which is fixed to the frame  $A$  by suitable bolts. The frame  $M$  is secured rigidly to a hollow sleeve,  $N^3$ , which in turn is fixed rigidly to the ball  $N$ , and frame  $M$  thus secured to it is revolved by means of a pulley,  $N^4$ , which is fixed to the ball  $N$  by suitable screws or bolts. The lower end of the frame has no bearing, but is provided with a short shaft,  $m$ , having a friction-pulley,  $m'$ , thereon, which is loosely confined in a large shell or cup,  $m^2$ , the shell or cup being large enough to permit the lower end of the frame to vibrate or move sufficiently to bring the center of gravity or rotation of the frame and the spool of wire thereon directly beneath the center of the ball, as said center may, from time to time, change as the spool of wire increases in size or changes in shape. The spool  $K$  is revolved on its own axis to wind up the twisted wire by means of the bevel-gear  $n$  on the spool-shaft  $n'$  meshing with the bevel-gear  $n^2$  on the end of the jointed shaft  $n^3$ , which shaft is driven from the hollow shaft  $a^4$  by the intermeshing gears  $n^4$  and  $n^5$ . The hollow shaft  $a^4$  is held stationary, so as to drive the spool-shaft by means of a friction-pulley,  $a^5$ , secured to said shaft, and a friction-clamp,  $a^6$ . The friction-clamp  $a^6$  is supported by the sleeve  $a^4$ , or the pulley  $a^5$ , secured thereto, and is prevented from rotating with said pulley by an arm or projection, which comes in contact with the standard  $O$ . The friction-clamp  $a^6$  is pressed against the friction-pulley by a screw-bolt furnished with a hand-wheel or other suitable means, so that the pulley may revolve when the tension on the wire is too great. The

wire-pulley <sup>a</sup> at the top or mouth of the twisting device is mounted on a bracket, O, and is provided with a number of small curved arms, o, extending out from the rim of the wheel on one side thereof, so as to form a proper support for the parallel fence-wires as they come from the machine, and not disarrange or alter the position of the barbs thereon before the same are immovably fixed by the twisting of the wires together.

The particular device for twisting the fence-wires together and spooling the cable herein shown is of my invention, but is not herein claimed, and the same is hereby expressly reserved as the subject-matter of a separate application, as is also the particular form of barbed wire herein shown, the great advantage of which consists in its adaptability to be manufactured with very great rapidity, and by simple and continuously positively-moving machinery.

I claim—

1. The combination, with mechanism for feeding the fence-wires continuously, of mechanism for feeding the barb-wire continuously, a continuously-revolving drum or wheel provided with a series of slots through its rim, mechanism for severing the barb-wire, and rotary devices, operating through slots in the drum, for applying and forming the barb journaled on the frame of the machine and projecting inside of the revolving drum, and conjointly operating stationary barb-forming devices secured to the frame outside of said drum, substantially as specified.

2. The combination, with a continuously-revolving drum provided with slots through its rim, of barb-forming tools or devices located inside said drum, and barb-forming devices located outside said drum, substantially as specified.

3. The combination, with a revolving drum for carrying and supporting the fence-wires, provided with grooves or devices for carrying and supporting the barbs while they are being applied, and with slots or openings through which the barb may be operated upon by tools inside or outside of the drum, and barb forming and applying tools located inside and outside of said drum, substantially as specified.

4. The combination, with the revolving drum provided with slots or openings through its rim, of a series of knives fixed in its periphery, an opposing-knife mounted on the frame of the machine, concave flanges or cheeks secured to the frame of the machine, revolving tools journaled on the frame of the machine and projecting inside said drum to force the middle portion of the barb between said cheeks, a tool projecting from between said cheeks to again bend the barb, a pair of rolls set tangentially to said drum to force the fence-wires together and further form the barb, opposing revolving tools journaled on the frame of the machine inside and outside said drum to press the bent or loop portion of the barb flat upon the wires, and a device

for twisting the fence-wires together, to fix the same securely in the opposite notches or shoulders formed by the loop and the ends of the barb, substantially as specified.

5. The combination, with mechanism for continuously feeding the fence-wires and barb-wire, of mechanism for severing the barb-wire, and a revolving wheel or drum provided with devices for carrying the barbs along with the fence-wires while the barbs are being formed and applied, and barb-applying devices mounted on the frame of the machine, adapted to operate upon the barb as the revolving drum brings the barb in contact therewith, substantially as specified.

6. The combination of a revolving drum or wheel carrying the fence-wire and the severed barbs, and of devices mounted on the frame of the machine for applying the barbs to the fence-wire as the drum revolves, substantially as specified.

7. The combination of a revolving drum or wheel carrying the fence-wires and barbs, of a stationary knife and a series of knives fixed in said drum or wheel for cutting off the barbs from the barb-wire as the drum or wheel revolves, and of devices mounted on the frame of the machine for applying the barbs to the fence-wire as the drum or wheel revolves, substantially as specified.

8. The combination, with a slotted wheel rotating continuously in the direction of the feed of the fence-wires and carrying said wires continuously forward, of a series of knives secured at the rim of said wheel, and an opposing-knife on the frame of the machine for cutting off the barb-wire, and a revolving tool journaled on the frame of the machine and projecting into said wheel, and opposing-cheeks fixed to the frame of the machine outside said wheel, said revolving tool operating on the barb through openings in the rim of said wheel, substantially as specified.

9. The combination, with a wheel having a slotted rim rotating continuously in the direction of the feed of the fence-wires and carrying said wires, of devices for forming or applying the barb to the fence-wires located inside and outside of said rim and conjointly operating upon the barbs through the slots or openings in said rim, substantially as specified.

10. The combination, with a wheel having openings in its rim and carrying the fence-wires, of a pair of revolving barb forming or applying tools journaled on the frame of the machine, one inside and one outside the peripheral line of said rim, substantially as specified.

11. The combination of a slotted wheel or drum for carrying the fence-wires, and provided with transverse grooves or devices on its periphery for carrying the barbs along with the fence-wires, opposing-knives mounted in the revolving wheel, and the stationary frame for cutting off the barbs, revolving tools or devices journaled on the frame of the machine and projecting inside said rim, and stationary

5 devices outside said rim for bending and forming the barbs, tangential rollers or devices for crowding the fence-wires together and further forming the barbs, and revolving tools journaled inside and outside said rim to further form and secure the barbs, and mechanism for continuously driving said revolving wheel and revolving tools, substantially as specified.

10 12. The combination, with the revolving wheel or drum carrying the fence wires and barbs, of devices for crowding the fence-wires together on the periphery of the rim as the wheel or drum revolves, and thus applying or partly applying the barbs to the fence-wires, 15 substantially as specified.

20 13. The combination, with a wheel or drum carrying the fence-wire thereon continuously forward, continuously-revolving knives, and an opposing-knife for severing the barb in equal barb-lengths as said barb-wire is fed continuously thereto, and barb applying and forming devices consisting of continuously-revolving and stationary parts, so that all the moving parts of the machine may have a simple continuous rotary motion and be adapted 25 to run at high speed, substantially as specified.

14. The combination, with a slotted wheel or

drum having transverse grooves across said slots, and provided with a series of knives 30 fixed in its rim, of a stationary knife for cutting off the barbs, concave cheeks or guards for forcing or guiding the barbs into said transverse grooves, and barb forming and applying mechanism located part inside and part 35 outside said drum and conjointly operating to bend and form the barb, substantially as specified.

15. The combination of the revolving wheel carrying the fence-wires on its periphery, of 40 grooved rollers journaled on the frame of the machine tangentially to said wheel for forcing the fence-wires together, and projecting guides to support the barbs and to regulate the action of said rollers in forming the barb, substan- 45 tially as specified.

16. In a barb-fence machine, the continuous revolving wheel for carrying the fence-wires and barbs while the barbs are being applied, in combination with mechanism for forming 50 and applying the barbs mounted on the frame of the machine, substantially as specified.

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