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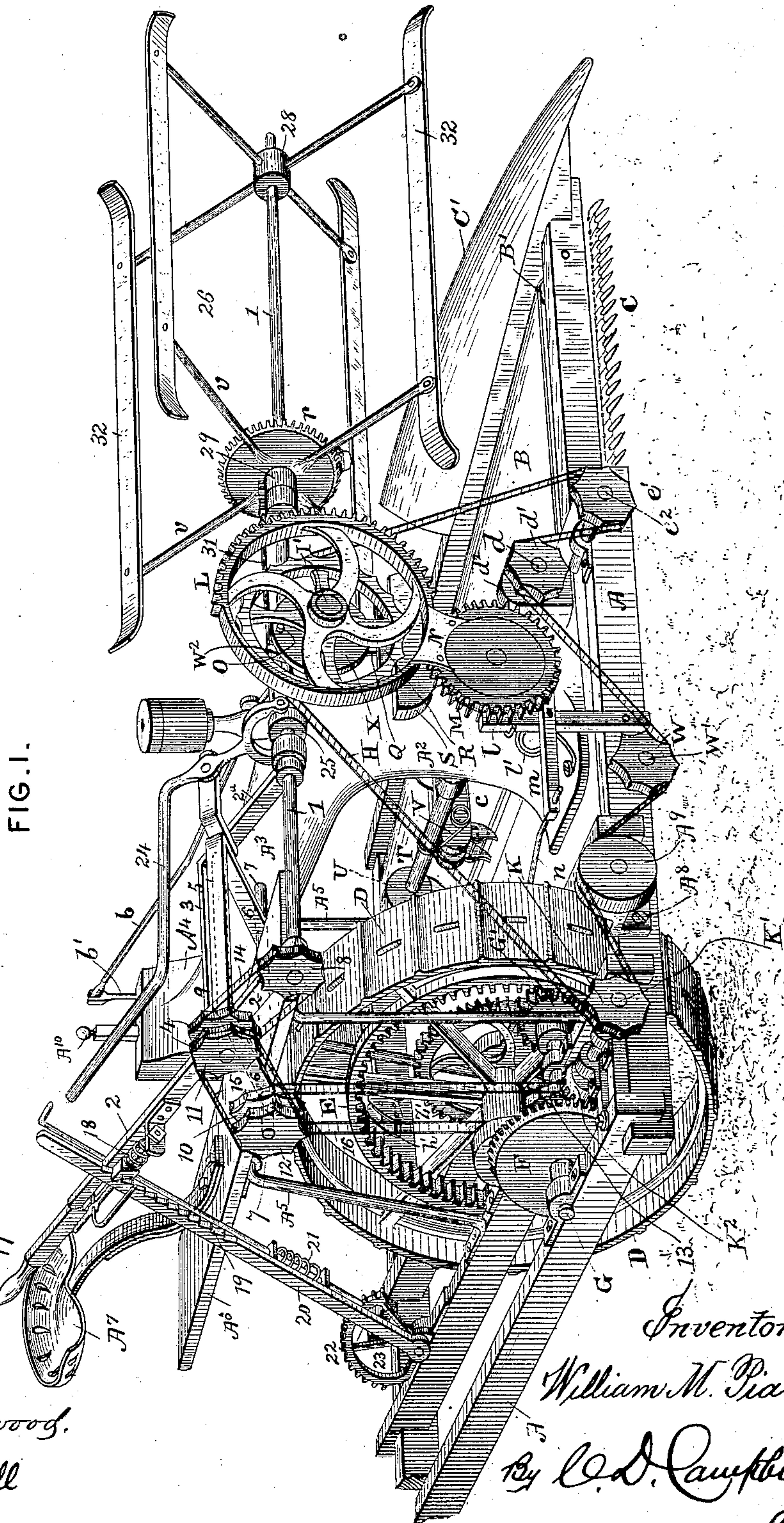
7 Sheets—Sheet 1.

W. M. PIATT.

GRAIN BINDER.

No. 374,267.

Patented Dec. 6, 1887.



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Geo. P. Smallwood.
E. K. Campbell

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(No Model.)

7 Sheets—Sheet 2.

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FIG. II.

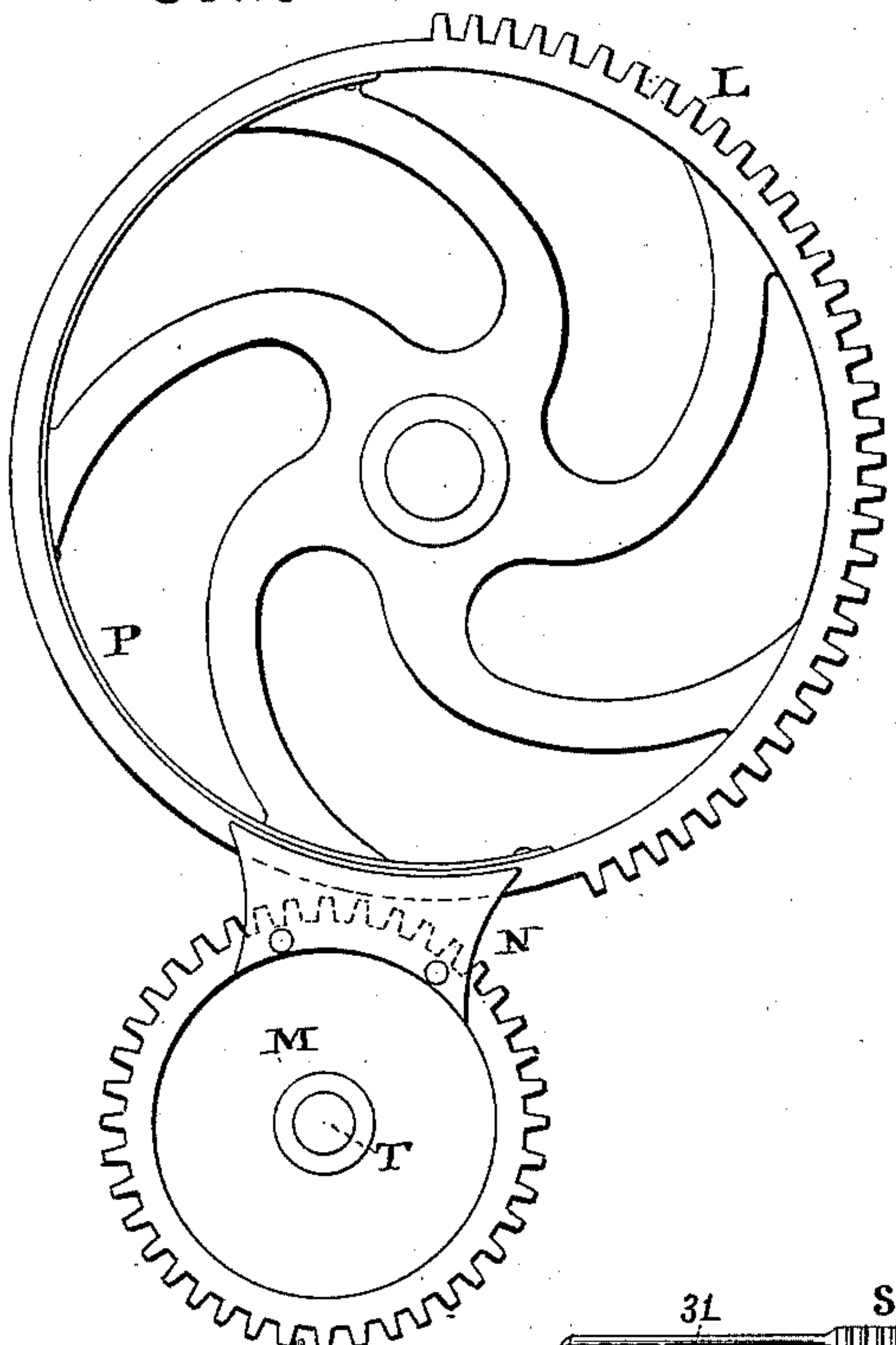


FIG. III.

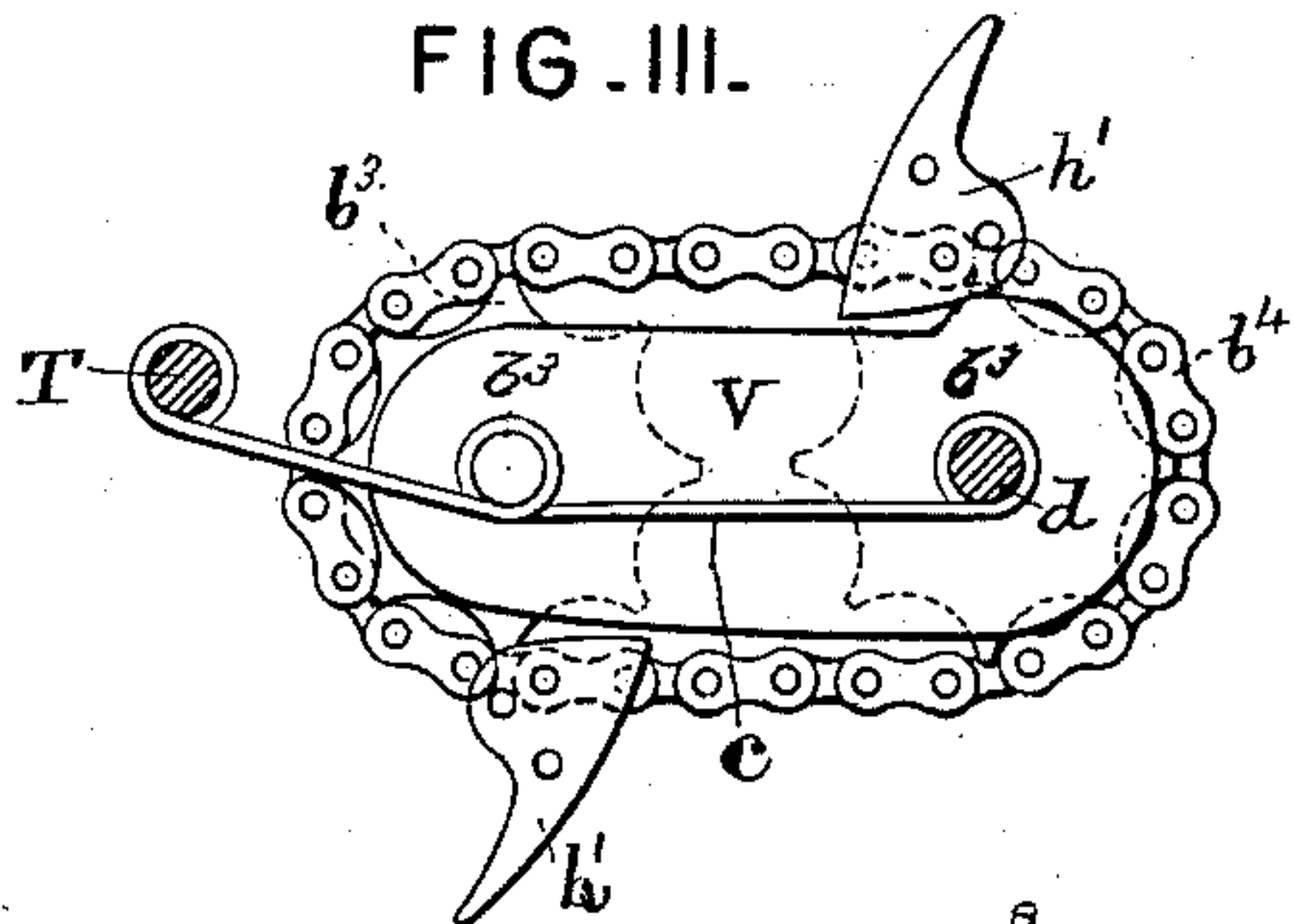


FIG. IV.

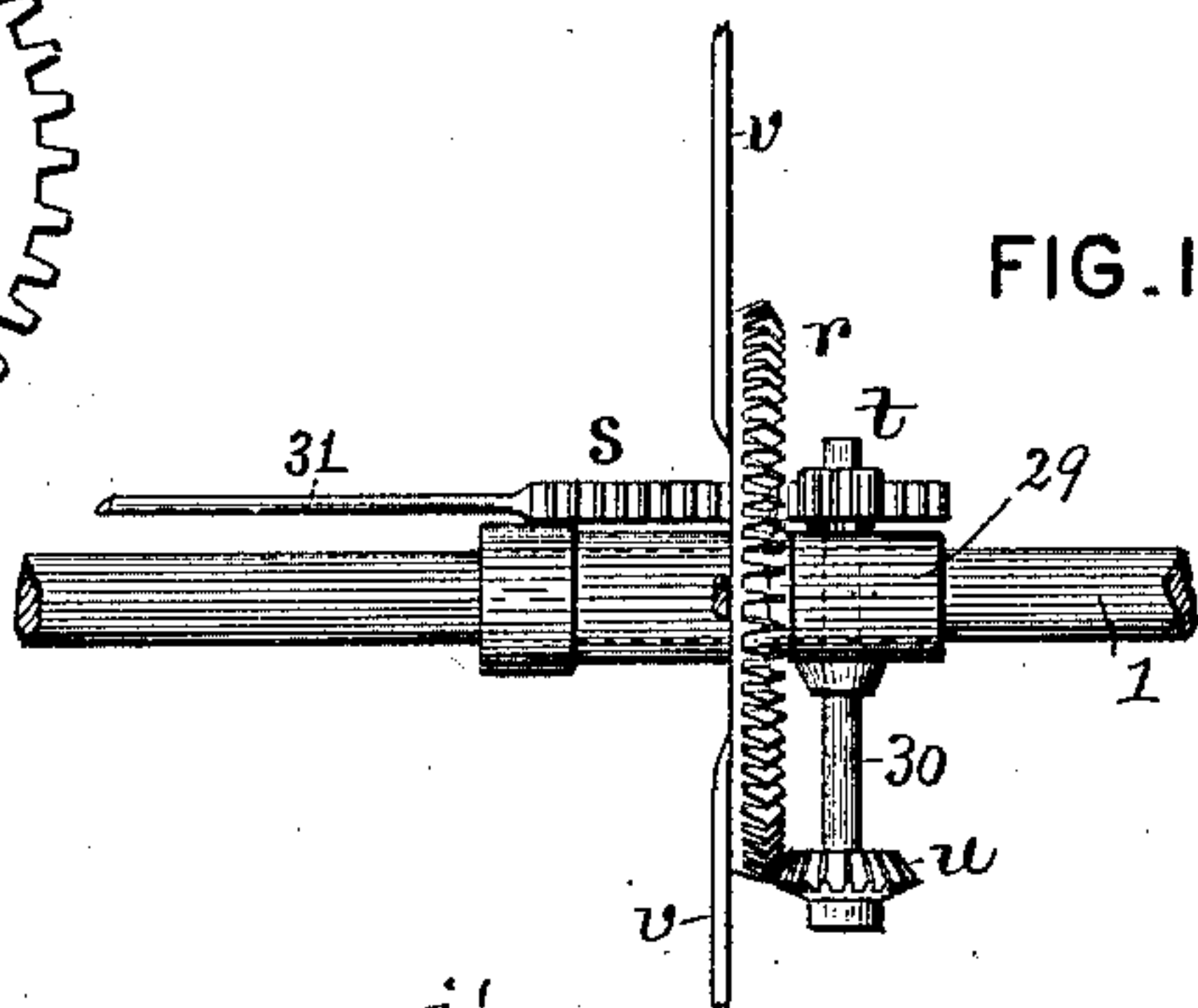


FIG. IV^a.

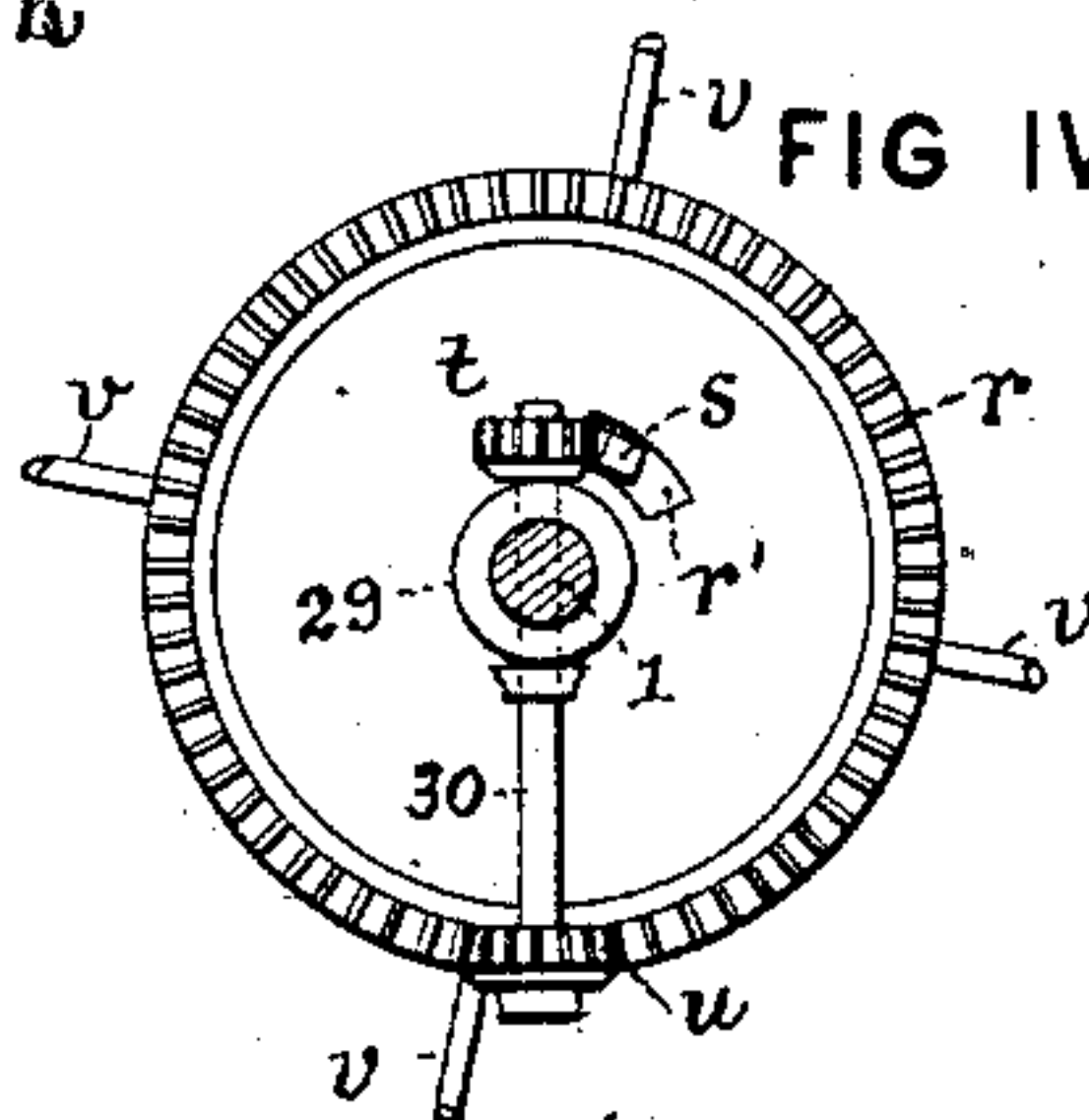


FIG. VI.

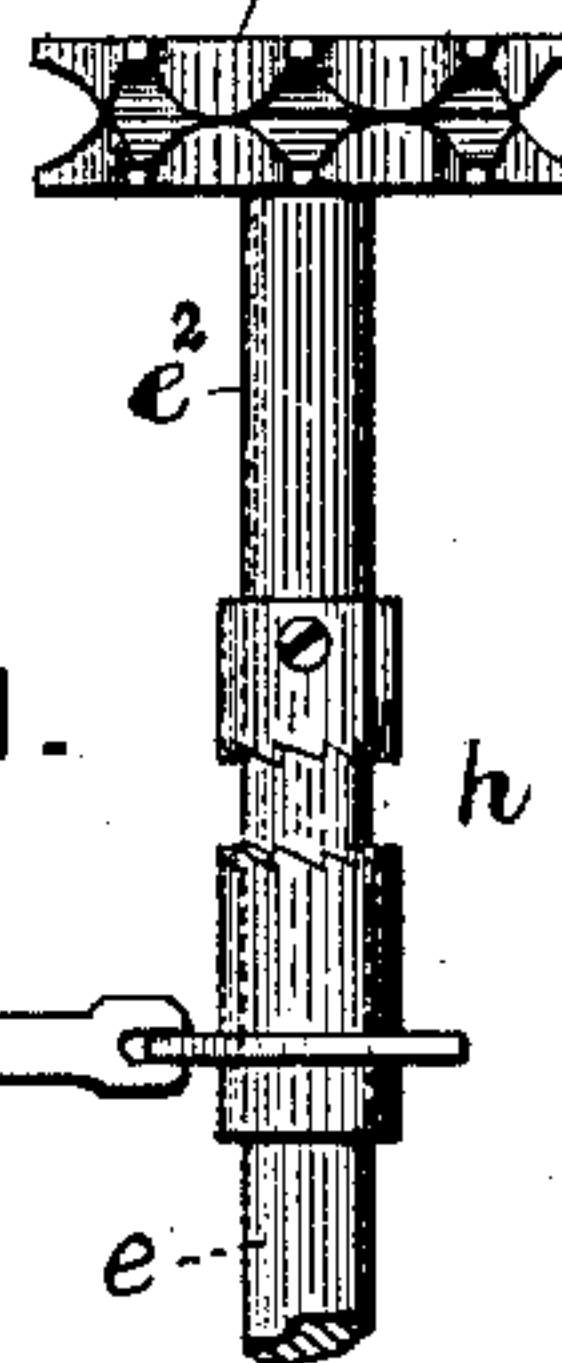
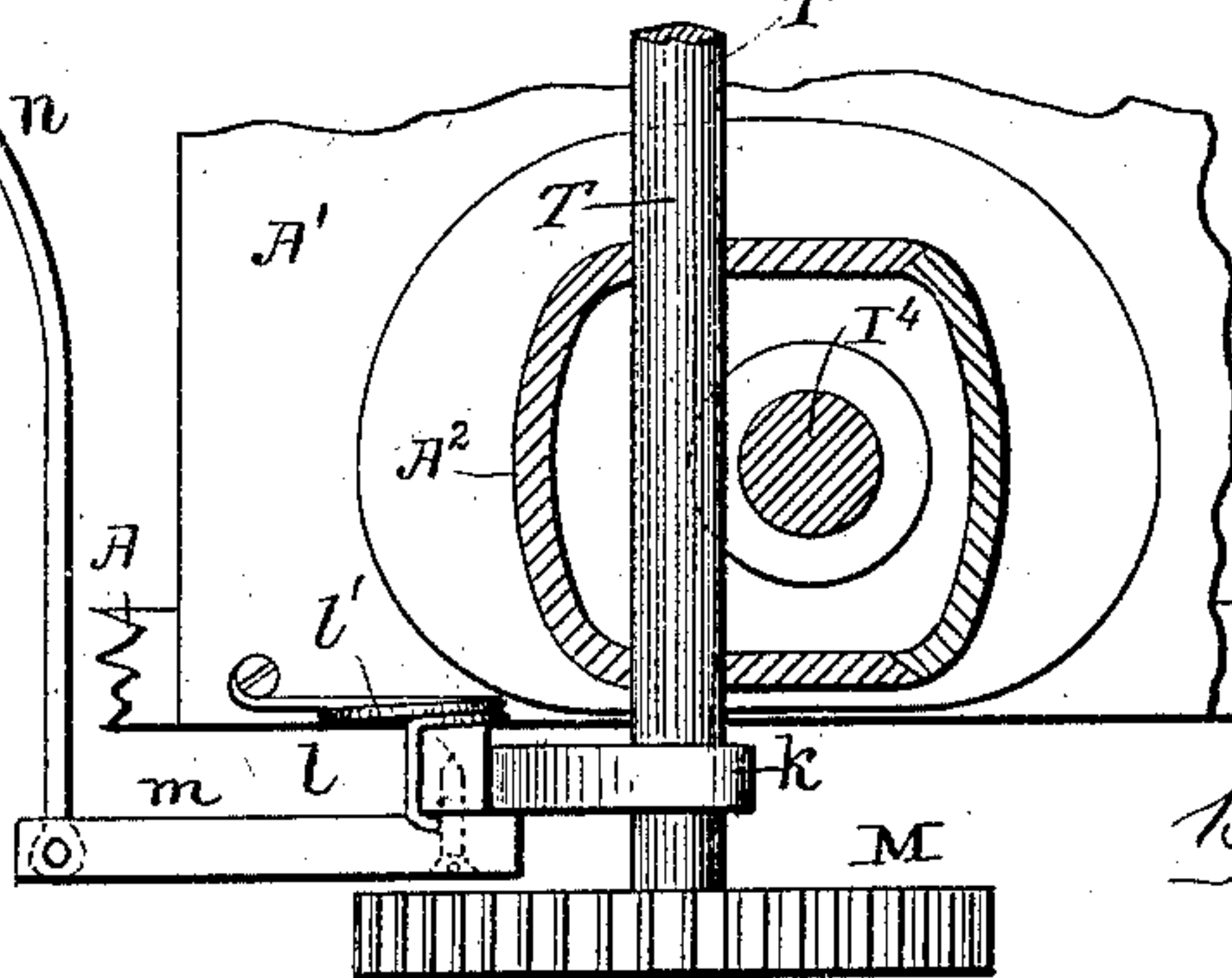
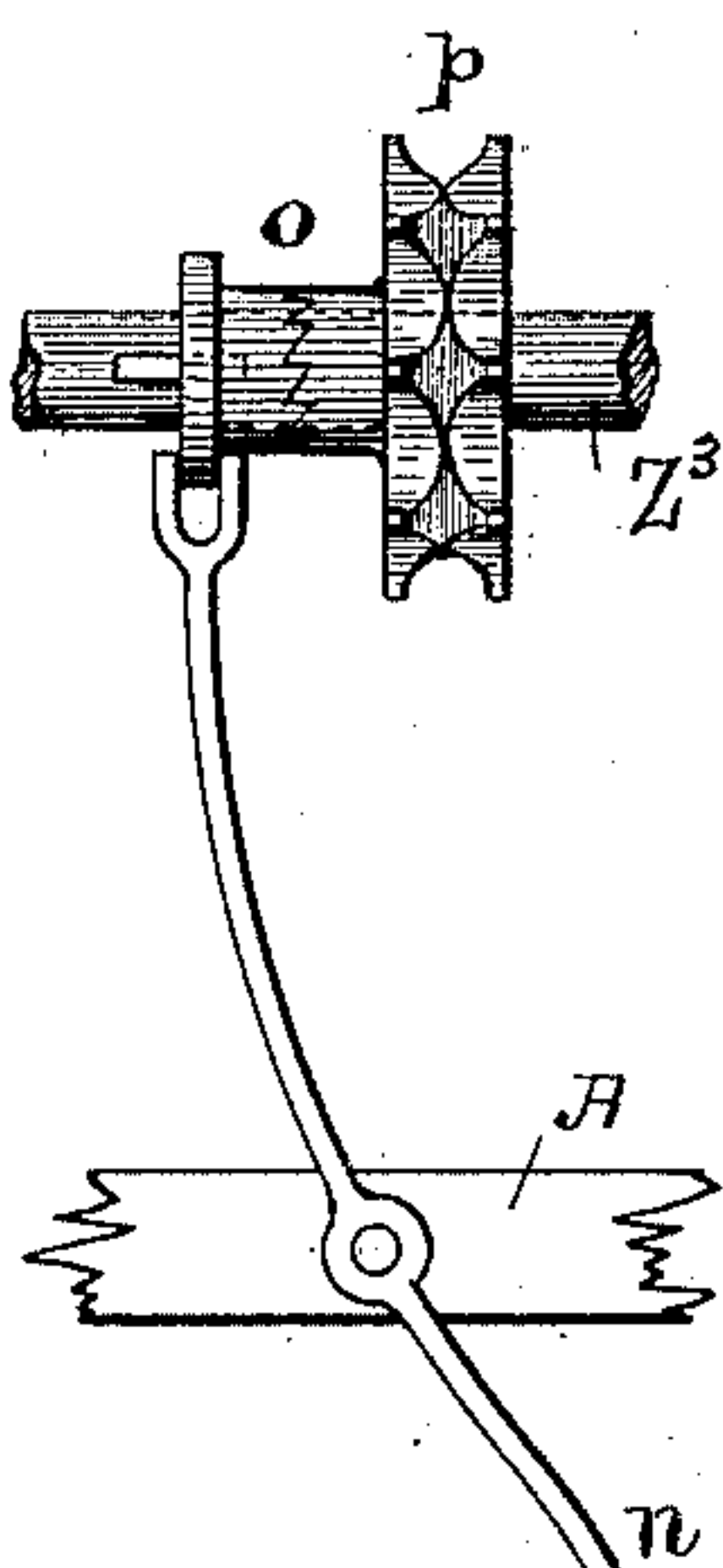


FIG. V.



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FIG. VII.

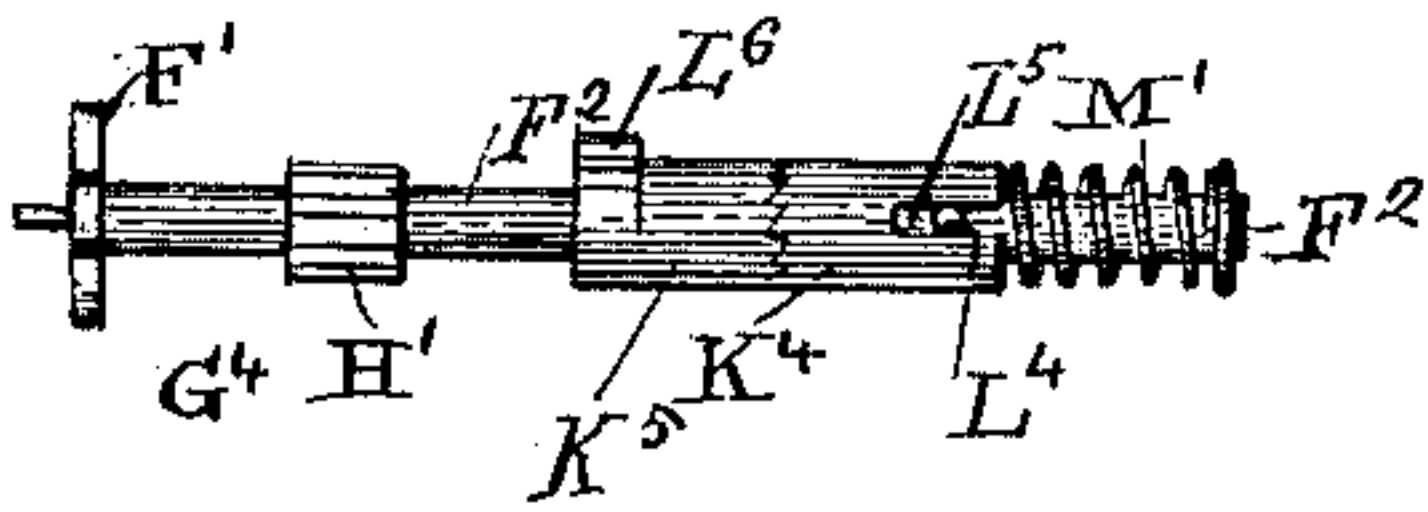


FIG. VIII.

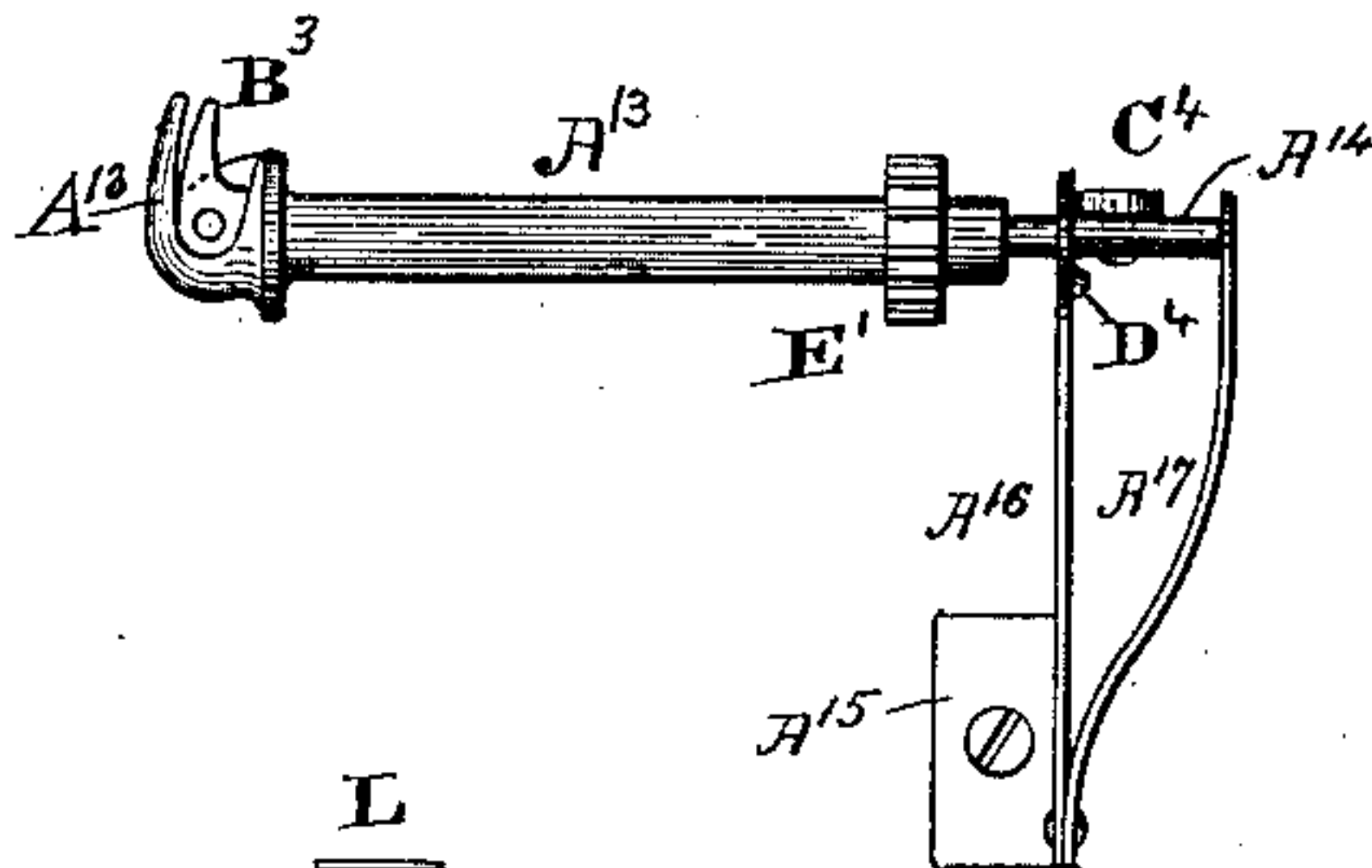


FIG. IX.

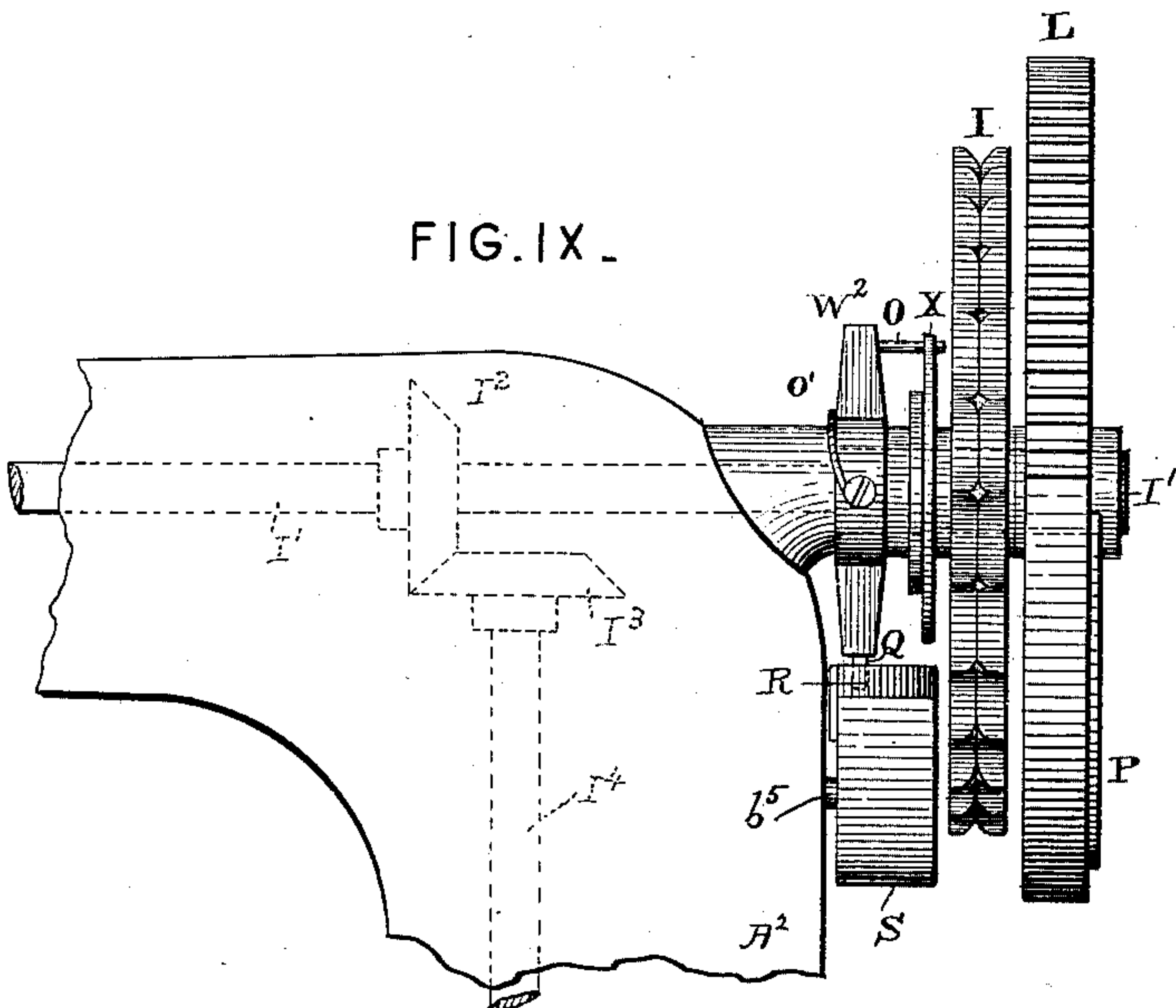


FIG. X.

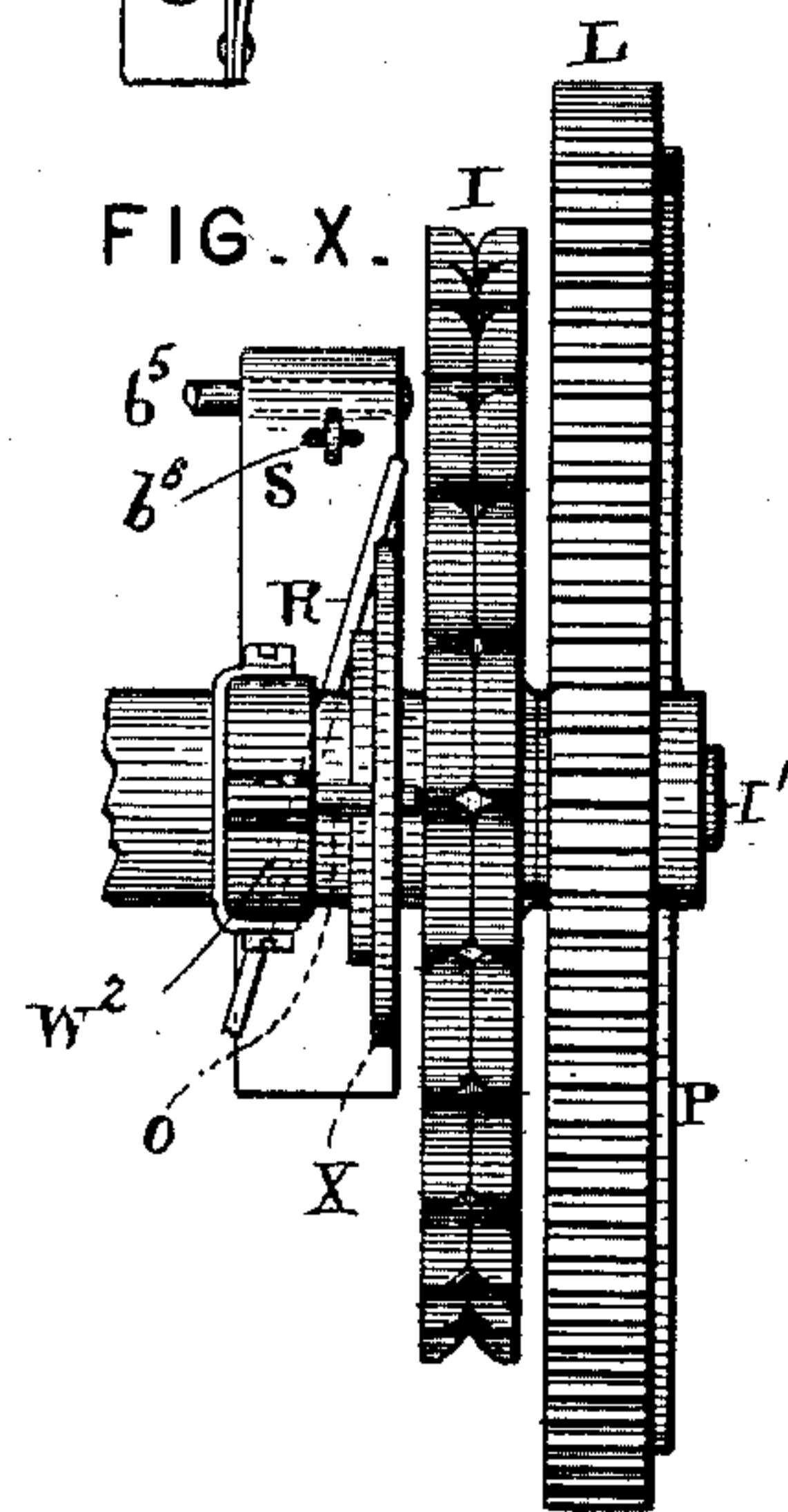
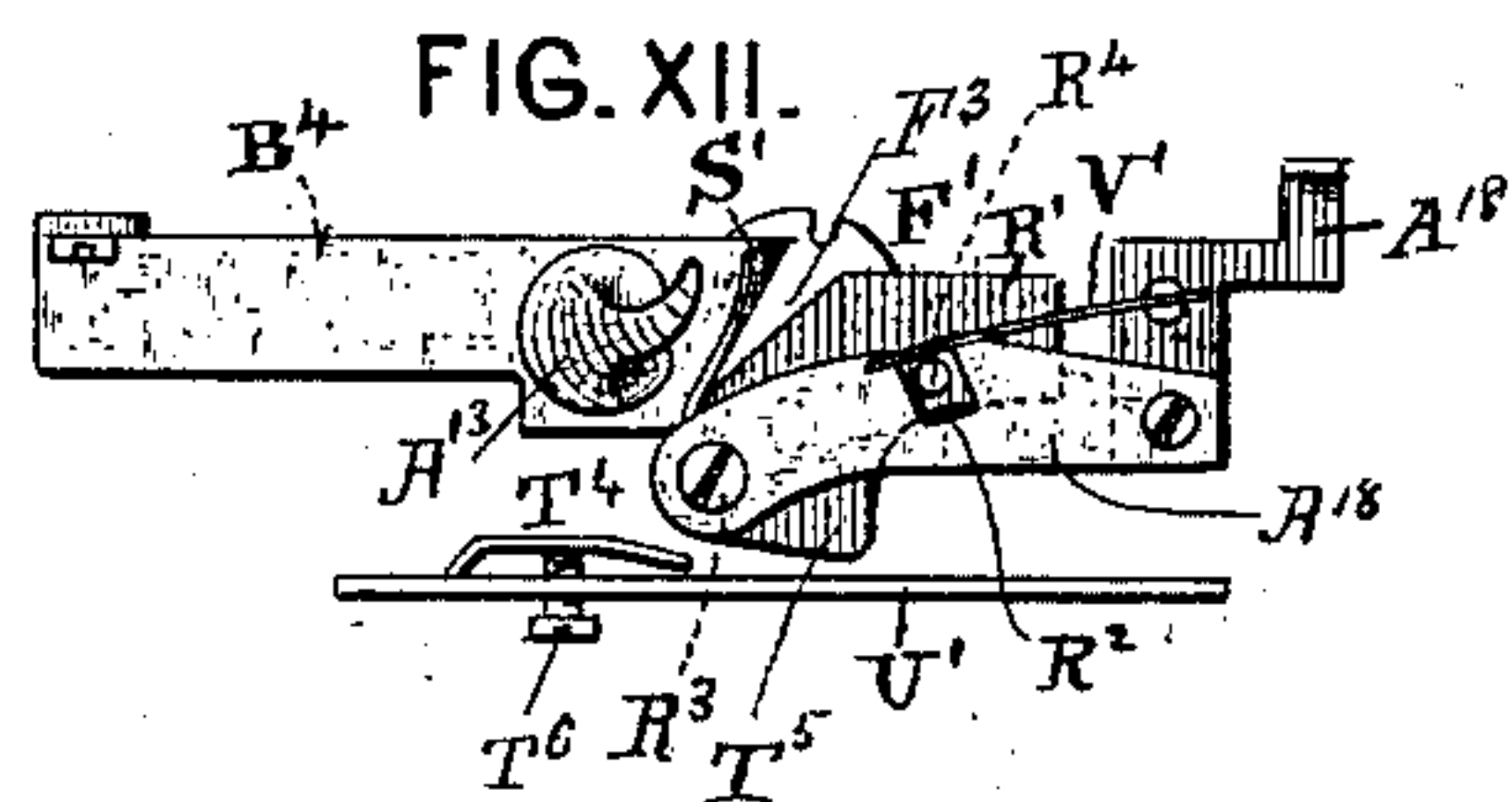
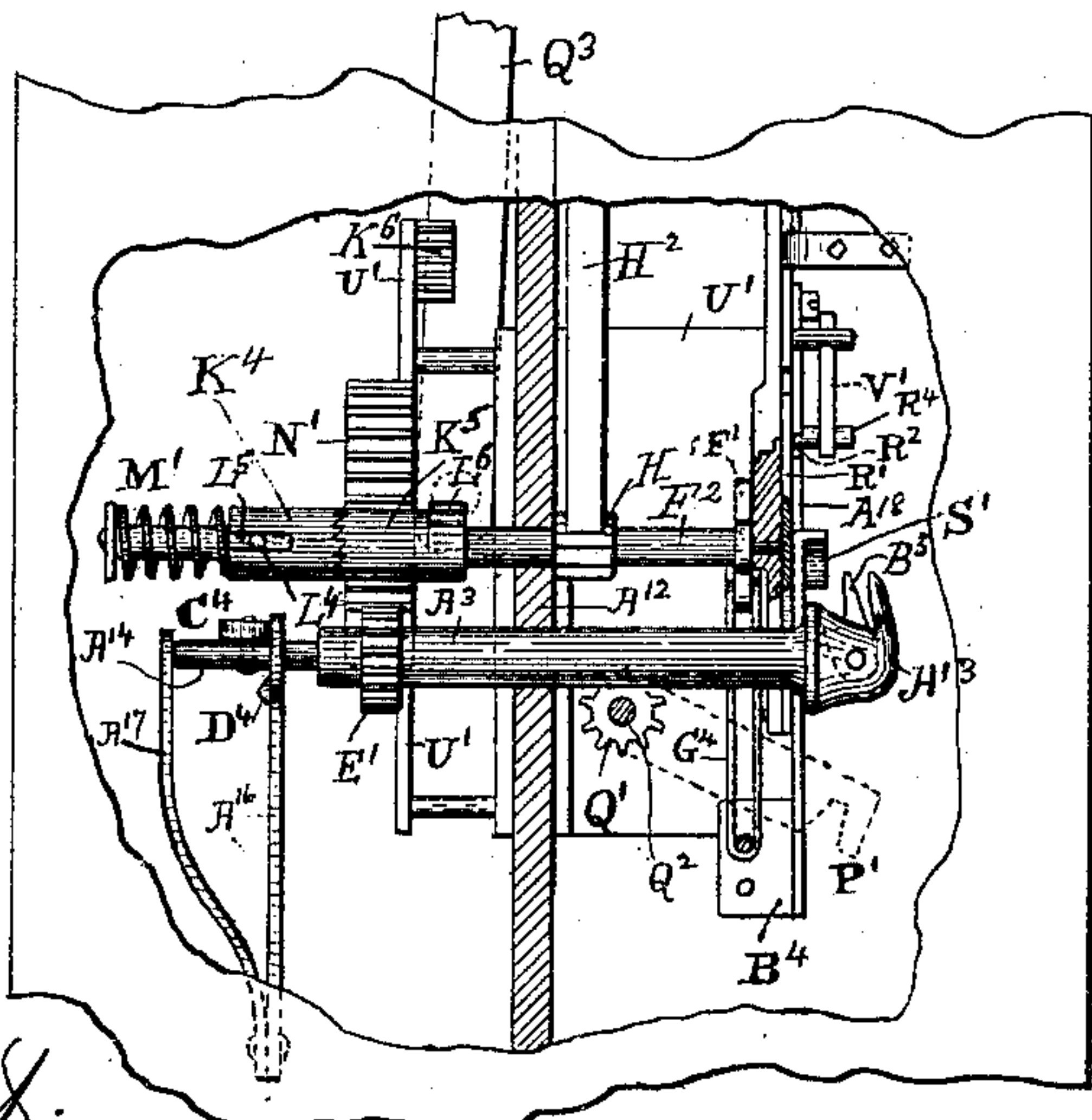


FIG. XI.



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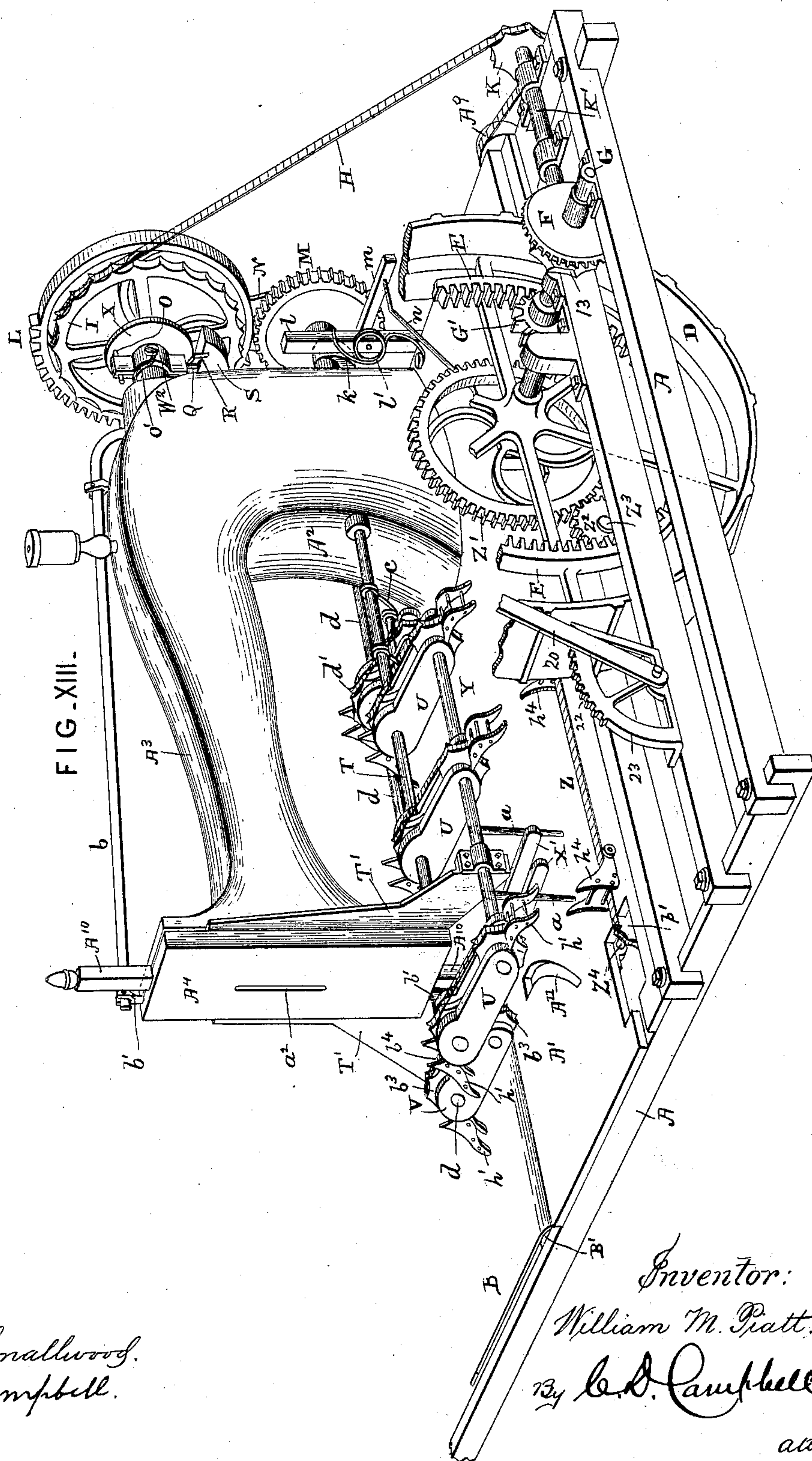
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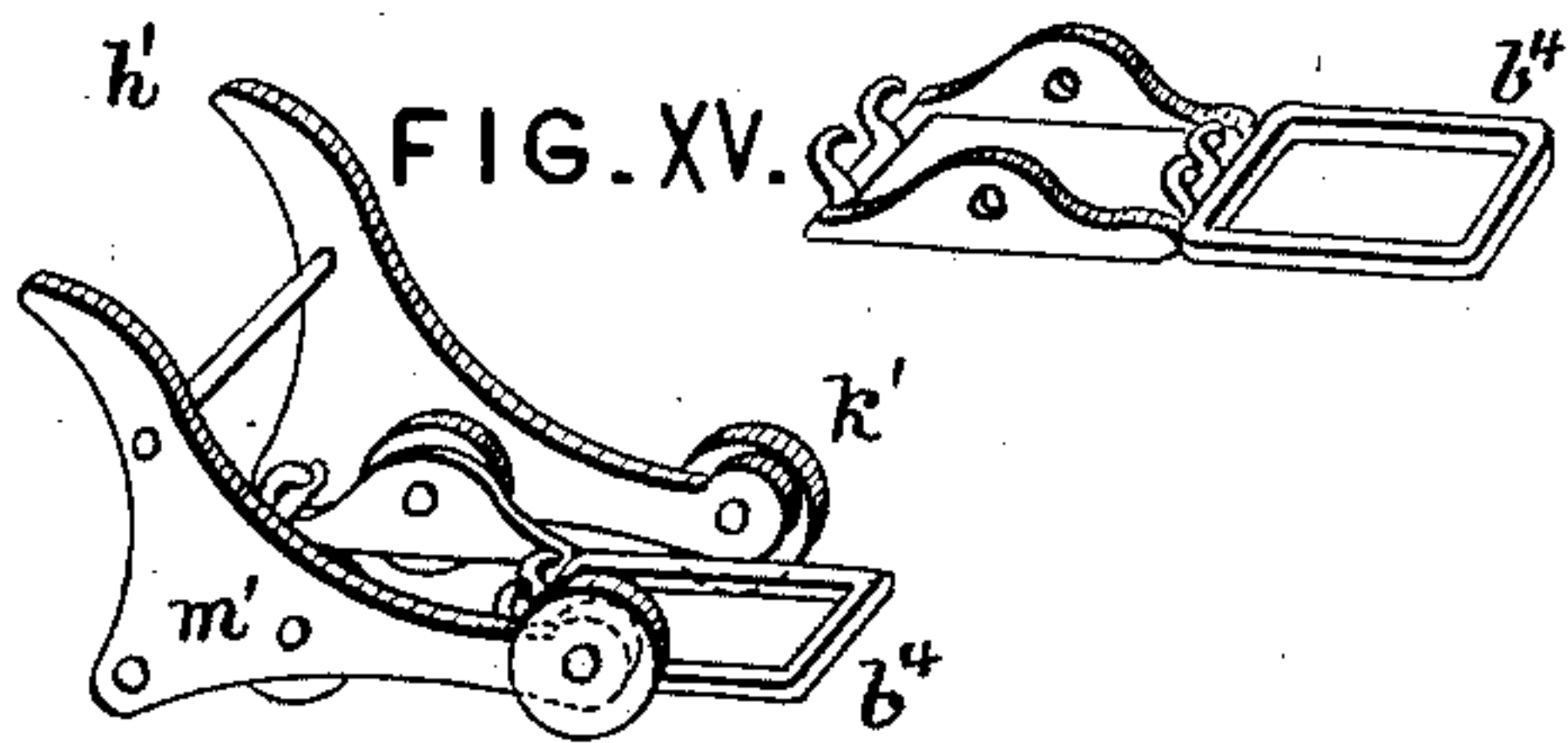
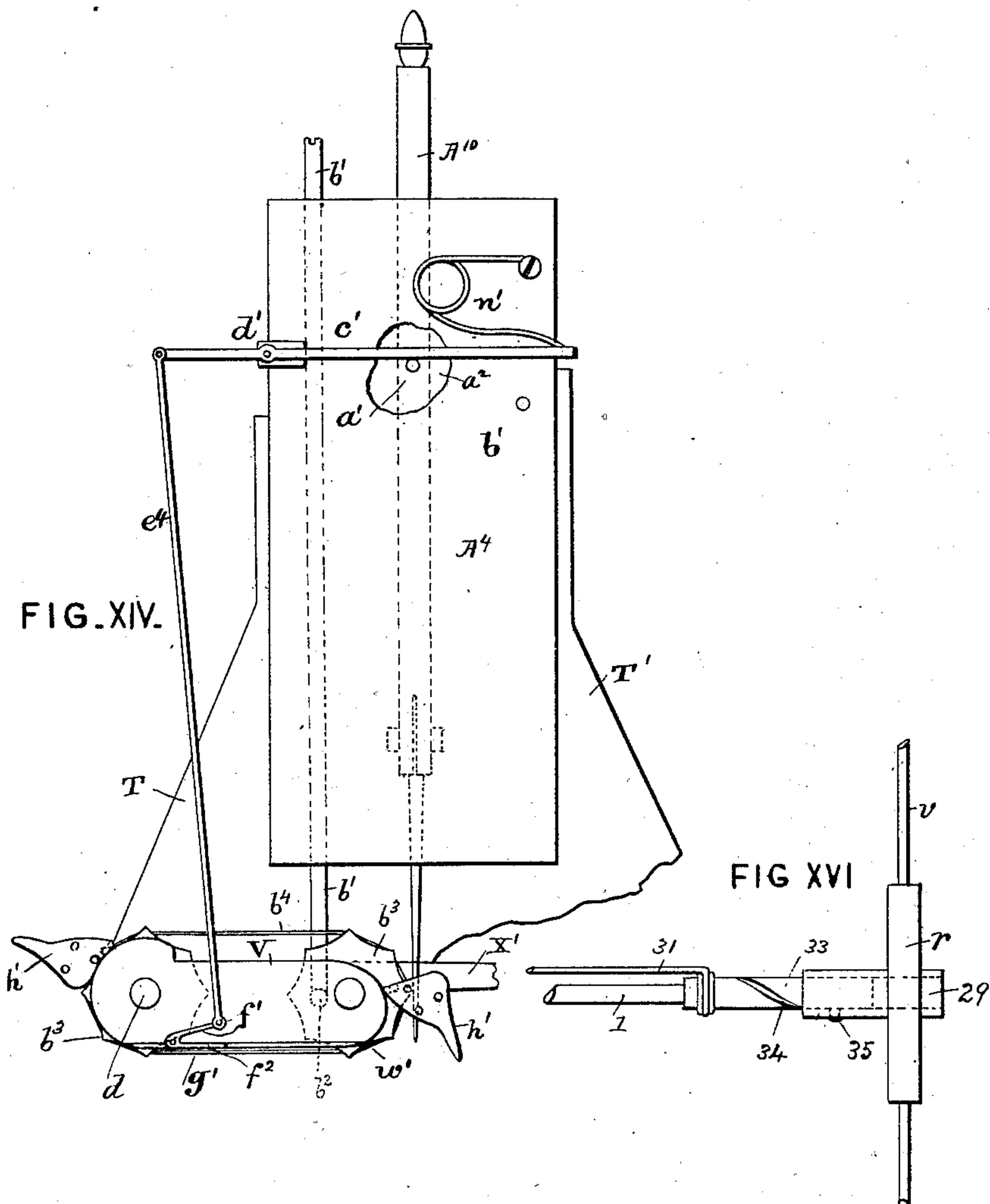
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(No Model.)

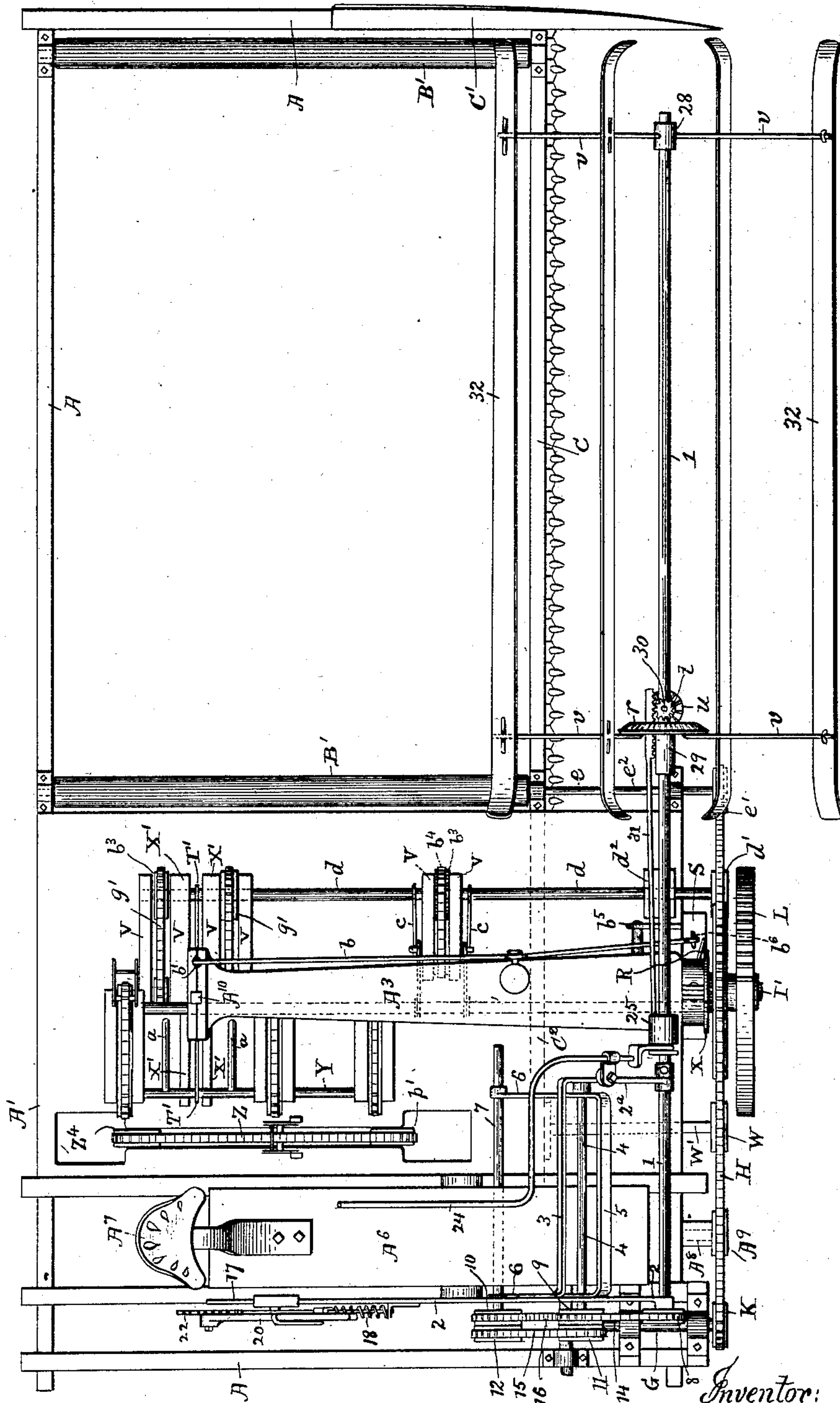
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GRAIN BINDER.

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FIG. XVII.—



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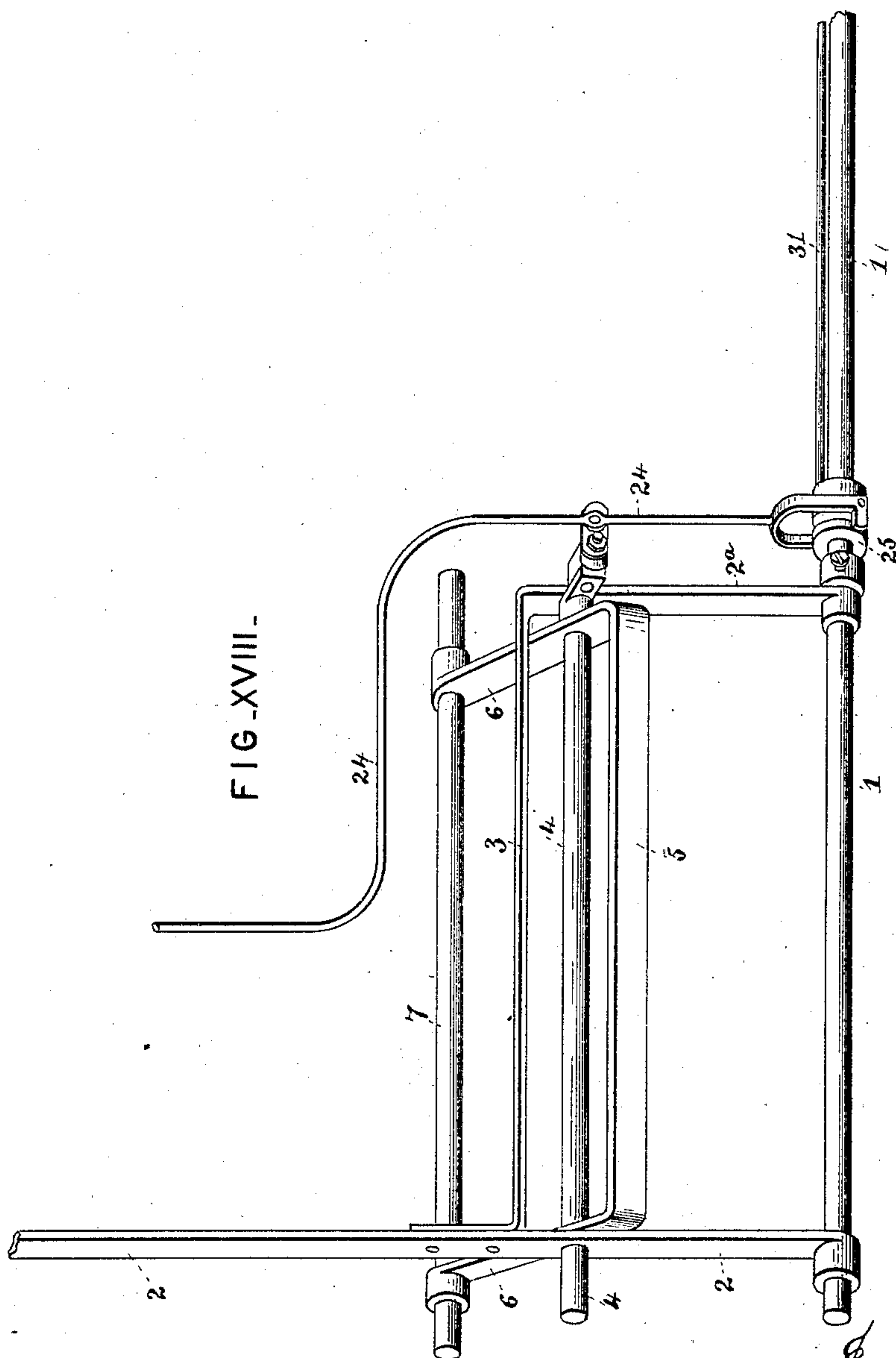
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GRAIN BINDER.

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UNITED STATES PATENT OFFICE.

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BENJAMIN P. RUNKLE, OF SAME PLACE.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 374,267, dated December 6, 1887.

Application filed March 22, 1886. Serial No. 196,142. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. PIATT, a citizen of the United States, and a resident of Mac-o-cheek, in the county of Logan and State of Ohio, have invented a new and useful Improvement in Grain-Binders, of which the following is a specification.

My invention is an improvement on my grain-binder which forms the subject-matter of application No. 171,809, filed July 16, 1885.

My improvements consist in the features of construction hereinafter described, and pointed out in the claims.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure I is a front perspective view of my improved grain-binder. Fig. II is a detached end view of the mutilated gear-wheel and the gear-wheel of the front ejector-shaft having a delay-shoe. Fig. III is a side view of the "butter." Fig. IV is a detached side view of gearing for operating the reel in tilting the bats of the latter. Fig. IV^a is an end view thereof, looking toward the stubble side of the machine. Fig. V is a detached top view of the device for throwing discharging-chains in and out of operation. Fig. VI is a bottom view of the lever, cam, and clutch for throwing the grain-apron in and out of operation. Fig. VII is a detached top view of my cord-gripper, ratchet, and spring-clutch. Fig. VIII is a bottom view of my knotter and cam and spring for operating the same. Fig. IX is a side view of the device for throwing the needle-shaft into operation. Fig. X is a top view of same. Fig. XI is a top view of the knot-tying device, showing the cord-knotter, cord-gripper, and cord-guide. Fig. XII is an end view of the cord-knotter, showing cord-gripper and cord-cutter. Fig. XIII is a rear perspective view, parts being cut away to show the tilting grain-carrying fingers, cam-tracks, discharging-chain with tilting-fingers, and the grain-retaining fingers that hold the gavel until bound. Fig. XIV is an end view of a cam-track, showing fingers with devices for breaking the track to tilt the fingers sooner when the needle is down. Fig. XV is a perspective view of my

tilting-fingers as attached to an open-link chain. Fig. XVI is a modification of my device for tilting the reel-bats. Fig. XVII is a top view of the machine. Fig. XVIII is a detail perspective view of the reel-supporting device.

A represents a platform; B, the endless carrier, supported on rollers B'; C, the cutter-bar; C', a divider, and D the driving-wheel, all of which may be of any suitable construction.

Intermediate of the carrier and driving-wheel is the usual binding-table, A', having needle-slot A¹¹, and to which is secured at the front end the standard A², formed with an arm, A³, provided with a head, A⁴.

Straddling the driving-wheel are supports A⁵ for a platform, A⁶, provided with a seat, A⁷, for the driver of the machine.

Connected to the shaft *e* of the inner roller B' by a clutch, *h*, is a counter-shaft, *e*², having a sprocket-wheel, *e*'.

W is a sprocket-wheel secured to a shaft, W', by which the pitman C² of the cutter-bar is reciprocated.

d is the butter-shaft, having a sprocket-wheel, *d*'.

I' is the needle-shaft, extending through the rear end of the arm A³ of the standard A², having a loose sprocket-wheel, I.

K' is a short shaft operated from the driving-wheel and provided with a sprocket-wheel, K. These sprocket-wheels *e*', *d*', W, and I are rotated by a chain or band, H, common to all driven from wheel K.

A⁸ is a chain or band tightener having a pulley, A⁹, which bears thereon. The short shaft K' carries at its inner end a small bevel gear-wheel, K², with which meshes a large bevel gear-wheel, F, on a shaft, G, which carries at its inner end a pinion, G', rotated by the internal gear, E, of the driving-wheel.

Secured to the needle-shaft I' within the arm over the standard is a bevel gear-wheel, I², meshing with another bevel gear-wheel, I³, on a vertical shaft, I⁴, journaled within the standard, and having at its lower end a cam, *i*, and disk I⁵, provided with an eccentric wrist-pin, *i*'. The cam *i* vibrates a lever, *x*', connected with the clutch *h* of the shaft *e*.

To the wrist-pin *i*' is secured a similar pit-

man, Q^3 , to that shown in my application No. 171,809, for reciprocating the slide U' of the knotting mechanism.

T is the front ejector-shaft, journaled in the arm A^2 and bracket T' on the head A^4 and extending therethrough. To the outer end of this shaft is secured a cam, k , and gear-wheel M , having a delay-shoe, N , fitting against an auxiliary rim, P , on a mutilated gear-wheel, L , secured rigidly to the needle-shaft I' , and whose teeth mesh with the teeth of the gear-wheel M . The butter-shaft d is mounted in a short standard, d^2 , at its front end and in the bracket T' at its rear end.

Hinged to the butter-shaft on each side of the bracket are the paired trip-arms X' , extending beneath the front ejector-shaft, having paired cam-tracks V formed thereon, the arms X' supported on a spring-bar, b' , by means of a cross-bar, b^2 .

At the front ends of the butter-shaft and at the rear ends of the cam-tracks on short shafts, respectively, and between the cam-tracks, are mounted sprocket-wheels b^3 , carrying the endless chains b^4 , having hinged fingers h' .

On the shaft d near the standard is hinged the butter, supported at its rear end between spring-bearings c , extending from the butter-shaft to the front ejector-shaft. The butter consists of paired cam-tracks, sprocket-wheels, endless chains, and fingers similar to those with which the trip-arms are provided. In rear of, parallel with, and journaled in the same bracket as the front ejector-shaft is the rear ejector-shaft, Y . Supported on these two shafts are a series of paired cam-tracks, U , similar to those of the trip-arms and butter. The shaft Y is provided with retaining-fingers a .

A^{10} is the needle-bar of the binder, secured, as usual, at the end of its shaft I' .

In Fig. XIV, n' is a spring on the head of the standard, which bears upon one end of a vibrating lever, c' , which is pivoted to the head at d' , and is supported beneath the spring on a pin, a' , projecting from the needle-bar through a slot, a^2 , in the head. The other end of the lever supports a rod, e^4 , connected to the arm f' of a hinged track-piece, f^2 , closing a break, g' , in the bottom of the cam-track V .

The form of tilting-finger h' , I prefer to use with the cam-tracks is shown in Fig. XV, pivoted to the chains and having rollers k' , which travel on the cam-tracks.

Hinged to an arm, b^5 , secured to the standard is a block, S , extending beneath the rear end of the needle-shaft, having a cam-piece, R , secured obliquely thereon and supported by links b^6 on one end of the lever b , whose other end is connected to the vertical rod b' .

On the sprocket-wheel I is secured a disk, X , having a perforation to receive a pin, O , projecting from the upper end of a collar, W^2 , pivoted to the needle-shaft and provided with another pin, Q , at the lower end, on which the cam-piece R is caused to bear.

Secured to the inner side of the driving-wheel is a gear-wheel, Z' , meshing with a

pinion, Z^2 , on a short shaft, Z^3 , having a sprocket-wheel, p , and clutch-collar o , with the movable member of which engages the inner end of a swinging lever, n , which is secured at its outer end to an arm, m , on a hinged post, l , caused to bear upon the cam k on the front ejector-shaft by means of a spring, l' .

At the rear end of the platform is a short shaft, Z^4 , carrying a sprocket-wheel, p' , in line with the sprocket-wheel p . Around these sprocket-wheels p p' travels the endless discharging-chain Z , having fingers h^4 . On the underside of this table are secured the brackets A^{12} B^4 for supporting the knotter.

A^{13} is the knotter, working in front of the bracket and having the shank A^{14} , operating the hinged lip B^3 . Journaled to the shank is a roller, C^4 .

Secured to a bracket, A^{15} , is a spring-arm, A^{16} , bearing on the roller to draw the piston inward and close the lip.

A^{17} is another arm, against which the inner end of the piston abuts.

The spring-arm A^{16} is provided with a cam, D^4 , on which the roller C^4 bears to throw the piston out.

The knotter is provided with a pinion, E' , engaged by a rack, N' , on the slide U' , as in my application No. 171,809.

G^4 are spring gripper-plates, between which a circular plate or gripper, F' , operates, having notches forming projections for seizing and retaining the portion of the cord laid in the usual V-shaped opening or recess, F^3 , between the lip-guide and gripper-plates on one hand and the opposing bracket, A^{18} , on the other hand.

The gripper is secured to a shaft, F^2 , provided with a ratchet-wheel, H' , engaged by a spring or pawl, H^2 , to prevent the shaft from turning backward. Secured to the rear end of this shaft is a clutch having halves K^4 K^5 . One member, K^4 , of the clutch has pin L^4 and longitudinal slot connection L^5 with the shaft, so as to turn the latter, while at the same time it is permitted to slide thereon. The other member, K^5 , of the clutch is loose on the shaft, and is provided with radial teeth L^6 , engaging a rack, K^6 , on the slide U' . A spring, M' , compels the clutch-teeth to engage, so that when the slide is moved in one direction the clutch-halves will turn together, and when the slide moves in the opposite direction the teeth of the loose member will slip on the teeth of the other half.

P' is the hook for placing the cord in the parts of the knotter, as in my previous application No. 171,809, being provided with a pinion, Q' , on its shaft Q^2 , engaged by the rack (not shown) on the slide U' .

The bracket B^4 is formed with an inclined lip-guide, S' , providing a stationary cutter.

Hinged at R^3 to the bracket A^{18} , in which the gripper-shaft is journaled at its outer end, is a moving cutter, R' , held in normal position against a stop, R^2 , by means of a stud, R^4 , and spring V' , and elevated by means of a spring-

cam, T^4 , on the slide U' , brought in contact with the heel T^5 , and adjustable by means of a set-screw, T^6 .

1 is the reel-shaft, journaled in the arms 2^a of a bail, 3, hinged by a shaft, 4, to another bail, 5, whose arms 6 are hinged to a shaft, 7, secured to the platform A^6 .

On the shafts 1, 4, and 7, respectively, are sprocket-wheels 8, 9, and 10.

On the side of the sprocket-wheels 9 and 10 are secured additional sprocket-wheels, 11 and 12, respectively.

13 is a sprocket-wheel on the shaft G .

14, 15, and 16 are chains which connect, respectively, the sprocket-wheels 8 and 9, 11 and 12, and 10 and 13. The arm 2 of the forward bail extends rearwardly and is provided with a handle, 17, within easy reach of the operator, and a spring-catch, 18, engaging the teeth 19 of a lever, 20, hinged to the frame, and whose spring-latch 21 engages the teeth 22 of a rack-segment, 23. This construction permits the reel to be raised or lowered on the shaft 4 and carried forward or rearward by the lever 20.

On the arm 2^a is hinged a lever, 24, connected to a sliding sleeve, 25, on the reel-shaft.

26 is the reel, whose arms v are secured to a fixed sleeve, 28, at the outer end and to a bevel gear-wheel, r , at the inner end, having a sleeve, 29, loose on the shaft.

Journaled to the reel-shaft is a short shaft, 30, having a small bevel gear-wheel, u , meshing with the bevel gear-wheel r , and a pinion, t , engaging a rack, s , extending through a curved slot, r' , in the gear-wheel r from a rod, 31, secured to the sliding sleeve 25. This construction permits the adjustment of the bats 32 according to the position of the grain.

In Fig. XVI, I show a modification in the means for adjusting the bats, consisting of a sliding sleeve, 33, on the reel-shaft, connected to the rod 31, having a spiral slot, 34, in which plays a pin, 35, within the sleeve 29 of the bevel gear-wheel r .

The operation of the several parts of my improvements is as follows: The grain, falling onto the apron B , is carried to the transferring and tilting fingers h' , traveling on the cam-tracks V , by which it is moved forward and formed into a gavel against the retaining-fingers a and under the trip-arms X' , as explained in my application No. 171,809. As the needle descends and the bundle is bound the cog-teeth on wheel L mesh with the teeth of the wheel M , operating the shaft T , causing the tilting-fingers on cam-track U to discharge the sheaf onto chain Z , and causing the retaining-fingers a to revolve out of the road of the sheaf and to come into position again to stop the inflowing straw. While the fingers on track V are moving, the straw in the fingers on track U and the retaining-fingers a are kept stationary by the delay-shoe N on wheel M pressing against the auxiliary rim P' on wheel L . As the needle descends a spring, n' , on the head of the machine (see Fig. XIV) presses down

the end of the lever c' and the arm e^4 is raised, lifting the track-piece f^2 and opening the break g' in the bottom of the cam-track V , causing the fingers h' to tilt backward and run on the upper part of the rest of the track to the end w , instead of crowding the straw against the needle. As the needle ascends again the pin a' raises the free end of the lever c' and closes the break g' in the track V again. As the sheaf accumulates under the presser-bars X' they are gradually raised up, raising the vertical bar b' and the front end of lever b , and lowering the piece S until the proper amount of straw has accumulated, when the track R on piece S falls below the end of pin Q , and the spring o' throws the pin O into a hole in wheel X , and the needle-shaft is revolved. As the needle ascends the block S is raised by the weight of the trip-arms after the bundle is ejected, and the oblique track R switches the arm W^2 back into normal position again. As the ejecting-fingers and cam-track U eject the sheaf onto the chain Z , the cam k operates through post l and arm m , the lever n throwing the clutch o into connection, operating the chain Z and ejecting the sheaf into the stubble. As the needle descends with the cord a rack on piece V' operates pinion Q' , causing the cord-guide P' to take the cord and carry it across the path of the knotter. The notched rotary gripper F' presses the cord between the spring gripper plates or jaws G^4 and carries the cord down the inclined lip-guide or knife S' into the jaws of the knotter-hook. These plates G^4 and the gripper F' hold the cord so tightly that the knotter in drawing the twine necessary to form the loop in its revolution must draw it from around the bundle instead of from the needle. This assists to tighten the cord around the sheaf. The traveling rack N' turns the knotter, twisting the cord around the head of the knotter. The roller C^4 comes against the cam D^4 , opening the jaw B^3 of the knotter, and as the knotter revolves the cord is taken between the jaws, which are then closed on the same by the roller C^4 slipping off the cam D^4 , and the further revolution of the knotter draws the loop over the part of the cord held between the jaws, forming the knot, when the cord, which is held by the cord-gripper F' between the gripper-plates G^4 , is cut by the knife R' , which is operated by the cam T' on the slide U' .

While the knot is being tied, the cam i on the upright shaft in the head of my machine operates the device x' , to disengage the clutch h on shaft e' and stop the grain-apron from feeding the grain in.

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

1. The combination of a binding-table, a support thereover, a front ejector-shaft, a rear ejector-shaft, belts extending from shaft to shaft for ejecting the bundle built thereunder, means for intermittently operating the shafts, and the retaining-fingers a , secured to the rear

ejector-shaft, against which the bundle is built, substantially as described.

2. The combination of a binding-table, a support thereover, a needle-shaft provided with a sprocket-wheel and mutilated gear-wheel having an auxiliary rim, the front ejector-shaft having a gear-wheel provided with a delay-shoe, a rear ejector-shaft having retaining-arms, and belts extending from shaft to shaft for ejecting the bundle, substantially as described.

3. The combination of a binding-table, stand-ard having an arm formed with a head, needle-shaft extending through the arm, needle-bar having a pin, a , the lever c' , a spring, n' , at one end of the lever, a vertical rod, e^t , at the other end of the lever, the shaft d , trip-arms X' , provided with cam-tracks formed with a break, g' , hinged track having arm with which the rod is connected, and suitable belts having transferring-fingers, substantially as described.

4. The combination, with the needle-shaft I' , of the sprocket-wheel I , loosely mounted thereon, disk X , having a perforation to receive a pin, arm b^s , block S , hinged to the arm, having cam-piece R , vertical bar b' , trip-arms X' , lever b , connecting the bar with the block, and collar W^2 , hinged to the needle-shaft, having pins O and Q , substantially as described.

5. The combination, with the front ejector-shaft, T , shafts Z^3 and Z^4 , sprocket-wheels p and p' , and the chain Z , having discharging-fingers, of the cam k on the front ejector-shaft, post l , spring l' , causing the post to bear on the cam, arm m , lever n , and clutch o on the shaft Z^3 , substantially as described.

6. The combination, with a reel-shaft, of sliding sleeve 25, lever 24, fixed sleeve 28, bevel gear-wheel r , formed with a slot, r' , and having a loose sleeve, 29, short shaft 30, having small bevel gear-wheel u and pinion t , rod 31, having rack s , operating through the slot and connecting the sliding sleeve and pinion, arms v , secured to the fixed sleeve and gear-wheel sleeve, and bats secured to the arms, substantially as described.

7. The combination, with the binding-table, the support thereover, endless apron B , and rollers $B' B'$, of the needle-shaft I' , horizontal bevel gear-wheels $I^2 I^3$, vertical shaft I^4 within the support, cam i on the vertical shaft beneath the table, lever x' , shafts e and e^2 , having clutch h , and the wheel e' , substantially as described.

8. The combination, with a knotter, of the rotary gripper F' , having shaft F^2 , clutch-half K^4 , having pin and longitudinal slot connection with the shaft, spring M , loose clutch-half K^5 , having radial teeth L^6 , slide U' , having rack K^6 , and the gripper-plates, substantially as described.

9. The combination, with a knotter, of the gripper-plates G^4 , gripper F' , bracket B^4 , formed with guide-lip knife S' , bracket A^{18} , having hinged spring-cutter R' , provided with heel T^5 , and slide U' , having cam-piece T^4 , substantially as described.

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