

No. 756,531.

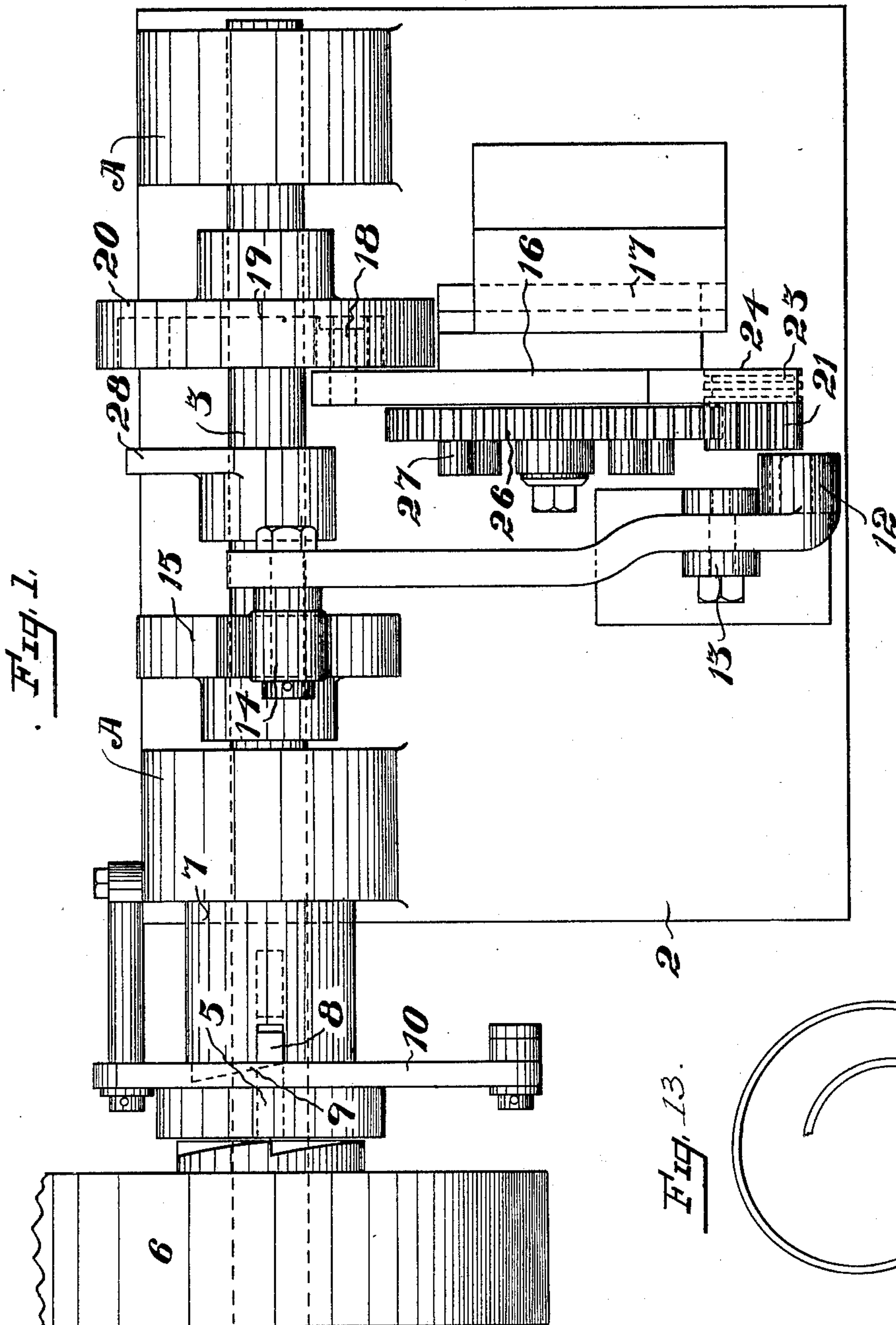
PATENTED APR. 5, 1904.

J. H. ROSS.
SPRING KNOTTING MACHINE.

APPLICATION FILED SEPT. 16, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses,
John H. Ross
Dudley Moss.

Inventor,
John H. Ross
Geo H. Strong atty.

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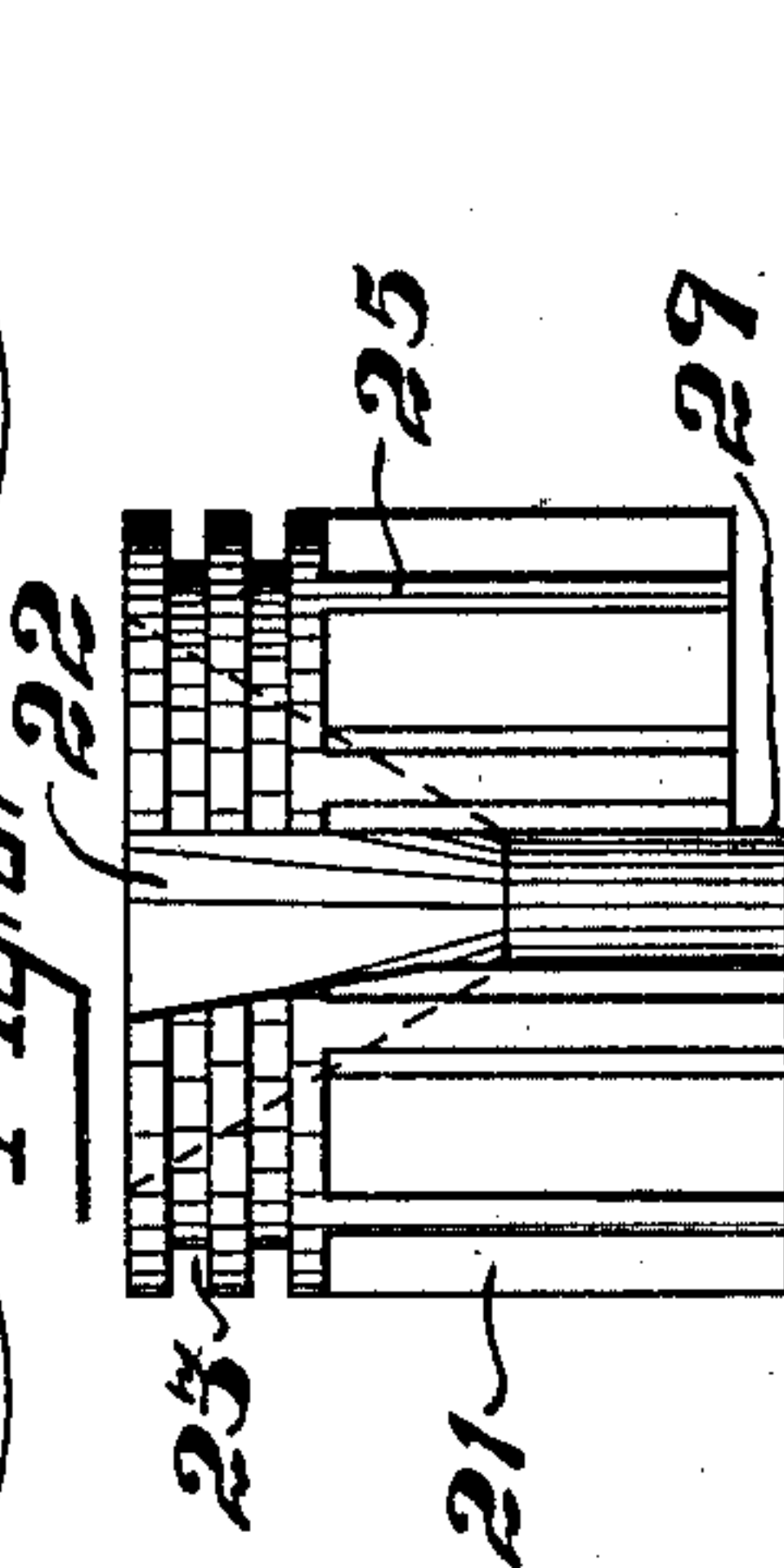
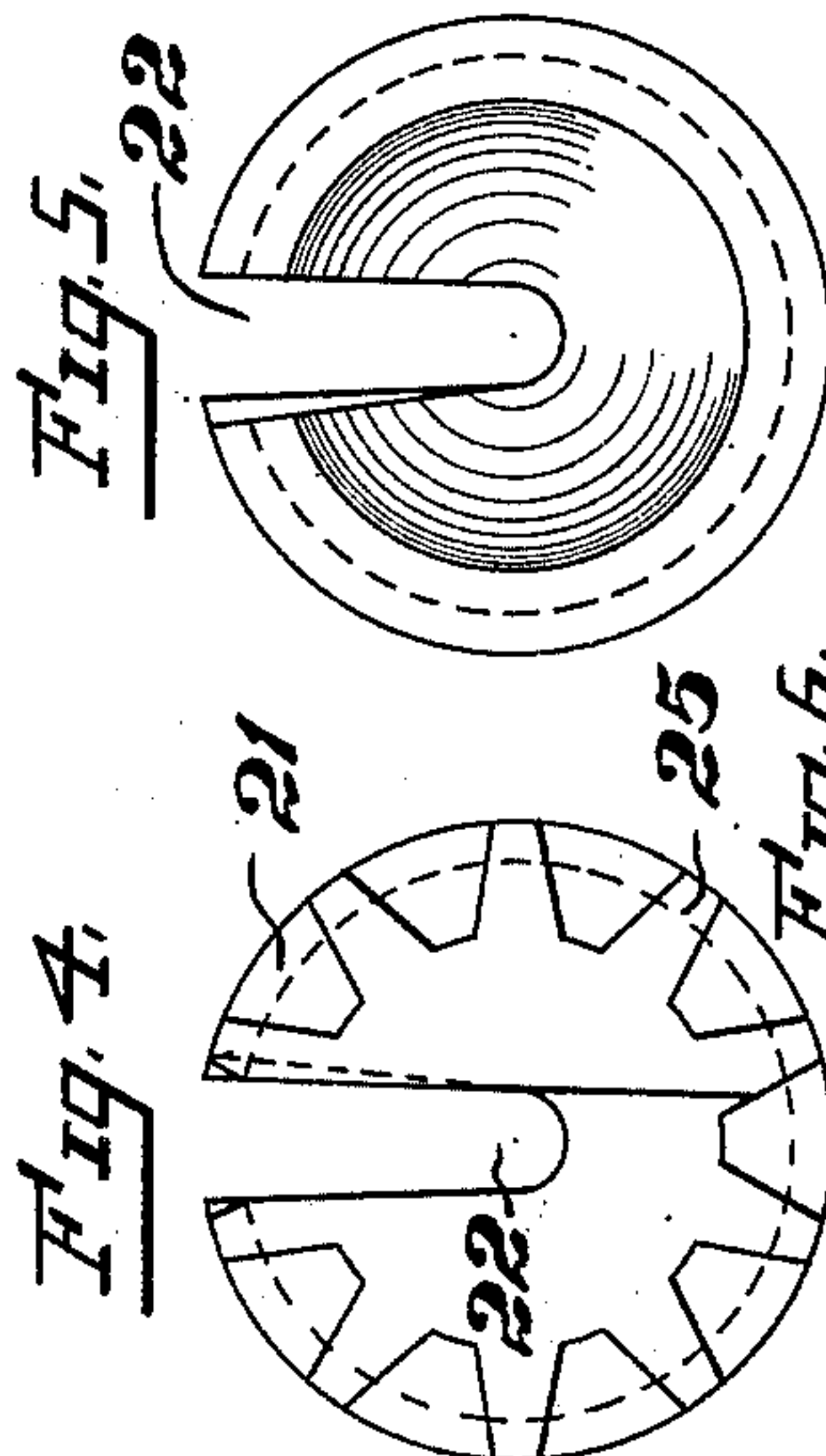
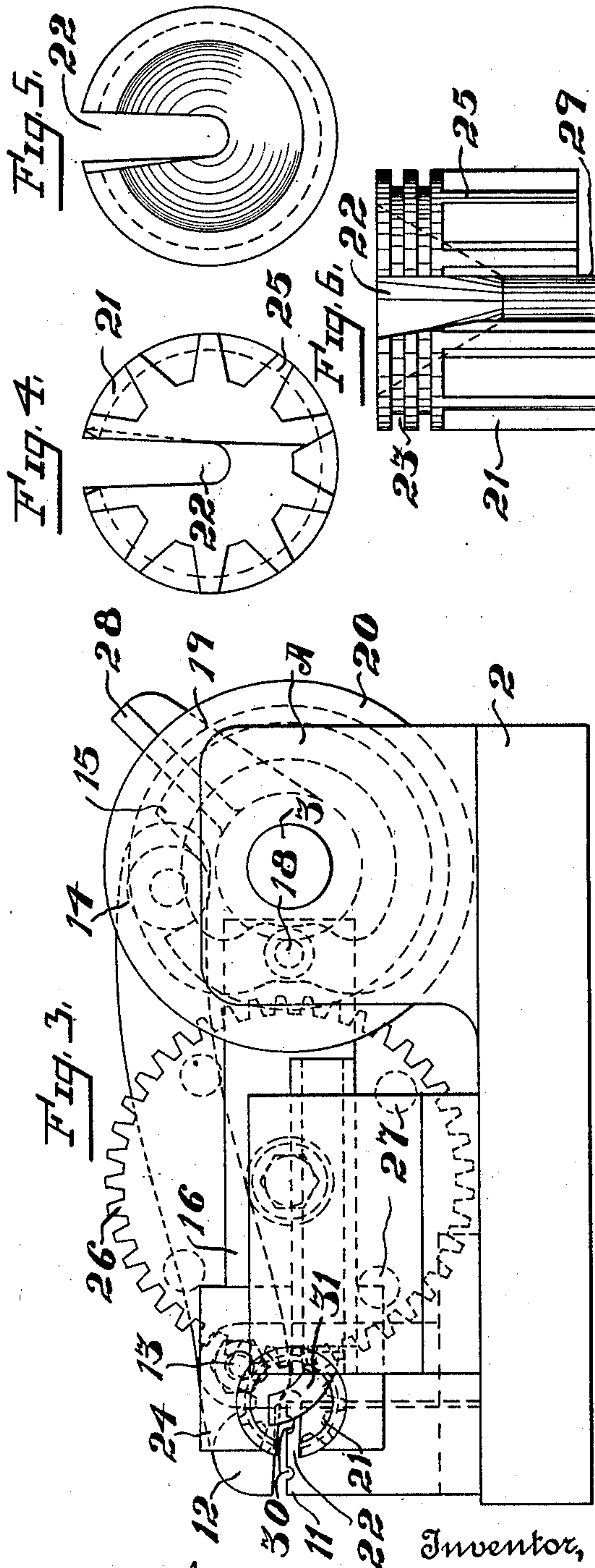
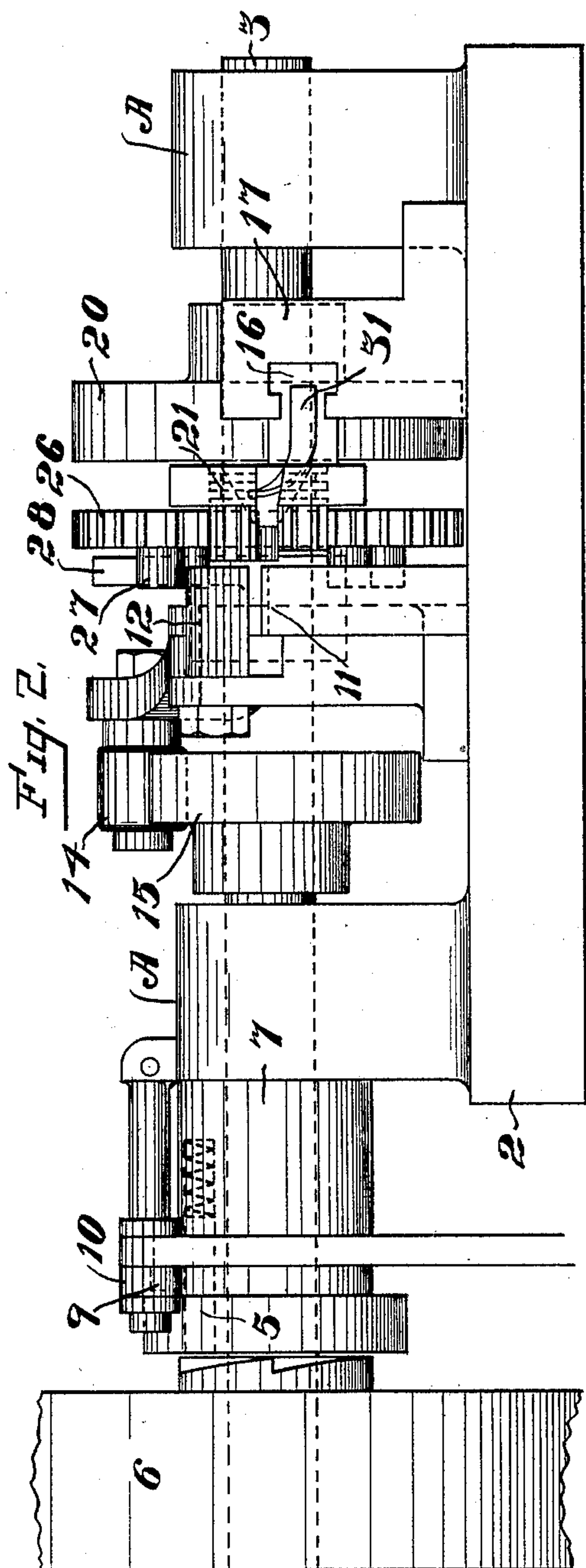
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NO MODEL.

3 SHEETS—SHEET 2.



Witnesses,

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3 SHEETS—SHEET 3.

Fig. 3.

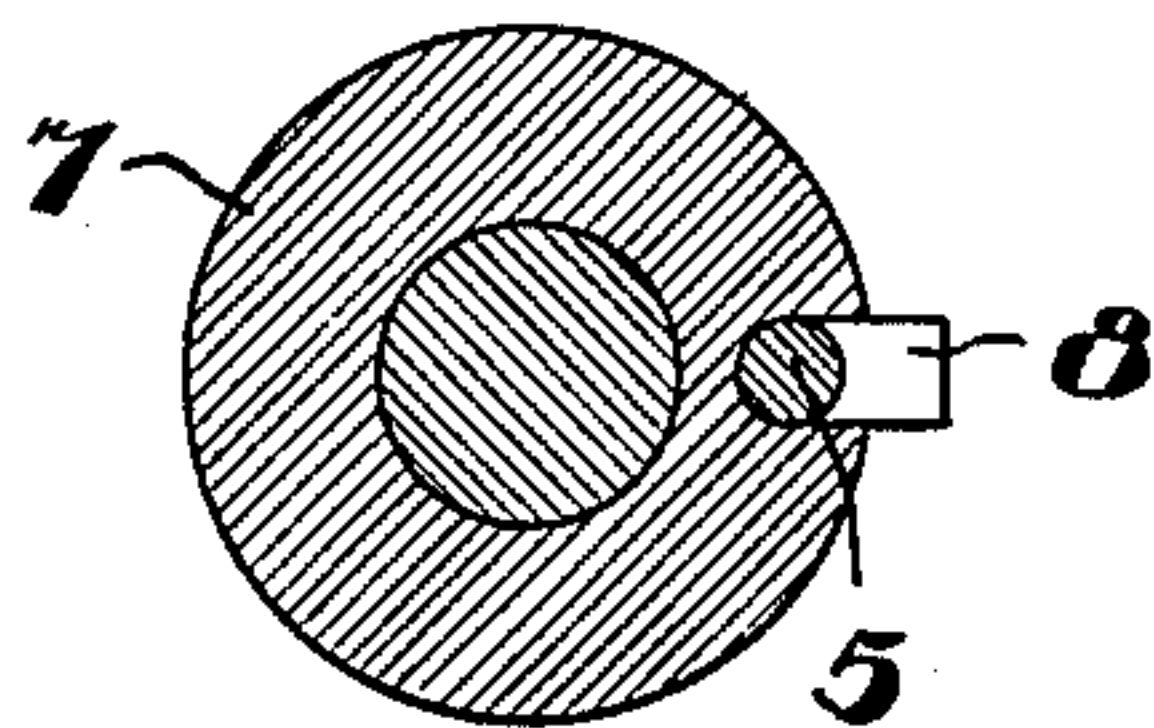


Fig. 7.

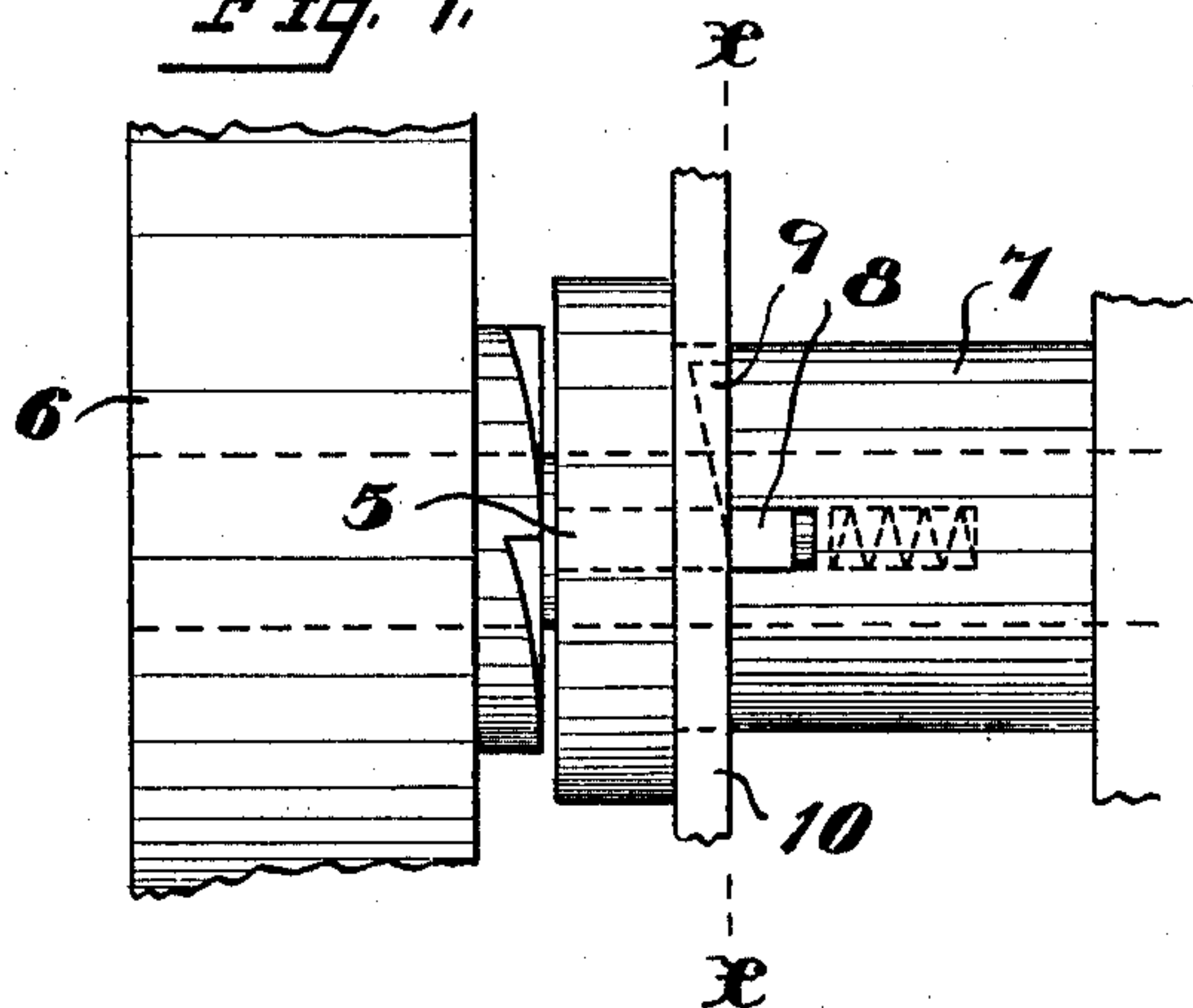


Fig. 10.

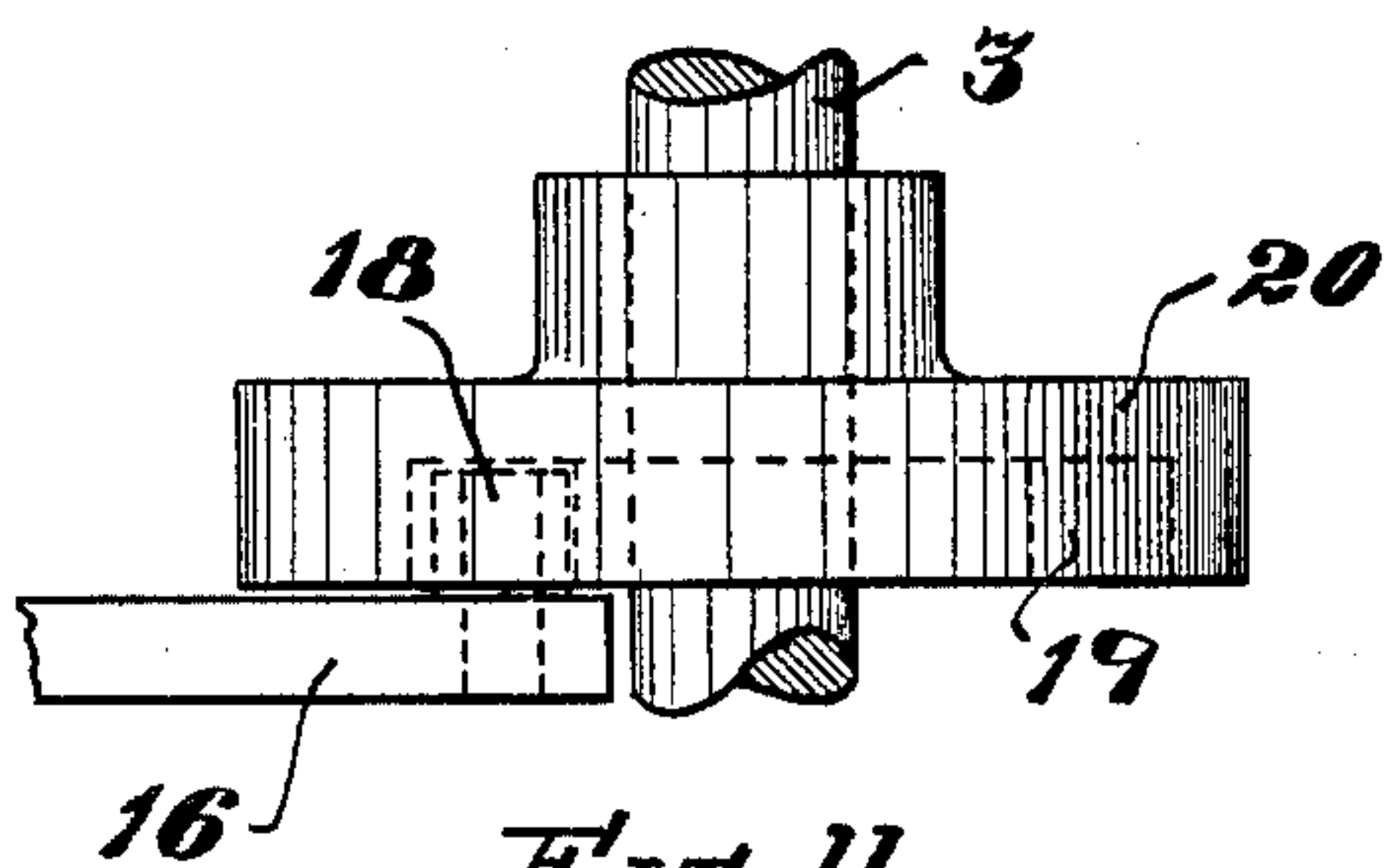


Fig. 9.

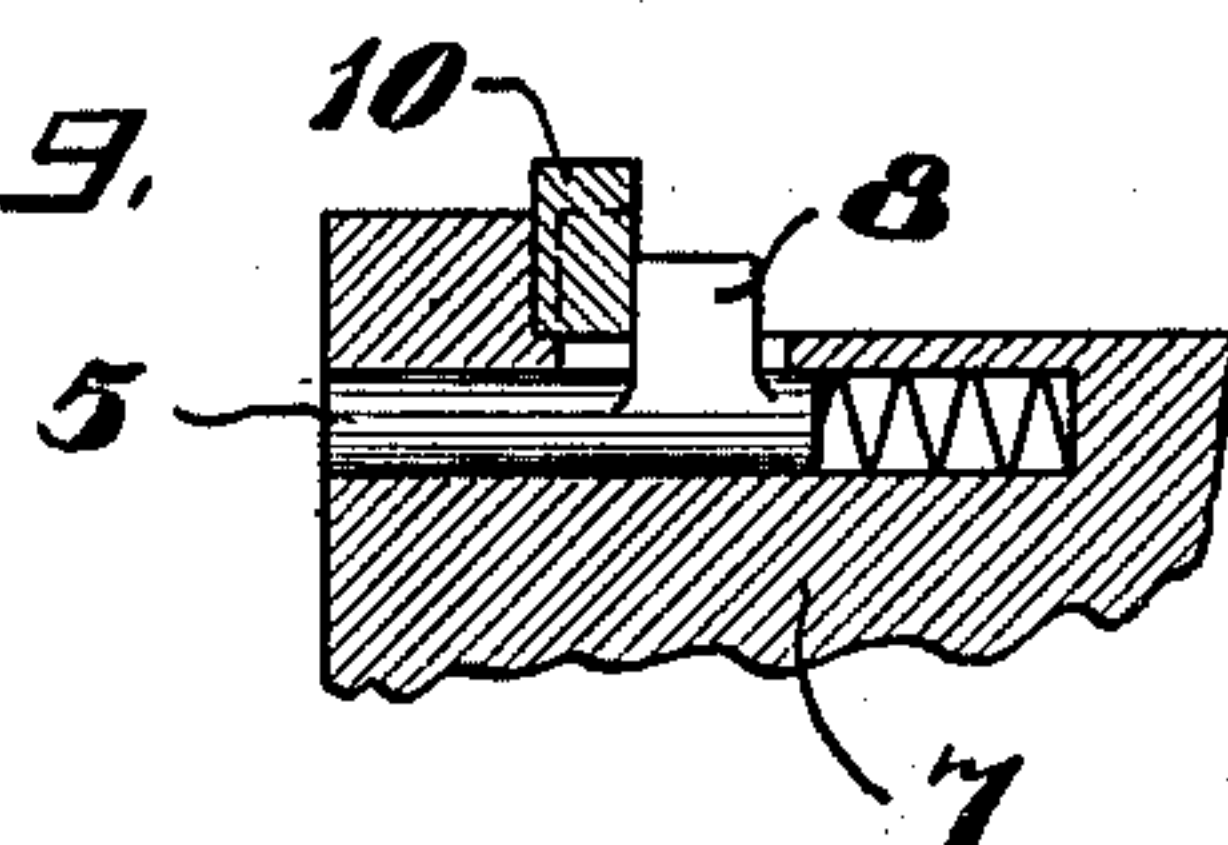


Fig. 11.

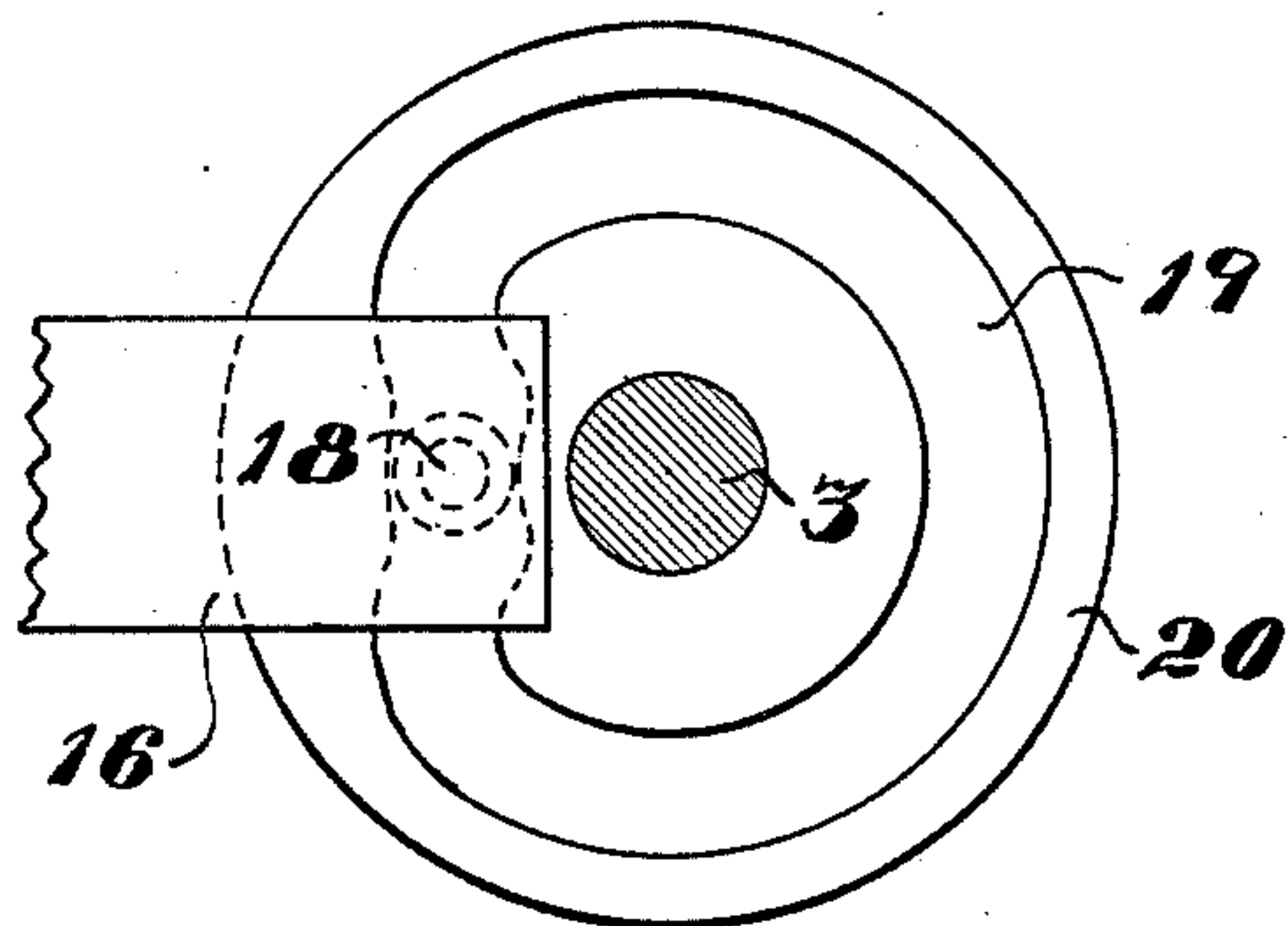
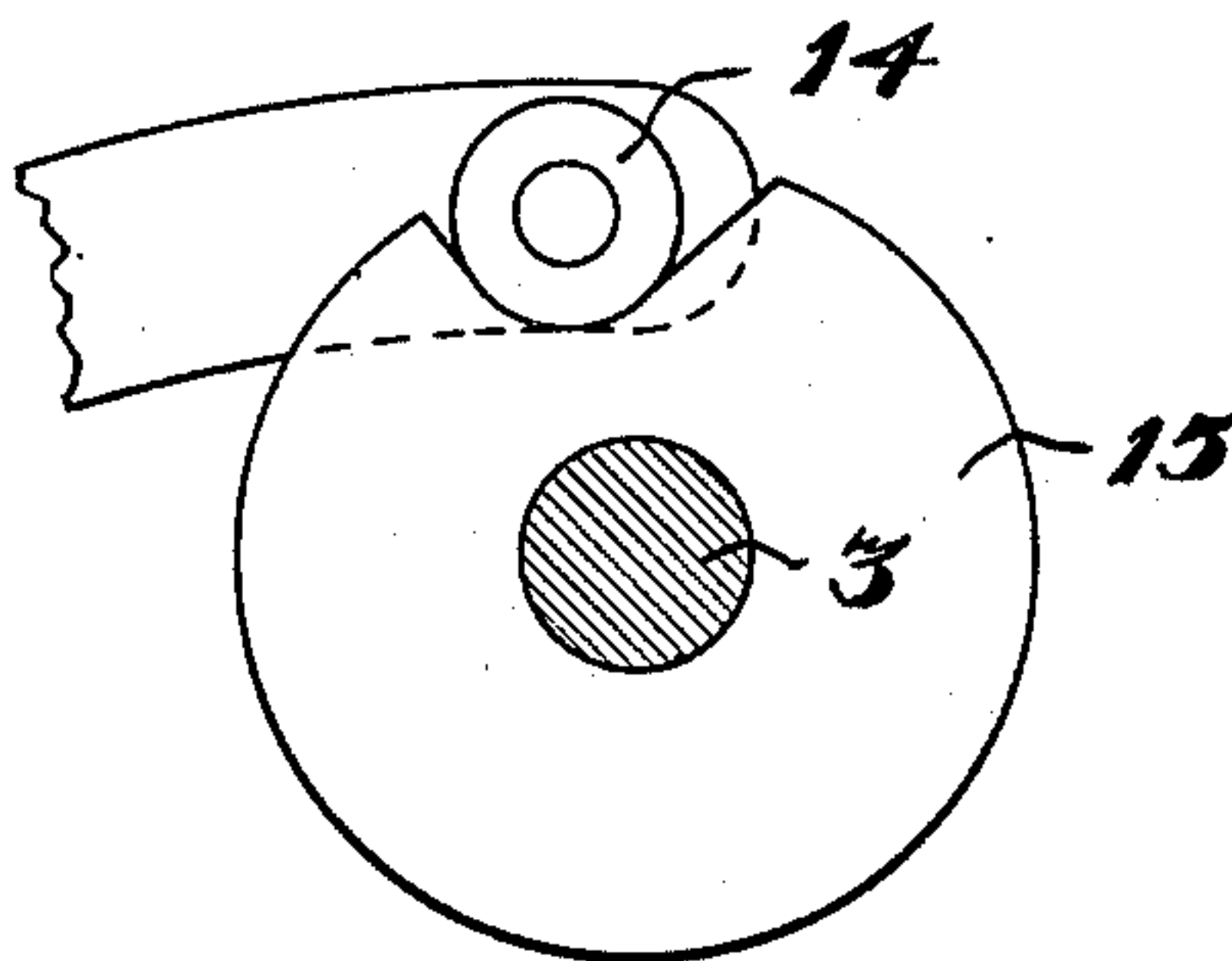


Fig. 12.



Witnesses,

St. Morse
Dudley Moss.

Inventor,

John H. Ross
By Geo. H. Strong.

UNITED STATES PATENT OFFICE.

JOHN H. ROSS, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO AMERICAN STEEL & WIRE COMPANY, OF SAN FRANCISCO, CALIFORNIA, A CORPORATION.

SPRING-KNOTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 756,531, dated April 5, 1904.

Application filed September 16, 1903. Serial No. 173,429. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. ROSS, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Spring-Knotting Machines, of which the following is a specification.

My invention relates to improvements in machines for knotting the ends of coil furniture-springs.

The object of the invention is to provide a machine for automatically tying or "knotting," as it is called, the end of a conical spring after it comes from the coiling-machine.

It consists of the parts and the construction and combination of parts, as hereinafter more fully described, having reference to the accompanying drawings, in which—

Figure 1 is a plan view of my machine. Fig. 2 is a front elevation of same. Fig. 3 is an end elevation of same. Fig. 4 is an end view of slotted pinion. Fig. 5 is the opposite end of same. Fig. 6 is a front view of same. Fig. 7 is a detail of clutch mechanism. Fig. 8 is a transverse section on line *xx* of Fig. 7. Fig. 9 is a longitudinal central section through latch-guide portion of collar. Fig. 10 is an edge view of grooved cam. Fig. 11 is a side elevation of same. Fig. 12 is a side elevation of cam for locking jaw of vise. Fig. 13 is a plan view of the spring with dotted lines indicating the bend and knot.

A represents the frame of my machine, 2 the bed-plate, and 3 the operating-shaft, journaled in the frame and rotatable intermittently through the engagement of the spring-catch 5 with the clutch on the band-pulley 6, which is loose on the shaft. Spring-latch 5 is reciprocable longitudinally of the shaft in suitable guides in a collar 7, which is keyed to the shaft. The latch has a projection 8 extending outward to engage a cam-surface 9 on a lever 10 to hold the latch in normally retracted position. By a foot-lever (not here shown) lever 10 is lifted to disengage the latch and allow the latter to press forward into the path of the clutch on pulley 6, causing the shaft to revolve. On releasing the foot-lever lever 10 drops, and

when the latch comes around cam projection 9 engages projection 8, retracts the latch, and the shaft stops.

11 represents the stationary member of a vise secured to the bed-plate, and 12 the movable member fulcrumed at 13 and carrying a roller 14, disposed in the path of a cam 15 on shaft 3. When the shaft revolves, cam 15 lifts up on roller 14 and closes the vise to grip two approximately parallel sections of the wire spring about an inch and a half from the end of the wire. This projecting end of the wire is adapted to be bent inwardly and radially of the gripped coil and wrapped around the portion of the coil adjacent to the vise. The means for effecting this bending and wrapping is as follows: Disposed parallel with and close to the vise is a horizontal reciprocating carriage 16, here shown as movable in a guide 17 on the frame and having a roller projection 18 engaging a continuous cam-groove 19 in cam 20, keyed on the shaft. When the latter is revolved, the carriage is reciprocated to carry forward a rotatable jaw or slotted pinion 21 into engagement with the protruding end of the spring wire and the gripped fold of the spring which is held in the clutch of the vise. The jaw 21 comprises a cylindrical longitudinally-slotted block having peripheral grooves 23, engaged loosely by suitable clamps 24, rigid with carriage 16. The bottom of the slot 22 is coincident with the axis of the jaw. The clamps are open in front to admit a wire radially through slot 22 when the jaw is turned in the right position. The periphery of the jaw not engaged by the journal-clamps 24 is provided with gear-teeth, as at 25, which engage a four-to-one gear 26, journaled on and movable with carriage 16. Gear 26 has four projections 27 at right angles to its outer surface, which are disposed in the path of a cam-finger 28. Projections 27 are equidistant from the center of gear 26 and are disposed at the four corners of a square, so that each time shaft 3 revolves cam 28 strikes one of the projections to turn gear 26 one-quarter of a revolution, which in turn causes jaw 21 to make one full revolution. The adjust-

ment of gears 25 and 26 is such that when they are at rest in their normal position slot 22 in jaw 21 will register with the front opening in the clamps 24 to admit the wire, the slot, the clamp-opening, and the section of wire in the vise being essentially in the same horizontal plane. The jaw is provided with a projecting rigid part 29 on the side adjacent to the vise and is separate from the latter barely sufficient to allow the jaw to turn freely. When the jaw is in normal open position, the projection 29 will be above slot 22 and immediately above the wire which is clamped in the vise. The side of the projection adjacent to the center of the jaw is grooved to afford a seat for the wire with which the projection is to engage.

The gripping-surface of the stationary member 11 of the vise has two transverse guide-grooves 30, adapted to receive the two sections of the wire that are to be united or knotted.

In practice a spring, as shown in Fig. 13, is inserted into the vise, the end of the wire at the larger end of the spring and the adjoining fold being laid in the grooves 30 with the end of the wire projecting into the path of the jaw-opening. The distance this end may project beyond the vise is regulated by a spring-guide 31, secured to the carriage 16 and adjustable in the slot-opening 22 centrally of the jaw, the jaw at the end opposite the vise being cored out cone-shaped to accommodate the guide. The foot-lever governing lever 10 is then operated to engage the clutch and turn the shaft one complete revolution, the operator releasing the foot-lever as soon as the shaft starts to turn, so that the shaft stops automatically as soon as one revolution is completed. During this revolution cam 15 operates to close and lock the vise and hold the section of wire that is to be wrapped and the end that is to do the wrapping, while cam 20 reciprocates the carriage, carrying the jaw forward and causing the protruding end of the wire on coming into engagement with the bottom of the slot 22 to be bent at right angles over the rigidly-held loop portion of the spring and under projection 29 on the jaw. The carriage continues its forward movement until the loop portion of the spring which is gripped near the front end of the vise is within and substantially concentric with jaw 21. The motion of the carriage is then temporarily arrested, while cam 28 engages one of pins 27 and turns the jaw one complete revolution to wrap the bent end of the spring around the loop through the agency of the projection 29. On the jaw returning to its original position the knotting operation is complete, the cam 20 retracts the carriage, and cam 15 releases the vise.

The vise, the carriage, and the jaw 21 have a coördinate movement, allowing the several operations to take place successively, as de-

scribed, without interference and during each complete revolution of shaft 3.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a knotting-machine the combination of means for gripping two sections of wire, means including a reciprocating part for bending one section transverse to the other, means carried by said reciprocating part for wrapping said transversely-bent portion around the other section, and means for giving said several operating means a coördinate movement.

2. In a knotting-machine, the combination of means for gripping two substantially parallel sections of wire, means for bending one section transverse to the other, wrapping means including a slotted rotatable jaw member carried by said bending means, and means for giving said several gripping, bending and wrapping means a coördinate movement.

3. In a knotting-machine, the combination of wire-grippers, a relatively disposed reciprocating carriage, a rotatable jaw member on and movable with said carriage, and means for giving said grippers, carriage and jaw member a coördinate movement.

4. In a knotting-machine, the combination with wire-gripping means of a slotted pinion, a reciprocating carrier therefor and means for operating said carrier and pinion coördinately.

5. In a knotting-machine the combination of a wire-gripping means adapted to receive parallel sections of wire, a rotatable wrapping member, a carriage reciprocable at right angles to the length of the wire held by said grip means on which said wrapping member is mounted, and means for reciprocating said carriage and rotating said wrapping member coördinately.

6. In a knotting-machine, the combination with wire-gripping means, of a slotted pinion movable in a plane with and transverse to the gripped wire, and means for operating said pinion.

7. In a knotting-machine, the combination of a reciprocating carriage, a slotted rotatable jaw on said carriage, means for operating said carriage and jaw, and means for holding two sections of wire which are to be united in the path of said jaw.

8. In a knotting-machine, the combination of a reciprocating carriage, a slotted rotatable jaw thereon, means for giving said carriage and jaw a coördinate movement and means for holding conjoinable sections of wire in the path of said jaw.

9. In a knotting-machine, the combination with a reciprocating carriage, a slotted rotatable jaw thereon, means for reciprocating said carriage and means for rotating said jaw intermittently and means for holding conjoinable sections of wire in the path of said jaw.

10. In a knotting-machine, the combination

with wire-holding means of a reciprocating carriage, an intermittently-rotatable slotted jaw thereon, and means for operating said carriage and jaw coordinately.

5 11. In a knotting-machine, the combination of a support, a drive-shaft journaled therein, wire - gripping means, a reciprocating carriage, a rotatable slotted jaw on said carriage and means for operating said gripping means, carriage and jaw coordinately during each revolution of said shaft.

12. In a knotting-machine, the combination of a support, a drive-shaft, a vise having a fixed member and a movable member operat-
5 able by said shaft, a carriage reciprocable in a plane approximate to said vise, connections of said carriage with the drive-shaft for effecting such reciprocation, a slotted rotatable jaw member carried by said carriage and means for
0 rotating said jaw member.

13. In a knotting-machine, the combination of a support a vise operatable by said shaft, a reciprocating carriage, operative connections between the shaft and carriage, a slotted pin-
5 ion mounted on said carriage, a gear upon the carriage meshing with said pinion, and means for rotating the said gear intermittently and

correlative with the operations of the vise and carriage.

14. In a knotting-machine, the combination 30 with wire-gripping means, a reciprocating carriage and a slotted rotatable jaw member, of a guide 31 supported on the carriage and interposable in the slot in said jaw, and means for operating the jaw and carriage. 35

15. In a knotting-machine the combination with a suitable support of a rotatable longi-
tudinally-slotted jaw member journaled in said support, said support having an opening with
which the slot in said jaw member is adapted 40 to register to admit a wire centrally of the jaw, means for rotating the latter, said jaw member having wire-engaging means at one end, the opposite end of the jaw having a con-
ical recess and a guide member disposed ap- 45 proximate to said recessed end and adjustable in the line of the axis of the jaw.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN H. ROSS.

Witnesses:

S. H. NOURSE,

JESSIE C. BRODIE.