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O. J. ZIEGLER.

WIRE BARBING MACHINE.

No. 359,485. Patented Mar. 15, 1887.

Fig. 1.

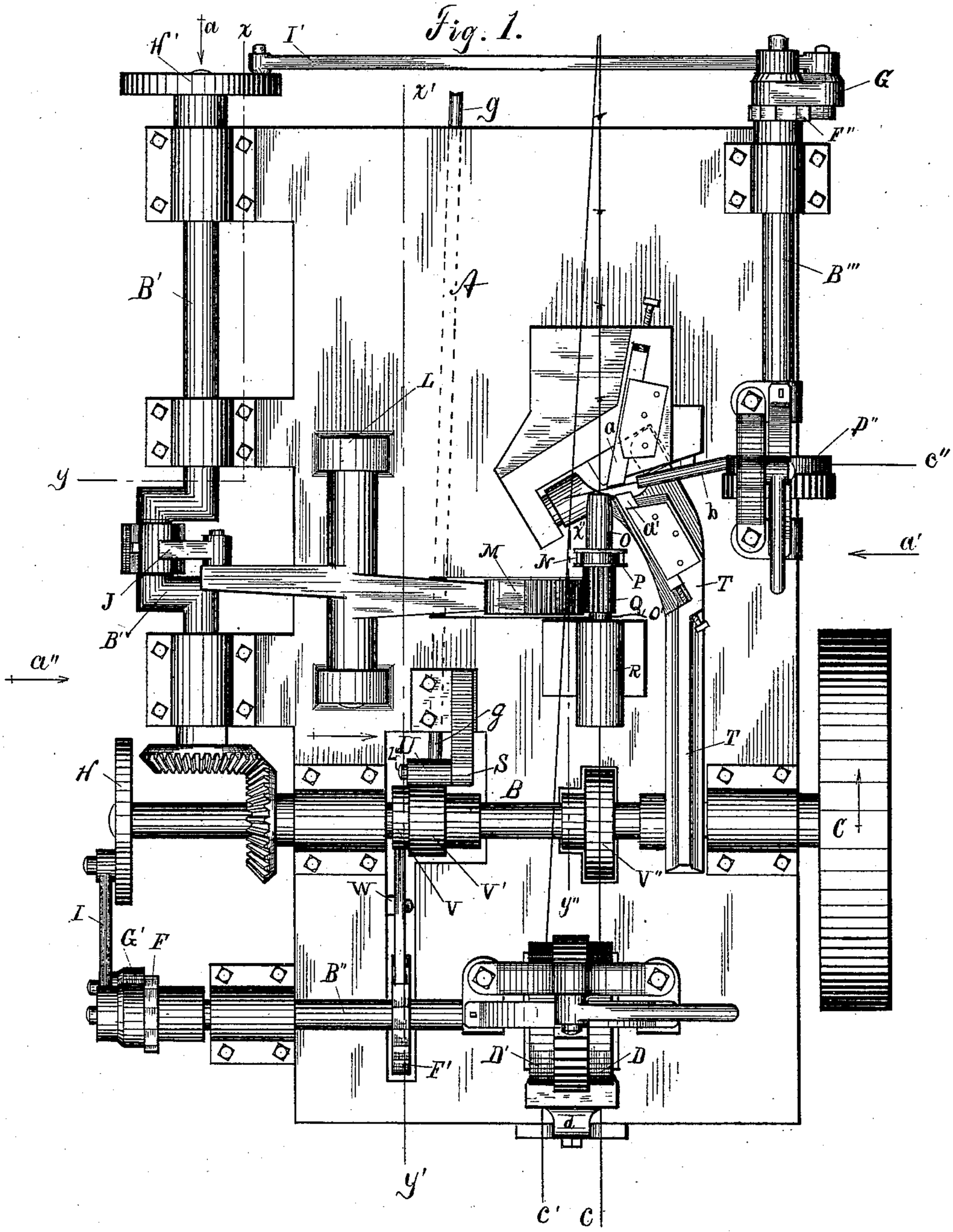

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Fig. 2.

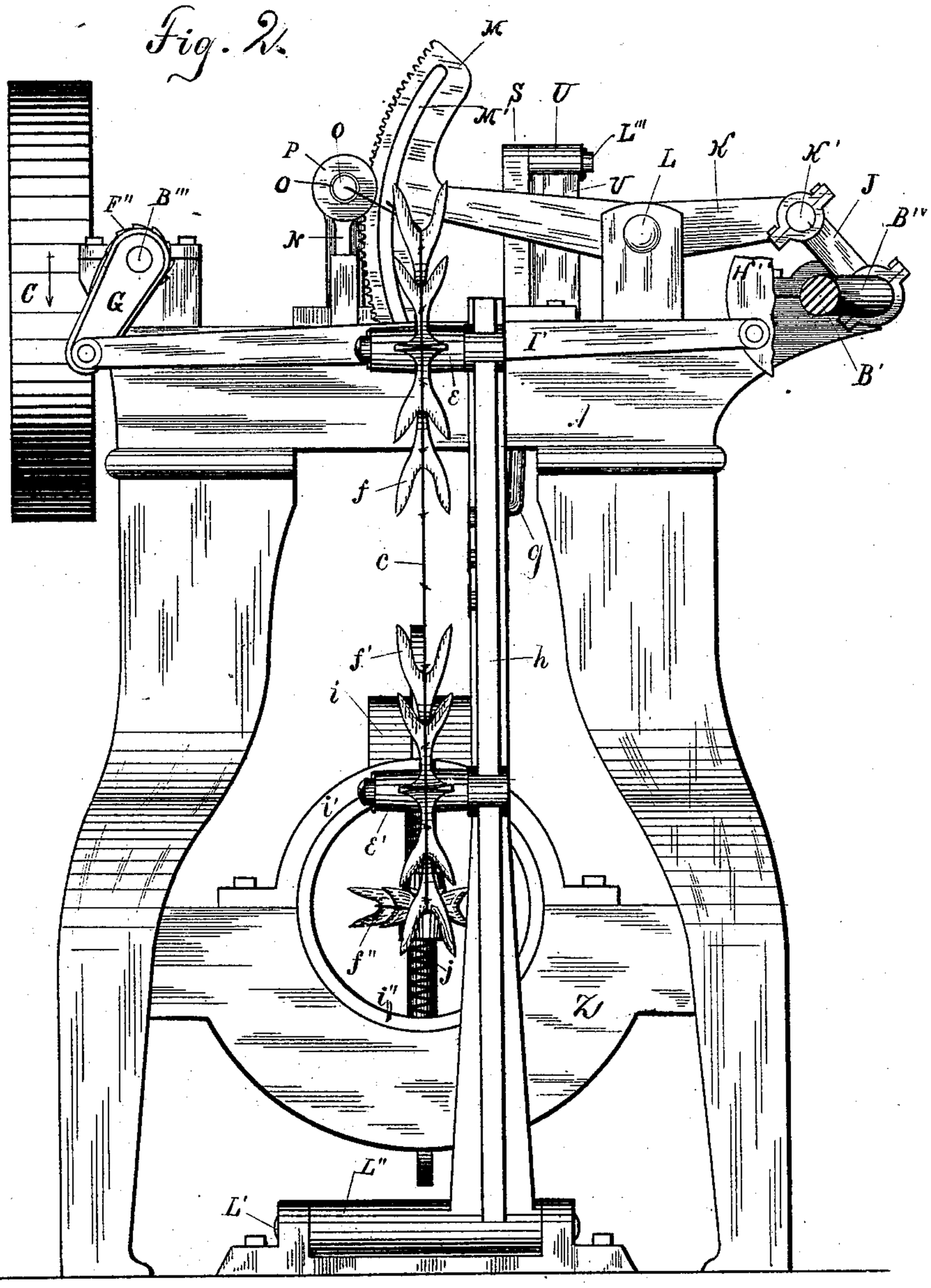

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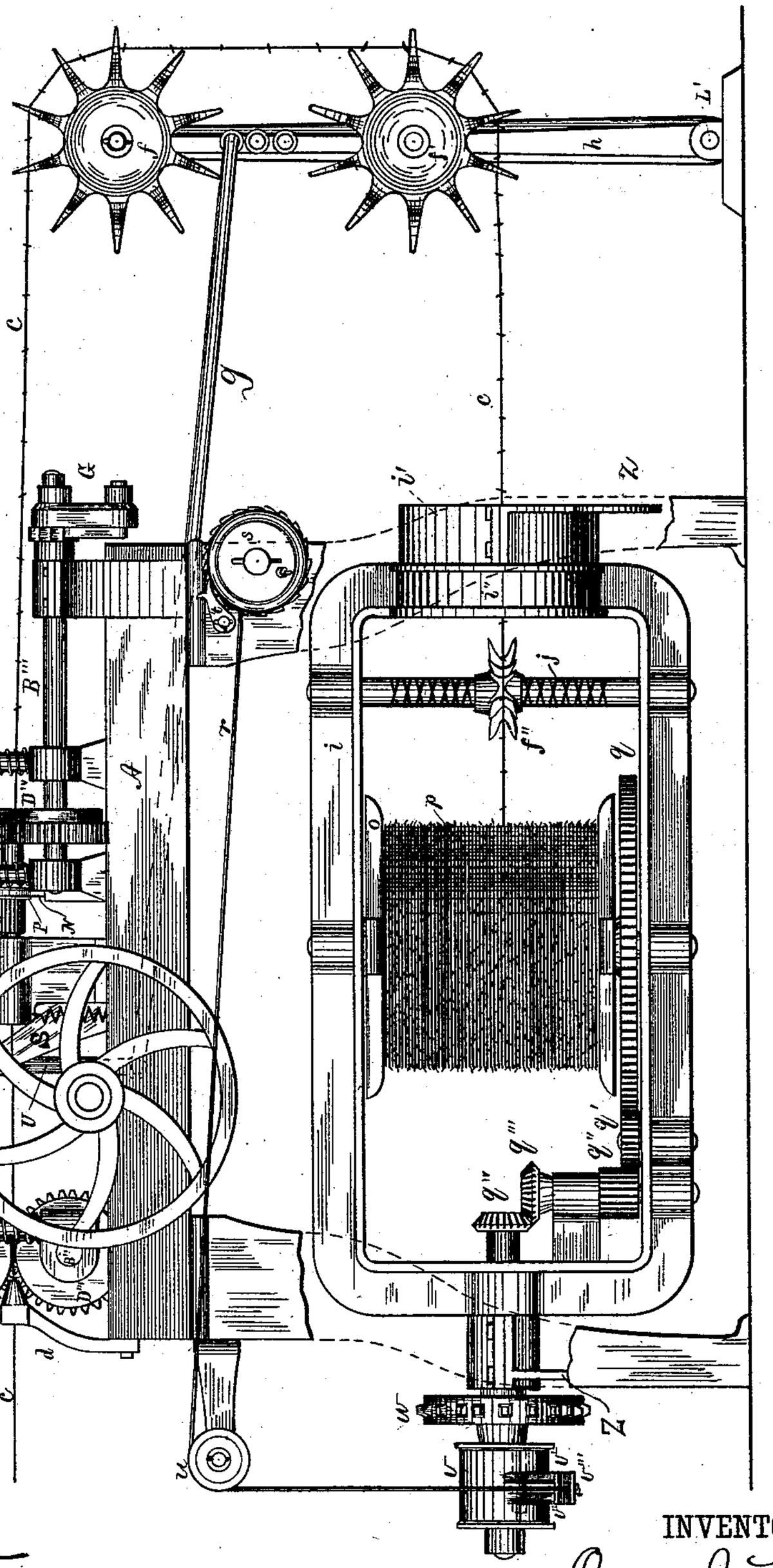
Fig. 3.



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WIRE BARBING MACHINE.

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Fig. 4.

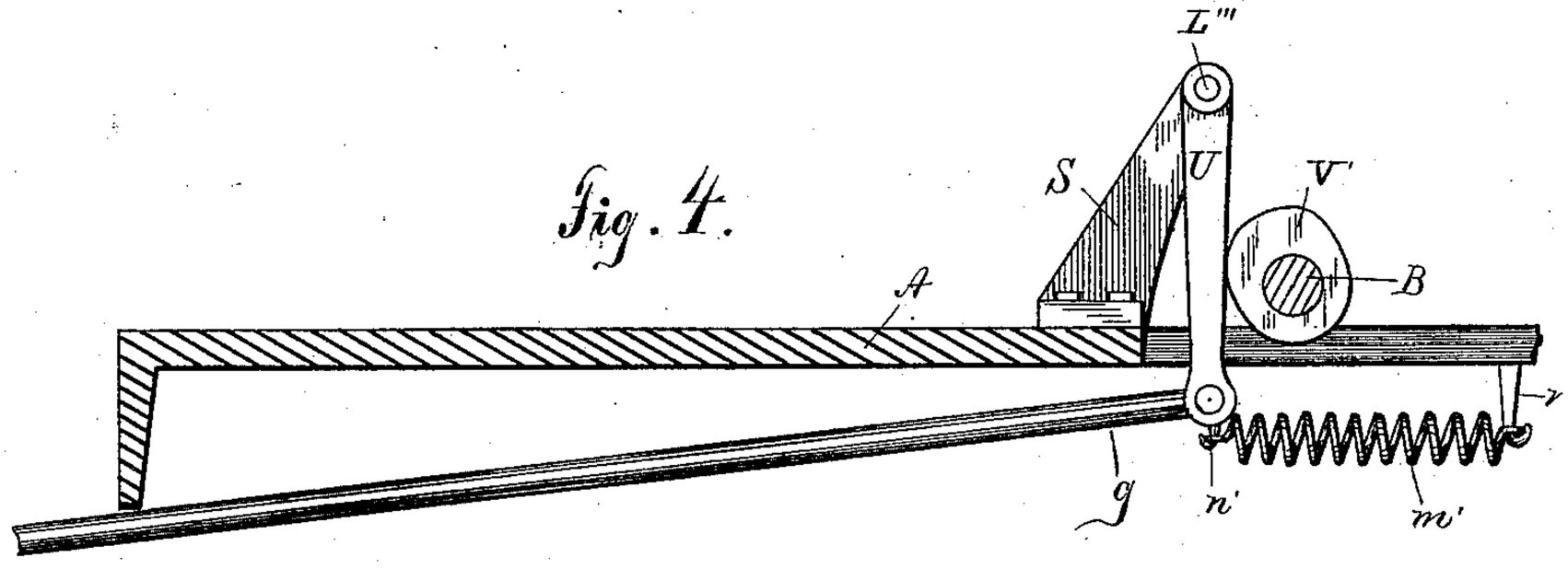


Fig. 5.

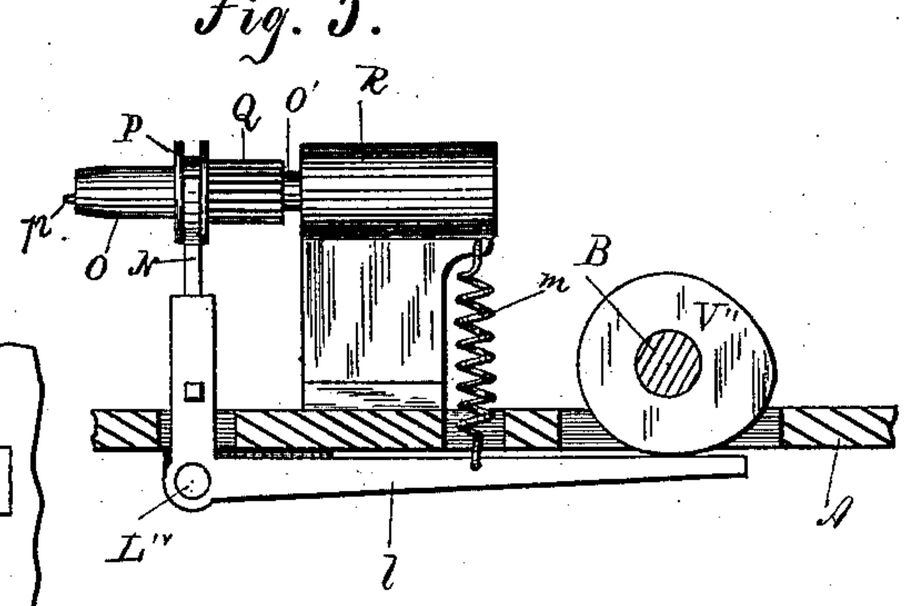
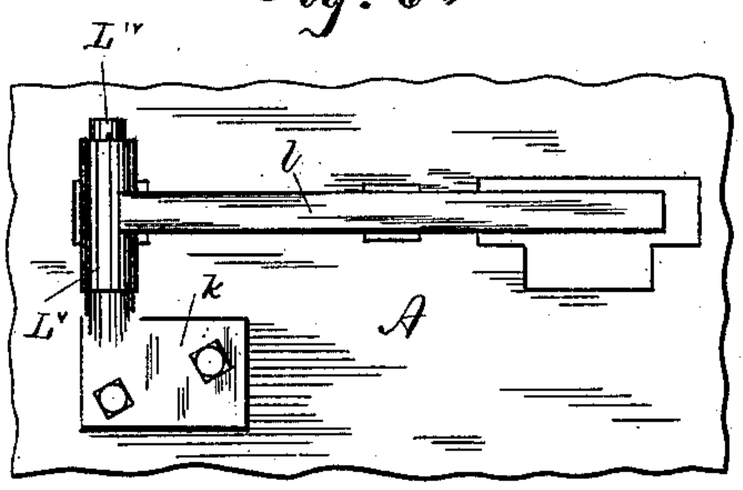


Fig. 6.



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UNITED STATES PATENT OFFICE.

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WIRE-BARBING MACHINE.

SPECIFICATION forming part of Letters Patent No. 359,485, dated March 15, 1887.

Application filed August 25, 1884. Serial No. 141,382. (No model.)

To all whom it may concern:

Be it known that I, OSCAR J. ZIEGLER, a resident of Freeport, in the county of Stephenson and State of Illinois, 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 relates to improvements in wire-barbing machines, the novel features thereof being embodied in the machine which is described and explained in this specification and shown in the accompanying drawings, of which—

Figure 1 is a plan of the entire machine, except the sprocket-wheels *f f'* of the take-up mechanism; Fig. 2, a front elevation of the machine looking in the direction indicated by the arrow *a*, Fig. 1; Fig. 3, a side elevation of the machine, looking in the direction indicated by the arrow *a'*, Fig. 1; Fig. 4, a longitudinal vertical section of the bed of the machine through the line *x' y'*, Fig. 1, showing the device for actuating the take-up mechanism, the view being in the direction indicated by the arrow *a''*, Fig. 1; Fig. 5, a longitudinal vertical section of the bed through the line *x'' y''*, Fig. 1, looking in the direction indicated by the arrow *a'''*, Fig. 1, showing the wrapping-sleeve and its support and the mechanism by which it is moved longitudinally; Fig. 6, a bottom plan of the lever which actuates the wrapping-sleeve.

In Fig. 1 are shown devices for feeding two main wires and one barb-wire and means for cutting the barb-wire. The feeding devices are shown in Fig. 3, but the cutting mechanism is omitted, and in Fig. 2 no feeding or cutting mechanism is shown. In Fig. 2, for the purpose of showing more clearly the segment-actuating mechanism, a portion of the front of the machine is broken away. The part so removed is shown in Fig. 1 in the angle between the lines *x y* at the left-hand front corner of the bed of the machine, and is cut away by vertical planes passing through said lines.

In the figures above enumerated, A is the bed of the machine. B is the main shaft, and B' a side shaft at right angles to the main shaft. A pulley, C, rotating in the direction indicated by the arrow on its rim in Fig. 1, is mounted on one end of the main shaft B, and serves as a means for applying power to the machine, and suitable miter-gears connect the shafts B B' and transmit the motion of the main shaft to the side shaft. On the opposite end of the shaft B from the pulley C is mounted a crank-plate, H, which imparts, through a pitman, I, and a pawl-and-ratchet mechanism, F G', intermittent rotation to a pair of double feed-rolls, D D' D''', Figs. 1, 3, adapted to feed forward two main wires, *c c'*, and on the front end of the side shaft, B', is mounted a crank-plate, H', which imparts through a pitman, I' and pawl-and-ratchet mechanism F'' G intermittent rotation to a pair of single feed-rolls, D'' D^{IV}, Figs. 1, 3, adapted to feed a single barb-wire, *c''*, across the path of the main wires and under and in contact with the wire *c*, on which the barb is to be formed.

To prevent the rotation of the feed-rolls D D' D''' by the tension of the main wires, a ratchet-wheel, F', is rigidly mounted on the shaft B'', and a pivoted pawl, W, Fig. 1, is so placed as to engage the ratchet-wheel during the forward swing of the crank G' and pitman I, but is lifted out of such engagement at the commencement of the backward stroke of the crank and pitman by means of a cam, V, mounted on the shaft B.

In front of the barb-wire and between the main wire *c* and the barb-feeding mechanism is a stationary knife, *a*, Fig. 1, provided with suitable means of longitudinal adjustment, and in rear of the barb-wire is a knife, *a'*, set in a rocking head, T, (in which it may be adjusted at pleasure,) adapted to co-operate with the stationary knife *a* and sever the barb-wire immediately after the formation of each barb on the main wire. Motion is imparted to the head T by means of a suitable cam on the main shaft B, and the knives are thus operated once for each rotation of the pulley C and main shaft B.

As the feeding and cutting devices above mentioned are well known in wire-barbing machines and are the same as those shown and described in the patent of Daniel C. Stover,

No. 278,624, I do not think it necessary to explain them in detail here.

The main wire *c* is supported immediately in rear of the barb-wire by a longitudinally-perforated stationary spindle, O′, through which it passes, the spindle itself being supported by a stationary bearing, R, in which it is rigidly fastened, and the bearing being fixed to the bed by any suitable means. On the spindle O′, in front of the bearing R, rotates freely a sleeve, O, somewhat shorter than the exposed portion of the spindle, and having in its front face an ordinary wrapping-pin, and about its periphery a grooved collar, P, and a pinion, 2, Figs. 1, 2, 5. The pinion 2 engages with a geared segment, M, Figs. 1, 2, formed integrally on the inner end of the vertically-oscillating lever K, which is pivoted on a suitably-supported horizontal shaft, L, parallel to the shaft B′. The outer end of the lever K has formed on its front face a boss, K′, whose axis is somewhat nearer than the axis of the shaft B′ to the wrapping-spindle O′. The shaft B′ is bent at a point opposite the lever K to form a double crank, B^{iv}, and the crank so formed is connected with the boss K′ by a pitman, J, Figs. 1, 2, provided at both ends with suitable boxes, which inclose the crank and boss, respectively. It is evident that the rotation of the crank B^{iv} must impart vertical oscillation to the lever K and segment M, and thus cause reciprocal rotation of the pinion 2 and shell O.

In the lower half of the annular groove in the collar P rests a yoke or fork formed integrally with a vertical rod, N, Figs. 2, 3, 5, which extends downward through the bed, and is adjustably attached to the vertical member of a bell-crank lever, *l*. The lever *l* is pivoted on a horizontal boss, L^{iv}, attached to the lower face of the bed of the machine, and its horizontal member extends backward from the pivotal point to a point somewhat in rear of the main shaft B. A cam, V″, Figs. 1, 5, mounted on the shaft B, gives the lever *l* an oscillating movement in a vertical plane, the rear end of the lever being held in contact with the cam by a spring, *m*, Fig. 5, one end of which is attached to the lever and the other end to the lower part of the bearing R. The oscillation of the lever *l* imparts reciprocal longitudinal motion to the sleeve O, and the extent of this motion is such that when the sleeve is at its forward limit of motion its front face is flush with the front face of the spindle O′, and when the sleeve is at its rearward limit the front end of the wrapping-pin is slightly in rear of the front face of the spindle—that is to say, when the sleeve is at its forward limit the wrapping-pin is in position to operate on the barb-wire; but when the sleeve is at its rearward limit the pin is wholly out of range of the barb-wire, and may rotate as far as desired without liability to strike it. The cam V″ is so "timed" as to hold the sleeve at its forward limit of motion (*i. e.*, in such a position that the wrapping-pin is in working position) during the wrapping and cutting of the barb. As soon as the barb is severed the sleeve recedes, the pin drops back in rear of the front face of the spindle O′, the barb is released, and the forward feed of the main wires commences. At the instant after the main-wire feed commences the barb-feeding mechanism begins to operate, and, since the wrapping-pin has been retracted out of range of the barb-wire, the entire barb-feed can be made during the reverse rotation of the sleeve O. Since the barb is fed below the main wire *c*, the wrapping motion of the sleeve O must be caused by and be simultaneous with the upward movement of the segment M. At the close of the upward movement of the segment the sleeve is drawn back, as above described, and during the moment when the segment is at rest at its highest position, and while it is moving downward, the sleeve and its wrapping-pin are out of working position. This is especially important when, as in the machine shown in the drawings, the segment-lever is actuated by a crank and pitman. The "dead-point" of the crank causes a "rest" of considerable length at the end of each upward or downward stroke of the segment, and renders it impossible to obtain the quick return which is possible when the segment-lever is moved by a cam. On the other hand, the motion imparted to the segment by the crank and pitman is smoother and more satisfactory than that obtained by the use of a cam. It has heretofore been impossible to get satisfactory results from the combination of the crank with the segment-lever, for the reason that as the barb-feed could not be made until after the reverse motion of the wrapping-pin had been nearly completed, the rest at the end of the upstroke of the segment was so long that when added to the downstroke of the segment it left an insufficient time for the barb-feed. In other words, the "rests" in the motion of the segment, caused by the dead-points in the motion of the crank, wasted so much of the working-time of the machine as to make a satisfactory speed impossible. The combination of the longitudinally-reciprocating sleeve (or any equivalent means of alternately advancing and retracting the wrapping-pin) with the segment, segment-lever, and crank and pitman removes this objection and makes the working of the machine extremely rapid as well as extremely smooth.

As the main wire *c* is barbed, it passes forward from the spindle O′, is carried over two sprocket-wheels, *f f′*, pivoted on horizontal gudgeons set in the side face of a vertical oscillating post, *h*, and passes from the lower sprocket-wheel backward to a reeling and twisting device beneath the bed of the machine, which will be hereinafter explained. The unbarbed main wire *c′* passes forward from the feed-rolls D′ D‴ through a slot, M′, in the segment M, and over the sprocket-wheels *f f′* to the reeling and twisting device, by means of which it is intertwisted with the barbed wire

c. The swinging post *h*, which supports the sprocket-wheels *f f'*, is pivoted at the bottom on a suitable-supported horizontal shaft, L', whose bearings are attached either to the machine or to the floor or foundation on which the machine rests. At a suitable distance above the pivot L' is pivoted to the post *h* the front end of a pitman, *g*, Figs. 1, 2, 3, 4, which extends backward under the bed of the machine to a point slightly in front of the main shaft B. The rear end of the pitman *g* is hinged or jointed to the lower end of a dependent swinging lever, U, whose upper end is supported by a pin, L''', set in a stationary support, S, which is bolted to the bed of the machine. A cam, V', mounted on the shaft B, gives a swinging motion to the lever U, which is held in contact with the cam by a spring, *m'*, Fig. 4. The forward motion of the lever U thrusts forward the pitman *g* and swings forward the post *h* and sprockets *f f'*, and the cam V' is so timed that this forward swing of the sprockets begins and ends simultaneously with the forward feed of the main wires, while the return swing of the sprockets occupies the time during which the main wires are at rest.

The duration and speed of the oscillation of the post *h* are such as to equalize the movement of the main wires from the barbing mechanism to the reeling device beneath the machine, the forward motion of the sprockets being such as to take up a portion of the slack caused by the forward feed of the main wires, while the backward movement pays out the slack taken up in the forward movement, and thus supplies the reel with wire during the cessation of the feed.

The reeling and twisting mechanism shown is substantially the same as that in common use with wire-barbing machines, and consists, essentially, of a flier, *i*, hung in suitable horizontal bearings, a transverse shaft near the center of the flier, on which to mount a spool, a transverse double-cut screw, *j*, and a distributing sprocket-wheel, *f''*, moving thereon, a sprocket-pulley, *w*, by means of which the flier is turned in its bearings, and gearing for rotating the spool and the shaft on which it is mounted. The flier is provided with the ordinary two-part friction-box, *v v' v'' v'''*, which is regulated by means of a cord, *r*, one end of the cord being fastened to the movable part of the box, while the other end is passed over a pulley, *u*, and thence to a ratchet-toothed handwheel, *s*, provided with a pawl, *t*. The only novel features claimed for the mechanism are, first, its arrangement under the bed of the machine, by which great economy of space is secured, and, second, the enlargement of the hollow shaft *i''* and bearing *i'* to permit the distribution of the barbed wire from the sprocket *f'* directly to the spool without the intervention of a guide-wheel in the throat of the hollow shaft. The flier is provided with support by bolting to the legs, at each end of the machine, a web, Z, with which is formed integrally one-half of the box which receives one of the hollow shafts of the flier, the other half of the box being bolted in place, as shown in Figs. 2, 3. This forms a simple and substantial support for the reeling and twisting mechanism, and is as well adapted for the purpose as any which can be devised; but its form can of course be varied, if desired, so long as the position of the flier remains substantially the same and the proper economy of space is preserved.

It has been customary heretofore to place a small guide-wheel at the inner end of the hollow shaft of the flier, through which the barbed wire enters, and to carry the wire from the guide-wheel to the distributing-sprocket, and thence to the spool. When that was done, it was necessary to place the transverse screw *j* and distributing-sprocket *f''* much farther from the inner end of the hollow shaft (and from the end of the flier) than they are shown in the drawings.

In the machine shown the barbed wire, when the distributing-sprocket is farthest from the center, describes a cone, of which the vertex is the point of contact of the wire and the sprocket *f'*, while the screw *j* is the diameter of its base. When a guide-wheel was placed in the throat of the hollow shaft, the base of the cone described by the wire remained the same as in the machine shown, but the guide-wheel was the vertex of the cone. The added length given to the cone by taking out the guide-wheel and enlarging the hollow shaft *i''* permits the screw *j* to be brought almost to the end of the flier and allows the flier to be materially shortened, thus effecting a considerable saving in space and weight and a consequent gain in smoothness and speed of motion.

I am aware that it is not new in wire-barbing machines to retract the wrapping-pin which forms the barb, in order to take it out of range of the barb-wire, since this feature may be found in a number of machines already patented or in public use. I am further aware that there are many ways of withdrawing the wrapping-pin from a working position, any one of which would be as practical as the method illustrated and described herein. I do not, therefore, desire to limit my invention to the combination of the special means shown for that purpose with the other elements of my machine, since it is evident that in any combination of which these means are an element they may be replaced by other substantially equivalent devices without materially altering the principle of operation of such combination.

All the features of this machine, except the barb-wrapping device, may be used in applying a barb to both the strands of a two-strand cable, as well as for making a cable one of whose strands is barbed and the other plain. The forming of a barb about both the strands requires the substitution of well-known and obvious barb-forming parts for the sleeve and spindle O O' in the exact forms shown; but the combination of the crank and pitman with the segment-lever and means for withdrawing the

wrapping-pin out of range of the barb-wire, the take-up mechanism, and the improved reeling and twisting device can all be used in the modified machine to the same purpose and with the same advantage as in the machine shown and described.

In making single-strand barbed fencing it is customary to twist the wire as it is reeled sufficiently to set each barb in a plane at right angles to the plane of the barb next to it in either direction, or, in other words, to put into the wire ninety degrees of twist for each barb applied to it. It is evident that the machine shown will make such fencing as well as a two strand cable, the only change necessary being a variation of the speed of rotation of the flier which carries the spool for taking up the fencing.

Having now described my invention 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 an intermittent main wire feeding mechanism, a barb-forming mechanism constructed and arranged to operate in the intervals between the forward movements of the main wire, a reeling and twisting mechanism in entering which the barbed wire moves in a direction contrary to that of its motion from the feeding to the barbing mechanism, a guide wheel or wheels about which the barbed wire passes in changing the direction of its motion, and from which it passes to the reeling and twisting mechanism, and means for increasing the distance of said guide wheel or wheels from the barbing mechanism during each forward movement of the main wires, and decreasing such distance during each interval between such forward movements, substantially as and for the purpose set forth.

2. In a wire-barbing machine, the combination of an intermittent main-wire feed, a barb-forming mechanism constructed and arranged to operate in the intervals of rest of the main-wire feed, a reeling and twisting mechanism suspended beneath the bed of the machine, an oscillating vertical support in front of said machine, a guide wheel or wheels mounted on said oscillating support, about which the barbed wire is carried in its course from the barbing mechanism to the reeling and twisting mechanism, a pitman connecting said oscillating support with the machine, and means for imparting longitudinal reciprocal motion to said pitman, whereby the support is moved forward during the operation of the main-wire feed and drawn back in the intervals of rest thereof, substantially as and for the purpose set forth.

3. The combination of an intermittent main-wire-feeding mechanism, a barb forming and applying mechanism operating in the intervals of rest of the main-wire feed, a reeling and twisting mechanism journaled in suitable supports beneath the bed of the machine, the post *h*, sprockets *f f'*, mounted thereon, the pitman *g*, swinging support U, and cam V', substantially as shown and described, and for the purpose set forth.

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

OSCAR J. ZIEGLER.

Witnesses:
JAMES H. STEARNS,
L. M. CURRIER.