(No Model.)

3 Sheets—Sheet 1.

T. H. DODGE.

WIRE BARBING MACHINE.

No. 299,524. Patented June 3, 1884.

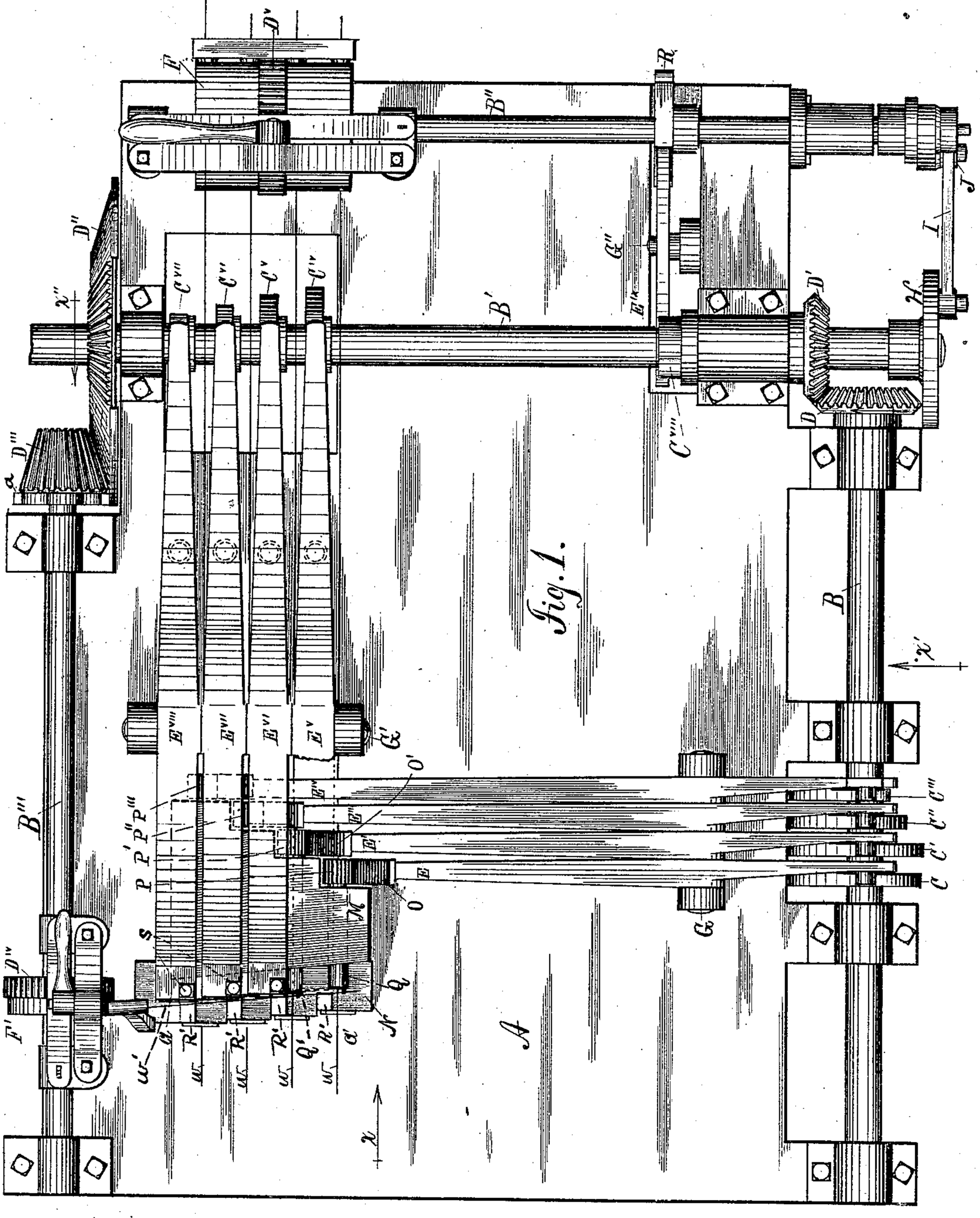

Fig. 1.

WITNESSES:

A. V. Richards

W. V. Brainard

INVENTOR

Thomas H. Dodge

BY

Robt. H. Wilcox

ATTORNEY

(No Model.)

3 Sheets—Sheet 2.

T. H. DODGE.

WIRE BARBING MACHINE.

No. 299,524. Patented June 3, 1884.

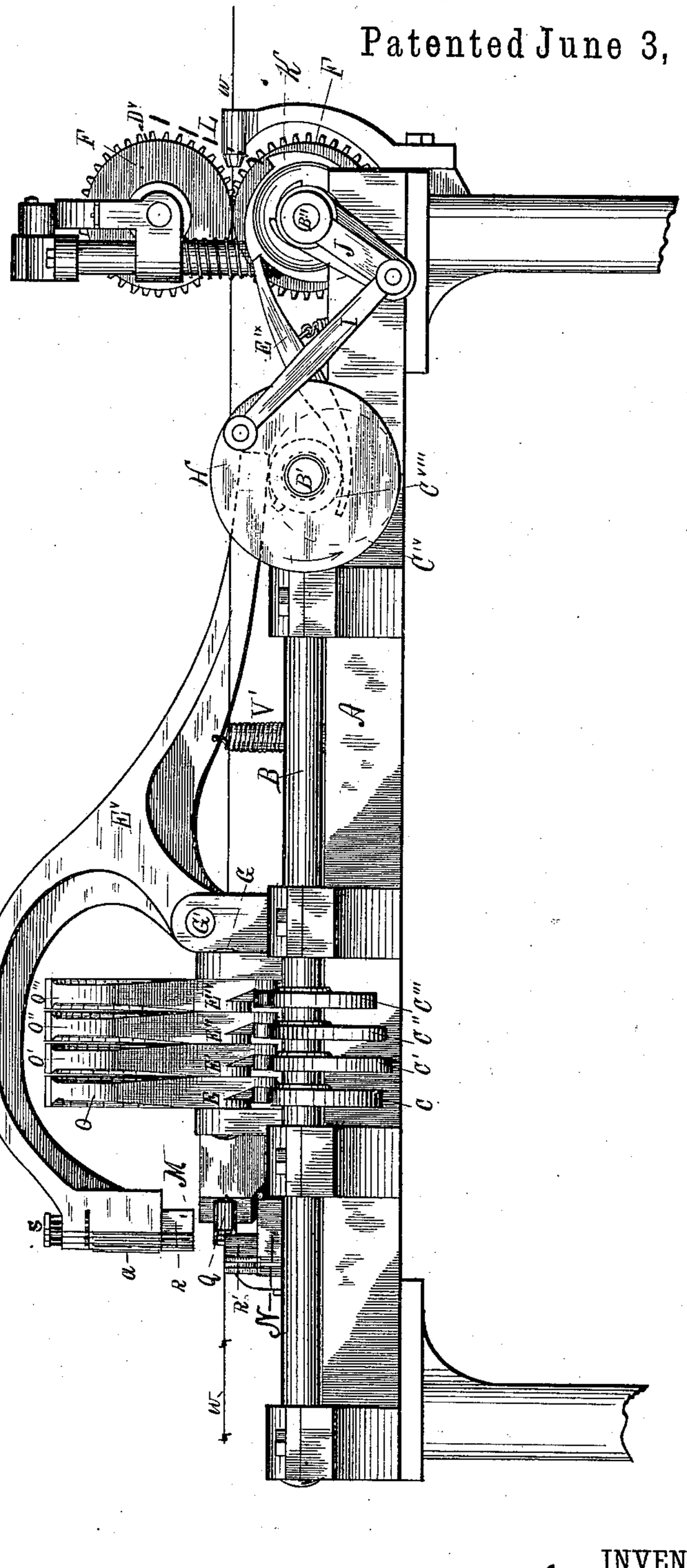

Fig. 2.

WITNESSES:

C. W. Richards

T. W. Brainerd

INVENTOR

Thomas H. Dodge

BY

Robt. H. Wiles

ATTORNEY

(No Model.) 3 Sheets—Sheet 3.

T. H. DODGE.

WIRE BARBING MACHINE.

No. 299,524. Patented June 3, 1884.

Fig. 9.

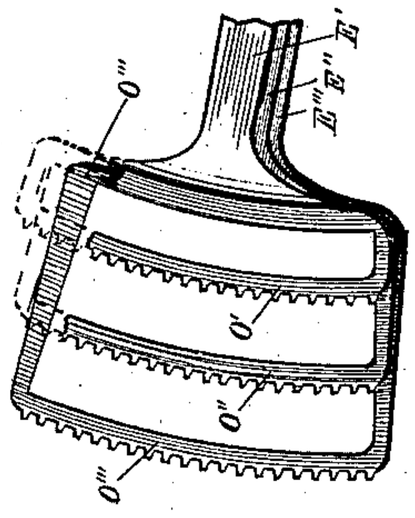

Fig. 5.

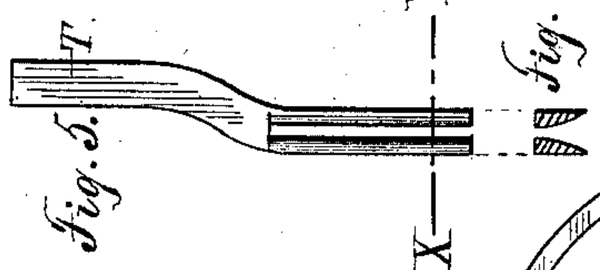

Fig. 8.

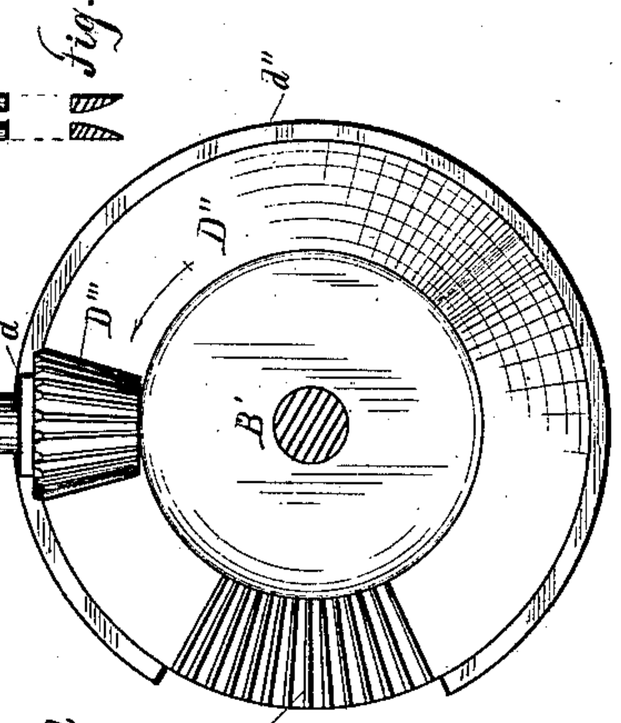

Fig. 6.

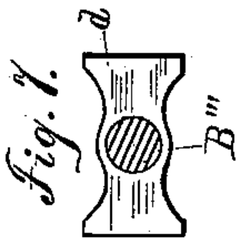

Fig. 7.

Fig. 3.

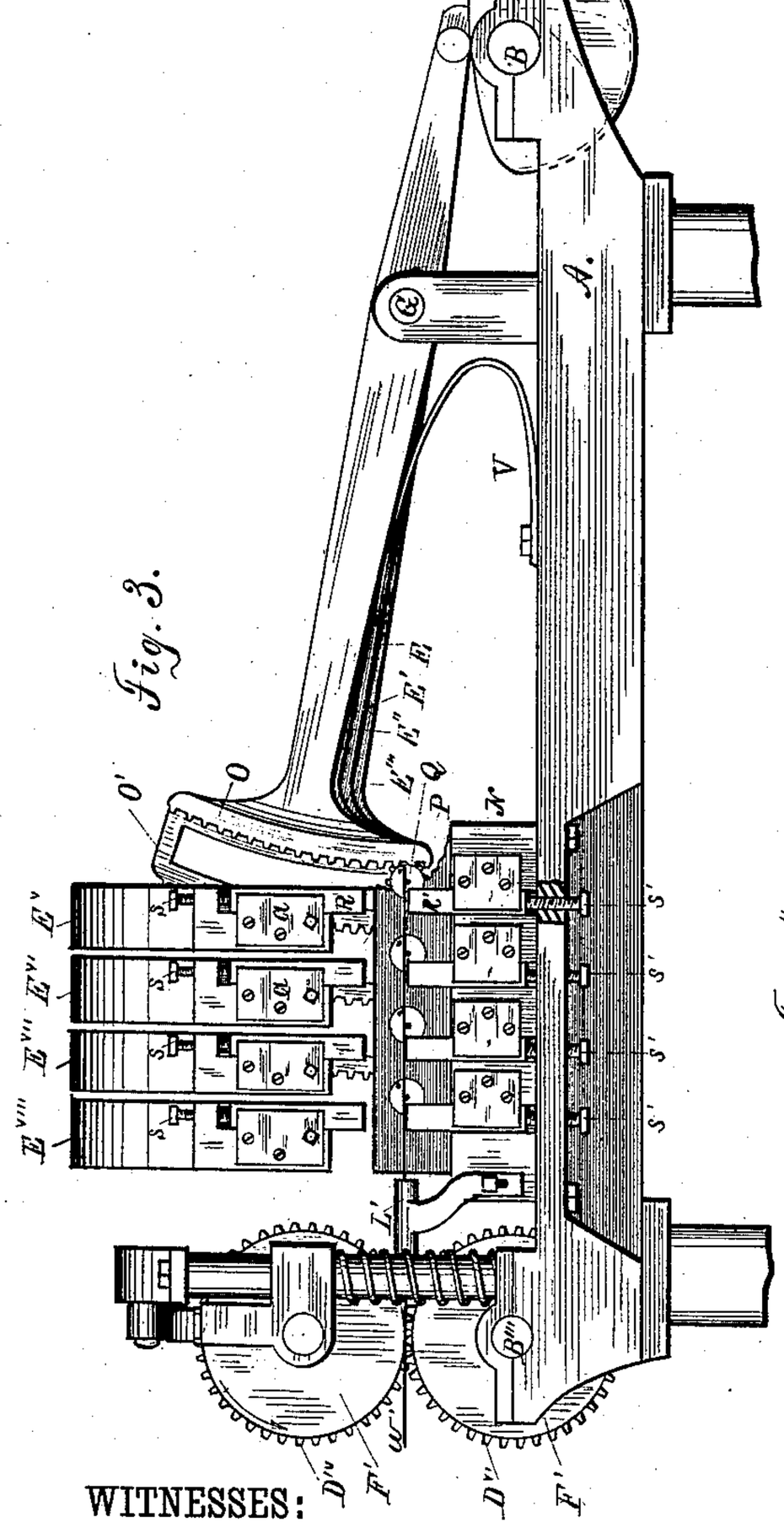

Fig. 4.

WITNESSES:

L. M. Devons

Wallace Greene

INVENTOR

Thomas H. Dodge

BY

Robt. H. Wiles.

ATTORNEY

UNITED STATES PATENT OFFICE.

THOMAS H. DODGE, OF WORCESTER, MASSACHUSETTS.

WIRE-BARBING MACHINE.

SPECIFICATION forming part of Letters Patent No. 299,524, dated June 3, 1884.

Application filed February 23, 1884. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. DODGE, a resident of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Wire-Barbing 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 pertains to make and use the same.

My invention is an improved automatic wire-barbing machine, especially adapted to the manufacture of what is known as the "Glidden barb." The construction and operation of the machine are such that while it supports and feeds forward at regular intervals any desired number of main wires to be barbed, it has but one barb-wire feed and cuts from a single wire barbs for the entire series of main wires.

The form, construction, and operation of the machine are fully explained and described in the following specification, and shown in the accompanying drawings, in which—

Figure 1 is a plan of the machine, a portion of one of the knife-carrying levers, E^{v}, being broken away, to show the construction of the parts beneath it; Fig. 2, a side elevation of the machine, looking in the direction indicated by the arrow *x'*, Fig. 1, the barb-feeding mechanism being omitted from the drawing; Fig. 3, a front elevation of the machine, looking in the direction indicated by the arrow *x*, Fig. 1; Fig. 4, an enlarged front elevation of the barb forming and cutting devices, showing a barb completed and severed on one of the main wires; Fig. 5, a side elevation, looking in the direction indicated by the arrow *x'''*, Fig. 4, of one of the wire-guides T, attached to the movable knife-heads, and adapted to guide the barb-wire as it is fed across the main wires; Fig. 6, a side elevation of the mutilated beveled gear D″ and beveled pinion D‴, engaging therewith, through which motion is communicated to the barb-feeding mechanism; Fig. 7, an elevation of the double cam-face *d*, attached to the beveled pinion D‴; Fig. 8, a horizontal section of the guide T, the plane of section passing through the line X Y, Fig. 5; and Fig. 9, a front elevation (looking in the direction indicated by the arrow *x*, Fig. 1) of the segments O′ O″ O‴, and the inner ends of the arms formed integrally with said segments, respectively, the segment O being removed and the segments O′ O″ being partly broken away, to show the segment O‴ in full.

In these views, A is the bed of the machine; B′, the main power-receiving and power-transmitting shaft thereof, and B a side shaft at right angles to the main shaft B′, and connected therewith by miter-gears D D′, the directions in which the two shafts rotate, respectively, being indicated by arrows on the various figures.

Near the front end of the machine, and at the side of the center opposite the side shaft, B, is a block, M, Figs. 1, 2, 3, 4, rigidly attached to the bed, and forming the stationary bearing of a series of parallel horizontal spindles, Q Q′ Q″ Q‴, which are journaled therein. Each of these spindles is centrally drilled from end to end, for the passage and support of one of the main wires to be barbed, and the distance between the axes of any two contiguous spindles is exactly equal to the length of wire required to form a single barb. In the front face of each spindle is an ordinary wrapping pin or lug, S, and on the rear end of each is mounted a pinion, the different pinions being marked P P′ P″ P‴, respectively, Figs. 1, 3. These pinions engage, respectively, with a series of segmental gears, O O′ O″ O‴, which are formed integrally with a corresponding series of vertically-reciprocating levers, E E′ E″ E^{iv}, pivoted on a common horizontal axis of oscillation, G, Figs. 1, 2, 3, the axis G being supported in suitable bearings at its ends.

Under each of the levers E E′ E″ E^{iv}, between the segment and the axis G, is a spring, V, Fig. 3, which tends to force the segment upward, and under the outer ends of the levers are a series of cams, C C′ C″ C‴, mounted on the shaft B, and tending to raise said outer ends, and thus depress the segments. The cooperation of the springs V and cams C produces reciprocal vertical motion of the segments, and consequently reciprocal rotation of the pinions P P′ P″ P‴. In order that the pinions may engage with the respective segments, the rear ends of the spindles on which the pinions are mounted are necessarily at different distances from the front line of the ma-

chine and the spindles are therefore of unequal lengths, the one nearest the shaft B being the shortest, and the others increasing regularly in length as their distance from said shaft is greater.

Through each of the spindles Q Q′ Q″ Q‴ passes a main wire, *w*, and the four main wires so supported are fed forward at regular intervals by a pair of feed-rolls, F F, Figs. 1, 2, connected by gears D^{iv}, and driven by the pawl-and-ratchet device shown in Figs. 1, 2. The connecting-gears D^{v} are placed at the middle of the feed-rolls, and the four wires lie two on each side of the gears. The pawl-and-ratchet mechanism shown is already in common use on other machines, and is the same shown and described in patent of D. C. Stover, No. 278,624, and any detailed description of its construction is therefore unnecessary.

The arms E E′ E″ E^{iv}, already mentioned, are at right angles to the main wires *w*, and the arm E′ crosses the main wire nearest the shaft B, the arm E″ crosses two main wires, and the arm E^{iv} crosses three main wires. In order to prevent these arms from striking the wires in their vertical movement, they are formed, as shown in Fig. 9, with suitable openings or loops, within which the main wires lie, the loop of the arm E′ being of such radial extent (measuring from the axis of oscillation G) as to include one of the main wires, the loop of the arm E″ being of such extent as to include two wires, and the loop of the arm E^{iv} being of such extent as to include three main wires. The arms are thus enabled to move up and down freely through an arc equal to that of the segments carried by them without interfering with the main wires. The forming of a segment with a loop adapted to include a main wire, for the purpose set forth in the above paragraph, is an old and well-known expedient in wire-barbing machines, and is neither shown nor claimed as being novel.

At the side of the machine opposite the shaft B are two coacting feed-rolls, F′ F′, Figs. 1, 3, connected by gears D^{iv} D^{vi}, the lower feed-roll being mounted on a shaft, B‴, journaled in stationary bearings, while the upper feed-roll is mounted on a short shaft journaled in boxes which move up or down on vertical posts attached to the bed of the machine. Intermittent rotary motion is communicated from the main shaft B′ to the shaft B‴ through a mutilated beveled gear, D″, mounted on the main shaft, and a beveled pinion, D‴, mounted on the shaft B‴, and so placed as to engage with the toothed sector *d′* of the mutilated gear. The sector *d′* has half the number of teeth of the pinion D‴; hence each rotation of the mutilated gear causes a half-revolution of the pinion. The pinion has formed integrally with it two diametrically-opposite cam-faces, *d*, Figs. 1, 6, 7, which are alternately in contact with a flange, *d″*, at the circumference of the mutilated gear, and thus prevent rotation of the pinion when not in engagement with the teeth *d′*. The flange *d″* is cut away from that arc of the circumference which subtends the sector *d′*, and the cam-faces *d* are thus left free to rotate with the pinion D‴ during the time it is in engagement with the teeth of the sector. At each rotation of the main shaft B′ the pinion D‴, shaft B‴, and feed-rolls F′ F′ rotate one hundred and eighty degrees, and the size of the feed-rolls is such that in this half-revolution they feed the barb-wire *w′*, Figs. 1, 3, 4, across the main wires through a space equal to the length of wire required for four barbs. As it leaves the feed-rolls, the barb-wire passes through a tube or guide which gives it a direction somewhat oblique to the main wires, the line of feed being slightly from front to rear, as well as across the bed of the machine. This oblique feed of the barb-wire is a well-known expedient for enabling the free end of the barb to pass between the body of the barb and the face of the spindle as it is wrapped, and in order to use the oblique feed, the front faces of the spindles Q Q′ Q″ Q‴ do not lie in the same plane; but the face of the spindle Q‴ is somewhat nearer the front line of the bed than the face of the one next it, and the face of each succeeding spindle is still farther back than that of the one which precedes it. (See Fig. 1.) As the barb-wire is pushed forward by the feed-rolls, it passes over the main wires *w* and under the wrapping-pins S, (see Figs. 3, 4,) and lies on the top face and obliquely across the inner edge of a series of stationary knives, R′, Figs. 1, 2, 3, 4, whose arrangement will be hereinafter mentioned, the top faces of said knives on the side toward the feed-rolls being slightly beveled to assist in guiding the wire. To prevent lateral deflection the wire passes through a series of guides, T, Figs. 3, 4, 5, 8, fastened to and projecting downward from a series of movable knife-carrying heads, E^{v} E^{vi} E^{vii} E^{viii}, which will be described hereinafter. These guides, which extend downward to a line below the upper faces of the stationary knives, are slotted from the lower end upward to the lower line of the movable knives. (See dotted lines, Fig. 4.) The inner faces of the slots are beveled on the side toward the feed-rolls, (see Figs. 5, 8,) in order to overcome any slight lateral deflection of the barb-wire. The slots necessarily extend up to the line of the lower faces of the movable knives, in order that as the knives and guides descend the guides shall not press down upon the barb-wire, (see head E^{v}, Fig. 4.)

The stationary knives R′, heretofore mentioned, lie in a series of slots in the front face of a block, N, rigidly attached to the bed of the machine in front of the block M. (See Figs. 1, 2, 3.) Each knife is secured in place by a face-plate screwed to the face of the block, and vertical adjustment is secured by means of set-screws *s′*, passing upward through the bed of the machine. (See Fig. 3.)

The movable knives R, which co-operate with the stationary knives R′, are attached to a series of vertically-reciprocating levers, E^{v} E^{vi} E^{vii} E^{viii}, Figs. 1, 2, 3, 4, each knife being held in a recess in the front face of the head at the end of a lever, and secured by a face-plate, *a*, screwed to the head. (See Figs. 3,4.) Vertical adjustment of the knives is provided for by set-screws *s*, whose points press downward upon the upper ends of the knives. The levers E^{v} E^{vi} E^{vii} E^{viii} are pivoted on a common horizontal axis of oscillation, G′, Figs. 1, 2, whose ends rest in suitable supporting-bearings. The rear ends of the levers rest on a series of cams, C^{iv} C^{v} C^{vi} C^{vii}, mounted on the main shaft B′, Fig. 1, which tend to raise said rear ends and depress the front ends of the levers which carry the knives, and between the cams and the axis G′ are a series of springs, V′, Figs. 1, 2, which connect the levers and the bed and hold the rear ends of the levers firmly down upon the cams. The cams and springs thus produce reciprocal vertical motion of the levers, whereby at each rotation of the shaft B′ each of the knives R descends, passing just inside the inner face of the corresponding stationary knife, R′, and severs the barb-wire. The cams C^{iv} C^{v} C^{vi} C^{vii} are so placed upon the shaft as to actuate the knives R, not simultaneously, but successively, beginning with the lever E^{v}, nearest the shaft B, and acting on the remaining knives in succession and at intervals, as hereinafter described. As the levers E^{v} E^{vi} E^{vii} E^{viii} cross the ends of the levers E E′ E″ E^{iv} at right angles, the first-named levers are arched between their front ends and their axis of oscillation, (see Fig. 2,) in order to permit the vertical movement of the segments O.

The operation of the machine is as follows: The main wires being in position in the spindles, and the segments O O′ O″ O‴ and the movable knives R being all at their highest point, as shown in Fig. 3, the barb-wire *w′* is fed across and above the main wires and under the wrapping-pins S, the main wires, barb-wire, and wrapping-pins taking the relative positions shown in Fig. 4. The cam C, rotating in the direction indicated by the arrow at its periphery in Fig. 3, then raises the outer end of the lever E, throws downward the segment O, and rotates the pinion P and spindle Q about two and one-fourth revolutions in the direction indicated by the arrow on the face of the spindle in Fig. 4, thus wrapping the free end of the barb-wire about the main wire at the center of the spindle Q. The cam C^{iv} next actuates the lever E^{v}, and the knife attached to said lever is forced down to the position shown in Fig. 4, severs the barb-wire at the proper distance from the main wire on which the wrap has been already formed, and rises immediately after severing the barb-wire to its former position. This barb being completed, the segment O′ next acts on the pinion P′ and spindle Q′ and wraps the end of the barb-wire about the main wire at the center of said spindle Q′; and immediately after the forming of this wrap the knife attached to the lever E^{vi} descends, severs the barb-wire, and immediately ascends to its former position. In the same way barbs are formed on the remaining wires and successively severed from the barb-wire, the last cut being between the spindle Q‴ and the barb-feeding mechanism. In order that the knives may cut sufficiently close to the main wires, the spindles are cut away at one side, (see Figs. 3, 4,) the segment removed being at such a part of the cylinder as to leave the flat side face vertical at the close of the wrapping movement of each spindle. Attention has already been called to the fact that each of the knives rises immediately after having severed the barb-wire. This is necessary in order to permit the wrapping of the barb next following the one just completed by the knife. On the other hand, it is equally necessary to defer the reverse motion of the wrapping-spindles until the series of barbs have been formed—one on each main wire—and have been severed and moved forward out of the way of the wrapping-pins. While, therefore, the cams C^{iv} C^{v} C^{vi} C^{vii} are of substantially the same form but so placed as to begin to act on their respective levers at different times, the cams C C′ C″ C‴ are of such different forms as to raise the ends of their respective levers at different times but drop them at the same time—that is to say, the segments O O′ O″ O‴ are forced down successively, but they all remain at their lowest point until the last barb of the series is finished and the forward feed of the main wires has carried the barbs away from the wrapping-pins, when all the segments rise at once, rotating the spindles backward and bringing them into position to receive the barb-wire anew. During the upward movement of the segments the forward feed of the main wires is completed, the length of feed being the space desired between two contiguous barbs on the same wire.

The barb whose manufacture has been described is the Glidden barb, and the machine shown is especially adapted to the making of that particular form; but I do not limit the application of my invention to the making of that barb, as other forms may be made by changing the construction and arrangement of the machine without sacrificing the parts of this machine which are new.

The main wires *w*, when barbed, may be spooled singly, if desired, and used separately as single-strand fencing; or each of them may be intertwisted with a plain wire to form the ordinary two-strand Glidden fence-cable; or each pair of contiguous wires may be twisted together to form a cable, one wire of each cable being carried around a sprocket-wheel of such size as to bring the barbs of that wire between the barbs of the wire which runs straight from the machine. In case the four barbed wires are to be intertwisted with an equal number

of plain wires, the latter can most conveniently pass under the bed of the machine and join the barbed wires in front, being fed forward by suitable mechanism in rear of the bed.

The guides T shown and described seem to me to be in the simplest and most efficacious form possible for doing the work for which they are intended; but various other devices may be employed for the same purpose, and I do not therefore consider the form of these guides an essential element of my invention.

The mutilated gearing shown for actuating the barb-feed may be dispensed with, if desired, and a pawl-and-ratchet mechanism substituted for it; but, if any considerable number of spindles be used, the barb-feed is very long, and, since by the pawl-and-ratchet device, the feed-rolls can only be turned about one-third of a revolution, the use of that mechanism necessitates the employment of very large feed-rolls. On the other hand, if the mutilated gearing be used, the feed-rolls may be turned through any number of degrees at each rotation of the main shaft, and small rolls can thus be employed.

I am aware that there is no novelty in the wire-supporting spindles shown, taken singly, nor in the means by which they are rotated, as single-spindle machines are in common use in which a wire-supporting spindle, provided with a barb-wrapping lug, is turned by a geared segment actuated by a suitable cam. Neither is there anything new in the form or office of the feed-rolls, either for the main wires or the barb-wires, since intermittently-rotating feed-rolls are common to most of the barb-machines in use.

Having however described this machine and explained its operation, what I claim as new, and desire to secure by Letters Patent, is—

1. In a wire-barbing machine, the combination of means for supporting a series of main wires to be barbed, means for feeding a single barb-wire across and in contact with all the main wires, and means for forming from said single barb-wire a series of barbs, and for applying one of them upon each of the main wires of said series.

2. In a wire-barbing machine, the combination of a series of wire-supporting spindles, each adapted to support a main wire to be barbed, means for feeding a single barb-wire across the entire series of main wires so supported, and in front of said wire-supporting spindles, and means for forming from said single barb-wire a series of barbs and for applying one of them upon each of said main wires.

3. In a wire-barbing machine, the combination of a series of parallel spindles, axially perforated for the passage and support of a corresponding series of main wires separated by uniform spaces, each equal to the length of wire required to form a barb on one of said main wires, means for feeding a single barb-wire across said main wires and in front of said spindles, and means for successively forming from said single barb-wire a series of barbs and for applying them successively one on each of said main wires.

4. In a wire-barbing machine, the combination of a series of parallel spindles axially perforated for the passage and support of a corresponding series of main wires separated by uniform spaces, each equal to the length of wire required for a barb upon one of said wires, suitable wrapping-pins fixed in the front faces of said spindles, means for feeding a single barb-wire across said main wires in front of said spindles, and between said main wires and said wrapping-pins, a series of cutting devices adapted to sever said barb-wire in the spaces between said spindles, means for successively rotating said spindles at suitable intervals of time, and means for successively operating said cutting devices in the intervals of time between the movements of said spindles, whereby from said single wire barbs are successively wrapped about said main wires by said wrapping-pins, and severed by said cutting devices.

5. The combination of the series of parallel axially-perforated spindles Q Q′ Q″ Q‴, and a suitable stationary bearing in which they are journaled, the series of pinions P P′ P″ P‴, mounted on the rear ends of said spindles, respectively, each pinion of the series lying wholly in rear of the one next preceding it in the series, the series of segments O O′ O″ O‴, engaging with said pinions, respectively, and means, substantially as described, for imparting reciprocal motion to said segments, whereby said spindles are rotated reciprocally, substantially as shown and described, and for the purpose set forth.

6. The combination of the journaled barb-wrapping spindles Q Q′ Q″ Q‴, pinions P P′ P″ P‴, mounted on said spindles, respectively, segments O O′ O″ O‴, engaging with said pinions, respectively, and adapted, when moving downward, to rotate said spindles in the direction for wrapping, and when moving upward to rotate said spindles in a reverse direction, the pivoted levers E E′ E″ E^{iv}, formed integrally with said segments, respectively, and the cams C C′ C″ C‴, operating said levers, respectively, and adapted, through the operation of said levers, to depress said segments successively, and raise them simultaneously, substantially as and for the purpose set forth.

7. The combination of the series of knives R′, fixed in suitable stationary bearings, the vertically-reciprocating levers E^{v} E^{vi} E^{vii} E^{viii}, pivoted on a suitable horizontal axis, the knives R, fixed in seats in the front faces of said levers, respectively, and the cams C^{iv} C^{v} C^{vi} C^{vii}, mounted on the shaft B′, and adapted to depress the knife-carrying ends of said levers successively, whereby said knives R cooperate successively with the knives R′, substantially as shown and described, and for the purpose set forth.

8. The combination of the series of station-

ary knives R′, the series of vertically-reciprocating knives R, co-operating therewith, and the series of slotted wire-guides T, attached to the heads carrying said knives, and moving reciprocally therewith, substantially as shown and described, and for the purpose set forth.

9. The combination of the geared barb-feeding rolls F′ F′, the shaft B‴, on which the lower of said rolls is mounted, the shaft B′ at right angles to said shaft B‴, the mutilated gear D″, mounted on the shaft B′, and provided with a circumferential flange, *d*″, which is cut away on the arc subtending the toothed surface of said gear, and the pinion D‴, mounted on the shaft B‴, and provided with the opposite cam-faces, *d*, adapted to engage with the flange *d*″ and prevent the rotation of said pinion when not in engagement with the toothed portion of the mutilated gear, substantially as shown and described, and in combination with the obliquely-placed front faces of the spindles Q Q′ Q″ Q‴.

10. The combination of the series of wire-supporting spindles Q Q′ Q″ Q‴, whose front ends are in a line slightly oblique to the lines of their axes, and means, substantially as described, for feeding a barb-wire along the oblique line of said front ends, and in contact with the faces of said spindles, substantially as and for the purpose set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. DODGE.

Witnesses:
ROSWELL B. BACON,
R. H. WILES.