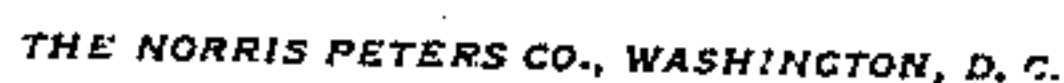


984,680.

5 SHEETS—SHEET 1.

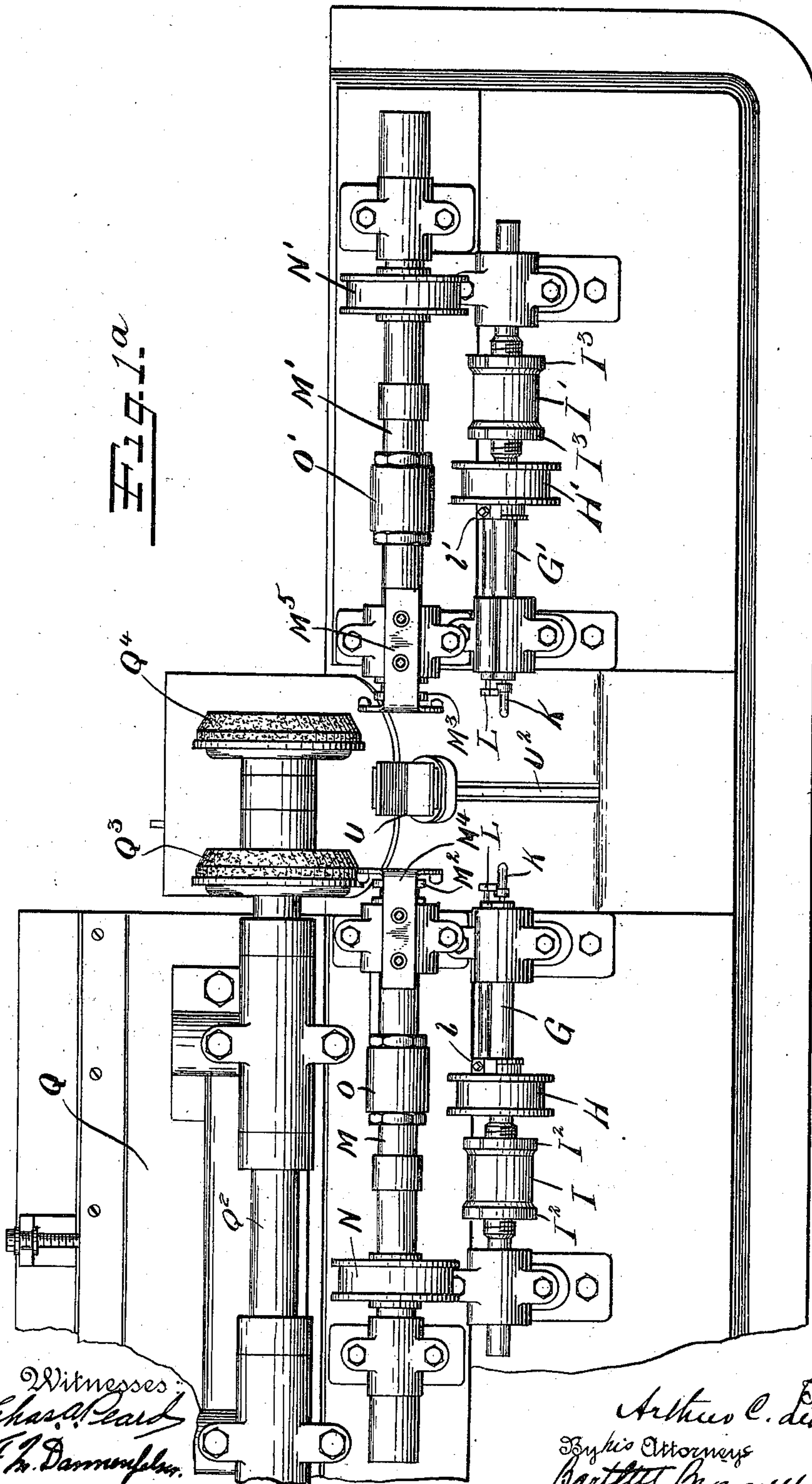


A. C. LIVERMORE.  
SPOOL FINISHING MACHINE.  
APPLICATION FILED OCT. 6, 1906.

984,680.

Patented Feb. 21, 1911.

5 SHEETS—SHEET 2.



Witnesses:  
Chas. A. Reed  
F. A. Dammeyer

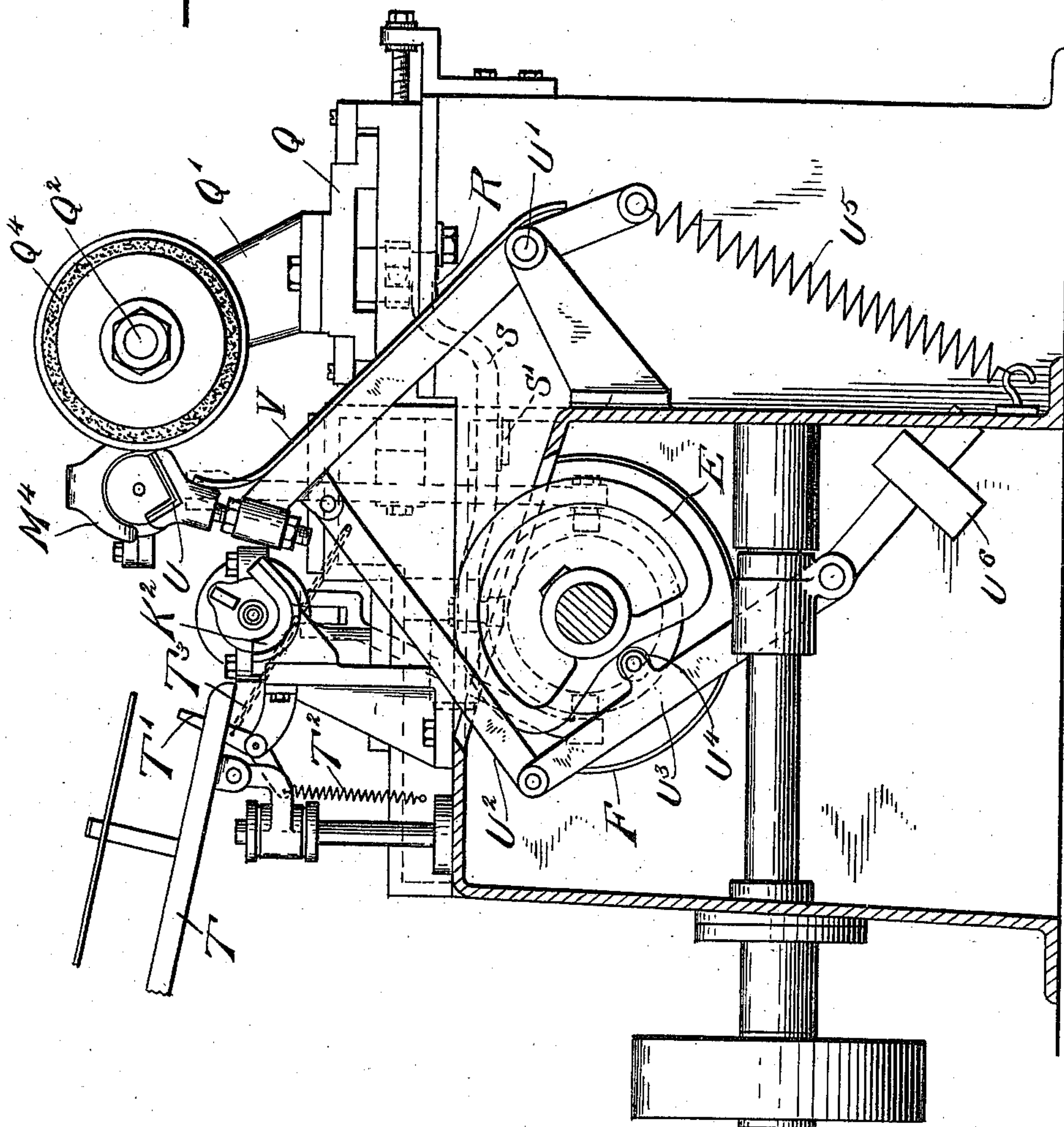
Arthur C. Livermore  
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984,680.

5 SHEETS—SHEET 3.

己丑



Witnesses  
Chas. W. Beard  
L. Vreeland

Arthur C. Livermore Inventor

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Bartlett, Brownell & Thibault.

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5 SHEETS—SHEET 4.

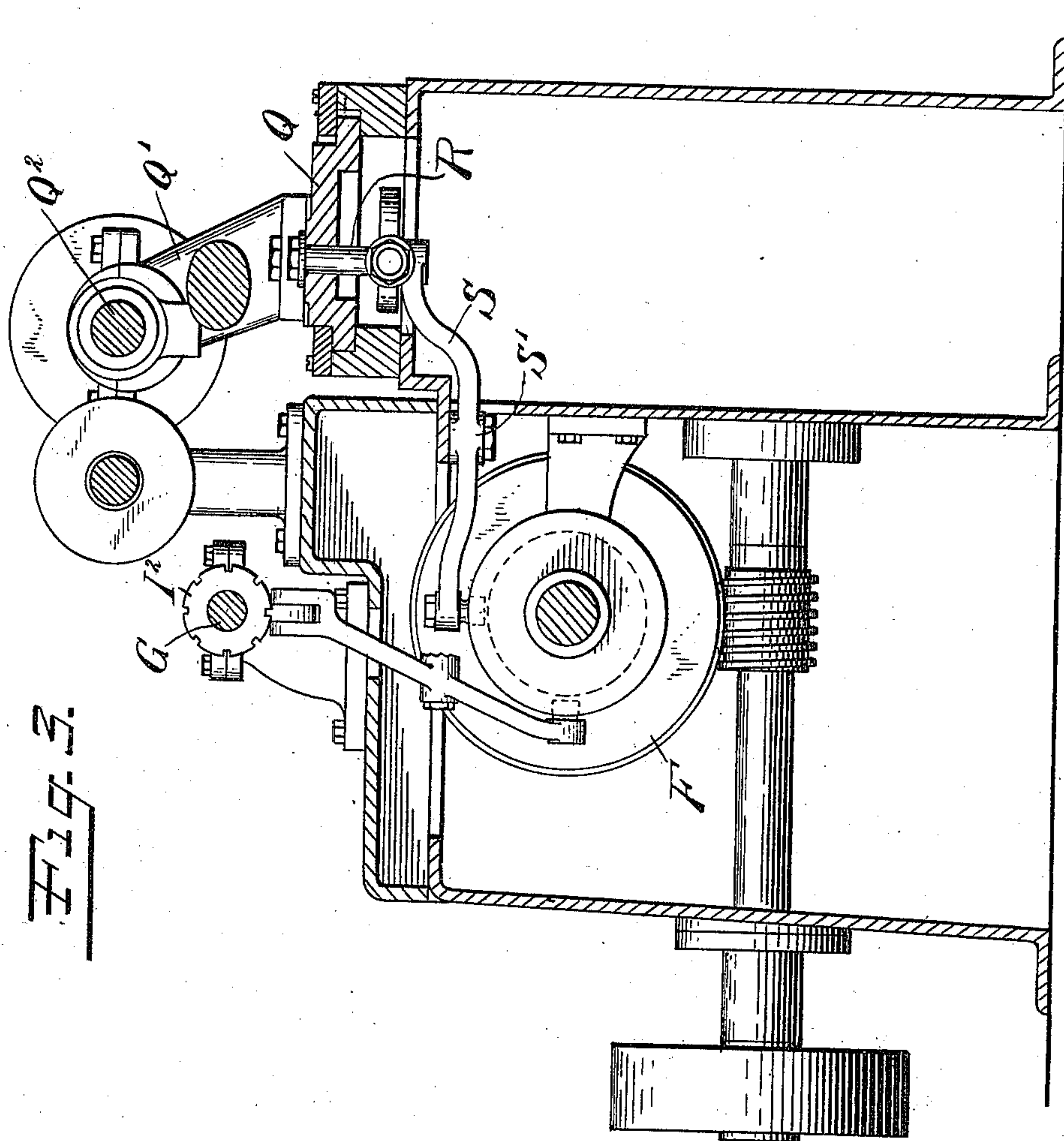


Fig. 3.

Witnesses  
*Chas. F. Reed*  
*L. Vreeland*

*Arthur C. Livermore* Inventor

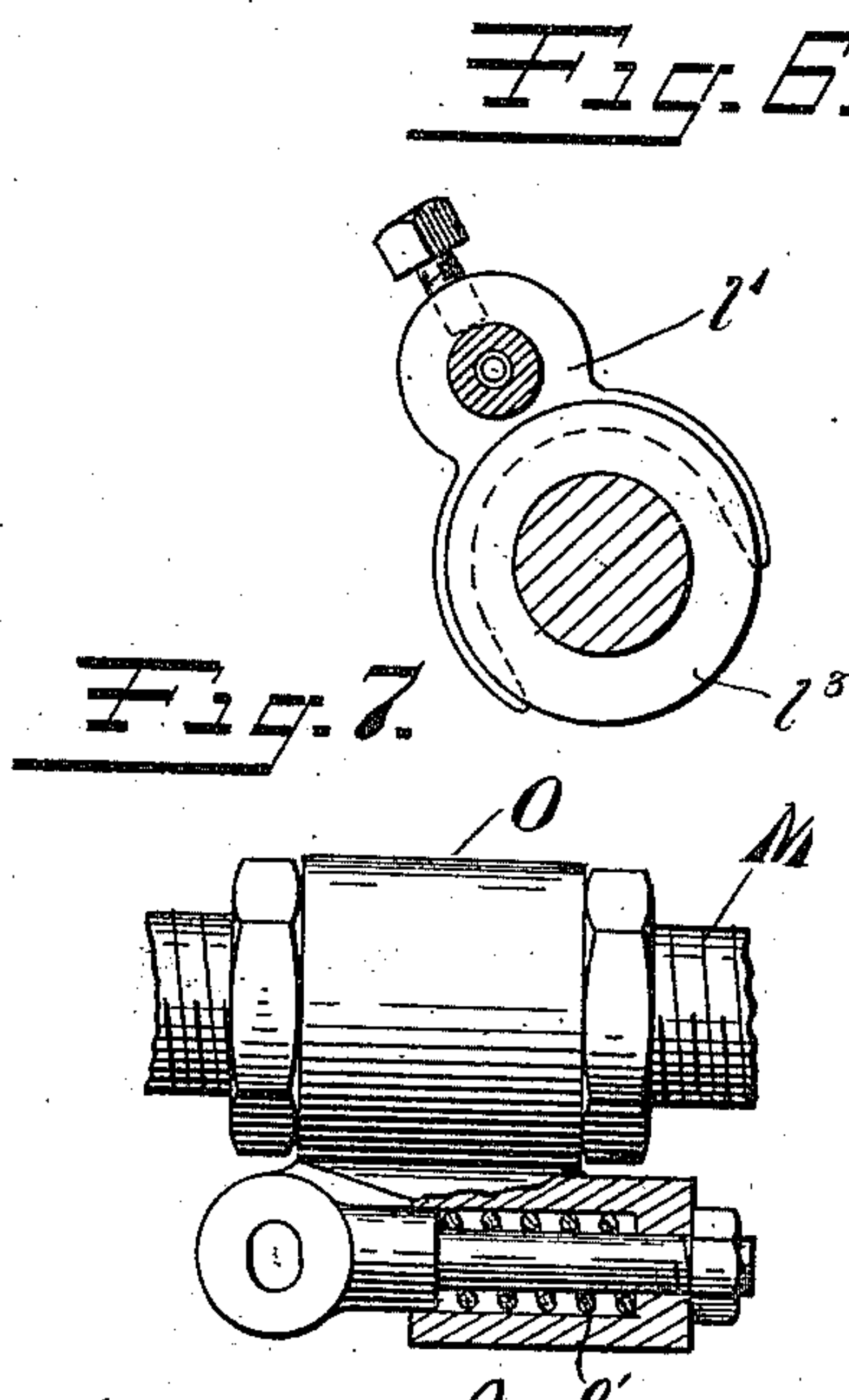
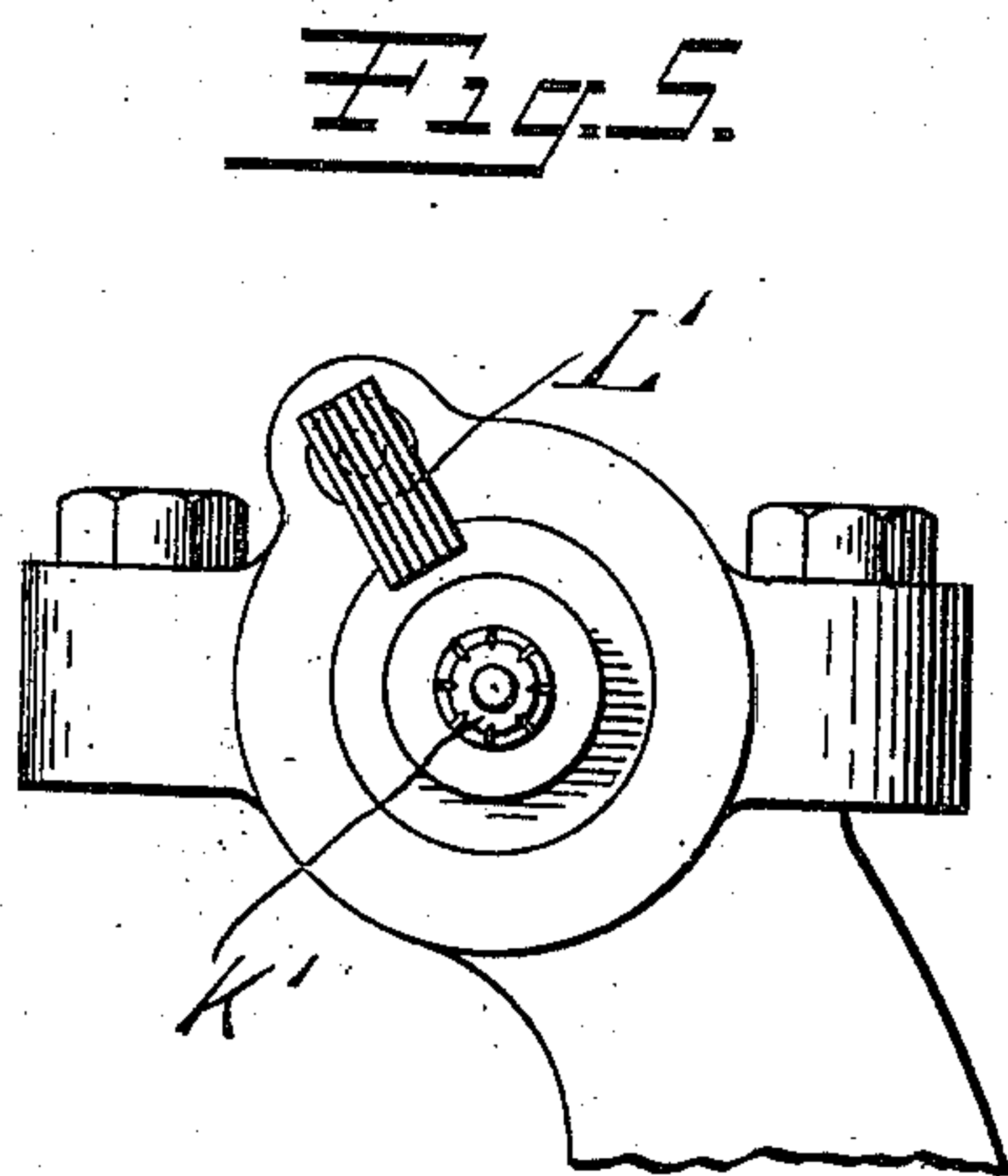
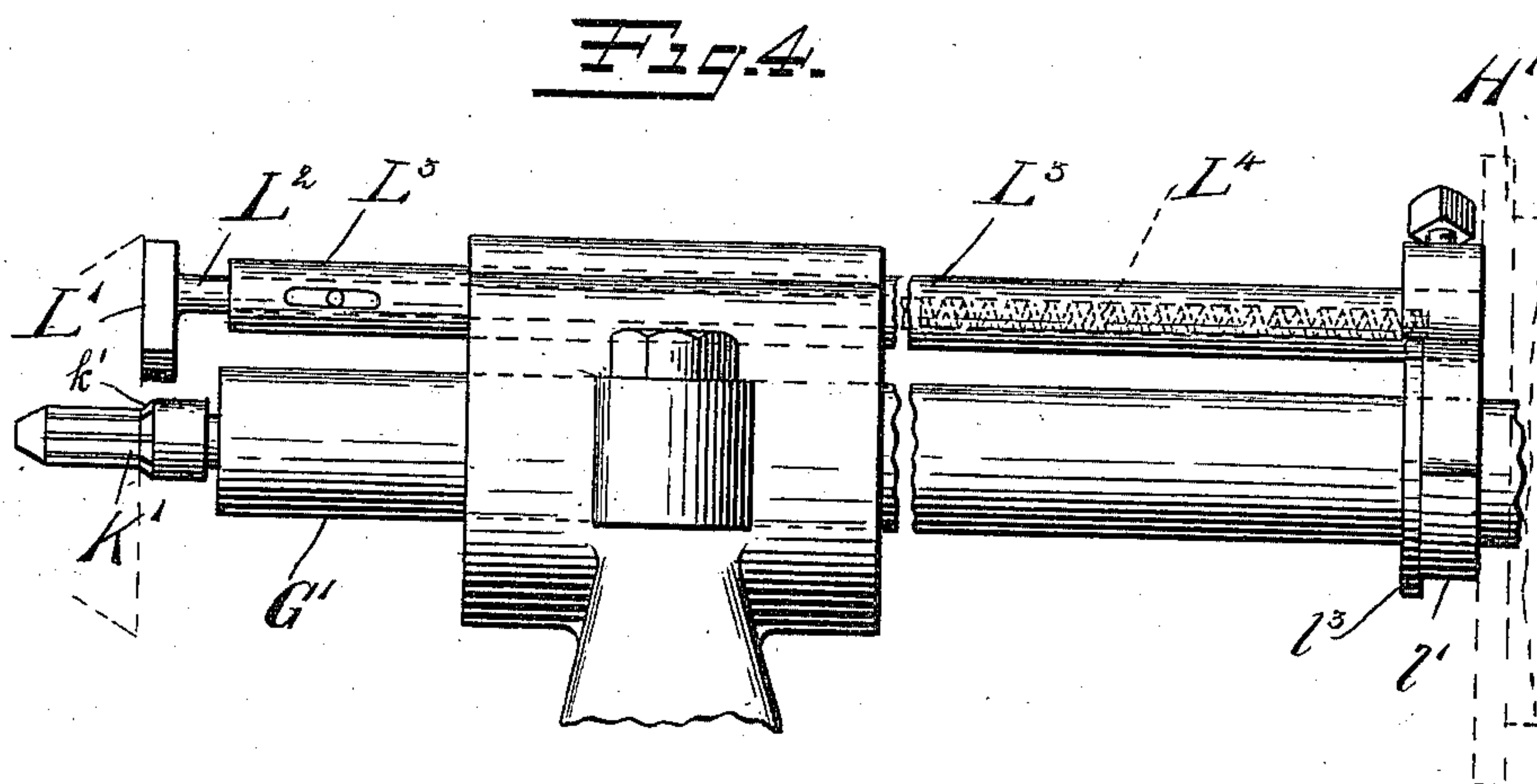
By *his* Attorneys  
*Barth. Brownell Menden*

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5 SHEETS—SHEET 5.



Witnesses  
*Charles A. Reed*  
*L. Vreeland*

*Arthur C. Livermore* Inventor

By *his* Attorneys  
*Bartlett, Brownell & Mendenhall*



# UNITED STATES PATENT OFFICE.

ARTHUR C. LIVERMORE, OF HOLYOKE, MASSACHUSETTS, ASSIGNOR TO THE AMERICAN  
THREAD COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

## SPOOL-FINISHING MACHINE.

984,680.

Specification of Letters Patent.

Patented Feb. 21, 1911.

Application filed October 6, 1906. Serial No. 337,842.

*To all whom it may concern:*

Be it known that I, ARTHUR C. LIVERMORE, a citizen of the United States, residing at Holyoke, Hampden county, Massachusetts, have invented certain new and useful Improvements in Spool-Finishing Machines, of which the following is a full, clear, and exact description.

My invention relates to improvements in spool finishing machines and has for its object to produce a machine for automatically finishing the heads of pulp spools so as to reduce them to a definite predetermined size and give their peripheral surfaces a smooth finish.

The following is a description of a machine embodying my invention, reference being had to the accompanying drawings in which—

Figure 1 is a front elevation of the machine showing the supporting table in section, Fig. 1<sup>a</sup> is a plan view, with the hopper removed, Fig. 2 is a cross-section of the machine on the line X—X, Fig. 1, Fig. 3 is a cross section of the machine on the line Y—Y, Fig. 1, Figs. 4, 5, 6 and 7 are enlarged views of the details.

Referring more particularly to the drawings, A is a cam shaft provided with cams A', A<sup>2</sup>, having respectively complementary grooves B B' and C C'. The left hand cam A' is provided with a third groove D. The shaft A is also provided with a carrier-actuating cam E for the purpose hereinafter described. This shaft A is revolved by a worm wheel F driven from any suitable source.

In journals upon the table of the machine are mounted two reamer shafts G G' which are made to revolve at a desired rate by belts upon pulleys H H'. These shafts are surrounded by loose collars I I' adjusted by nuts I<sup>2</sup> I<sup>3</sup>. To the collars I I' are pivoted levers J J', the lower ends of which levers are provided with anti-friction rollers traveling in the grooves C C'. These reamer shafts G G' are provided with reamers K K'.

L L' are the heads of clamping devices which pass through the stationary journals of the shafts G G' and have their rear ends connected to forks l l' on the shafts G G'. These forks lie between shoulders l<sup>3</sup> upon the shafts G G' and the pulleys H H' so as to partake of the longitudinal movement of these shafts while being prevented from

turning by their bearings in the stationary journals. The heads L L' are mounted on rods L<sup>2</sup> which enter the tubes L<sup>3</sup> and are forced outwardly by the springs L<sup>4</sup> so as to offer pressure to any object in contact with which they may be brought.

When a bobbin comes between the reamer ends of the shafts G G' the reduced portions of the reamers K K' enter the holes of the bobbins so as to center it. On a further inward movement of the shafts G G', the clamps L L' engage the bobbin and prevent it from turning. Upon a further inward movement of the shafts G G', the straight cutting portions of the reamers K K' ream the ends of the holes within the bobbin to the desired size, the cutting shoulder portion l' of the reamers then cuts off the edge of the hole and eliminates the bur.

Above the reamer shafts G G' and slightly to the rear are two revolving clamping shafts M M' having clamping surfaces M<sup>2</sup> M<sup>3</sup>. These shafts are provided with pulleys N N' so as to be belt-driven at a rapid rate. They are also provided with loose adjustable collars O O' to which are connected levers P P' having at their lower ends anti-friction rollers which enter the cam grooves B B'. The collar O' is provided with a spring connection o' which takes up any unevenness in the length of the spools. The cam grooves B B' are so constructed that when the bobbin is placed between the clamping surfaces M<sup>2</sup> M<sup>3</sup>, the clamping shafts M M' are brought together sufficiently to firmly grasp the bobbin and cause it to revolve.

M<sup>4</sup> M<sup>5</sup> are doffers or knock-off devices assisting in centering a bobbin between the clamping surfaces M<sup>2</sup> M<sup>3</sup> and doffing it when the spindles are withdrawn. Mounted in ways upon the table of the machine is a sliding base Q provided with bearings Q' in which is mounted a revolving shaft Q<sup>2</sup> carrying two finishing or grinding disks Q<sup>3</sup> Q<sup>4</sup> adapted when moved longitudinally to engage the periphery of revolving bobbins held between the clamping surfaces M<sup>2</sup> M<sup>3</sup>. This table Q is provided with a depending lug R to which is connected a lever S fulcrumed at S' and provided at its other end with an anti-friction roller which travels in groove D. The revolution of the cam groove D causes the lever S to move the table Q to and fro in the direction of the axis of the shaft Q<sup>2</sup>, thus bringing the fin-



ishing surfaces  $Q^3 Q^4$  up against the sides and onto the peripheries of the two heads of the revolving spool.

The spools are primarily contained in a hopper T and are automatically released so as to be carried by gravity to the reamers, from thence they are carried to the clamping surfaces  $M^2 M^3$  by a carrier U mounted on an arm pivoted at  $U'$  and actuated by a link  $U^2$  which in turn is actuated by a counterweight lever  $U^3$  carrying an anti-friction roller  $U^4$  which bears against the cam E. The spring  $U^5$  and counterweight  $U^6$  keep the roller  $U^4$  in engagement with the cam E.

Beneath the reamers is a stationary receiver or holder  $K^2$  which catches the heads of a falling bobbin and holds it in position while the tapered ends of the reamers are entering the holes to be reamed. The bobbins are retained in the hopper T by an upward projection  $T'$  which is pivotally mounted on a stationary arm. A spring  $T^2$  tends to hold it up in the path of the bobbins in the hopper, while a chain  $T^3$  connected to the link  $U^2$  of the carrier withdraws it when the carrier is in depressed position.

In the operation of the machine the revolution of the cam E brings the carrier U in position so as to lift a bobbin from the holder  $K^2$ , whereupon being released from the hopper, it falls into the support  $K^2$  and is held with its holes in alinement with the reamers  $K K'$ . The reamers  $K K'$  are then forced inwardly under the action of the cam grooves  $C C'$  so as to ream the ends of the holes of the binder and are then withdrawn. Thereupon a further movement of the cam E moves the carrier so as to pick up the bobbin and bring it between the clamping surfaces  $M^2 M^3$  where it is held until the clamping surfaces  $M^2 M^3$  engage therewith. Thereupon the carrier U is withdrawn and returned to a position to pick up another bobbin from the support  $K^2$ . While the bobbin is held between the clamping surfaces  $M^2 M^3$ , the sliding base Q through the action of the cam groove D and lever S is moved longitudinally so as to bring the finishing surfaces  $Q^3 Q^4$  against the sides and peripheries of the revolving bobbin, thereby grinding them to size and finishing them as desired. The sliding base Q is then withdrawn to its original position. The clamping surfaces  $M^2 M^3$  are withdrawn and, the carrier being in depressed position, the bobbin when released thereby is dropped upon the guiding surface  $B'$  and is conveyed to the rear of the machine. The machine is automatic in its action it requiring only that the hopper T be kept filled with bobbins. On account of the slight attention necessary, one attendant can look after a number of such machines and thereby the work can be greatly expedited and the cost

of labor much reduced. The machine is simple in its construction and accurate in its operation and can be adapted for various uses as may be desired.

The grinding surfaces  $Q^3 Q^4$  where the machine is used for grinding or finishing objects made of compressed wood pulp, I preferably make of carborundum glued or cemented to the surfaces in any suitable manner. The carborundum may be made of varied degrees of coarseness depending upon the fineness of the finish desired.

The finishing devices  $Q^3 Q^4$  have tapered and cylindrical portions, both of which are covered with carborundum, so that the spool heads are first engaged by the tapered surfaces and thus gradually reduced to the desired size. The front face of the rim  $Q^5$  on the finishing device  $Q^3$  is also provided with a carborundum coating, so as to finish a circle on one end of the spool.

What I claim is:

1. In a finishing machine, the combination of a revolving clamp having a fixed axis of revolution, said clamp being concentric with its axis of revolution, a revolving finishing device whose surface of revolution has a tapered portion and a cylindrical portion, and means for producing a relative longitudinal movement between the finishing device and the clamp parallel to the axis of said clamp, the axis of said finishing device being out of alinement with and parallel to the axis of said clamp.
2. In a machine for finishing spools, the combination of a revolving clamp having a fixed axis of revolution, said clamp being concentric with its axis of revolution, a revolving finishing device consisting of two members each having tapered finishing portions facing in the same direction, and means for producing a relative longitudinal movement between said finishing device and said clamp parallel to the axis of said clamp, the axis of said finishing device being out of alinement with the axis of said clamp.
3. In a machine for finishing spools, the combination of a revolving clamp having a fixed axis of revolution, said clamp being concentric with its axis of revolution, a revolving finishing device consisting of two members, each having a tapered portion and a cylindrical forming portion, means for producing a relative longitudinal movement between said finishing device and said clamp parallel to the axis of said clamp, the axis of said forming device being out of alinement with the axis of said clamp.
4. In a machine for finishing spools, the combination of a revolving clamp having a fixed axis of revolution, said clamp being concentric with its axis of revolution, a revolving finishing device having a surface of revolution in part tapered and in part cylindrical and in part at right angles to its axis,



the part at right angles extending beyond the cylindrical part and means for producing a relative longitudinal movement between said finishing device and said clamp 5 parallel to the axis of said clamp, the axis of said finishing device being out of alignment with the axis of said clamp.

5. In a finishing machine, the combination of a carrier lifting objects to be finished one 10 at a time, a revolving clamp concentric with its axis of revolution, means for causing said carrier to convey said objects to said clamp, means for causing said clamp to grasp and release said objects, a revolving finishing de- 15 vice adapted to be brought into engagement with said object while in said clamp, and a chute carried by said carrier for guiding the objects when released by said clamp, being beneath said clamp when said carrier is in 20 depressed position and said clamp releases said objects.

6. In a finishing machine, the combination of a hopper, a receiver to which objects to be finished are delivered one at a time, a carrier lifting said objects from said receiver, 25 a revolving clamp concentric with its axis of revolution, means for causing said carrier to convey said objects to said clamp, means for causing said clamp to grasp and release said objects, a revolving finishing de- 30 vice adapted to be brought into engagement with said object while in said clamp, and a chute carried by said carrier for guiding the objects when released by said clamp, being beneath said clamp when said carrier is 35 in depressed position and said clamp releases said objects.

ARTHUR C. LIVERMORE.

Witnesses:

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A. N. LA PORTE.