No. 777,101. PATENTED DEC. 13, 1904.

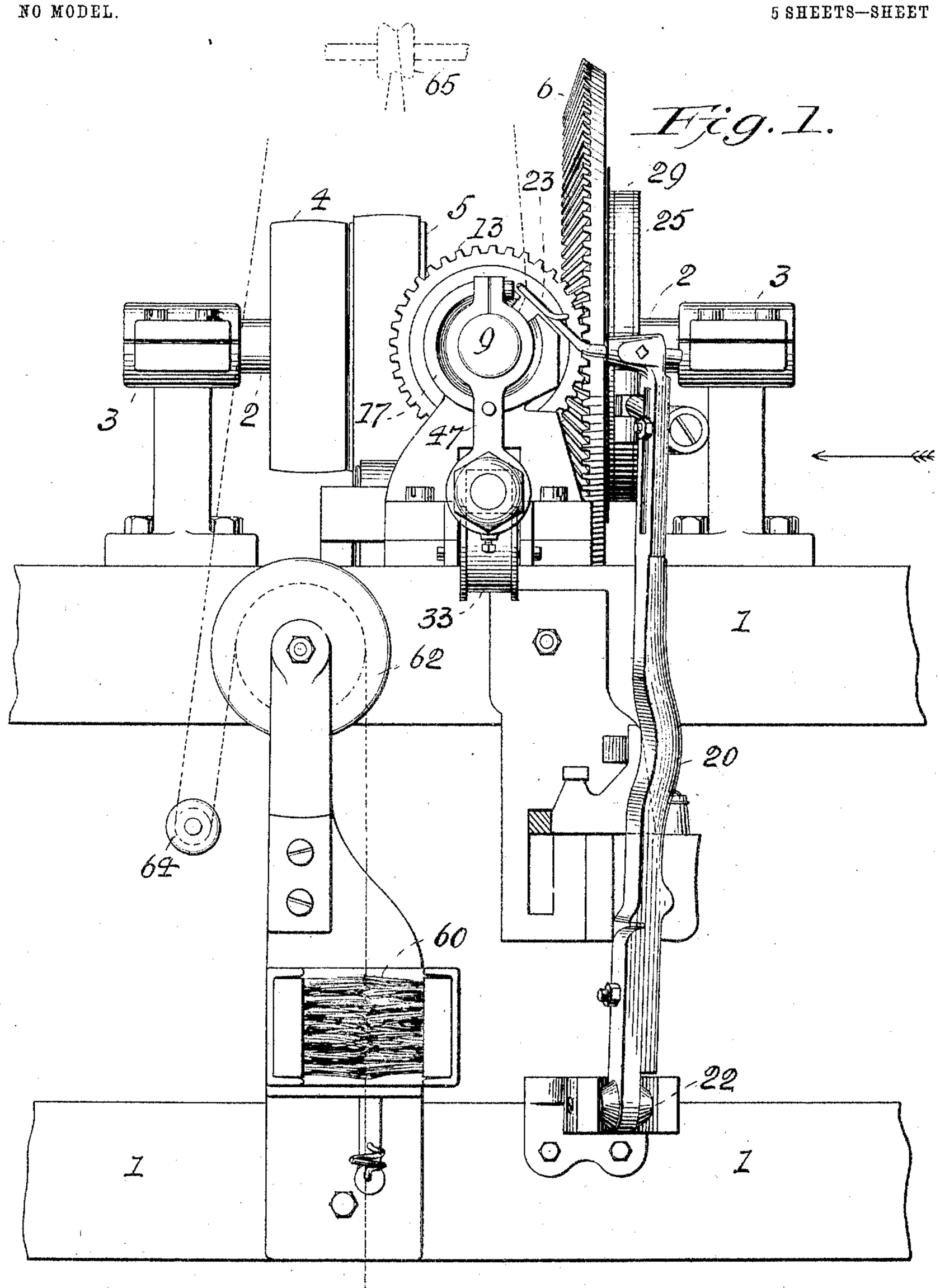
W. E. HOOPER.

COP WINDING MACHINE.

APPLICATION FILED NOV. 30, 1903.

NO MODEL. 5 SHEETS—SHEET 1.

Fig. 1.



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NO MODEL. 5 SHEETS—SHEET 2.

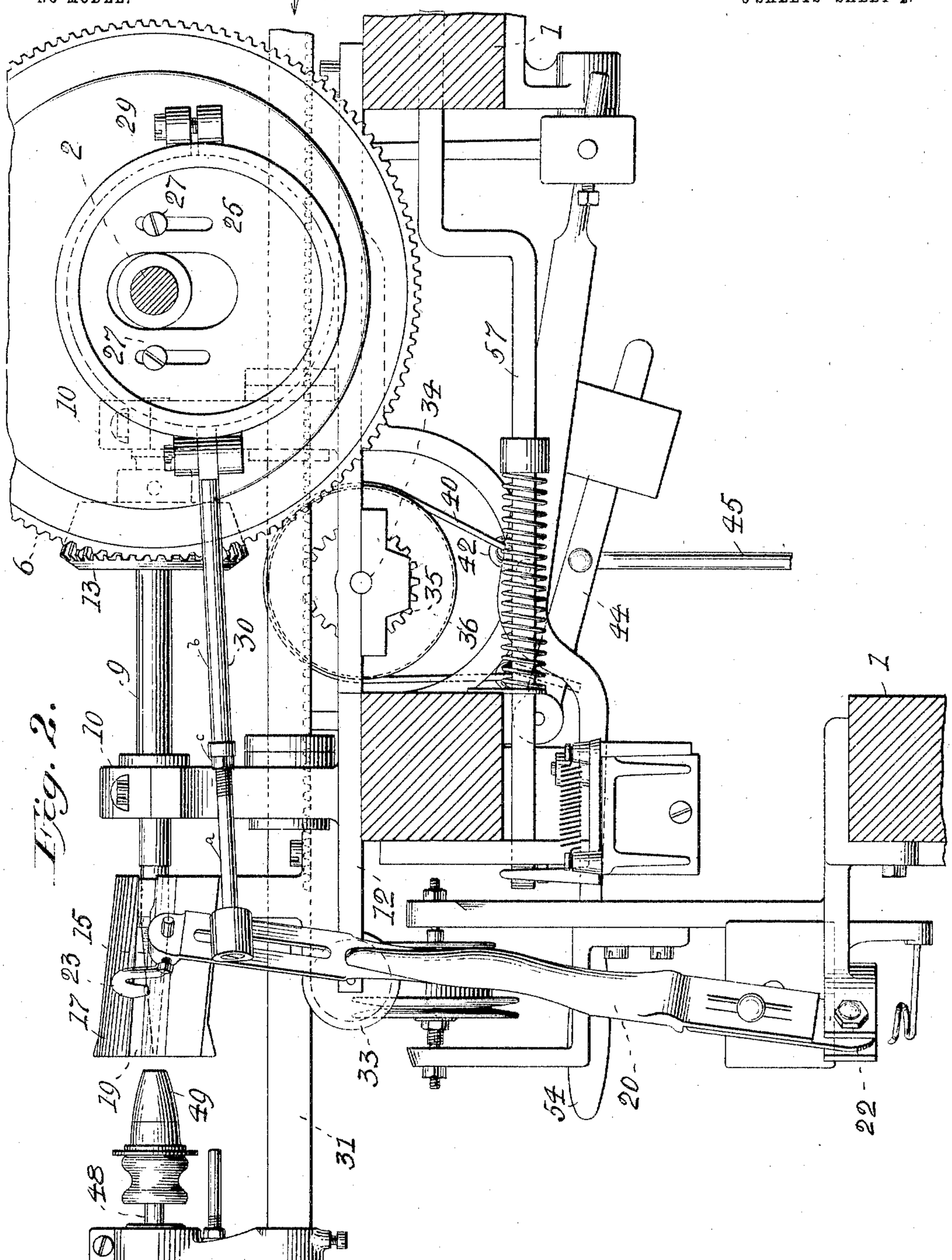

Fig. 2.

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NO MODEL. 5 SHEETS—SHEET 3.

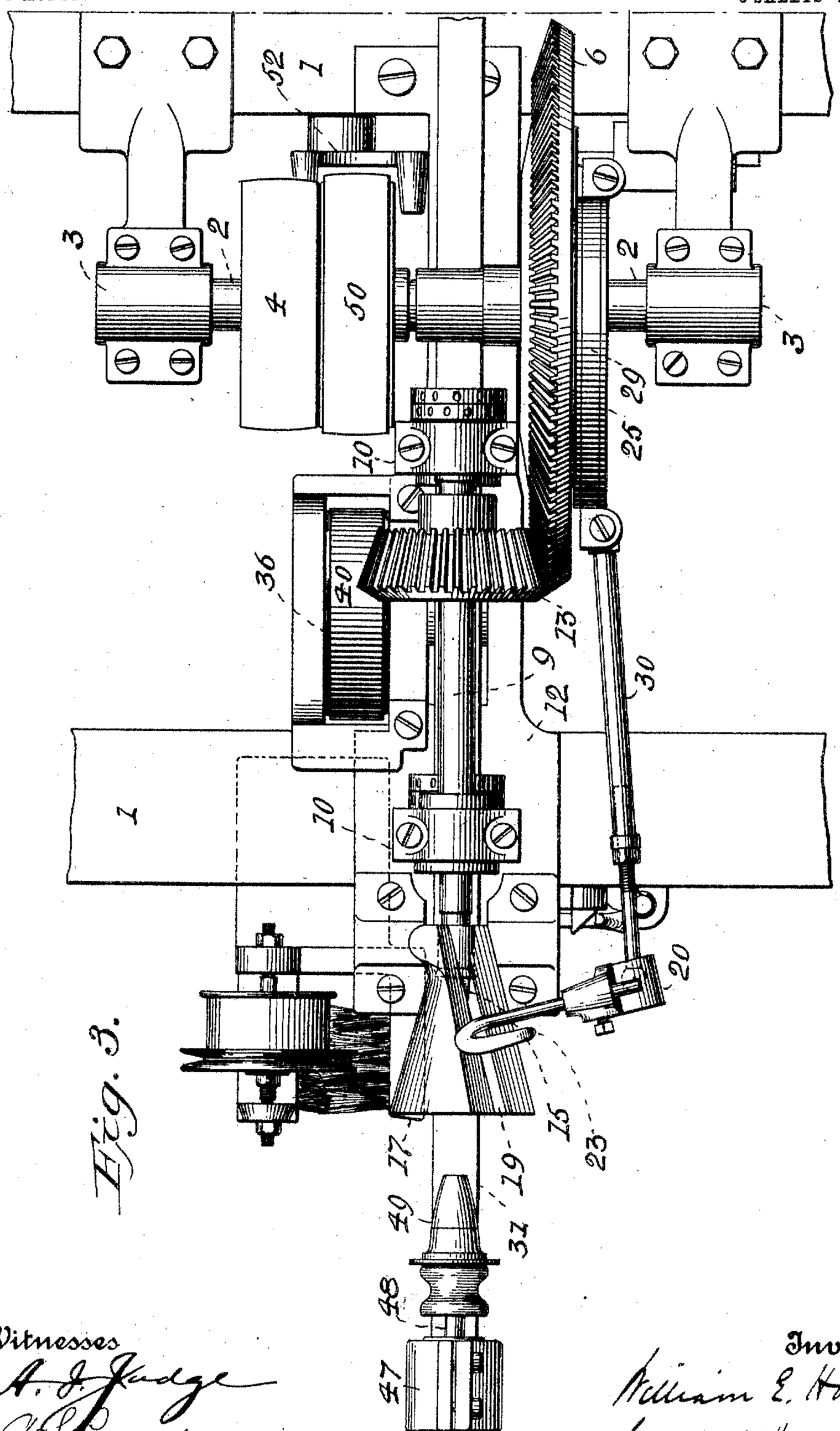

Fig. 3.

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COP WINDING MACHINE.

APPLICATION FILED NOV. 30, 1903.

NO MODEL. 5 SHEETS—SHEET 4.

Fig. 4.

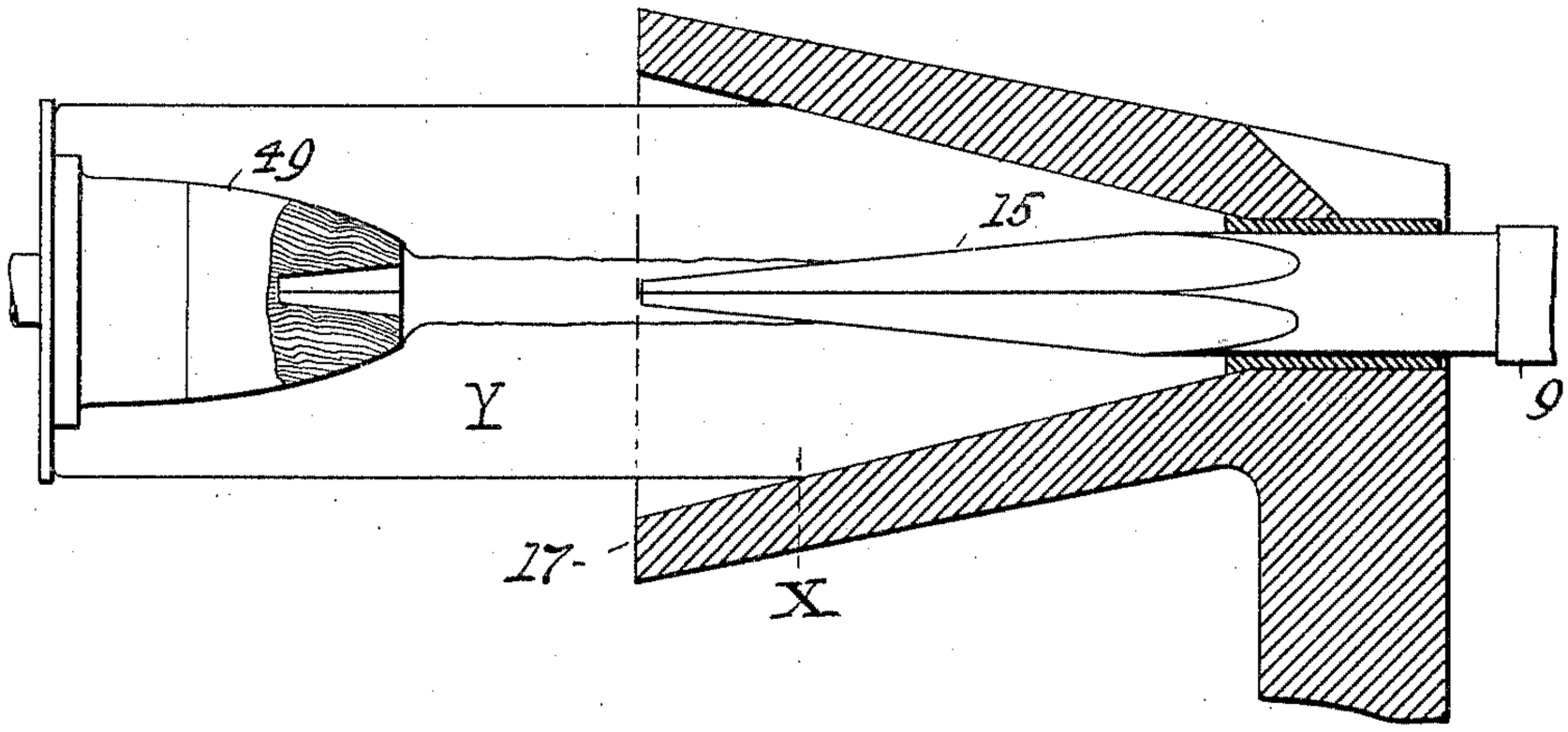
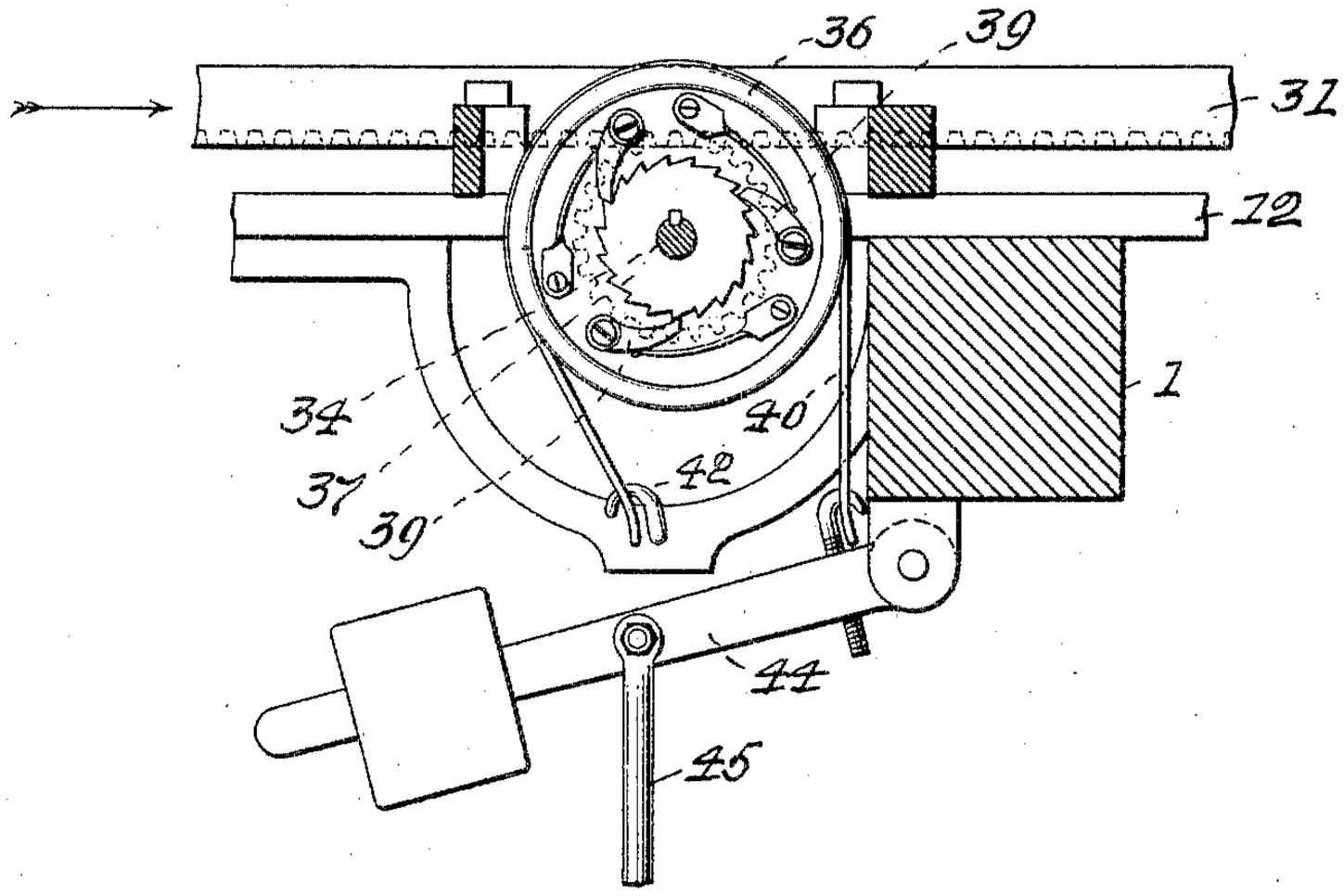


Fig. 5.



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No. 777,101. PATENTED DEC. 13, 1904.

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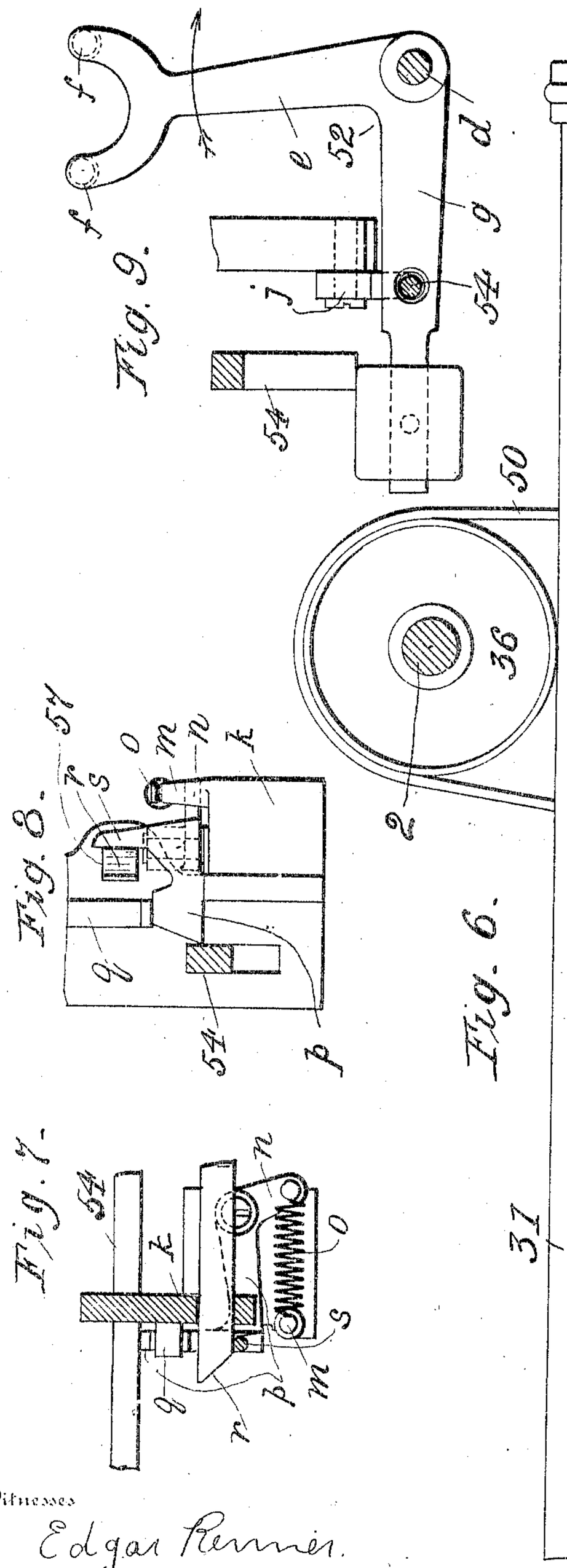
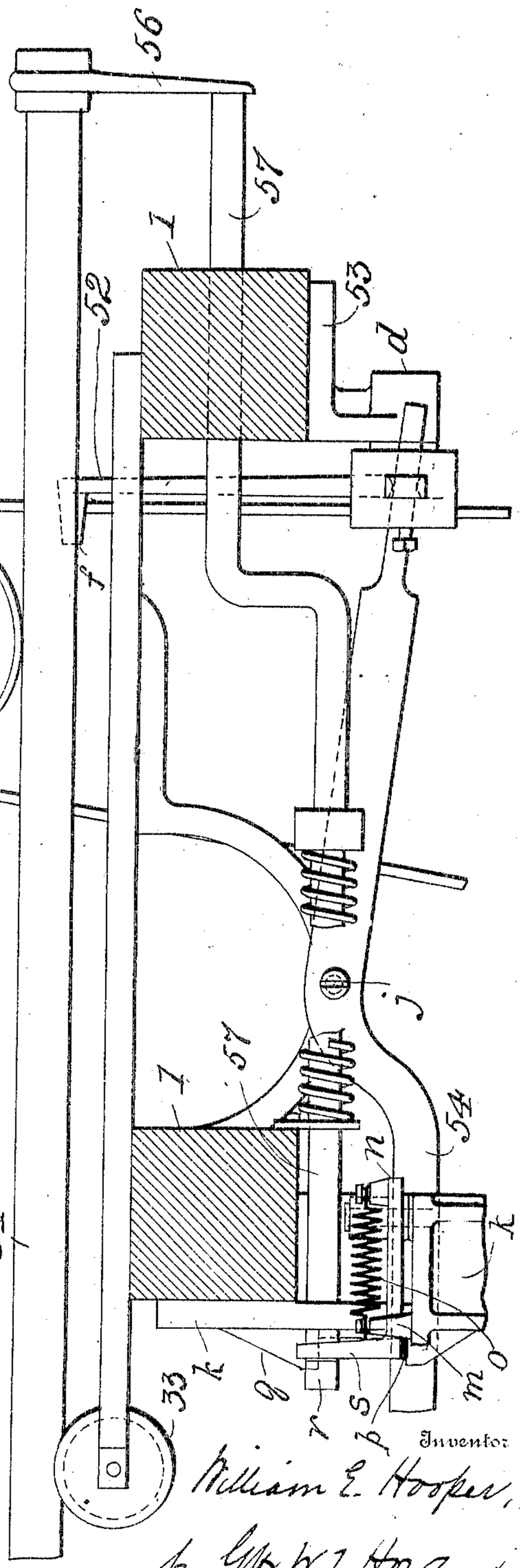
COP WINDING MACHINE.

APPLICATION FILED NOV. 30, 1903.

NO MODEL. 5 SHEETS—SHEET 5.





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No. 777,101. Patented December 13, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM E. HOOPER, OF BALTIMORE, MARYLAND.

COP-WINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 777,101, dated December 13, 1904.

Application filed November 30, 1903. Serial No. 183,097. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. HOOPER, of the city of Baltimore and State of Maryland, have invented certain Improvements in Cop-Winding Machines, of which the following is a specification.

In the description of the said invention which follows reference is made to the accompanying drawings, forming a part hereof, and in which—

Figure 1 is a front view of the improved machine. Fig. 2 is a side view looking in the direction indicated by the arrow in Fig. 1. Fig. 3 is a top view. Figs. 4, 5, 6, 7, 8, and 9 are details of the machine.

Referring now to the drawings, 1 is a part of the frame of the machine, and 2 is a horizontally-placed shaft adapted to rotate in bearings 3, secured to a plate forming a part of the frame 1, as shown particularly in Fig. 3. The shaft 2 carries a tight and a loose pulley (denoted, respectively, by 4 and 5) and the tight beveled gear-wheel 6.

9 is another rotary shaft in horizontal alinement with the first and at a right angle therewith.

The shaft 9 is journaled in standards 10, erected on the plate 12, before referred to, and provided with the pinion 13, the teeth of which are in mesh with those of the beveled gear-wheel 6, and the relative diameters of these wheels are such that one rotation of the shaft 2 produces three rotations of the shaft 9.

The front end of the shaft 9 is provided with a tapered spindle 15, preferably square in cross-section, upon which the cop is formed, as hereinafter described.

17 is a trumpet within which the tapered spindle 15 rotates. It is secured to the plate 12, and its wall, at one side thereof, is provided with the slot 19 for the passage of yarn from a spool to the tapered spindle, as hereinafter described.

20 is a vibratory arm pivoted at 22 to a bracket secured to the frame 1, and 23 a guide-hook extending from the upper end of the arm 20 to a position directly over or opposite the slot 19. In order that in the vibration of the arm 20, produced as hereinafter described, the guide-hook may move in a line practically parallel with the adjacent slotted inner surface of the trumpet, the pivotal bolt at 22 is set in an angular position with respect to the shaft 9, as best shown in Figs. 2 and 3.

25 is an eccentric secured, by means of screws 27, to the outer face of the beveled gear-wheel 6.

The strap 29 of the eccentric 25 is connected to the arm 20 by means of a rod 30, and in view of the angular position of said arm and the arc described by the upper end of the same the rod 30 is pivoted to the eccentric-strap and also to the arm, and in the latter case a ball connection is employed.

The rod 30 is made extensible and contractible in length by forming it in two separate parts *a* and *b*, the former being screwed into the latter and held when adjusted by means of the locking-nut *c*. By this means the guide-hook may be made to begin its forward stroke or that toward the mouth of the trumpet, invariably at the butt of the tapered spindle 15, without respect to the throw of the eccentric, and to make the throw of the eccentric alterable, so as to change the degree or length of vibration of the guide-hook 23, the hole in the eccentric where the shaft 2 passes through it and the holes for the screws 27, which hold the said eccentric to the beveled gear-wheel 6, are elongated, as shown in Fig. 2.

31 is a bar having rack-teeth on its lower side adapted to slide longitudinally in boxes which are seated in slots in the standards 10 and partially supported by a roller 33.

34 is a shaft journaled under the plate 12, carrying a spur-pinion 35, the teeth of which are in mesh with those of the rack-bar 31.

At one end of the shaft 34 is a loose drum 36, (see Fig. 5,) within which is placed a ratchet-wheel 37, keyed to the said shaft.

39 39 are spring-held pawls pivoted to the drum 36 with their points in engagement with the teeth of the ratchet-wheel. The effect of this arrangement is such that when the rack-bar 31 is moved outward or in the direction indicated by the arrow in Fig. 2 the drum is rotated, and when reversed in direction or pushed inward the shaft 34 rotates independently of the drum, the pawls merely clicking

on the ratchet-teeth. A resistance to the outward movement of the bar 31 is effected by a strap 40, which is placed over the drum with one of its ends connected to a fixed hook 42, extending from some part of the frame 1, as shown particularly in Fig. 5, and the other end attached to a weighted lever 44, having a rod 45 leading to a treadle, (not shown,) whereby the lever 44 may be lifted to allow of a reverse movement of the drum 36.

To the outer end of the rack-bar 31 is fastened in any suitable manner the arm 47, carrying a rotary spindle 48, at the inner end of which is fastened the cone center 49. To reduce friction, the bearing for the spindle, which is within the arm 47, is provided with balls or rollers. (Not shown.)

The cone center is preferably made hollow, so as to pass over the point of the tapered spindle 15. (See Fig. 4, in which a portion of the cone is represented in section.)

50 is the belt whereby the pulley 4 on the shaft 2 is driven from a driving-pulley. (Not shown, but which is situated at the lower portion of the machine.)

52 is the belt-shifter pivoted at *d* to the bracket 53, secured to the frame 1. (See particularly Figs. 6 and 9.) The said shifter is in the form of a bell-crank, the arm *e* of which has pins *f*, which engage the belt 50. The arm *g* of the bell-crank is weighted and provided with a hole through which one end of a pivoted hand-lever 54 extends loosely. The hand-lever 54 is pivoted at *j* to some stationary part of the machine, as shown in Fig. 6, and in depressing the outer end of the said lever the belt-shifter is moved in the direction indicated by the curved arrow in Fig. 9 and the belt transferred from the loose pulley 5 to the tight pulley 4, when the said lever is caught by the spring-held latch 67, by which it is held.

A side view of the spring-held latch, the hand-lever 54, and certain of their attachments is shown in Fig. 6 and a top view of the same in Fig. 7. Fig. 8 is a view of Fig. 6 looking in the direction indicated by the arrow in that figure. By reference to Fig. 8 it will be seen that *k* is a fixed or stationary bracket having a vertical pin *m* on its upper surface. The latch 67, before referred to, is in the form of a bell-crank and pivoted to the top of the bracket *k*, with its arm *n* connected by a spring *o* to the pin *m*. The other arm, *p*, of the bell-crank is the part of the latch which, owing to the contraction of the spring *o*, passes over the upper edge of the hand-lever 54 when the same is depressed and holds it down.

In Fig. 8 the operative end of the latch, which is beveled, is shown as pressing against the side of the hand-lever 54, which is the case when the outer end of the hand-lever is in its highest position or before its depression. Any upward movement of the latch is prevented by the lug *q*, formed on the bracket *k*, as shown in Fig. 8.

The hand-lever 54 is released from the latch 53 and the driving-belt shifted from the tight pulley 4 to the loose pulley 5 when the cop has attained the required length by means of a finger 56, fastened adjustably to the bar 31. This finger is well shown in Fig. 6, and in the outward movement of the bar 31 the said finger strikes the end of a spring-held rod 57 (see Fig. 6) and pushes the said rod forward or toward the operator. The forward end of the spring-held rod 57 is tapered, as seen from the top, (see Fig. 7,) and when the rod is moved forward a sufficient distance the inclined surface *r* strikes the vertical projection *s* on the latch 53 and forces it back to its original position, thus releasing the hand-lever 54 and stopping the machine.

59 (see Fig. 1) represents the spool from which the yarn (illustrated by the broken line) to be formed into a cop is drawn, and it will be seen that the yarn passes from the spool upward and between the fixed brushes 60, then over the sheave 62, then downward and under a roller or button 64, then upward and over the spring-held roller 65, (shown in dotted lines,) and finally downward through the guide-hook into the trumpet, where it is attached to the cone center.

To arrange the machine for operation, the eccentric 25 and the rod 30 are adjusted so that the guide-hook in the rotation of the shaft 2 will vibrate from the butt of the tapered spindle 15 to a point in transverse alinement with the portion of the trumpet having an internal diameter equal to that which a cop is required to have. This point is represented in Fig. 4 by the dotted line marked X. The end of the yarn is then wrapped about the button at the base of the cone and the rack-bar pushed inward, so as to bring the end of the cone center over the point of the tapered spindle within the trumpet. A few turns of the cone center, effected by hand, will tighten the yarn, so that it will retain its position in the guide-hook. The machine is now started by lifting the hand-lever 54 until it is caught by the latch 67, (shown in Fig. 7,) the belt 50 being shifted to the driving-pulley 4 in the operation. The tapered spindle, which is thus set in rapid rotation, winds the yarn upon itself and also upon the cone center. As soon as the cop fills the portion of the trumpet between the butt of the tapered spindle and the line X in Fig. 4 the pressure of the cop against the conical surface within the trumpet forces the bar 31 outward and the cone center from the trumpet, and this outward movement of the parts is continued until the cop has required the requisite length, which is obtained by the finger 56 striking the spring-held shifting-rod 57, which stops the machine. The rack-bar 31, with the cone center, is then lifted so as to disconnect its

teeth from those of the spur-pinion 35, and drawn forward and the cop removed, after which it is replaced in position, so that another cop may be produced in the manner described.

In Fig. 4 is shown a cop in progress of formation and denoted by Y. It will be understood that the completed cop when removed from the cone center is devoid of any core, butt, or other similar device and is annular in cross-sections.

It will be understood that as the cop is being constantly pushed from the tapered spindle cops of great length may be produced with a short spindle having an acute taper which offers only a slight resistance to their removal from the trumpet.

I claim as my invention—

In a cop-winding machine, the combination of a trumpet, a rotary tapered spindle situated within the trumpet, with means to convey yarn thereto and vibrate the yarn within the trumpet, a rack-bar carrying a rotary center adapted to engage with the point of the tapering spindle and cover its point, a shaft carrying a pinion with its teeth in mesh with those of the rack-bar and also a drum, a strap which is placed over the said drum with one end thereof attached to some fixed part of the machine, and a weighted lever to which the other end of the said strap is secured whereby resistance is offered to the rotation of the drum, and to the outward movement of the rack-bar and its rotary center, substantially as, and for the purpose specified.

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