

No. 693,622.

Patented Feb. 18, 1902.

J. V. RICHARDSON, Dec'd.

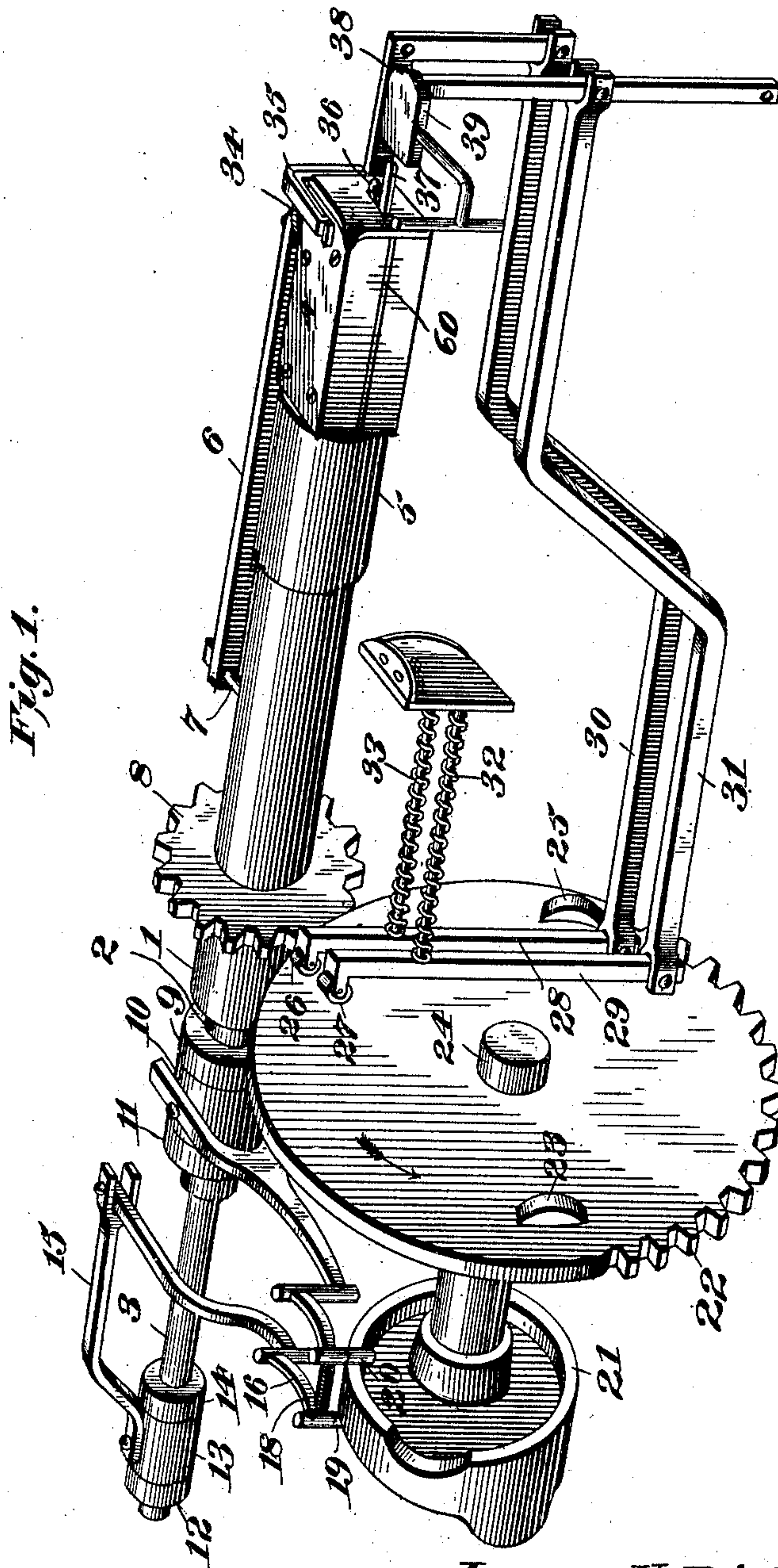
W. H. RICHARDSON, Administrator.

KNOTTING MECHANISM FOR BAG STRINGING MACHINES.

(Application filed Dec. 26, 1900.)

(No Model.)

2 Sheets—Sheet 1.



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Fig. 2.

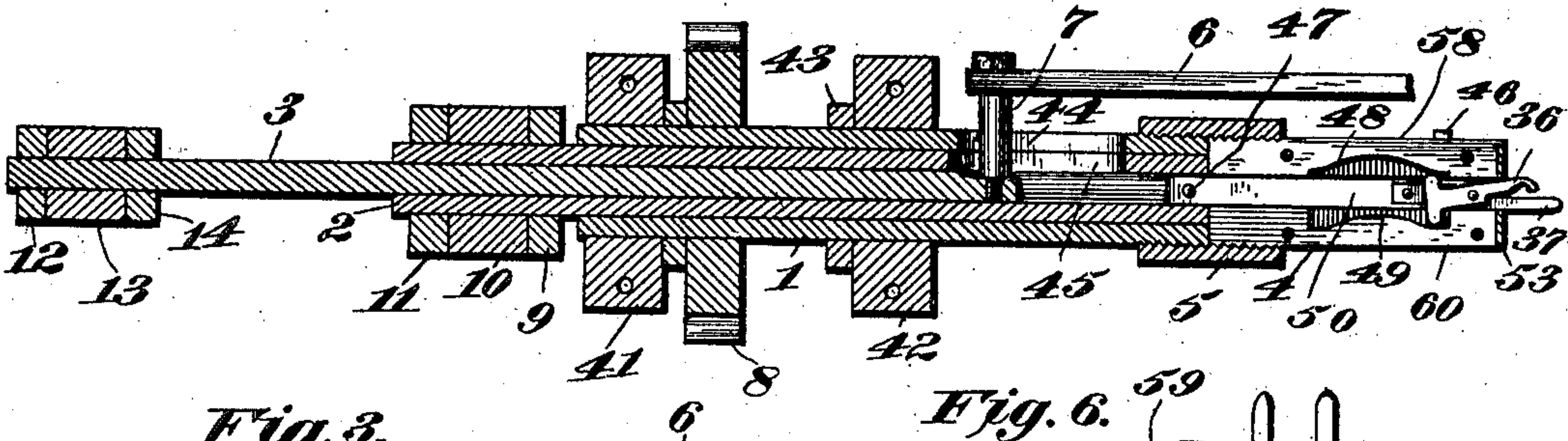


Fig. 3.

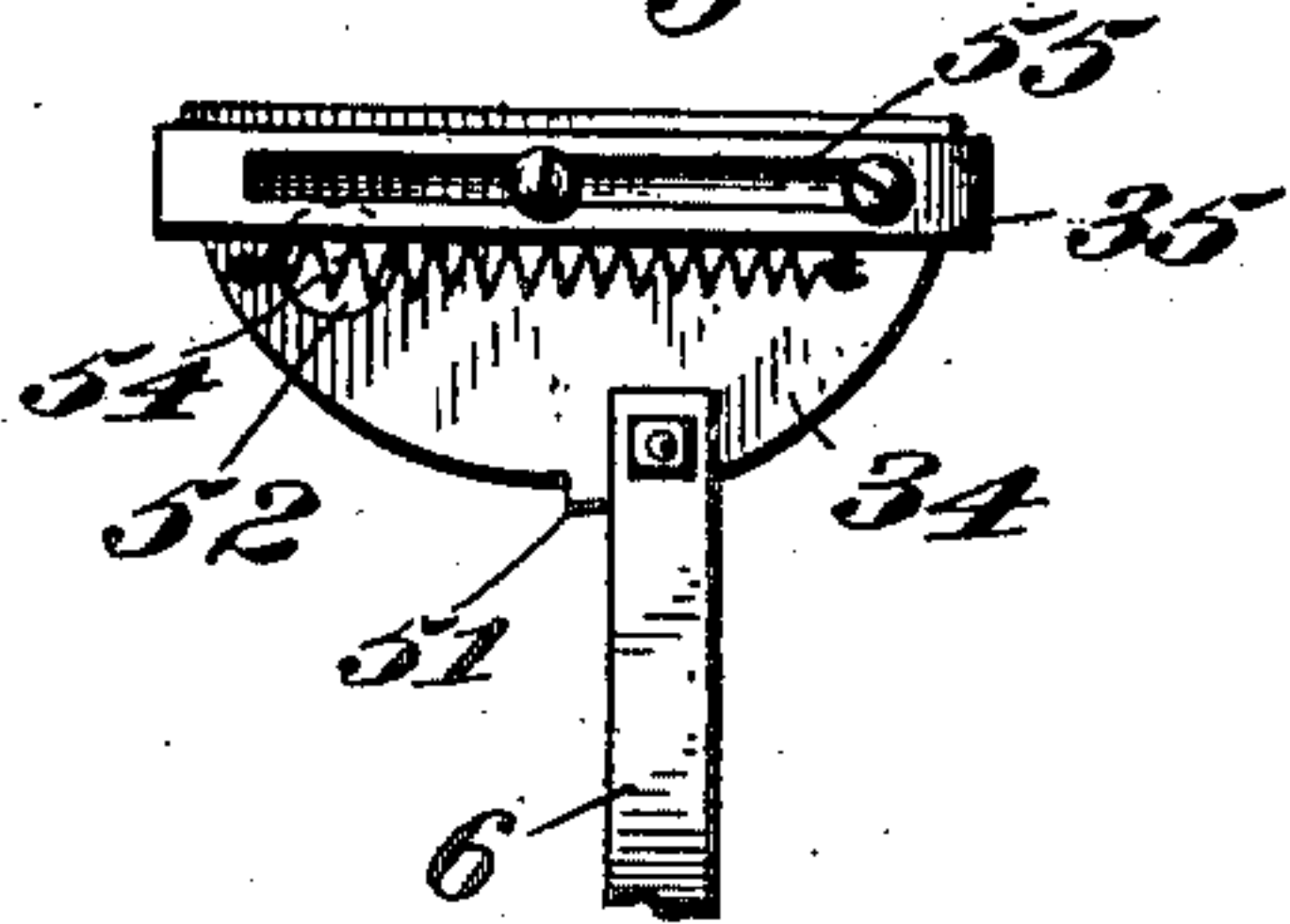


Fig. 6.

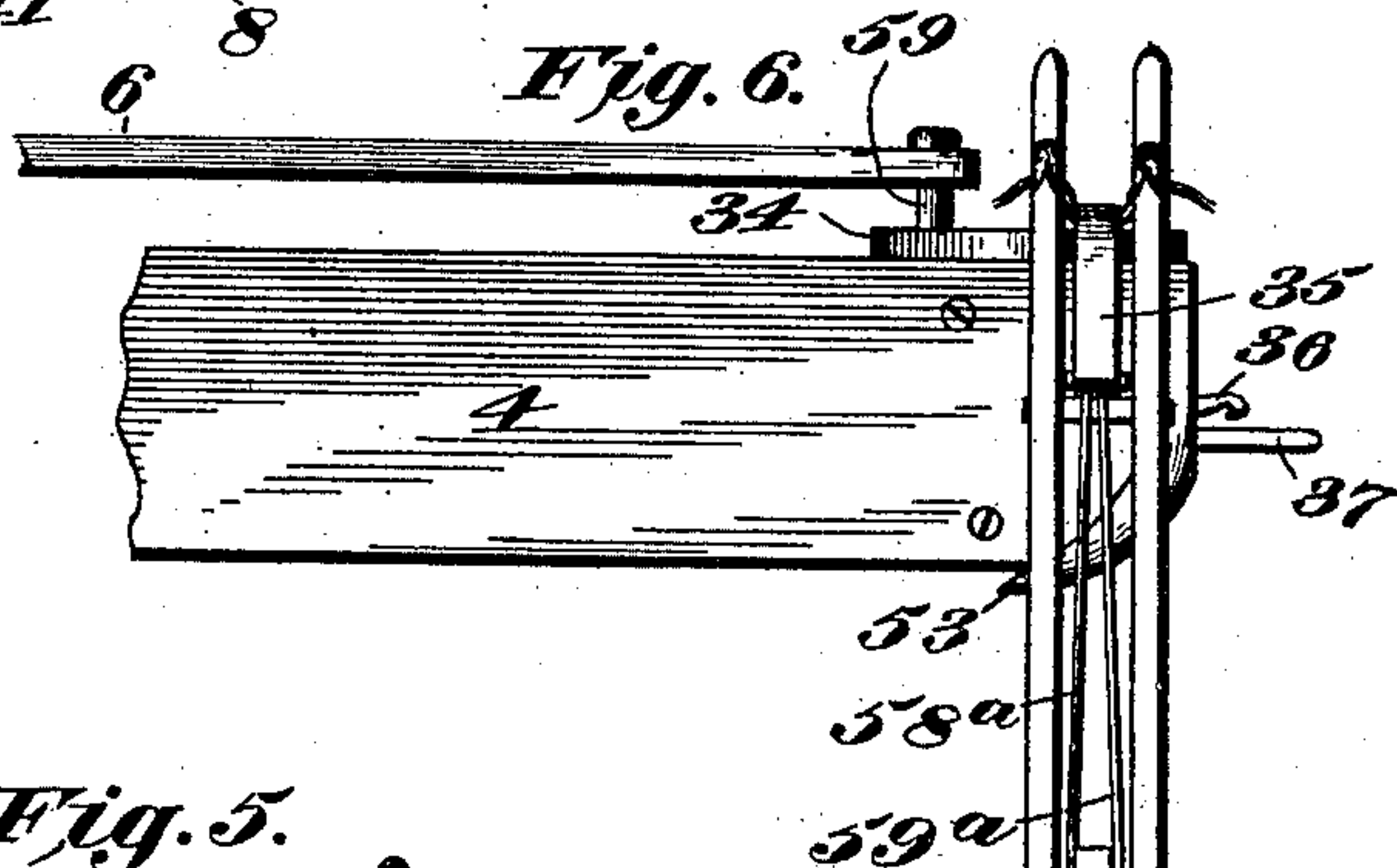


Fig. 5.

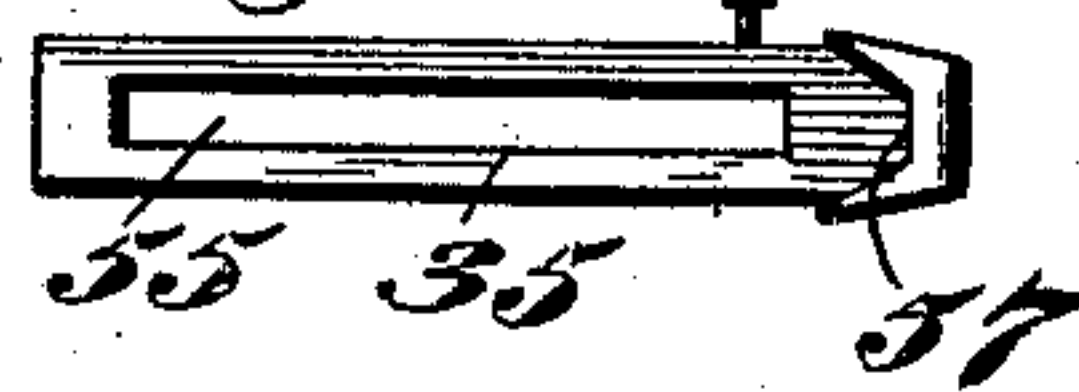


Fig. 4.

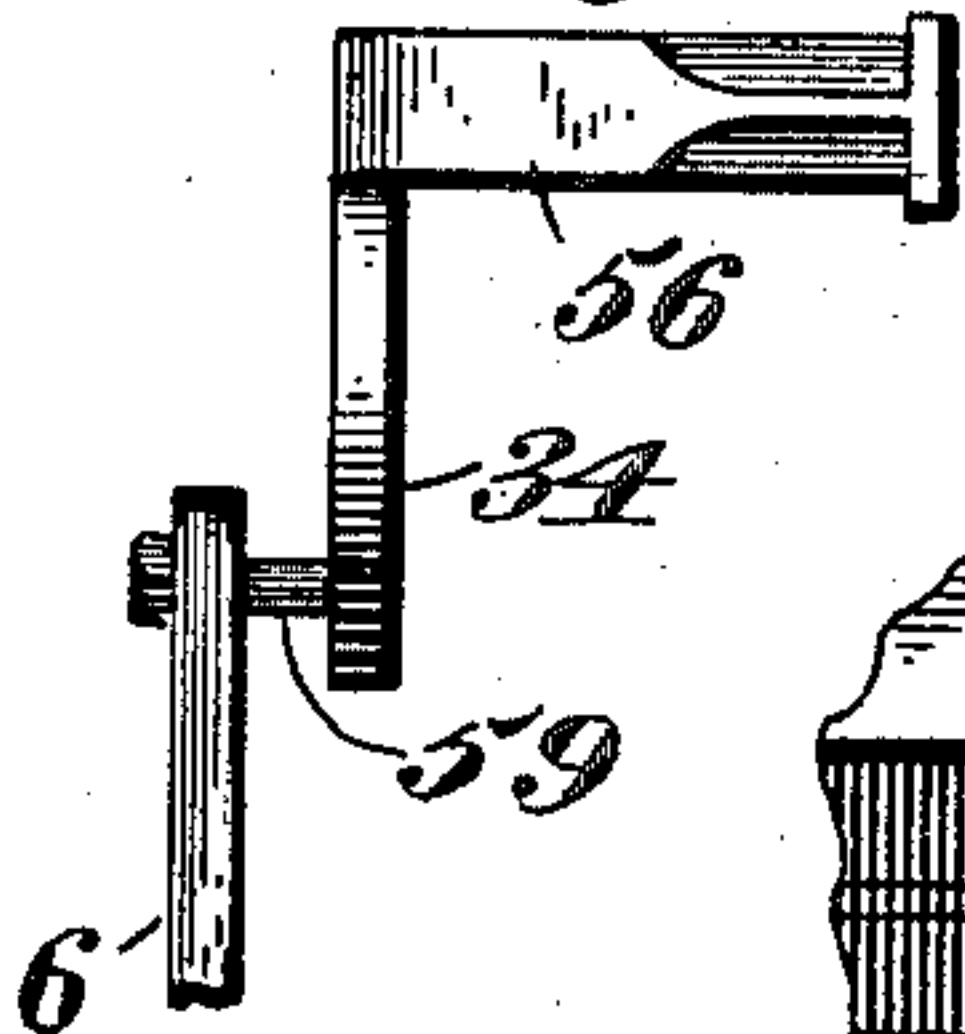


Fig. 7.

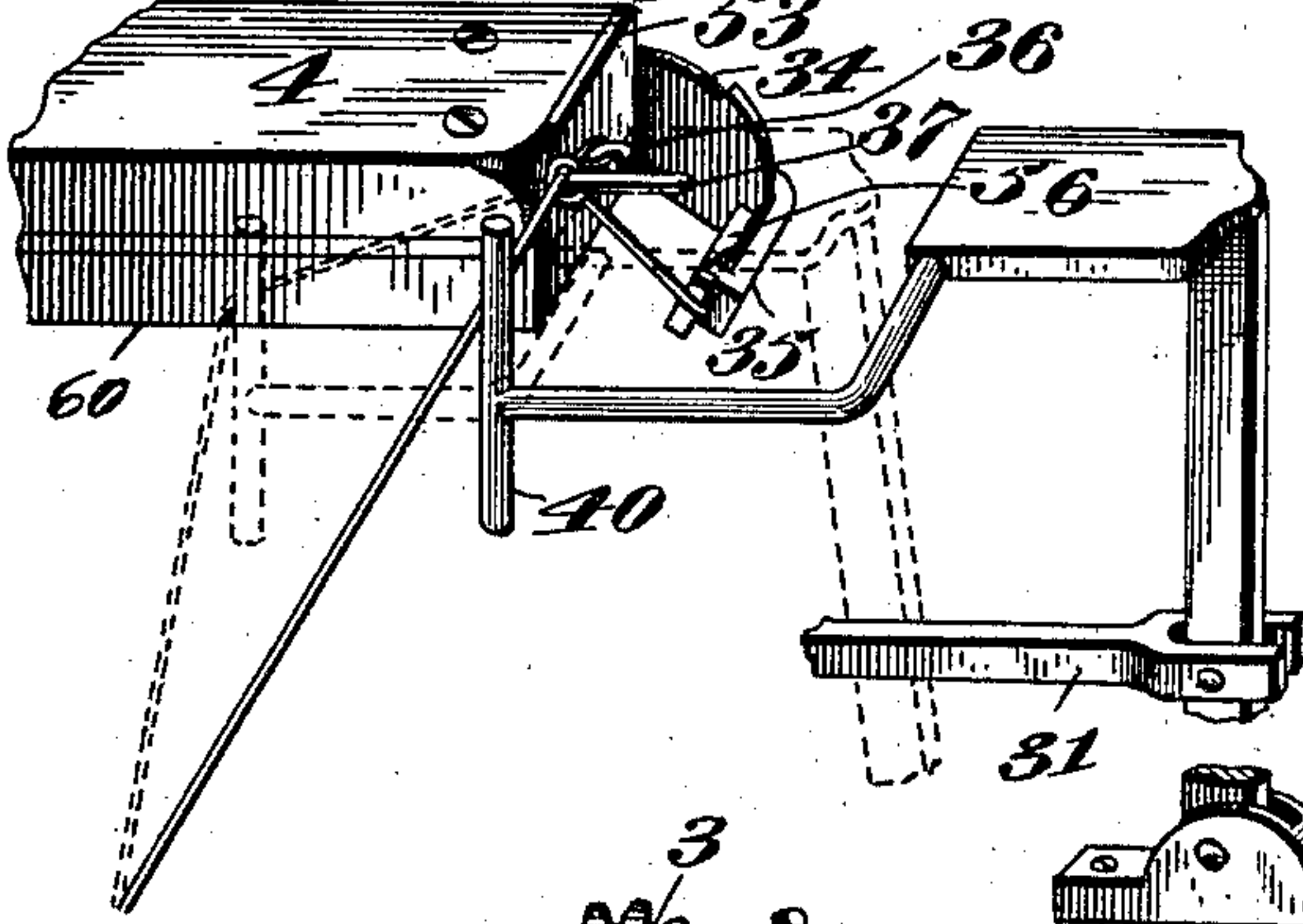
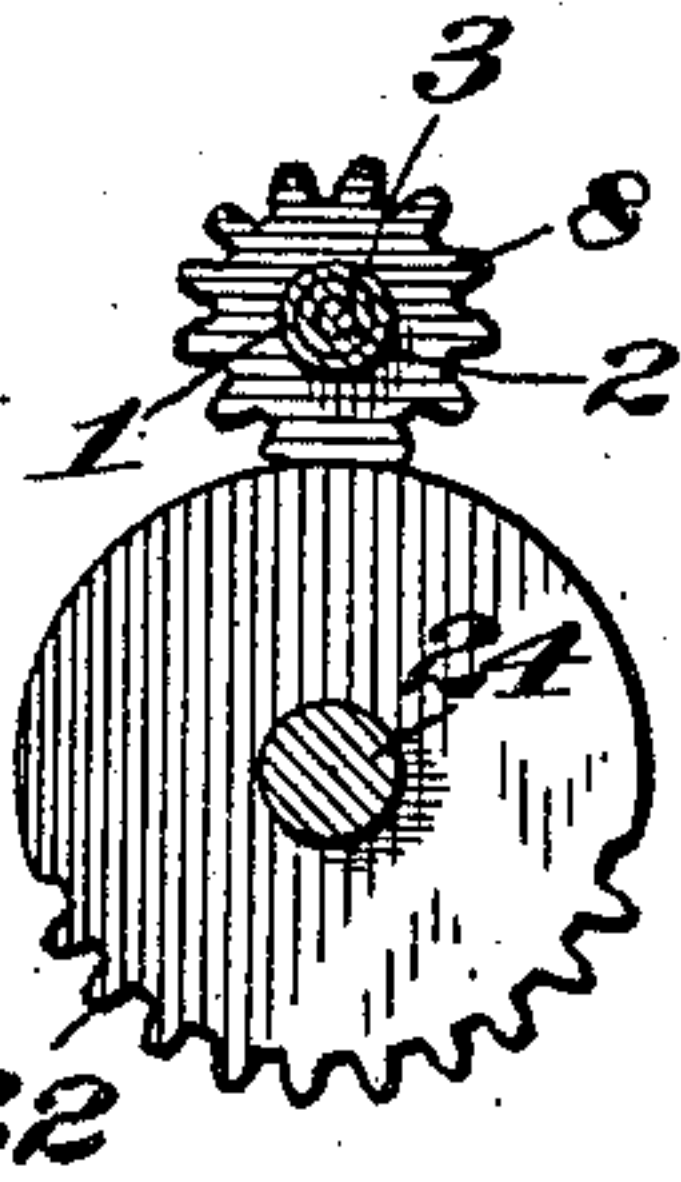


Fig. 8.



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# UNITED STATES PATENT OFFICE.

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ADMINISTRATOR OF SAID JAMES V. RICHARDSON, DECEASED.

## KNOTTING MECHANISM FOR BAG-STRINGING MACHINES.

SPECIFICATION forming part of Letters Patent No. 693,622, dated February 18, 1902.

Application filed December 26, 1900. Serial No. 41,140. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES V. RICHARDSON, a citizen of the United States, residing at Farmville, in the county of Prince Edward and State of Virginia, have invented a new and useful Knotting Mechanism for Bag-Stringing Machines, of which the following is a specification.

My invention relates to improvements in knotting-machines to be used in connection with or attached to machines for inserting shirring-strings into bags, loop-strings into tags, pamphlets, &c., and other machines used in the manufacture of articles whereby a loop-string is employed, and more especially that class of machines in which the string is cut into a section before engaged by the knotter.

The chief object of my invention is to provide mechanical means for tying the ends of strings which have been previously inserted into or otherwise placed about tobacco-bags or other bags and other articles employing a loop-string.

In the accompanying drawings a desirable means is shown for giving movement to my knotter; but as it is attachable to machines of varied construction I do not confine myself to this particular means. As will be seen, this particular means of giving movement could not in every case be employed—as, for instance, in the stringing of tobacco-bags, some manufacturers prefer to insert both strings through the hem or mouth of the bag from the same side, others prefer inserting one from each side, while others use only one string. In the first case it would be necessary to use two knotters, both on the same side of bag-holder, preferably one above and one below the path of the needles. In the second case it would be necessary to place a knotter on each side of bag-holder. In the last case only one knotter would be necessary.

Referring to the drawings, Figure 1 is a perspective view of my machine, the supporting-journals of which are omitted to avoid confusion of parts. Fig. 2 is a detail sectional view of the knotter-head, stem, and connections. Fig. 3 is a side view of pivoted gripper or clamp. Fig. 4 is a top view of the pivoted string gripper or clamp with the spring-clamp removed. Fig. 5 is a view of the spring-

clamp. Fig. 6 is a top view of knotter-head and connections, showing the manner in which the string is taken from needles. Fig. 7 is a perspective view of knotter-head and connections, showing the strings wound around the grippers or fingers 36 37 and the pivoted gripper thrown forward, the ends of strings between grippers or fingers 36 37, the arm 39 against the knotter-head, and the bar 40 pressing against the string, showing the knot formed ready to be drawn by grippers or fingers 36 37. Fig. 8 is an elevation of the intermittent gear.

1 is a hollow shaft or tube, into which fits the hollow shaft 2, and into 2 fits the rod 3.

4 is the knotter-head and is connected to outside shaft or tube 1 by a coupling 5.

The hollow shaft or tube 2 works back and forth in shaft or tube 1. To the inside end of hollow shaft or tube 2 is connected the rod 50 by means of the pin 47. The outside or free end of the rod 50 is slotted to admit the grippers or fingers 36 37. The gripper or finger 36 is pivoted at or near its center within the slot of rod 50. The gripper or finger 37 is held in the slot of rod 50 by two or more pins or other means.

The knotter-head 4 is for convenience of manufacturing made in two pieces and with two plates or sheets of metal 58 60 between the two sections of knotter-head 4. These two plates or sheets of metal 58 60 are shaped on the inside so as to form guides for the gripper or finger 36. (See Fig. 2.) When the shaft or tube 2 is drawn out or to the left, the pivoted gripper or finger 36 is closed and opened on gripper or finger 37 by means of the projections of pivoted gripper or finger 36 coming in contact with or rubbing against the guide plates or sheets 58 60.

On one side of the knotter-head 4, as shown, is pivoted the semicircular piece 34, and upon the face of this the piece 35 is secured by two screws in a slot 55. This piece 35 is held against the arm or projection 56 of the pivoted semicircular piece 34 by the spring 54.

12 and 14 are collars rigidly fastened to the rod 3, and between these is a loose collar 13.

9 and 11 are collars rigidly fastened to hollow shaft or tube 2, and between these is a loose collar 10.



It will be seen that the hollow shaft or tube 2 is moved back and forth by means of the cam-wheel 21 and the spring 18. As the hollow shaft or tube 2 is connected to the rod 50, as hereinafter described, the grippers or fingers 36 37 are moved in and out of the knotter-head 4 and operated. The rod 3 is moved back and forth by means of the cam-wheel 21 and the spring 18, and as the rod 3 is connected to the pivoted semicircular piece 34 by the stud 7, the connecting-rod 6, and the stud 59 therefore when the rod 3 is moved in the pivoted semicircular piece 34 is partly revolved on the pivot 52, thereby placing the ends of the string between the grippers or fingers 36 37, as will be hereinafter more fully explained.

The hollow shaft or tube 1 has a slot 44 and the hollow shaft or tube 2 has a slot 45. (See Fig. 2.) The stud 7 is fastened to the central shaft or rod 3, passing through these slots, and is free to work back and forth.

To the front of knotter-head 4 is fastened the plate or cap 53, and one or more of the corners are elongated and turned inward, (see Figs. 6 and 7,) so that when the knotter-head 4 is revolved the string will be thrown forward and wound around the grippers or fingers 36 37.

58<sup>a</sup> 59<sup>a</sup> are the strings.

41 42 are journals or boxes holding hollow shaft or tube 1.

61 62 are the needles, and 60<sup>a</sup> the bag-holder.

The projection 38, Fig. 2, is intended to engage the notch 51 of semicircular piece 34, thereby stopping it in the same position always.

The operation is as follows: The shaft 24, Fig. 1, is revolved in the direction indicated by the arrow. The needles being operated by the machine to which the knotter is attached move toward the knotter-head 4, Fig. 6, and pass directly above the projection or arm 56. Before the needles reach the arm or projection 56 the piece 35 is raised by reason of the cam or projection 25 on intermittent gear 22 passing under roller 26, thereby moving the connecting-rod 30 and raising the end of lever 38, which bears against the end of the piece 35 directly after the eyes or notches of the needles pass the bifurcated end 57 of piece 35. The piece 35 is drawn to its normal position by spring 54, thus passing between the needles, catching the strings in the bifurcated or notched end 57, and holding them against arm or projection 56 of pivoted semicircular piece 34. The radius of the arc cut in the smaller intermittent gear 8 equals the radius of the pitch-circle of the larger gear, and is revolved one complete revolution by intermittent gear 22 and locked, during the same time the smooth or unsmoothed surface of wheel 21 is passing, in this manner: The intermittent gear-wheel 22, as will be observed by referring to Fig. 1, is provided with teeth on only a portion of its periphery, the remaining portion being perfectly smooth. The small gear

8 is also provided with teeth on a portion of its periphery, the remaining portion having an arc cut therefrom, the radius subtending the same being equal to the radius of the larger intermittent gear 22. It will therefore be seen that the smooth portion of the periphery of gear 22 will register exactly with said cut-out portion in gear 8 when said gears are meshed. The gears, moreover, are provided with the same number of teeth. When, therefore, the larger gear 22 is revolved, the teeth thereon mesh with the teeth of the smaller gear 8, which turns said gear 8 one revolution and brings the concave portion therein adjacent said gear 22 at the same moment that the smooth periphery of said gear 22 is adjacent said gear 8, which allows said smooth periphery of said large gear to slide in the concave portion of said small gear 8 without revolving said small gear, but, on the contrary, securely holding and locking the same against any movement until the teeth of said large gear again engage the small gear and turn the same another revolution. By this operation the knotter and connections are made to revolve one complete revolution, which winds the string around the fingers or grippers 36 37, the string slipping under the bifurcated or notched end 57 of piece 35 sufficiently to allow for the loop to be formed, but not entirely from under notched or bifurcated end 57. As soon as this is accomplished the rod 3 is moved by the cam 21, the rod 3 being connected, as shown, to the pivoted semicircular piece 34. The string is carried between the grippers or fingers 36 37 by reason of the pivoted semicircular piece 34 being partly revolved. (See Fig. 7.) Thus the knot is formed; but to more securely place the ends of the string between grippers or fingers 36 37 the arm 39 is provided, which is moved by the cam or projection 23 on intermittent gear 22 passing under roller 27, thereby throwing the flattened end of the arm 39 against the string and lightly holding it against knotter-head 4. In order to have the knot close to the end of string, the bar 40 is provided and actuated by the arm 39. This bar 40 presses or draws the string at a point between the knotter-head 4 and the bag-holder 60<sup>a</sup>, the string slipping on the grippers or fingers 36 37 until the end is drawn the desired distance. The knot being formed and ready to be drawn, the hollow shaft or tube 2 is moved to the left by the cam-wheel 21, thus carrying the grippers or fingers 36 37 in the knotter-head 4, the guides 48 49 closing the finger or gripper 36 on gripper or finger 37, thereby claspings or holding the string and drawing the knot tight. Then on account of the shape of the guides 48 49 the gripper or finger 36 is parted from gripper or finger 37, therefore freeing the string, so that it can be drawn from machine. The guides 48 49 are shaped in accordance with the position of the knot to be tied. If it is desired to have the knot close to the end, the guides



48 49 are shaped as shown in drawings, (see Fig. 2;) but if the knot is wanted farther from the end the guides 48 49 are shaped so as to partly close finger or gripper 36 to allow end of string to be drawn through loop. Then the guides 48 49 close the gripper or finger 36, and the knot is drawn and the string released, as in the other case. When the knot is wanted far from the end, it is best to have the end of the gripper or finger 37 that projects out of the knoter-head a good deal longer than gripper or finger 36, so that the loop of the string will be held open and on the cap 53 until end of string is drawn through loop. In this case the bar 40 may be dispensed with or made to draw the string only a short distance.

The machine being an attachment, supports or brackets are not shown in every instance. They will be constructed so as to conform to the machine to which the knoter is attached.

Having thus described my invention, what I claim is—

1. The combination with string-supplying means, of a knotting mechanism comprising a rotatable knoter-head, a slotted cap or plate fastened to the end of said knoter-head, grippers or fingers passing through said cap, a rotatable and slidable tube carrying said grippers, string receiving and clamping mechanism secured to the knoter-head, a slidable rod within said rotatable and slidable tube adapted to operate said receiving and clamping mechanism, substantially as described.

2. The combination with string-supplying means of a knotting mechanism comprising a rotatable knoter-head, string receiving and clamping mechanism, attached to the knoter-head, grippers or fingers projecting from the knoter-head, means for rotating the knoter-head, and a cap or plate secured to the outer end of the knoter-head, a corner of which is elongated and turned inwardly, substantially as and for the purposes described.

3. The combination with string-supplying means of a knotting mechanism comprising a rotatable knoter-head, an outer tube secured thereto, a rotatable and slidable inner tube, a rotatable and slidable rod in the inner tube, grippers carried by the head, string-clamping mechanism connected to and operated by the slidable rod, substantially as described, and for the purposes set forth.

4. The combination with an outer rotatable tube, of an inner slidable tube, a knoter-head coupled to said outer tube, grippers attached to one end of the inner tube, two fixed collars

on the inner tube, a loose collar between the fixed collar, a lever engaging the loose collar, means for rocking the lever, thereby moving said inner tube longitudinally, and means for rotating said outer tube before moving said inner tube longitudinally, substantially as described.

5. A knotting mechanism comprising in combination a hollow knoter-head having cam-guides in its interior, grippers slidably secured in the knoter-head, having projections engaging said cam-guides, an inner tube carrying said grippers, string receiving and clamping means, a rotatable and slidable rod within said inner tube adapted to operate said receiving and clamping means, and means for rotating the knoter-head, substantially as described.

6. A knotting mechanism comprising in combination a hollow knoter-head, an outer tube, an inner tube, grippers carried thereby, a rod within said outer tube, and string receiving and clamping mechanism operated thereby, of an intermittent gear-wheel secured to said outer tube, a driving-shaft, an intermittent gear on said shaft engaging the intermittent gear-wheel to rotate it, substantially as described.

7. The combination with the knoter-head and grippers, and means for operating them, of the arm or lever 39 located in front of the grippers, means for operating said arm to press the string on the grippers against the knoter-head, and the bar 40 actuated by the arm 39, substantially as described.

8. In a knotting-machine, the combination of a knoter-head, string-supplying means, string receiving and clamping means, an outer tube secured to said knoter-head, inner tube carried therein, grippers secured to said inner tube, a rod within said inner tube, means for rotating the knoter-head, outer tube, inner tube and rod, and means for sliding said inner tube and rod longitudinally substantially as described.

9. In a knotting-machine, the combination with a rotatable knoter-head of string-supplying means, string-receiving mechanism, a rotatable tube and rod within said rotatable knoter-head, grippers secured to said tube, a loose collar secured to said rod, intermediate two fixed collars and operating means, substantially as described.

In witness whereof I hereunto set my hand in the presence of two witnesses.

JAMES V. RICHARDSON.

Witnesses:

J. W. BEAL,

W. HOWELL RICHARDSON.