

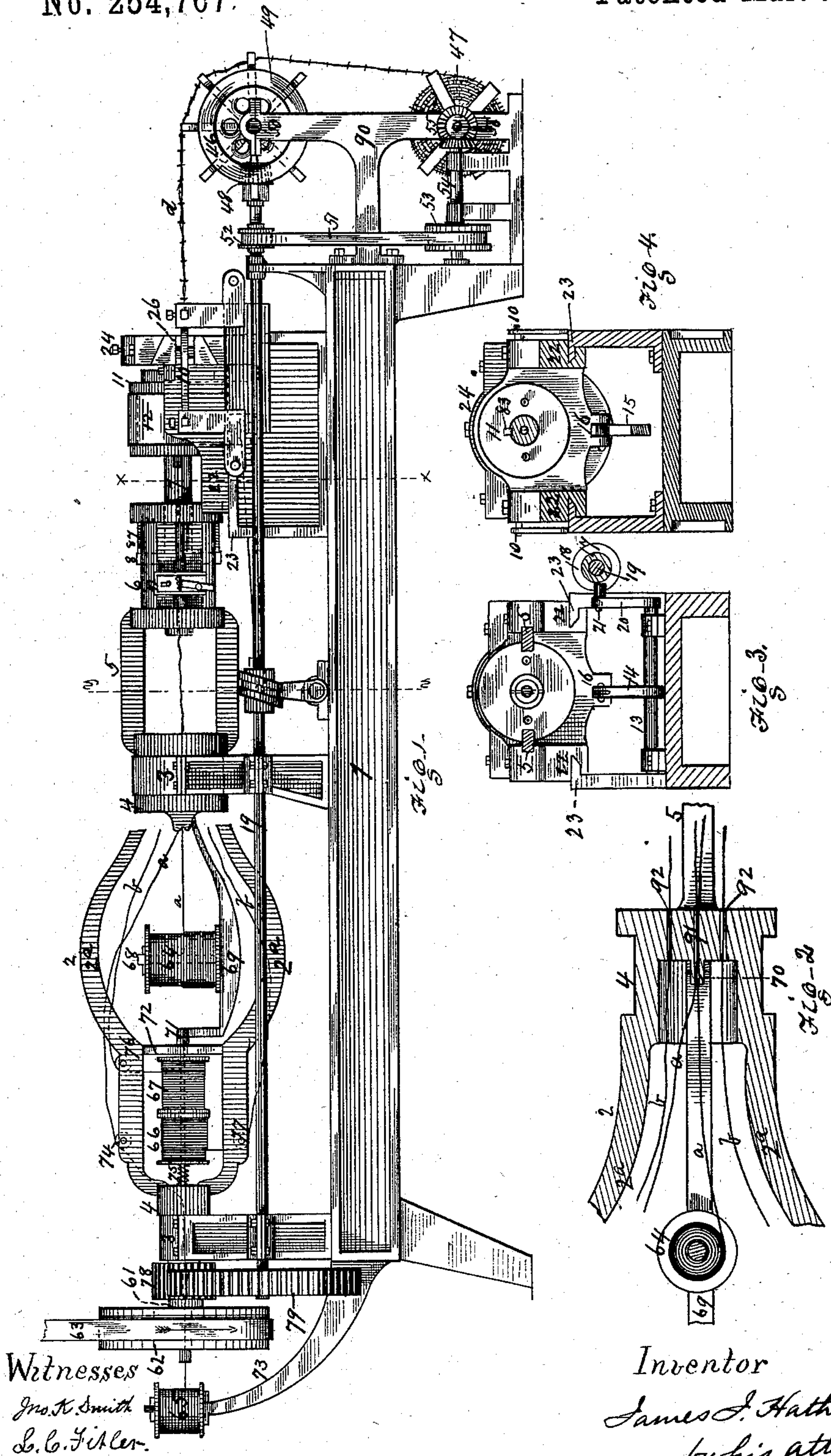
(No Model.)

4 Sheets—Sheet 1.

J. J. HATHAWAY.
WIRE BARBING MACHINE.

No. 254,767.

Patented Mar. 7, 1882.



Witnesses
Geo. H. Smith
L. C. Fidler.

Inventor
James J. Hathaway
by his attys
Bakewell & Kerr.

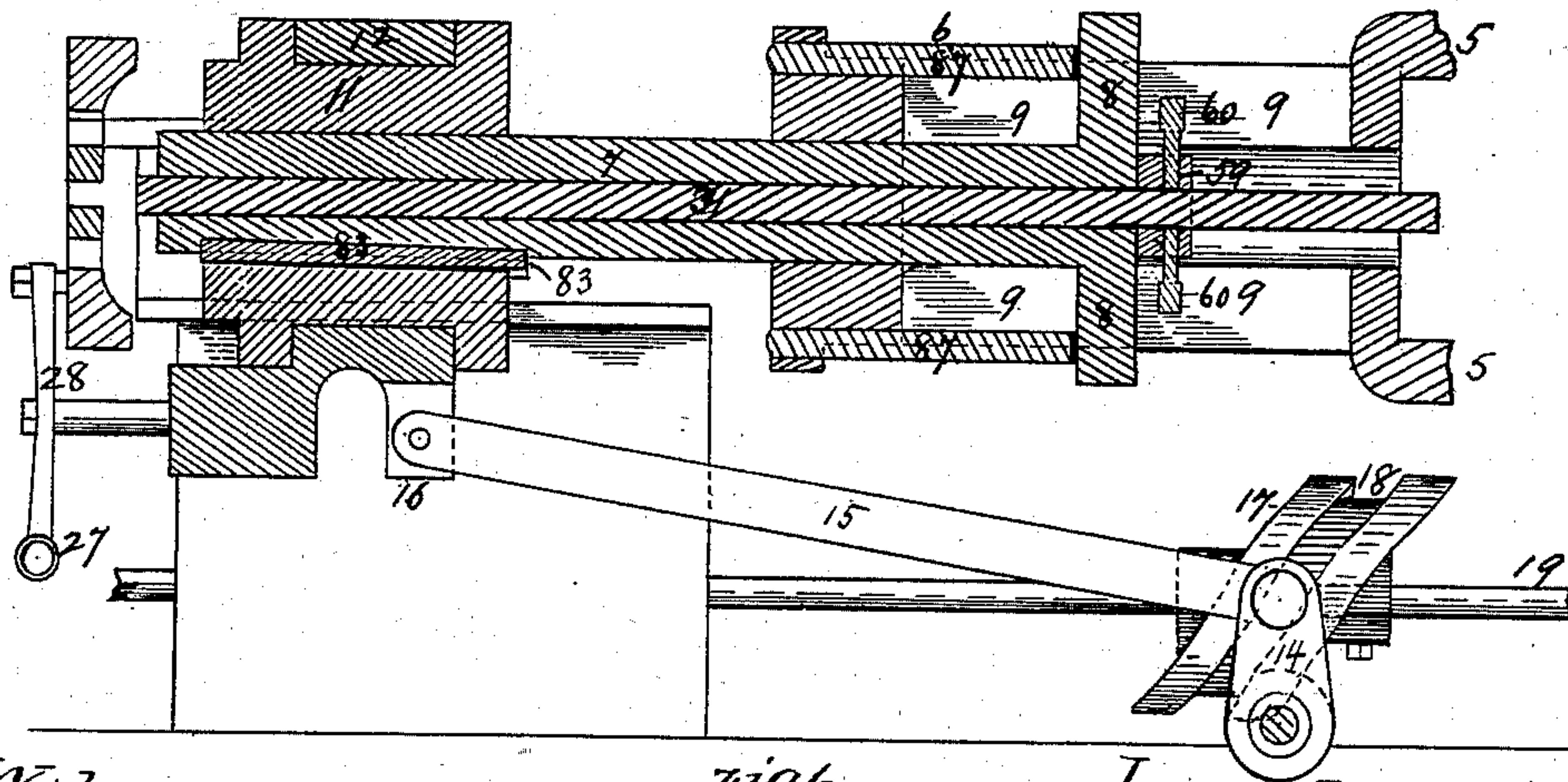
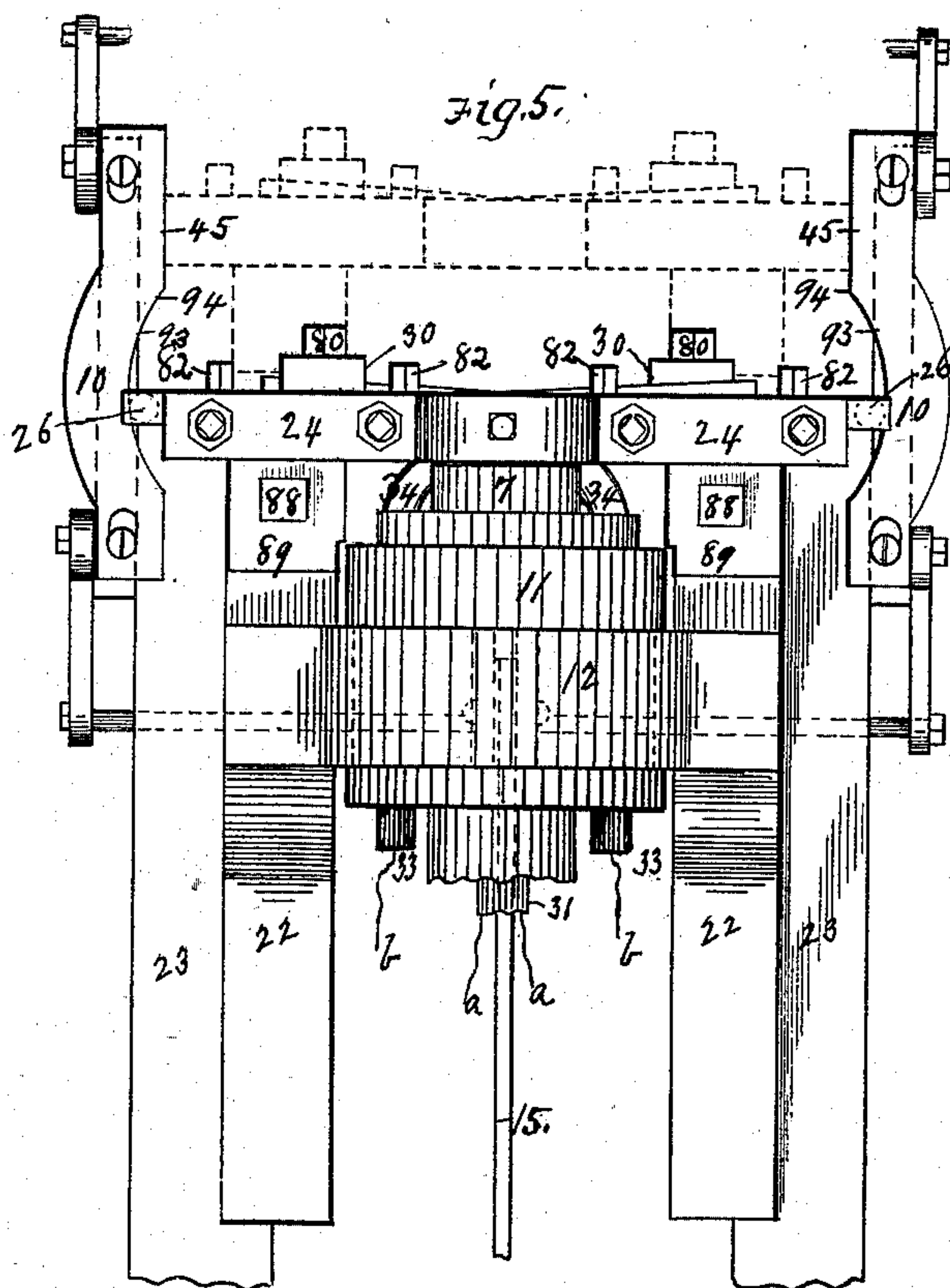
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Fig. 6.

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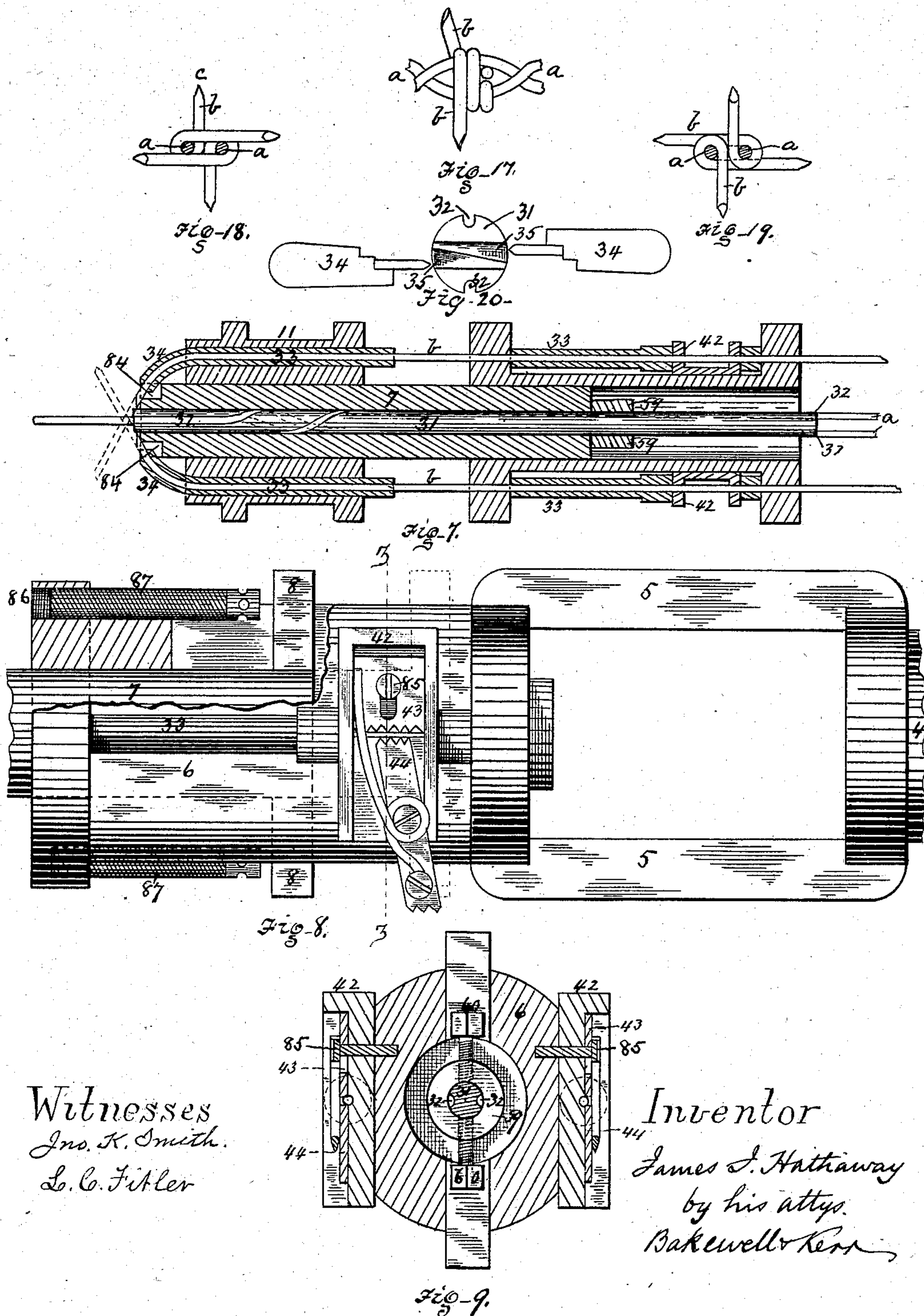
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4 Sheets—Sheet 3.

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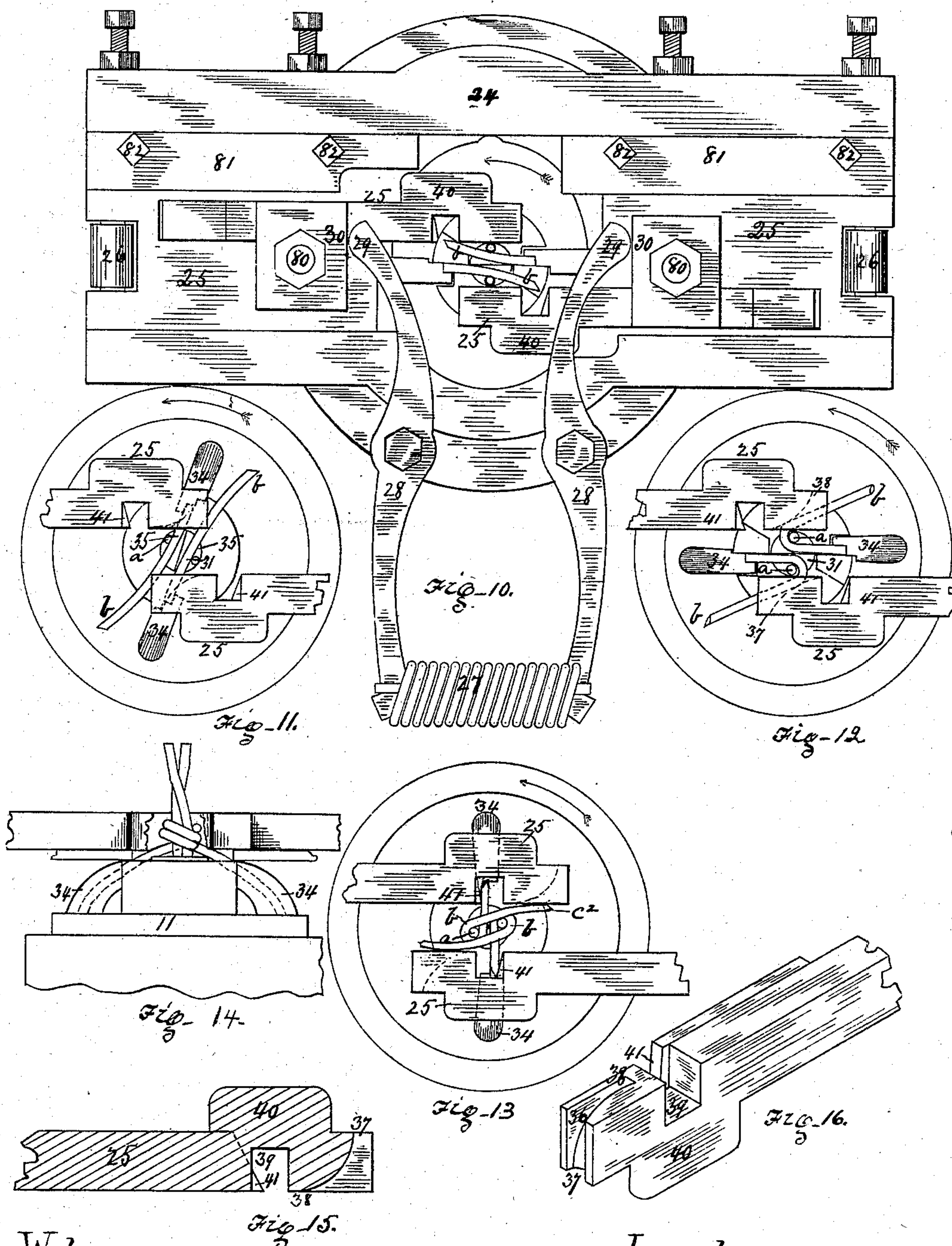
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4 Sheets—Sheet 4.

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UNITED STATES PATENT OFFICE.

JAMES J. HATHAWAY, OF BEAVER FALLS, PENNSYLVANIA, ASSIGNOR OF
ONE-HALF TO JOHN H. McMAHON, OF SAME PLACE.

WIRE-BARBING MACHINE.

SPECIFICATION forming part of Letters Patent No. 254,767, dated March 7, 1882.

Application filed October 31, 1881. (No model.)

To all whom it may concern:

Be it known that I, JAMES J. HATHAWAY, of Beaver Falls, in the county of Beaver and State of Pennsylvania, have invented a new and useful Improvement in Wire-Barbing Machines; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to those machines in which two or more strands of wire are twisted and furnished with double barbs. This operation necessitates the use of four spools of wire, one for each strand-wire and one for each barb-wire.

In the machines heretofore most generally in use for this purpose the barb-wires were fed in laterally, while the strand-wires came in longitudinally of the machine. Such construction required the use of separate feeding mechanism for each barb-wire, and was comparatively slow, intricate, and expensive.

In my improved machine the four spools are arranged at the middle and rear end of the machine and the four wires run longitudinally thereof. The strand-wires extend through grooves in a rod or core in the center of the rotating twisting-spindle, and the barb-wires are led in through curved guides in the rotating head, which cause them, when projected forward, to pass between the strand-wires and to cross each other in the path of two laterally-reciprocating bending-slides mounted in a longitudinally-reciprocating frame, which, as the strand-wires are twisting, bend the barbs around them. The barbs are then severed from the coil by knives attached to the bending-slides, after which they are drawn out of the machine by the progressive movement of the strand-wires.

To enable others skilled in the art to make and use my invention, I will now describe it by reference to the accompanying drawings, (in four sheets,) in which—

Figure 1, Sheet 1, is a side elevation of my improved machine as it appears in operation, except that the spinner-frame 2 is broken at the front end and turned a quarter-way around, so as not to conceal the wires. As used in the machine the spinner-frame 2 stands at right angles to the arms 5. Fig. 2 is a longitudinal

section of the forward end of the spinner and its journal, and shows the proper position of the arms 5 to the spinner. Fig. 3 is a vertical cross-section on the line *y y*, Fig. 1. Fig. 4 is a similar section on the line *x x* of Fig. 1. Fig. 5, Sheet 2, is a plan view of the forward end of the machine, omitting the reeling devices and showing in dotted lines the reciprocating motion of the frame carrying the bending devices. Fig. 6 is a longitudinal vertical section of rotating reciprocating head and of the rotating non-reciprocating head, and shows the devices for reciprocating the former and its rotating spindle. Fig. 7, Sheet 3, is a longitudinal horizontal section of the two heads and spindle, and shows how the wires are led through them. Fig. 8 is a side view of the rotating head 6, partly in section. Fig. 9 is a cross-section on the line *z z* of Fig. 8. Fig. 10, Sheet 4, is a face view of the bending devices as the reciprocating head 11 is partially retracted and the barb-wires *b* are partially projected. Fig. 11 is a face view of the bending devices, showing the barb fully projected. Fig. 12 is a like view, showing the bending-slides advancing and making the first bend of the barb-wires. Fig. 13 is a like view, showing the completion of the operation and the cutting off of the barbs. Fig. 14 is a plan view of the ends of the spindle 7 and head 11, and shows the position of the knives 41 when beginning to cut off the barbs. Fig. 15 is a longitudinal vertical section of the upper bending-slide. Fig. 16 is a perspective view of the lower bending-slide. Fig. 17, Sheet 3, is a side view of an applied barb. Figs. 18 and 19 are cross-sections of the barbed wire. Fig. 20 is an end view of the core-rod, and shows its position in relation to the guides 34.

Like figures of reference indicate like parts in each.

The machine has a suitable frame, 1, upon which all of its parts are mounted. It has an open spinner or frame, 2, provided with journals 4, which turn in suitable bearings, 3. At the rear end it has a shaft, 61, upon which is a pulley, 62. Power to operate the machine is applied to it by means of the belt 63 and pulley 62.

The spools are four in number, 64 65 being the strand-wire spools and 66 and 67 the barb-wire spools. One of the strand-wire spools, 64, is placed on a vertical spindle, 68, on a loosely-pivoted arm or hanger, 69. The forward end is pivoted by a collar to a pin, 70, in the front journal, 4, of the spinner 2 and the rear end by a pin, 71, to a cross-bar, 72, extending between the two arms 2^a of the spinner. This spool, by reason of the loosely-pivoted hanger 69, remains always in a vertical position. The other strand-spool, 65, is placed in a vertical position on a bracket, 73, at the rear of the machine, and the wire *a* is led from it through the shaft 61, which is hollow, up over the friction-wheel 74 on one arm of the spinner, and thence forward to the point where it joins the wire from spool 64. The spools 66 67, for the barb-wires, are placed on a shaft or rod, 75, extending longitudinally in the spinner from the rear end to the bar 72. The wires *b b* are led over friction-wheels 76 77 and thence forward.

At the side of the machine is a shaft, 19, which receives its power from the shaft 61 by means of the gear-wheels 78 79. This shaft 19 supplies the power to reciprocate the head 11 and to operate the reeling apparatus.

Extending forward from the front journal, 4, of the spinner are a pair of arms, 5, which are connected to a hollow rotating head, 6, in which is secured a hollow spindle, 7, by lugs 8 thereon, extending laterally into longitudinal slots 9 in the head. The spindle extends forward, and at the outer end is a head, 11, which rotates in a suitable box or bearing, 12, and has a reciprocating motion given to it and to the spindle by means of the following mechanism:

Journalled in the frame of the machine is a shaft, 13, Fig. 3, which is provided with a central arm, 14, pivoted to a connecting-rod, 15, said rod in turn being pivoted to a lug, 16, on the under side of the box 12, in which the head 11 rotates.

The power to oscillate the shaft 13 is communicated to it by means of a cam, 17, having an eccentric groove, 18, on the side, shaft 19, and an arm, 20, extending up from the end of the shaft 13, having a pin, 21, which enters the eccentric groove 18. The operation of the cam upon the shaft is to give it an oscillation in its bearing, which oscillation is transmitted to the bearing 12 and causes it and the rotating head 11 and spindle 7 to reciprocate, the spindle 7 moving back and forth in the hollow rotating head 6, from which it receives its rotation. The head 11 is sustained and guided by two lugs or carriers, 22, one on each side of the bearing 12 which slide on ways 23, formed on the frame of the machine.

Secured by bolts 88 through the overlapping plates or cleats 89 to the bearing 12 in front of the rotating head 11, and reciprocating with it, is a frame, 24, which extends laterally across the machine, and in which are mounted the bending-slides 25. These slides

are secured in suitable retaining-recesses, and are forced inward to operate upon the barb-wire by means of stationary cams 10, mounted at each side of the machine, which cams bear upon friction-rollers 26, placed in the ends of the slides 25, and cause them to be projected inward at the forward motion of the reciprocating head, during which motion the barbing operation is performed, so as to do their work of bending the barbs upon the strand-wires and severing them from the barb-wires. The slides are thrown back during the retraction of the head by the operation of a spiral spring, 27, upon the lower ends of two arms, 28, pivoted to the frames, the upper ends, 29, of which bear outwardly against plates or shoulder 30, fastened by bolts 80 to the slides. The slides 25 are removable by taking off the upper retaining-plates, 81, which are fastened by bolts 82 to the frame 24.

Inside of the rotating spindle 7 is a core-rod of metal, 31, which is of such size as to fit snugly in the bore of the hollow spindle, and is secured therein by set-screws 60, Fig. 9, placed in the slots 9 in the head 6 and bearing on the rod through a collar, 59, on its rear end. This core-rod is provided with two grooves, 32, one on each side, which extend from end to end of the rod, and near the forward part each makes a three-quarter turn of the rod. The strand-wires *a* are fed through these grooves, being entered at the rear end of the spindle and passed out at the front, the purpose of the core-rod being to hold them apart during their forward feed until after the barb-wires *b* are passed between them, when, being freed from the core-rod 31, which separated them, they will twist beyond the rotating head 11. The barb-wires *b* are led forward through hollow guides 33, extending along the outer sides of the heads 6 and 11. The guides in the head 11 are curved inward at their forward ends, as at 34, which causes the two barb-wires passing through them to be projected out toward the other side of the machine and to cross each other just in front of the outer end of the core-rod, and just between the two strand-wires as they leave the core-rod. In the end of the core-rod and opposite to the delivery-openings of the curved guides are two tapered grooves, 35, Fig. 6, so arranged that when the barb-wires leave the curved guides they enter and pass out through the corresponding grooves in the end of the core-rod.

The spindle 7 is secured to the head 11, so as to be reciprocated thereby, by means of the key 83 and by the ends of the curved guides 34, which, curving inward, terminate in recesses 84, Fig. 7, in the end of the spindle. In the working machine these parts are so compactly put together as to move practically as one piece.

The inner ends of the bending-slides 25 are grooved or recessed, as at 36, the bottom of the recess curving and extending backward from the upper to the lower side, as shown from

37 to 38. Back of this recessed end there is a rectangular recess, 39, extending in from the lower side, 38, to a depth equal to the width of the slide, or nearly so, there being an enlargement, 40, of the slide opposite to the recess 39, to permit it to be made. At the back side of the rectangular recess a knife or shear, 41, is bolted, with its shearing-edge projecting over the edge of the recess. When the slides are in place these knives are on the inside and next to the rotating head 11, and are so arranged that when the slides are reciprocating to perform the bending operation the moving knives passing over the mouth of the curved guide sever the barb *c* from the barb-wires *b* at the close of the barbing operation by a diagonal cut, so as to leave the end of the barb sharp and pointed. When the slides 25 are in place the lower one is inverted, so as to bring its recesses opposite to those of the upper slide in their operation on the barb-wires, as shown in Figs. 3 and 9.

The barb-wires are fed forward during the forward motion of the machine by the following devices:

At each side of the head 6, and fastened thereto by a screw, 85, is a rectangular frame, 42, through and across which the barb-wires pass.

At one end of the frame is a stationary serrated jaw, 43, which extends along one side of the wire. On the other side of the wire, and in the opposite end of the frame, is a pivoted spring-dog, 44, having a serrated biting-edge, said dog being pivoted at such an angle that the wire is free to be drawn through it in a forward direction and cannot pass in a backward direction, because then it is engaged by the dog and is clamped between it and the stationary jaw. When the reciprocating-head 11 is retracted its tendency is to push back the barb-wires, which causes the locking-dogs to bite upon them and hold them stationary, while the head 11 slips back over them and causes their ends to be projected beyond the ends of the curved guides 34. This projection is equal to the desired length of the barb.

The forward or unslotted part of the head 6 is tapped, as at 86, in front of the slots 9, and gage-screws 87 are screwed into the holes 86 and extend back into the slots 9 in front of the lugs 8. The purpose of these screws is to gage the length of the slots 9 to the length of the movement of the head 11 and spindle 7.

The projected ends of the barb-wires, after passing between the strand-wires, encounter the ends of the approaching bending-slides 25, and, entering the grooves 36, are bent thereby around the strand-wires, which meanwhile are twisting between the slides. The further advance of the slides 25 completes the coiling of the barbs, causing the free ends to pass out of the grooves 36 into the rectangular recesses 39, and, by the passage of the knives 41 over the end of the curved guides 34, severing the barb *c* from the barb wires *b* by a diagonal cut.

At this instant the slides pass onto the straight part 45 of the stationary cams 10 and the applied barbs *c* are in the position shown in Fig. 9, with their points extending at right angles into the recesses 39 and between the adjacent sides 38 of the bending-slides. The straight part 45 of the cams 10 permits the slides to remain at rest an instant at the end of the forward stroke of the head 11, and this is to give time for the withdrawal of the barbs from between the bending-slides before the latter are retracted. If the slides were retracted instantly, the barbs would be partially uncoiled by them, because two opposite points, one on each barb, extend into the rectangular recesses 39 and would be drawn back by the sides of the same when the slides were retracted. As it is, the barbs have been drawn out clear of the slides when they begin their retrogression.

The finished wire *d* passes over the wheel 46 down to the reel 47, upon which it is wound. The wheel 46 is driven by a bevel-pinion, 48, on the end of the side shaft, 19, meshing into a large bevel-gear, 49, on the end of the shaft 50 of the wheel 46. The reel 47 is driven by the belt 51 from a pulley, 52, on the side shaft, 19, extending to a pulley, 53, on a counter-shaft, 54, which, by means of beveled-gear wheels 55, drives the reel-shaft 56.

The shafts 50 and 56 are journaled in a frame, 90, bolted to the front end of the machine.

The draft of the wheel 46 and reel 47 upon the strand-wires constitutes the power which draws the strand-wires *a* through the machine. This draft being constant, the strand-wires have a constant feed. On the other hand, the feed of the barb-wires is intermittent, being made on the backward movement of the head 11 only. Each forward movement of the head draws enough wire off of the barb-wire spools to form one pair of barbs.

The operation of my improved machine is as follows: The ends of the strand-wires *a* are by hand passed through the hole 91 in the front journal, 4, of the spinner 2, and one passed through each groove 32 32 of the core-rod 31, and then they are both drawn over the wheel 46 and fastened to the reel 47. The ends of the barb-wires *b* are passed over the friction-wheels 76 77, carried forward, and one passed through each of the holes 92 92 in the front journal, 4, of the spinner and through the guides 33 34. Power is then applied to the machine. Imagine it in the position shown by the dotted lines in Fig. 5, Sheet 2. In this position the operation of applying and severing the barbs has been completed. The position of the bending-slides immediately after the severing of the barbs is shown in Fig. 13, Sheet 4. During the entire operation of the machine the strand-wires are being drawn through the machine by the operation of the power-driven reel 47, and are being constantly twisted by the rotation of the head 11. The head 11 then begins to move backward. This causes the spring-dogs 44 to release their hold

on the barb-wires *b*, and the latter remain stationary while the head 11 goes back. The result is that the ends of the barb wires are projected from the curved guides 34 across each other and between the strand-wires to a length equal to the backward movement of the head 11, which length is that required for the applied barbs. During the first part of the backward movement, the bending-slides, being on the straight surfaces 45 of the cams 10, do not depart from the position shown in Fig. 13. This allows ample time for the barbs last applied to be drawn from the bending-slides before they change position. When the head 11 is partially retracted on the incline 93 of the cams 10 the bending-slides and barb-wires are in the position shown in Fig. 10, Sheet 4. When fully retracted they are in the position shown in Fig. 11. When beginning to advance they are in the position shown in Fig. 12, and when at the extreme forward limit of the movement they are in the position shown in Fig. 13. The head 11 revolves in the direction of the arrows, and the ends of the barb-wires *b*, being held by the grooves 36 of the non-rotating slides 25, are guided thereby, while the twisting of the strand-wires winds them up upon the strand-wires. At the instant this is accomplished the abrupt ends 94 of the inclines of the cams 10, acting on the slides, project them inward to the position shown in Fig. 13, bringing the recesses 39 opposite each other, cutting off the barbs, and drawing the forward ends, *c*², of the barbs out of the grooves 36. Then, the slides being on the straight surfaces of the cams 10, and the points of the barbs projecting into the recesses 39, and the clear spaces between the adjacent sides of the slides, the advance of the strand-wires draws the applied barb safely out from the bending devices. In case any of the wires give out, the machine is stopped, a new spool put in, and the end of the wire drawn through and spliced by twisting it around the other wires beyond the outer end of the head 11.

Many of the devices in the machine just described may be varied by the skilled constructor by the use of equivalent means well known in mechanics, and it will therefore be unnecessary for me to indicate them.

The main feature of my invention is applying the barbs to the twisting strand-wires by means of laterally-moving bending and severing devices, and also of the construction of those devices, which permits the safe removal of the applied barbs from the bending mechanism.

The machine is automatic in its operation, and requires only to have the spools renewed when empty. It can be used with one or with three or more strand-wires without material change. It may also be used to apply a single barb to the strand wire or wires. When but one strand-wire is used the core-rod is not needed, and when but one barb-wire is used only the opposite bending-slide is needed.

The advantages of my improvement are great rapidity and certainty of operation, the perfect application of the barbs to the strand-wires, and the simplicity of the machine.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of a reciprocating rotating head, a pair of laterally-reciprocating bending-slides, and a knife or knives moving with the slides, substantially as and for the purposes described.

2. A pair of laterally-reciprocating bending-slides, forked or grooved in the ends for receiving the ends of the barb-wire, and each provided with a recess for allowing the withdrawal of the finished barb, and a knife for cutting off the barbs at the end of the stroke, substantially as and for the purposes described.

3. A pair of laterally-reciprocating bending-slides, in combination with stationary cams, which force them inward to bend the barbs, the said cams having straight surfaces at their outer ends, which permit the slides to have a short stop while the applied barb is being withdrawn, substantially as and for the purposes described.

4. The combination of a rotating reciprocating head having a hollow spindle and curved barb-wire guides with a pair of laterally-reciprocating bending and severing slides, substantially as and for the purposes described.

5. A bending-slide forked or grooved in the end, and provided with a lateral recess back of the groove, and a knife or shear in the rear side of the recess and projecting into it, substantially as and for the purposes described.

6. The rotating barbing-head having a hollow spindle and inwardly-curved barb-wire guides, in combination with a core-rod having lateral grooves in its end, substantially as and for the purposes described.

7. The reciprocating barbing-head having a curved guide or guides through which the barb-wire is fed, in combination with devices which hold the barb wire or wires stationary, so that the head shall slip over them during its backward movement, substantially as and for the purposes described.

8. The reciprocating barbing-head having a barb-wire guide or guides, in combination with the non-reciprocating spring-dog, which permits the barb-wire to be drawn forward at the forward movement of the head and prevents its moving back at the backward movement of the head, substantially as and for the purposes described.

In witness whereof I have hereunto set my hand this 4th day of October, A. D. 1881.

JAMES J. HATHAWAY.

Witnesses:

R. C. WRENSHALL,
T. B. KERR.