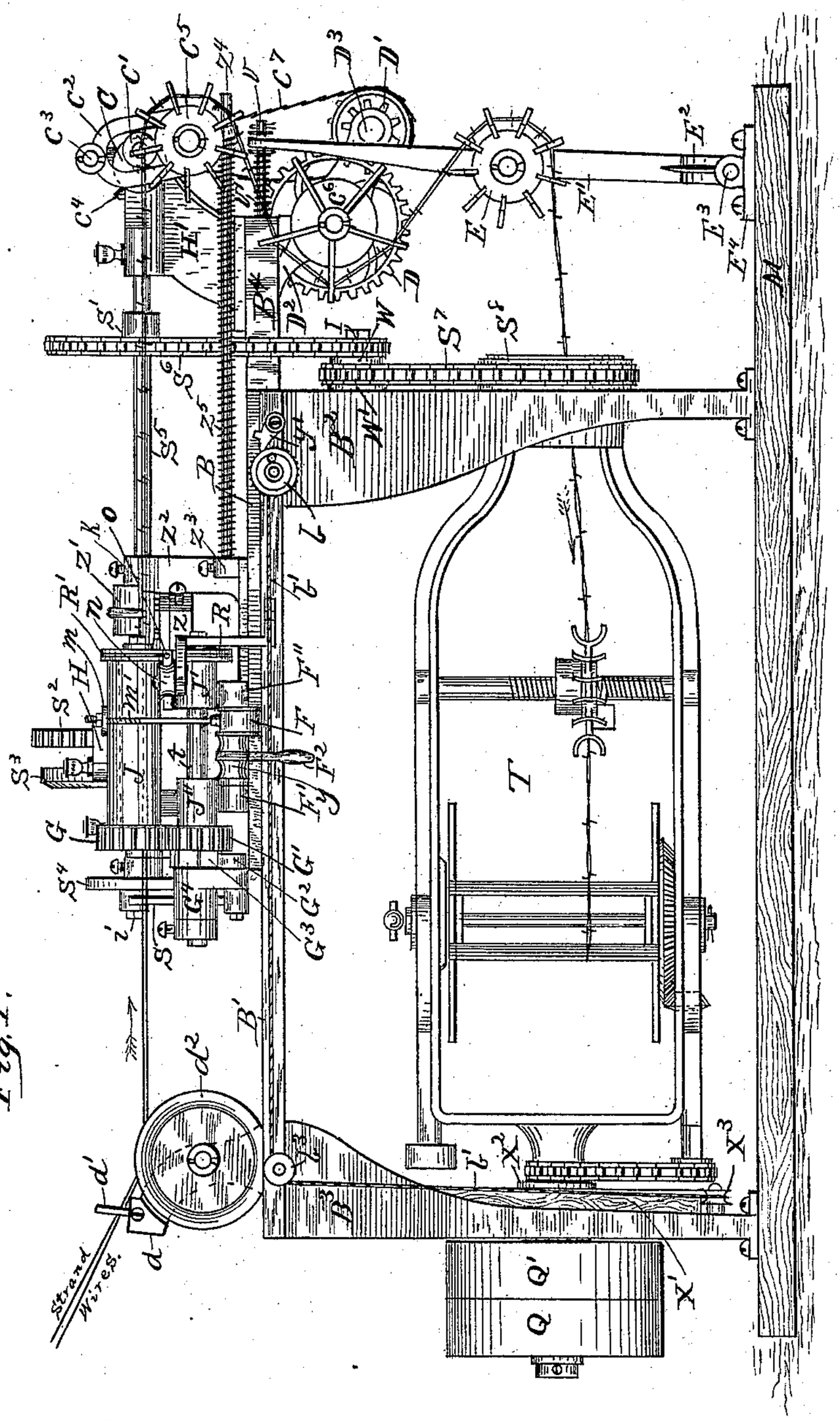
(No Model.) 3 Sheets—Sheet 1.

A. J. BATES.

WIRE BARBING MACHINE.

No. 365,723. Patented June 28, 1887.



Witnesses
Thos C Hutchins.
Wm J Hutchins.

Inventor.
Albert J. Bates.

(No Model.) 3 Sheets—Sheet 2.

A. J. BATES.

WIRE BARBING MACHINE.

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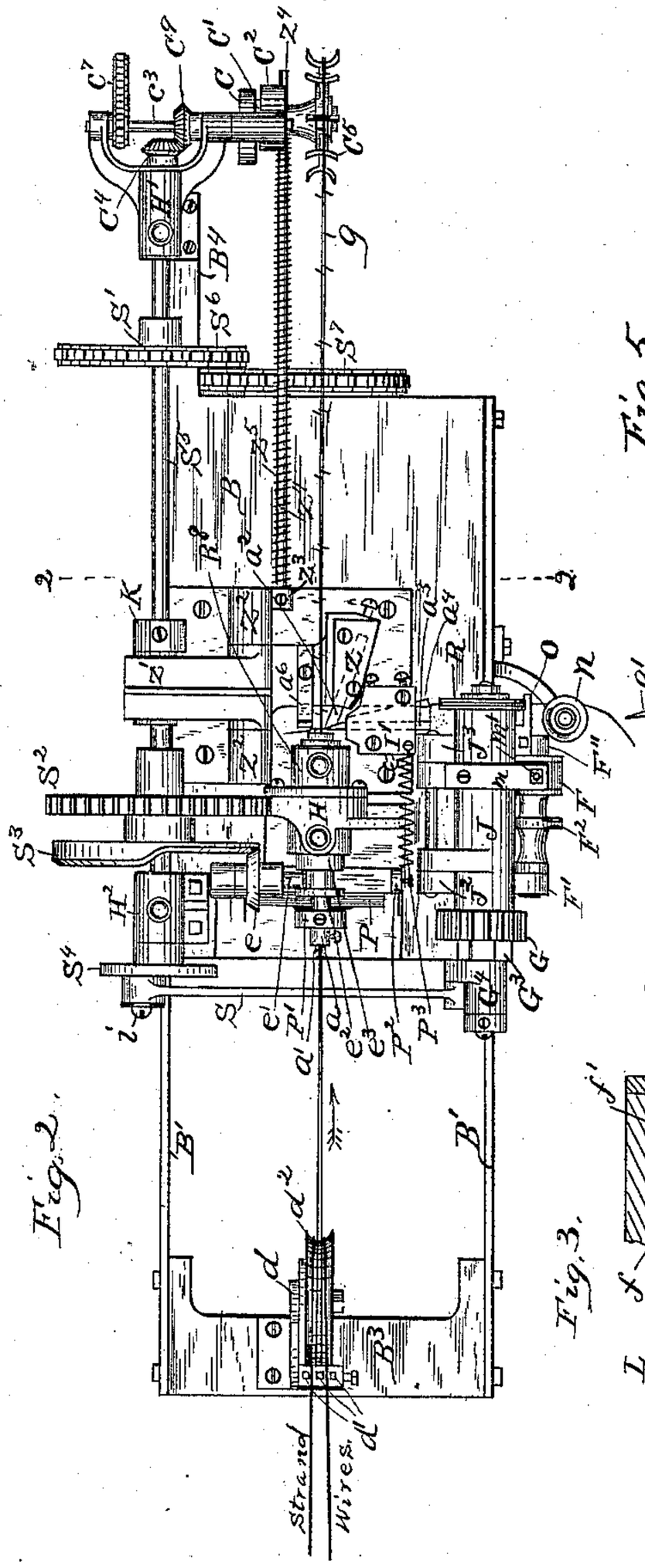

Fig. 2.

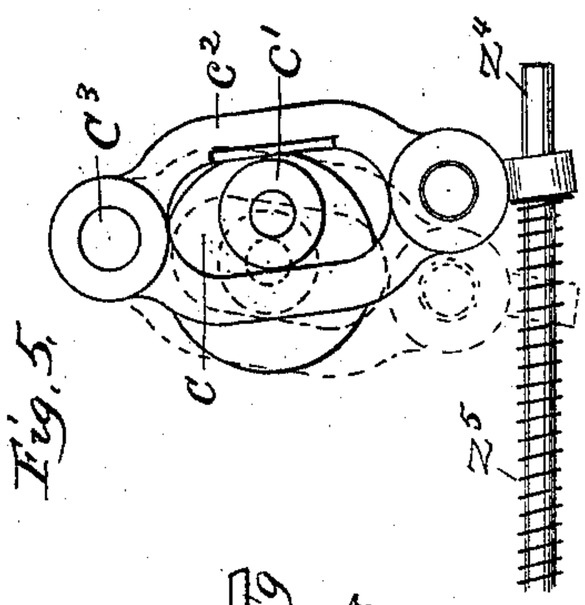

Fig. 5.

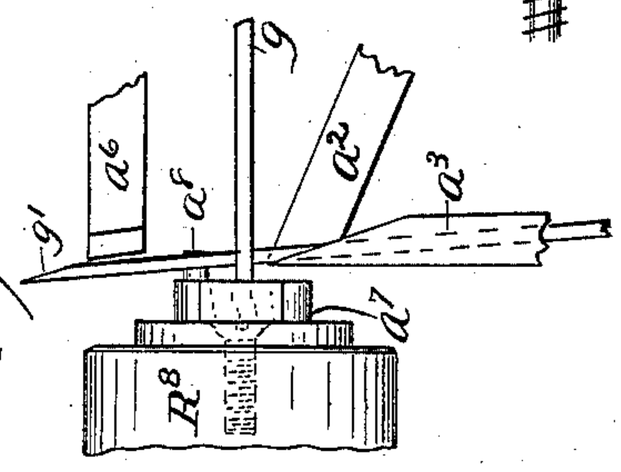

Fig. 3.

Fig. 4.

Fig. 6.

Witnesses
Thos. H. Hutchins.
Wm. J. Hutchins.

Inventor.
Albert J. Bates.

(No Model.) 3 Sheets—Sheet 3.

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Fig. 7.

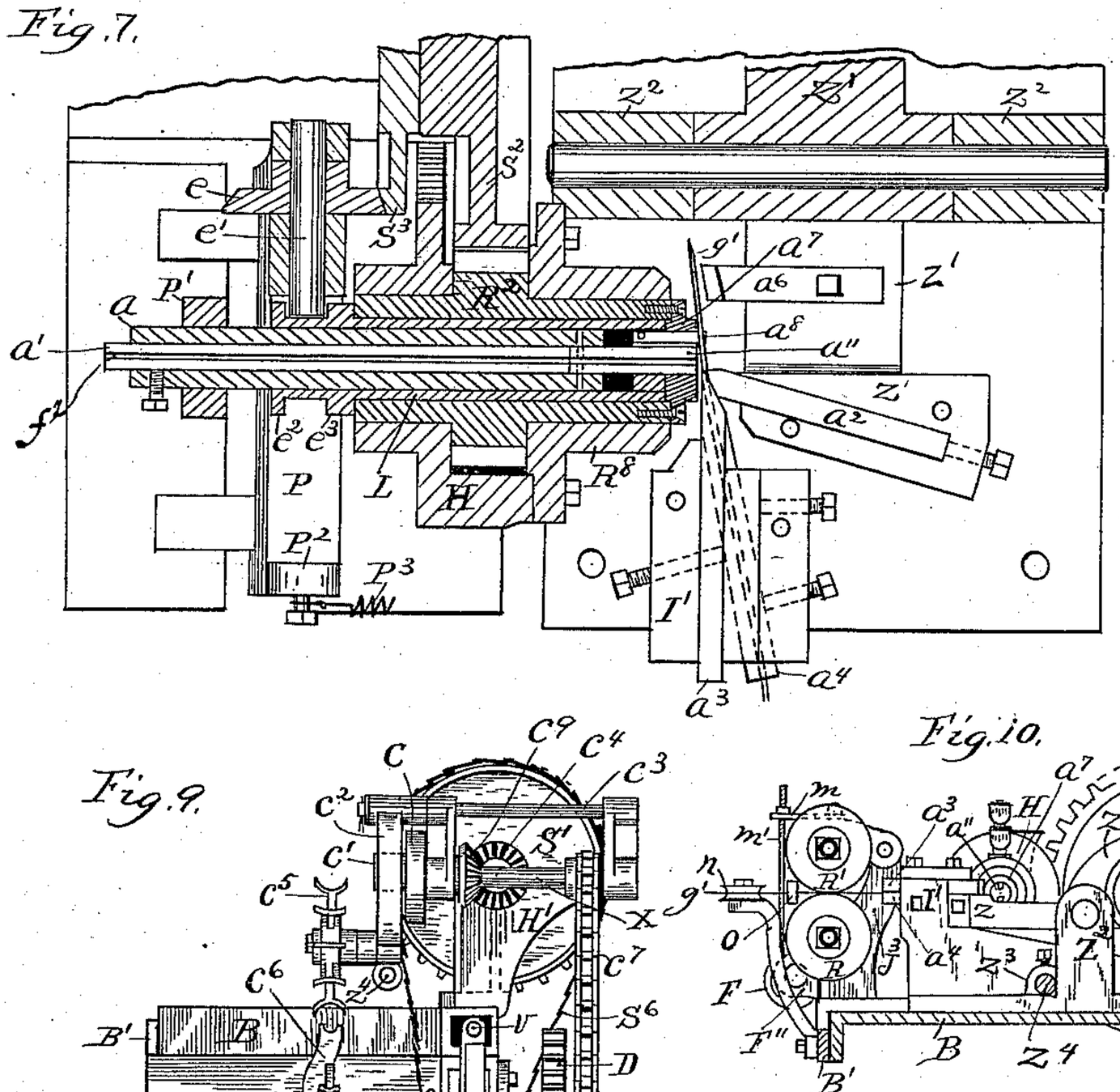


Fig. 8.

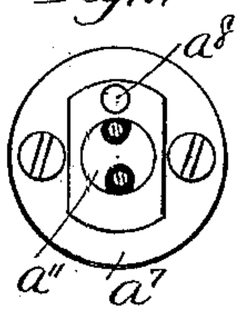


Fig. 9.

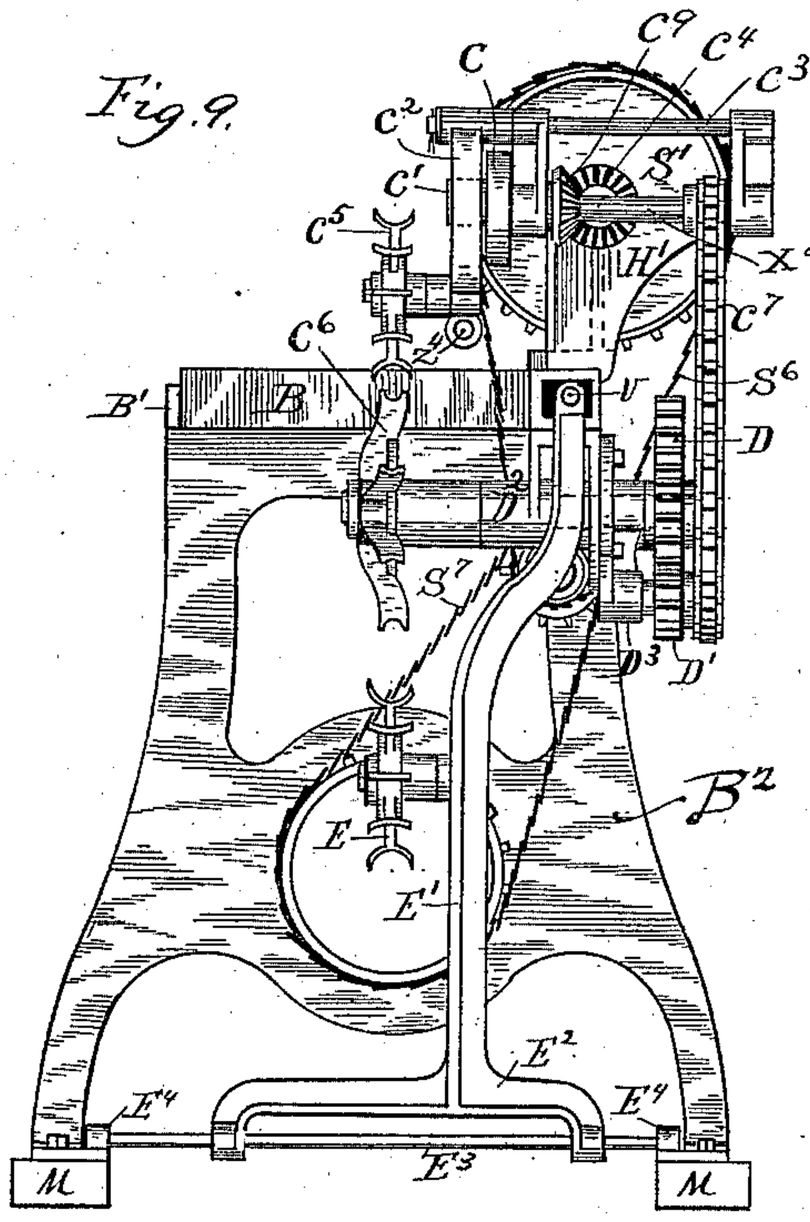
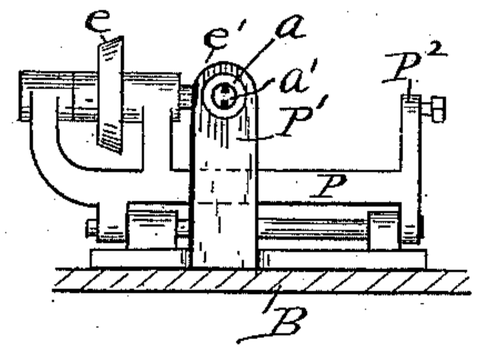


Fig. 10.

Fig. 11.



Witnesses
Thos. H. Hutchins.
Wm. J. Hutchins.

Inventor
Albert J. Bates.

UNITED STATES PATENT OFFICE.

ALBERT J. BATES, OF JOLIET, ILLINOIS, ASSIGNOR OF ONE-HALF TO WILLIAM O. BATES, OF SAME PLACE.

WIRE-BARBING MACHINE.

SPECIFICATION forming part of Letters Patent No. 365,723, dated June 28, 1887.

Application filed March 25, 1887. Serial No. 232,358. (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.

This invention relates to certain improvements in wire-barbing machines, which improvements are fully set forth and explained in the following specification and claims, reference being had to the accompanying drawings, and the letters and figures of reference thereon, making a part of this specification, in which—

Figure 1 is a side elevation of the wire-barbing machine. Fig. 2 is a top plan view of the same. Figs. 3 and 4 are detailed views of parts of the machine which operate to coil the barbs on the strand-wires. Fig. 5 is a detailed side view of parts of the machine which operate to take up and intermittingly pull the strand-wires through the machine. Fig. 6 is a perspective view of a section of two strand-wires having a barb coiled thereon, being the product of the machine. Fig. 7 is a horizontal longitudinal section of the barbing parts of the machine, taken on the line of the strand-wires. Fig. 8 is a face view of the barb-coiling mechanism. Fig. 9 is an end elevation looking toward the machine from the right in Fig. 1, showing more particularly the take-up mechanism. Fig. 10 is a cross-sectional view on line 2, Fig. 2, looking toward the barbing mechanism; and Fig. 11 is a detailed view of an oscillating frame of the machine, which operates to reciprocate the coiling-pin.

Referring to the drawings, B represents the bed of the machine, which is rectangular in form and supports the parts of the machine that coil the barbs on the strand-wires, and is supported at one end by the legs B^2 and at the opposite end, through the medium of the side extension-bars, B′ B′, on the legs B^3.

T is a spooler and twister of the ordinary pattern, journaled underneath the bed of the machine, between and boxed in its legs, as shown in Fig. 1, and bears at one end the pulleys Q Q′; one of which is loose and the other fast, to which the power is applied to drive the machine.

B^4 is an extension of bed B for supporting the wire take up mechanism of the machine. Two strand-wires pass through the machine in the direction of the arrow and enter between fingers *d′*, and thence over the guide-sheave d^2, studded to standard *d* on the legs B^3.

S^5 is the drive shaft secured to the bed of the machine in the standard-boxes H′ H^2, and has keyed on it the gear-wheel S^2, miter-gear C^4, cam-wheel S^3, crank-disk S^4, and sprocket-wheel S′, and is driven by the twister T through the medium of sprocket-chains S^6 S^7, sprocket-wheel S^8 on twister T, and double sprocket-wheel W W′, studded to the legs B^2, as shown at I in Figs. 1, 2, and 9.

The parts of the machine that place the barbs on the strand-wires are located about centrally on the top of the machine-bed, and are constructed, arranged, and operated substantially as follows:

H represents a standard secured to the top of the bed B, and, together with the face-plate R^8, secured to its side by means of bolts, forms a box and case for containing pinion R^2, as shown particularly in Fig. 7, which pinion meshes with the gear-wheel S^2, and is driven thereby. The hub of pinion R^2 is hollow for containing the strand-wire guide and coiling parts, and its hub is quite long for making a sufficient bearing for the parts passing through it.

L is a reciprocating wrapping-shaft centrally chambered from its rear end to within a short distance of its front end for the reception of stationary sleeve *a*, held stationary at its rear extending end in standard-box P′ by means of a set-screw, as shown in Figs. 2 and 7. Said sleeve *a* is short enough in shaft L so that space is left between its front end and the unchambered front end of shaft L, as shown in Figs. 3 and 7, so said shaft may reciprocate over said sleeve.

A′ is a strand-wire guide composed of a metal rod having opposite longitudinal channels f^2 (see Fig. 3) for the two strand-wires to lie in, and is held stationary in said sleeve *a* by means of a set-screw, as shown in Fig. 7.

A″ is a short similar strand-wire guide extending from the forward end of said guide A′ through an aperture in the forward end of the wrapping-shaft L, and through face-cap A⁷ to a position flush with its face, as shown in Fig. 7. Said guide A″ is designed to be interchangeable for others when worn, and is secured in sleeve A by means of a pin, *f*, passing through said guide and sleeve, as shown in Figs. 3 and 7.

A⁷ is a face-cap secured by means of screws to the forward end of the hub of pinion R², as shown in said figures and in Fig. 8.

A⁸ is a reciprocating coiling-pin secured in the forward end of wrapping-shaft L by means of a pin, *f′*, passing through said pin and shaft, and extends forward through an aperture in said face-plate A⁷ at one side of the strand-wire guide A″ out far enough to engage the barb-wire, as shown in Figs. 7 and 8. Said wrapping-shaft L is rotated continuously by means of pinion R² by being thus connected with it through the medium of said coiling-pin and face-plate. The rear extending end of said wrapping-shaft L is provided with the two annular flanges *e*² *e*³, as shown in Figs. 2 and 7, for the reception between them of the end of shaft *e′* of friction-wheel *e*, supported in the frame P, hinged to the machine-bed, as shown in Figs. 2, 7, and 11. The cam-wheel S³ on shaft S⁵ bears against friction-wheel *e*, as shown in Fig. 2, and as it rotates oscillates said frame P, with its friction-wheel *e* and its shaft *e′*, and thus reciprocates the wrapping-shaft L and the coiling-pin A⁸. The coil-spring P³, connecting a stationary part of the machine with arm P² of frame P, serves to hold said friction-wheel in contact with said cam. The said wrapping-shaft L and coiling-pin A⁸ are thus given a constantly rotating and reciprocating motion.

Z′ is a lever fulcrumed in standard-boxes Z², and is forked at its outer end over eccentric K, keyed on shaft S⁵. (See Figs. 1, 2, 7, and 10.) The inner end of said lever has secured therein the adjustable barb-cutters A², held by a proper cap-plate and cap-screws and adjusted by means of a set-screw at its outer end. A⁶ is a guard secured on said lever to direct the barb-wire *g′* so the coiling-pin A⁸ will engage it.

A³ is a stationary barb-cutter secured in standard I′ in the ordinary manner, and is designed to shear with the oscillating cutter A², and A⁴ is a barb-wire guide secured in said standard I′ under cutter A³, and held properly therein by means of set screws, and guides the barb-wire *g′* in between said cutters.

R and R′ are a pair of barb-wire feed-rolls for intermittingly feeding forward the barb-wire between the strand-wires. The lower feed-roll, R, is secured on the end of shaft *t*, boxed in the boxes J′ J″, secured to the machine-bed. The opposite end of said shaft has secured to it the gear-wheel G′, ratchet-wheel G³, and arm G⁴, having the pawl G² for engaging said ratchet-wheel. Said arm G⁴ connects with crank-disk S⁴ through the medium of pitman S, and the said shaft S⁵ through the medium of said crank-disk, pitman, and pawl-and-ratchet mechanism intermittingly rotates shaft *t* and feed-roll R. The upper roll, R′, is located immediately above roll R, and is secured to the end of a shaft in box J. The opposite end of said shaft has secured to it the gear-wheel G, which meshes with gear-wheel G′, from which it and its shaft and feed-roll R are driven and receive a like intermittent rotary motion. Said box J is provided with a pair of lugs on its inner side, which are hinged to the standards J² J³ on the machine-bed, as shown in Figs. 2 and 10, so that the upper feed-roll, R′, may be elevated and lowered to accommodate the feed-rolls to the size of the wire to pass between them.

M is a spring-arm secured to the upper side of box J, and connects at its outer end through the medium of the rod M′ with eccentric F on shaft Y, secured in the boxes F′ F″, as shown in Figs. 1, 2, 10. Said shaft Y is provided with the hand-lever F², by means of which said shaft and eccentric may be partially rotated and bring pressure to bear on said box J for the purpose of giving pressure to the feed-rolls on the wire between them.

N is a guide-sheave secured on a bracket-arm attached to the machine-bed, and serves to guide the wire to the feed-rolls, and O is a perforated plate secured to the standard J³, and is for the purpose of holding the barb-wire *g′*, passing through it, and properly guiding it between the feed-rolls R R′. The strand-wires pass through the pinion R² in the channels *f f* in the strand-wire guide in such position that one is directly above the other, as shown in Fig. 1.

The barb wire *g′* is intermittingly fed in between the strand-wires from the side of the machine by means of the feed-rolls R R′ in the position shown in Figs. 2, 4, and 7, each partial rotation of the feed-rolls feeding in enough wire to form a barb. The rotation of the coiling-pin A⁸ causes it to catch the extending end of the barb-wire and coil it around the two strand-wires in the form shown in Fig. 6. The machine is so adjusted that the coiling-pin A⁸ will be withdrawn from its contact with the barb when it is coiled on the strands, as shown, and the barb-cutters A² A³ will at the same time sever the barb loose from the barb-wire in a diagonal manner to form barb-prods, and the take-up mechanism will draw the strand-wires along far enough and stop them for the next succeeding barb to be placed on the proper distance from its predecessor in like manner. The strand-wires must pass through the machine in an intermittent manner, so that they may remain quiet during the time the barbs are placed on, and then move forward far enough and stop for the next succeeding barb to be placed on, and after being barbed pass over the butterfly-wheels C⁵ C⁶ and E through the throat or hollow journal of the twister to the spool in said twister. (See Figs. 1 and 2.)

These butterfly-wheels and their operative parts constitute the take-up mechanism for intermittingly drawing the strand-wires through the machine. The wheel C^5 is studded to the side of the depending arm C^2 at the lower end, as shown in Fig. 9, and said arm depends from the outer end of the shaft C^3, boxed in standard H′, secured to extension-bed B^4.

X is a shaft boxed in said standard, and has secured on it a sprocket-wheel, bevel-gear C^9, and crank-disk C, having the crank-roller C′, extending into the slot in arm C^2. Said shaft is driven by the shaft S^5, through the medium of the miter-gears C^4 and C^9. Said crank-roller is set eccentric to shaft X, and when said shaft rotates causes said arm C^2, and wheel C^5, studded to it, as stated, to vibrate. The butterfly-wheel C^6 is secured to a shaft boxed in box D^2, secured to the under side of extension-bed B^4, which shaft has secured to its opposite end the gear-wheel D, which meshes with pinion D′, studded to arm D^3, secured to the side of the bracket bearing box D^2. Said pinion D′ is provided with a sprocket-wheel secured to its outer side, and C^7 is a sprocket-chain connecting said sprocket-wheel with the sprocket-wheel on the shaft X. The said butterfly-wheel C^6 is driven by the shaft S^5, through the medium of miter-gears C^4 C^9, sprocket-chains C^7, pinion D′, and gear wheel D. The lower end of vibrating arm C^2 is provided with an eye, through which the outer end of rod Z^4 passes, its inner end being secured in box Z^3 on the machine-bed. (See Figs. 1, 2, 5, 9.) Said rod bears the coil-spring Z^5, as shown, against which the arm C^2 yieldingly presses to prevent pounding of said crank-pin in said arm C^2.

E′ is an arm having a forked foot, E^2, which is secured on shaft E^3, boxed on the sills M M at E^4, as shown in Figs. 1 and 9, and has secured to its side a stud bearing the butterfly-wheel E. The upper end of said arm is provided with an eye, through which rod V passes. Said rod bears the coil-spring V′, against which the upper end of said arm yieldingly presses to permit the wheel E to yield when the wire winds on uneven places or inequalities on the spool. When the wheel C^5 is oscillated from the machine, it draws the strand-wires along through the machine. Its reverse movement permits the wires to remain stationary in the wrapping-shaft long enough to permit a barb to be placed on, as described. The wheel C^6, which is driven, as stated, causes the strand-wires to pass over it and wheel E continuously to the spool of the twister T.

The distance the barbs are to be placed apart and the strand-wires intermittingly drawn through the machine is regulated by means of changing the position of crank-roller C′ on the disk C to lengthen or shorten the oscillation of arm C^2 and wheel C^5. Wheel C^6, being driven, is taking up wire continuously. During each half-rotation of the machine, while the barbs are being placed on the strand-wires, it is supplied with wire by the slack wire given out by the return vibration of wheel C^5; and when wheel C^5 is vibrated reversely to take up wire, wheel C^6 is fed by drawing the wire around wheel C^5 at the same time said wheel C^5 is taking up, and thus during the time wheel C^5 is taking up wire, wheel C^6 has drawn one-half the required feed around wheel C^5, and as the wire is passing to and about wheel C^5 and back toward the machine to wheel C^6, by means of such passage of the wire, the wire taken up by wheel C^5 is equal to twice the distance of the vibration of said wheel, and thus said wheel C^5 is vibrated but one fourth the distance that the barbs are placed apart, and consequently has a very easy and uniform movement.

It becomes necessary in operation that the barbed wire shall be taken up by the spool in the twister as fast as it is taken up and paid out by the take-up mechanism of the machine; also, it is necessary that the wire on the spool shall be wound evenly at a certain tension. To accomplish this, the mechanism of the twister and spooler is such that the spool will revolve fast enough to take up all the wire when the spool is first placed in the twister and the wire begins to wind on it. Said spooler mechanism is operated by a friction-brake (shown at X′) of the ordinary pattern, and as the wire increases in bulk on the spool said friction mechanism partly slips, permitting the spool to revolve only as fast as wire is delivered to it; and to retain a uniform tension on the spooling barbed wire said friction-brake has to be adjusted at various times during the winding of each spool, which is done by means of a hand-wheel, *b*, (see Fig. 1,) through the medium of a rope, *b′*, passing over pulleys b^3 and X^3. The friction brake X′, which brakes against wheel X^2 of the twister, is tightened or loosened by means of said hand wheel through the medium of rope *b′*, which connects said brake at one end and winds on the hub of said hand-wheel at its opposite end, said brake being of the ordinary pattern.

The yielding end of arm E′, which supports the butterfly-wheel E, serves as an indicator for the operator of the machine to indicate to him about what tension is on the barbed wire as it passes to the spooling mechanism. When spring V′ on rod V of said arm is closely compressed, it indicates that the tension is too great, and the operator then turns back the hand-wheel *b* to loosen the spooler-brake, and when said spring is loosely expanded it indicates that the tension is not sufficient, and the operator then tightens the brake of the spooling mechanism, and thus is enabled to maintain a uniform tension.

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

1. In the wire-barbing machine shown and described, and in combination with the continuously rotating and reciprocating coiling-pin A^8, the stationary cutter A^3, oscillating lever Z′, having the cutter A^2, arranged to

shear with stationary cutter A^3, wire-guide A^4, barb point guard A^6, feed-rolls R R′, and cam K, and the means, substantially as specified, for operating said parts, as and for the purpose set forth.

2. In the wire-barbing machine, and in combination with the wire-barbing mechanism described, the barb-wire-feeding mechanism consisting of the feed-rolls R R′, hinged box J, spring-arm *m*, shaft Y, having eccentric F, and hand-lever F^2, rod *m*′, for connecting said eccentric and arm, gears G G′, ratchet-wheel G^2, arm G^4, having pawl G^2, for engaging said ratchet, pitman S, and crank-disk S^4, substantially as set forth.

3. In the wire-barbing machine shown and described, and in combination with pinion R^2, having the face-cap A^7, the reciprocating and rotating wrapping-shaft L, having the coiling-pin A^8, stationary sleeve A, and stationary strand-wire guides A′ A″, having the channels f^2 f^2, stationary barb-cutter A^3, lever Z′, oscillating barb-cutter A^2, and means, substantially as set forth, for operating said parts and for feeding said strand and barb wires, as and for the purpose specified.

4. In the wire-barbing machine shown and described, the combination of the gear-wheel S^2, pinion R^2, having face-plate A^7, hollow wrapping-shaft L, carrying coiling-pin A^8, and having the annular flanges e^2 e^3, stationary sleeve A, strand-wire guides A′A″, stationary cutter A^3, oscillating lever Z′, having the cutter A^2, to shear with cutter A^3, barb-wire guide A^4, rock-frame P, spring P^3, friction-wheel *e*, shaft *e*′, and cam-wheel S^3, substantially as and for the purpose set forth.

5. In a wire-barbing machine, and in combination with the barbing mechanism, the vibrating butterfly-wheel C^5, yielding butterfly-wheel E, and stationary driven butterfly-wheel C^6, and mechanism, substantially as described, for operating said parts, as and for the purpose set forth.

6. In the wire-barbing machine described, the oscillating frame P, in combination with the friction-wheel *e*, shaft *e*′, coil-spring P^3, cam-wheel S^3, and wrapping-shaft L, having the annular flanges e^2 e^3, and the mechanism, substantially as shown and described, for operating said parts, as and for the purpose set forth.

7. In the wire-barbing machine described, and in combination with the positively-driven wheel C^6 and a driven spooler, the yielding wheel E, arranged between said wheel C^6 and spooler, substantially as and for the purpose set forth.

8. In the wire-barbing machine described, and in combination with shaft S^5 and miter-gears C^4 C^9, the shaft X, having the crank-disk C and crank pin or roller C′, shaft C^3, slotted arms C^2, and rod Z^4, bearing the coil-spring Z^5, substantially as and for the purpose set forth.

9. In the wire-barbing machine described, the combination of the oscillating butterfly-wheel C^5, driven butterfly-wheel C^6, and yieldingly-supported butterfly-wheel E, constructed and arranged to operate in the manner substantially as and for the purpose specified.

10. In the wire-barbing machine described, the combination of lever Z′, fulcrumed to standards Z^2 Z^2, and having the head Z, cam K, head I′, wire-guide A^4, wire-guard A^6, and cutters A^2 and A^3, and the mechanism, substantially as set forth, for feeding forward the barbing-wire and for coiling barbs on the strand-wires, as specified.

11. In the wire-barbing machine described, and in combination with shaft S^5 and miter-gears C^4 C^9, the shaft X, having a sprocket-wheel fixed thereon, sprocket-chain C^7, pinion D′, having an integral sprocket-wheel arranged at its side, gear-wheel D, butterfly-wheel C^6, and a shaft connecting said butterfly-wheel and gear-wheel, all arranged to operate substantially as and for the purpose set forth.

12. In the wire-barbing machine described, and in combination with the driven butterfly-wheel C^6, the arm E′, fulcrumed on rod E^3, and having the butterfly-wheel E studded to its side, rod V, bearing the coil-spring V′, vibrating arm C^2, having the butterfly-wheel C^5 studded to its side, and the mechanism, substantially as shown, for operating said parts, as and for the purpose set forth.

13. In a wire-barbing machine wherein the strand-wires, being barbed, are intermittingly drawn through the barbing mechanism of the machine, the combination of a butterfly vibrating wheel arranged to move toward and from and support the barbed wire moving from the barbing mechanism, a continuously-driven butterfly-wheel arranged to take and support the barbed wire from said vibrating wheel, and an idler butterfly-wheel arranged to take and support the barbed wire paid out by said driven butterfly-wheel and guide it to the spooling mechanism, whereby the barbed wire is intermittingly drawn through the barbing mechanism by the joint action of the movement of said vibrating butterfly-wheel from the barbing mechanism, and the said driven butterfly-wheel drawing the wire from and over said vibrating wheel, and whereby the barbed wire is continuously paid out to the spooling mechanism by means of the continuous movement of said driven wheel, being supplied with slack wire from said vibrating wheel during the time said vibrating wheel is moving toward the barbing mechanism, substantially as and for the purpose specified.

ALBERT J. BATES.

Witnesses:
THOS. H. HUTCHINS,
WM. J. HUTCHINS.