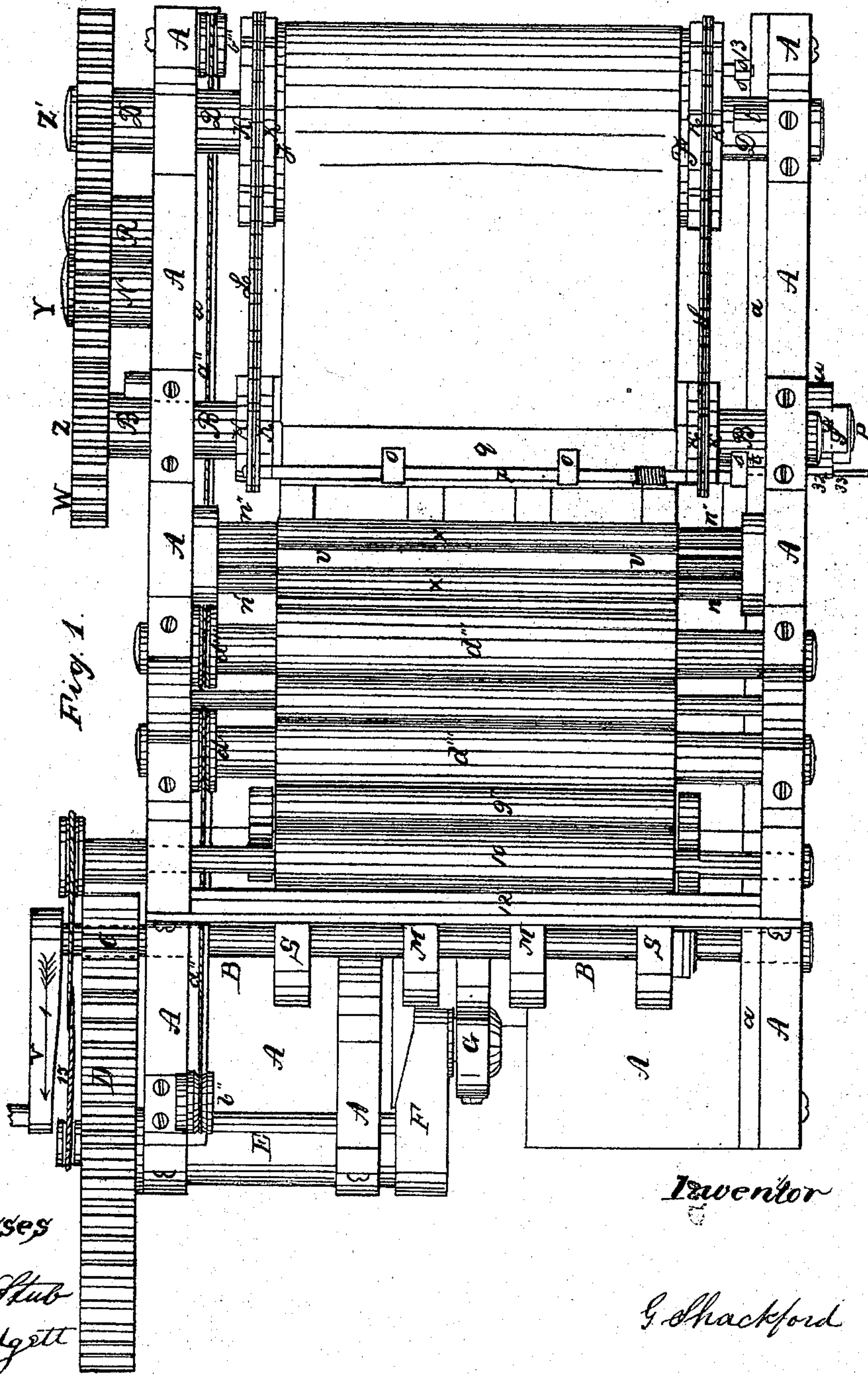


A. G. SHACKFORD.
LITHOGRAPHIC PRINTING PRESS.

No. 80,771.

Patented Aug. 4, 1868.



Witnesses

Wm H. Stub
G B. Blodgett

Inventor

G. Shackford

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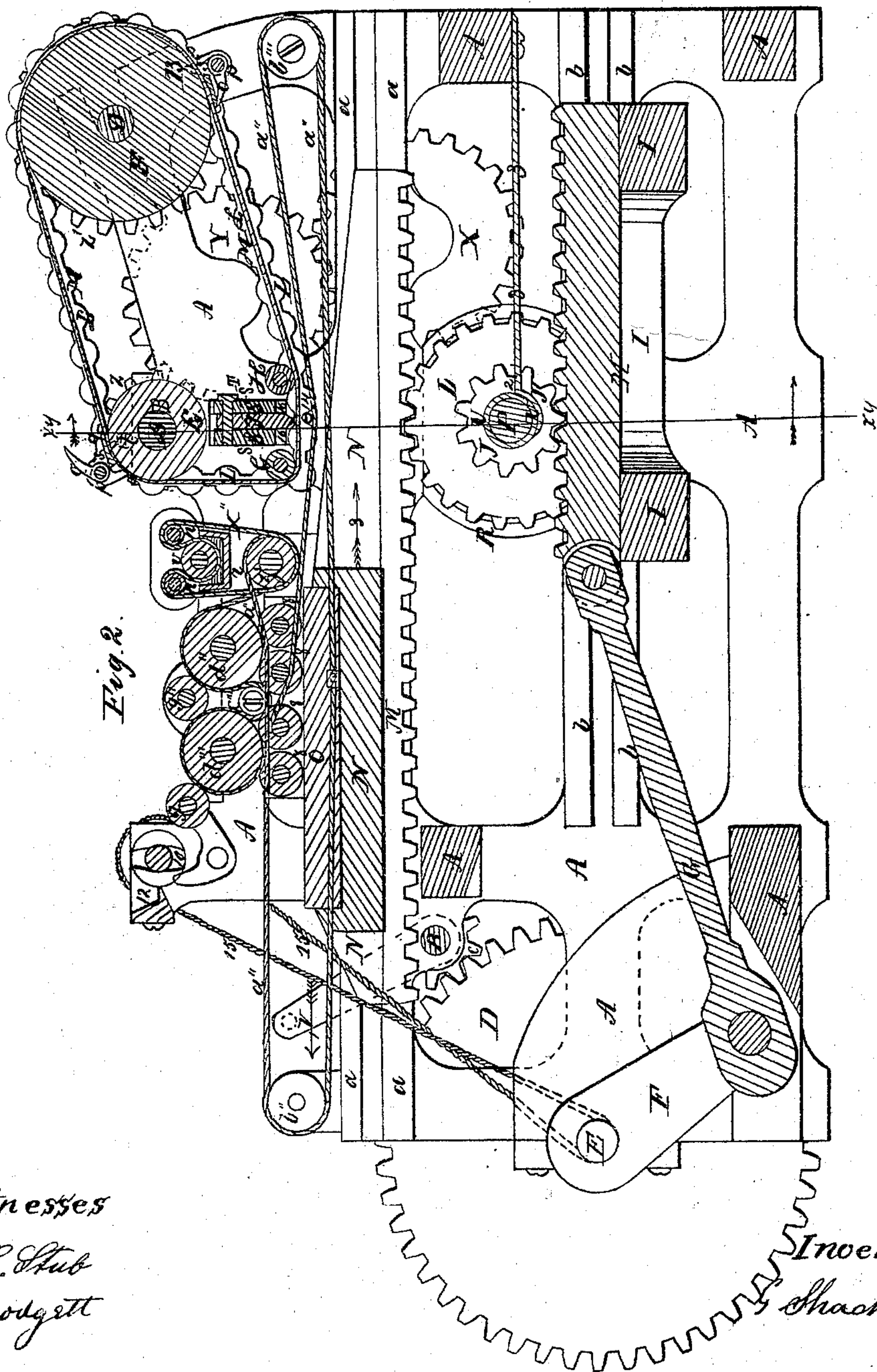


Fig. 2.

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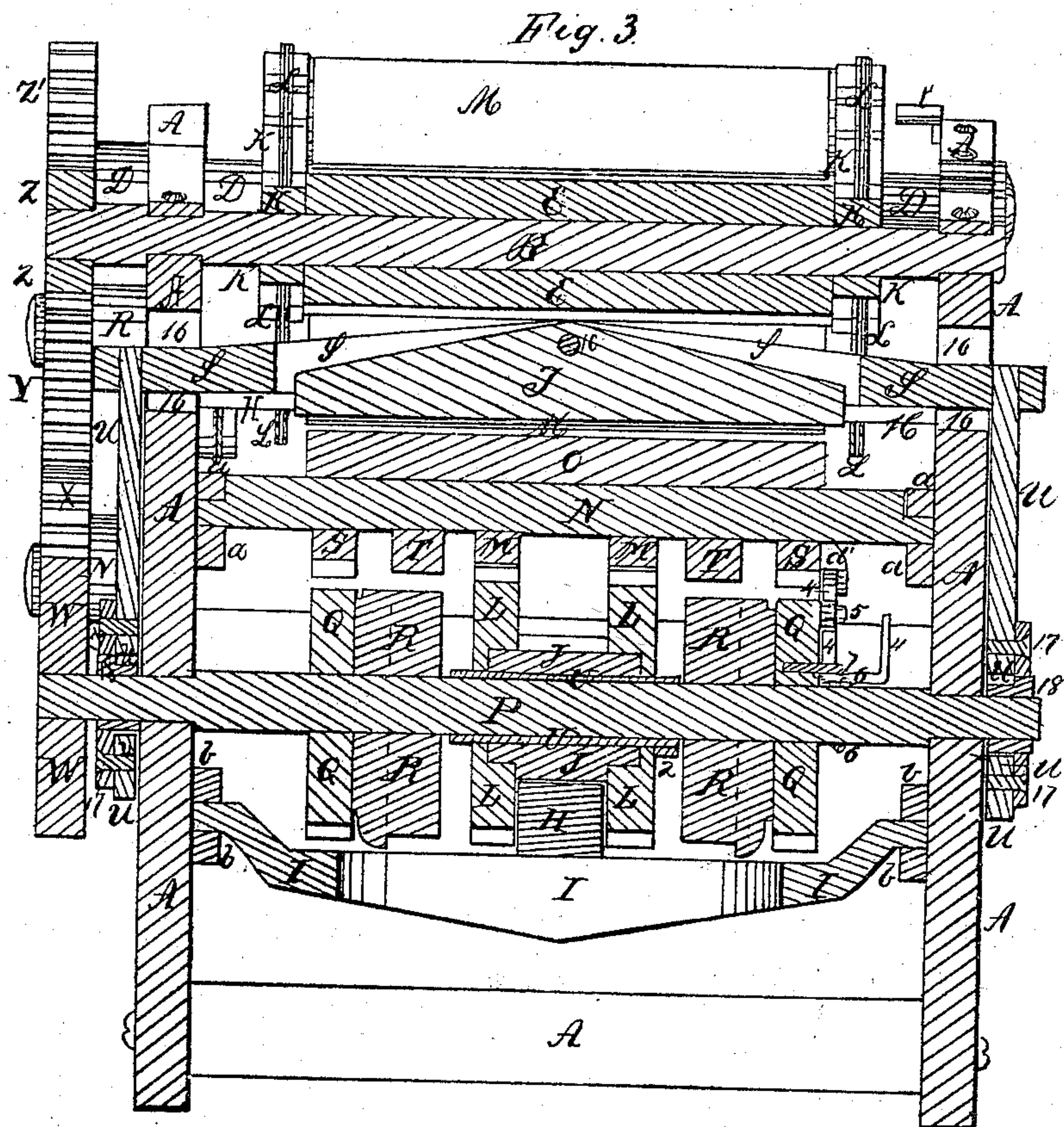
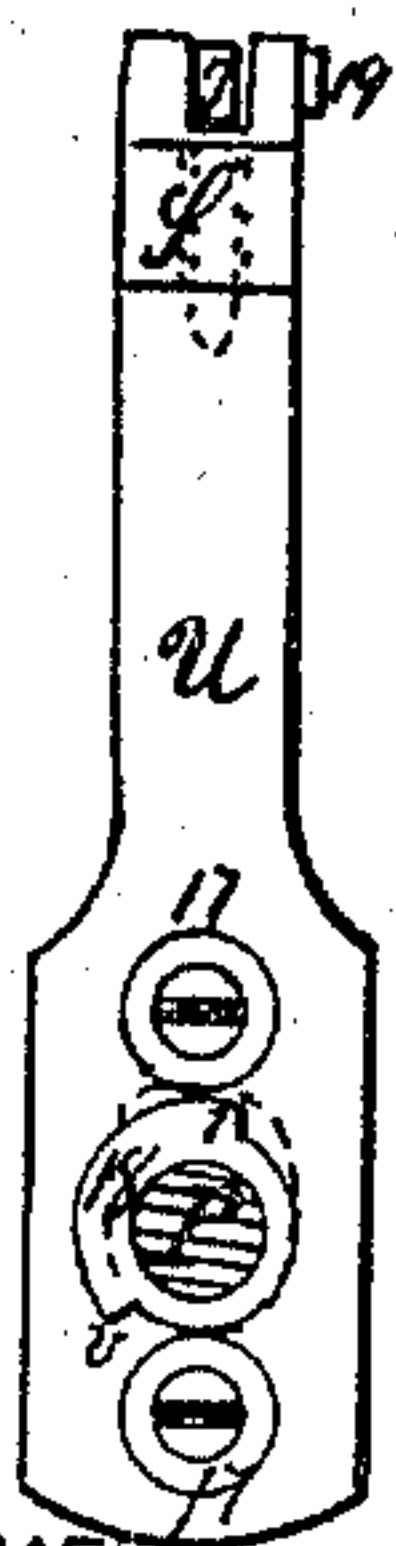


Fig. 5.



Witnesses
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G. B. Blodgett

Fig. 4.

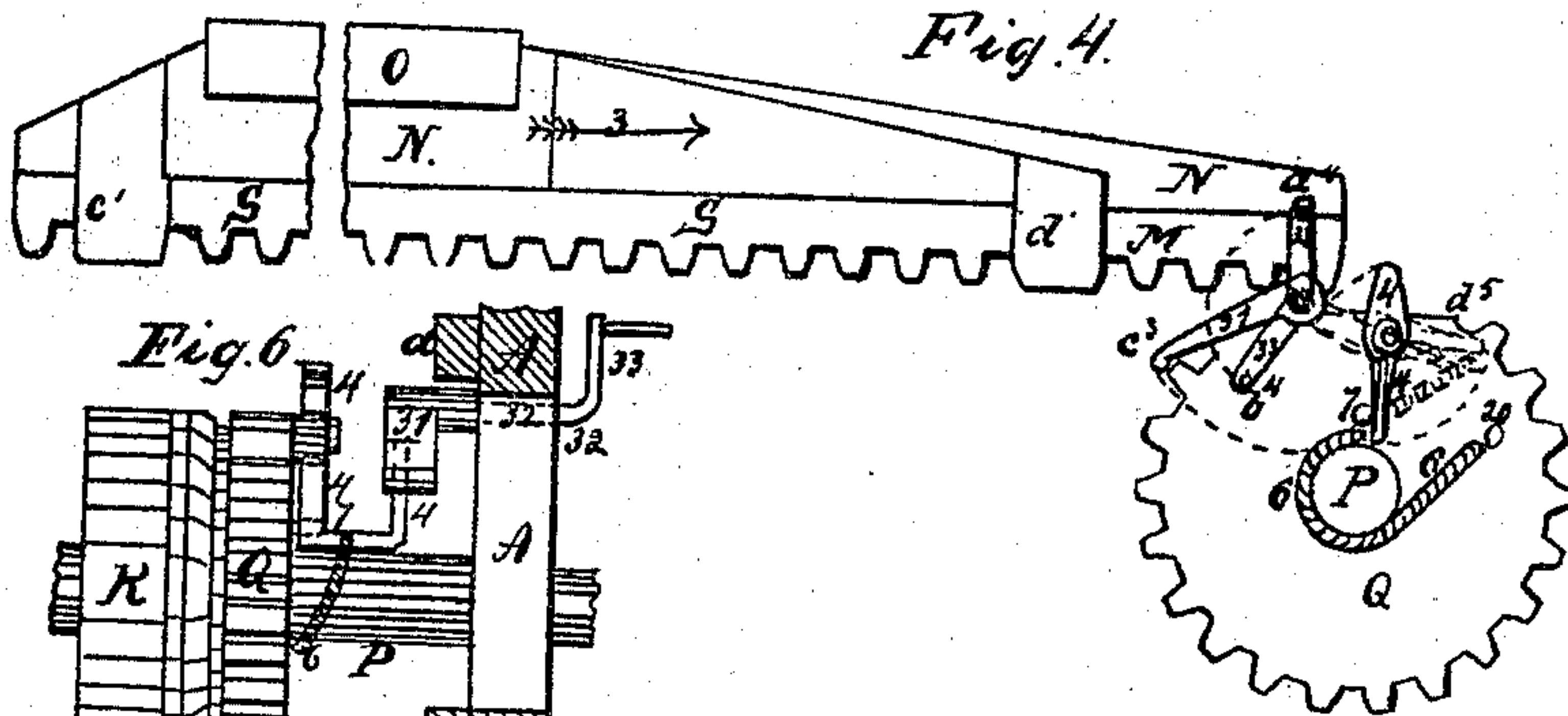
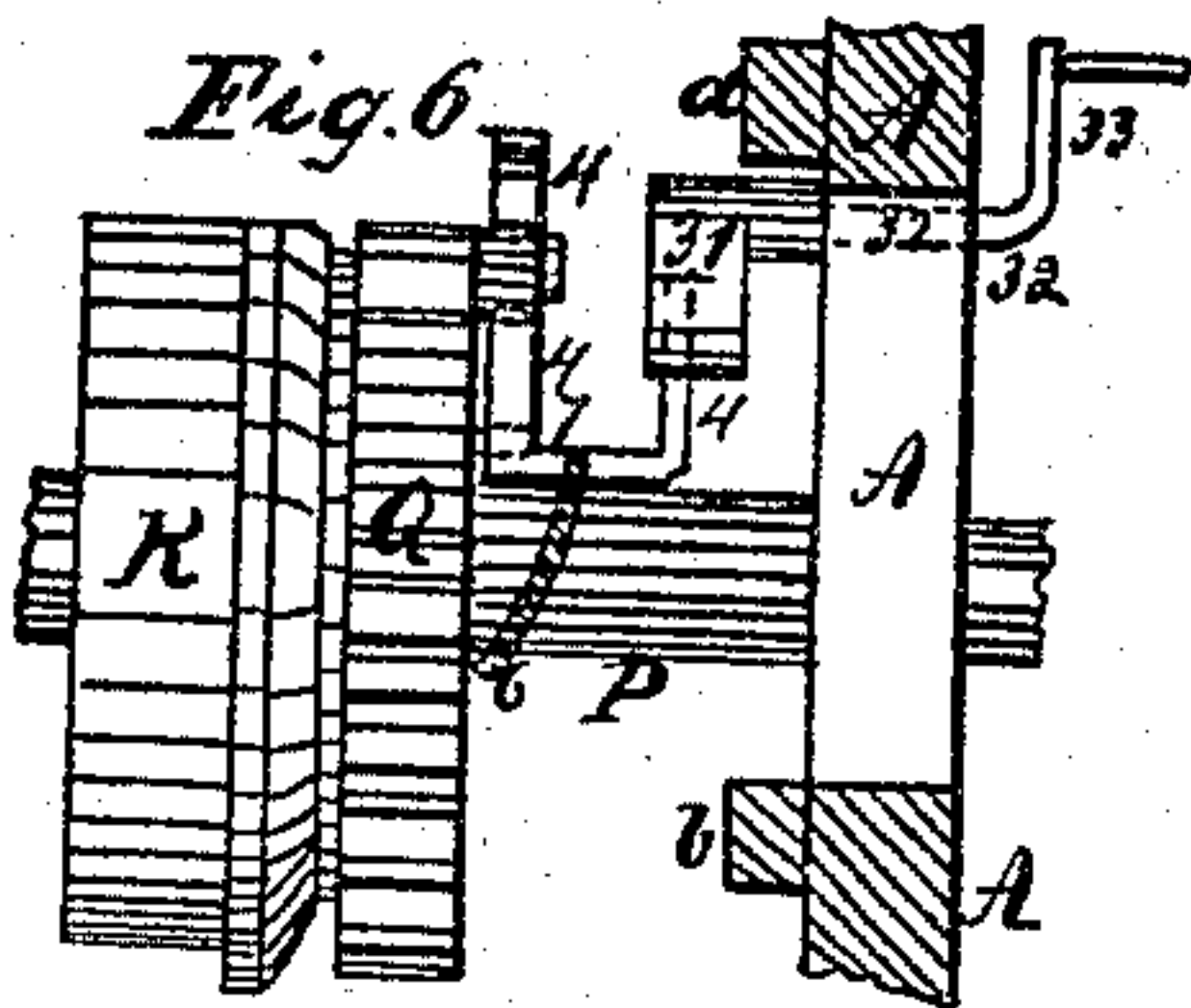


Fig. 6.



Inventor

A. G. Shackford

United States Patent Office.

AMAZIAH G. SHACKFORD, OF MALDEN, MASSACHUSETTS.

Letters Patent No. 80,771, dated August 4, 1868.

IMPROVEMENT IN LITHOGRAPHIC-PRINTING PRESSES.

The Schedule referred to in these Letters Patent and making part of the same.

Be it known that I, AMAZIAH G. SHACKFORD, of Malden, in the State of Massachusetts, have invented certain new and useful Improvements in Lithographic Presses; of which the following, with the accompanying drawings, is a full description.

Figure 1 is a plan of my machine.

Figure 2, a vertical section of the same.

Figure 3, a cross-section, showing a longitudinal section through the scraper.

Figures 4, 5, and 6 are details to be referred to hereafter.

In the accompanying drawing, A is the framework of the machine, in suitable bearings in which is supported the shaft B, which carries the driving-wheel C, which engages the cog-wheel D. This is attached to the shaft E, which has its bearings in the framework A.

On the other end of the shaft E is a crank, F, connected to which is a connection-rod, G, of which the other end is pivoted to the rack H. This rack is fastened on the vibrating-carriage I, which slides in suitable bearings, *b b*, attached to the framework.

The rack H engages with the cog-wheel J, to which is fastened, on each side, one of the cog-wheels L L, which are twice the size of the former wheel, J, and all three of which turn loose upon the shaft P, as if they were one.

When the rack H engages the cog-wheel J, the cog-wheels L L are set in motion thereby, and engage with the racks M M, which are attached to the under part of the carriage N, which supports the stone, O, and vibrate the carriage N and the stone, O, in the opposite direction of the rack H, and at twice its speed. The carriage N is supported in suitable bearings, *a a*, which are fastened to the framework A.

As the cog-wheels J L L revolve loose around the shaft P, as before mentioned, and are apt to engage the shaft by friction, I have placed a thimble or counter-bearing, U, round the shaft P, (shown in figs. 2 and 3,) over which the gears J L L revolve, and prevent them from setting the shaft P in motion by friction. This thimble or counter-bearing U is held stationary in its place by an arm, 3, of which one end is attached to the thimble in a place marked 2, (in figs. 2 and 3,) and the other end is fastened to the framework A.

On the shaft P are fastened cog-wheels Q Q, opposite to which, and on the under part of the carriage N, are fastened racks S S. That part of the teeth of the gears Q Q which is opposite the racks S S is cut off, for the purpose of allowing the racks S S to pass over the gears Q Q without engaging them, as seen in figs. 3 and 4.

On one of the wheels Q Q is a projecting, upright, swinging tooth or dog, 4, which is pivoted, at one side, to the gear Q, a little below where the teeth are cut off, in a place marked 5, in figs. 3, 4, and 6. The lower end of this tooth 4 rests against a pin, 7, against which it is firmly pressed, when the projecting cams *c' d'* engage the swinging tooth 4, when brought in contact with it, and, when the cams *c' d'* are not in contact with the tooth 4, it is held in an upright position by a spiral spring, 6, one end of which is fastened to the lower end of the swinging tooth 4, and which extends half way around the shaft P, and is fastened, at the other end, to a pin, 20, projecting from the cog-wheel Q, as seen in figs. 4 and 6.

To one of the racks S, which is opposite the gear Q, (containing the swinging tooth 4,) are attached the before-mentioned projecting cams *c' d'*. By the traverse of the carriage N in the direction of the arrow 3, the projecting cam *d'* is brought in contact with the swinging tooth 4, by the action of which the gears Q Q are thrown into the racks S S, and, by the continued motion of the carriage N in the same direction, the gears Q Q are revolved, revolving, also, the shaft P, (to which they are fastened;) but, when the carriage N has traversed so far that the projecting cam *c'* comes in contact with the swinging tooth 4, then the gears Q Q and the shaft P are disengaged from the racks S S, and assume their original position.

On the shaft P (which has its bearings in the framework A) are also fastened the flange-wheels R R, part of which (opposite to the carriage N) are cut off, so as to allow the carriage N, with the timbers T T, attached to the under part of the same, to traverse back and forth without coming in contact with the flange-wheels R R. These timbers T T are of such size and thickness that they will bear on the broad part of the flange-wheels R R,

and, when they are set in motion by the shaft P, receive the pressure given by the "scraper" to the stone and carriage at the time an impression is made, and prevent the breaking of the supporting-ways *a a* of the carriage N, and equalize the strain on the carriage. The cog-wheel W is also attached to the shaft P, on the outside of the machine. This wheel engages with the intermediate wheel X, which engages with another intermediate wheel, Y, (both of which run on studs projecting from the framework.) This last-named wheel, Y, engages with the cog-wheels Z Z', which are attached (on the outside of the machine) to the shafts B D, which have their bearings in the framework A.

Upon the shafts B and D are the rolls E and F, and the sprocket-wheels K K K K. Over these rolls E and F, and the small roll G, which is in front of the "scraper" and the small roll H, situated behind the "scraper," (which also have their bearings in the framework,) are stretched the tympan M M, made of leather or other suitable material; and over the sprocket-wheels K K K K, and small rolls G and H, are stretched the chains L L, which are connected together by flat strips of metal, *g g*, to which the tympan is riveted; and, by thus attaching the tympan to the chains, any tendency of the tympan to slip upon the rolls is prevented, and it also insures the proper surface-motion of the tympan required by the traverse of the carriage.

Spring-nippers, of which there is one set for each tympan, are attached, in a place marked *o*, to the rods *p p*, and operated by the same, and which have their bearings in ears projecting from the chains L L, and are provided with tappets *s s*, which strike against the projections *t t* as the chains and tympan revolve, and thus open the nippers at required points, the nippers being closed at other times by coiled springs on the rods *p p*.

I will now describe the apparatus by which the stone is damped or moistened previous to being inked. *r'* is a box or trough, secured to the framework, and partially filled with water, in which revolves a roll, *v*. Above, on either side of the same, are two small rolls, *w w''*, which are forced against the roll *v* by means not shown in these drawings. An endless cloth, X'', is stretched over the roll *w*, passes from there under the roll *v*, and thereby through the water contained in the trough *r'*, in order to get saturated; then passes again upward and over the roll *w''*; then downward (on the outside of the trough *r'*) and under the damping-roll *z'*; and thence to the starting-point on the roller *w*.

The damping-roll *z'* consists of an iron shaft covered with wood, over which is stretched a cylinder of rubber or other soft material, and is driven by the cord *a''*, fastened to the carriage N, passing over a roll, *b''*, which runs on a stud projecting from the framework; then over and around the damping-roll *z'*; then over a cylinder, *d''*; then under a roll, *e'''*, which runs on a stud projecting from the framework; then over a cylinder, *d'''*, which has its bearings in the framework; then under a stud, *l*, projecting from the framework; then over a roll, *b'''*, which runs on a stud projecting from the framework; and then fastened, with this end, to the carriage N.

When the carriage N vibrates, the damping-roll *z'* is driven by the cord *a''*, as described, which revolves the endless belt of cloth X'', and this the rolls *w*, *w''*, and *v*, whereby the cloth is submerged in the water, and passes from there between and over the rolls *w*, *v*, and *w''*, whereby the excess of water is pressed out of the cloth X'', which passes then under the damping-roll *z'*, which presses the cloth upon the surface of the stone, and so moistens the same before inking.

The ink is contained within a trough, 12, from which it is transferred, by rolls 10 and 9, to an ink-distributing cylinder, *d'''*, by which the ink-rolls 8 are served; and, in contact with the latter rolls, the stone passes twice, once when it advances, and once as it returns.

The roll 10 is driven by a cord, 15, from the main driving-shaft E.

I will now describe the method by which the tympan and nippers are carried down and past the "scraper," so as to bring the paper into contact with the stone, O, for the purpose of receiving the impression. S is a longitudinal bar, sliding in guides 16, in each side of the framework. This bar carries the scraper T, which fits in a groove, and is pivoted in the centre, at 19, so as to adapt itself to the stone in a lateral direction, seen in figs. 2 and 3. To the bar S is attached (on each side of the machine) a rod, U, which is provided, at its lower end, with an oblong hole, which acts as a guide, and is large enough to slide over the slide P, seen in figs. 3 and 5. These rods U are also provided with two friction-rolls, 17, (which are running on studs projecting from the arms U,) and are placed opposite, above each other, and so far apart that the cam 18 (attached to the shaft P) can play between them. The cams 18 are revolved by the shaft P, on the outside of the machine, by the motion of which the friction-rolls 17 are acted on, and the rods U, the bar S, with the scraper T and the tympan M, are brought down, as required, to make the impression; but, as soon as the cam 18 ceases to act upon the lower friction-roll 17, it will lift the upper roll 17, and, with it, the rod U, bar S, with the scraper T and tympan M, and all assume their former position.

The action of the cams 18, when in motion, is such that, when the point of the cam 18, marked 1, reaches the lower roll 17, the scraper is suddenly depressed, and, by passing from the point 1 to the point marked 2, the scraper presses the tympan and paper against the upper surface of the stone, O, and, when the point marked 1, on the cam 18, reaches the upper roll 17, it is lifted up, and thereby raises the rod U, the bar S, and scraper T, to their former position, as seen in figs. 3 and 5. As the tympan is required to remain stationary while the carriage N travels in the opposite direction of the arrow 3, it is effected in the following manner:

Upon the shaft P is the cog-wheel W, (as before stated,) which engages with the cog-wheels X Y Z Z', (as before described,) but which are all kept stationary while the racks S S, attached to the carriage N, are passing over the toothless portion of the gears Q Q, (attached to the shaft P,) and projecting cam *d'*, upon one of the racks S, is passing over the swinging tooth 4.

As the projecting cam *d'* comes in contact with the swinging tooth 4, when the carriage moves in the opposite direction of the arrow 3, (as before stated,) it will be swung on its pivot so far as to assume a horizontal position, and, as soon as the cam *d'* has passed over the tooth 4, it is brought back to its former upright posi-

tion by means of the spiral spring 6, and is then ready for action on return of the carriage in the direction of the arrow 3, as seen in fig. 4. Now, as soon as the carriage traverses in the last-named direction, for the purpose of bringing the stone in position to make an impression, the projecting cam d' will come in contact with the swinging tooth 4, the lower end of which is pressed against the projecting pin 7, and thereby throw the gears Q Q into the racks S S, which revolve the same by the continued motion of the carriage, and, also, the shaft P, with the cog-wheel W, which engages with the intermediate gear X, which engages with another intermediate gear, Y, which engages with the gears Z Z', (as before stated,) whereby the tympan and nippers, in which the paper is fed by the attendant, are carried beneath the scraper, and into contact with the stone, so as to receive the impression, after which it is carried around until the tympan and nippers are arrested at a point, 13, seen in figs. 1 and 2, by the action of the projecting cam c' , which, by the motion of the carriage, is brought in contact with the swinging tooth 4, and thereby disengages the gears Q Q from the racks S S, which latter can pass over the toothless portion of the gears Q Q, and thus stopping the action of the gears which revolve the tympan; also the motion of the tympan and nippers.

On the next movement of the tympan, the nippers are opened by the tappet s coming in contact with the projections t , when the printed sheet falls into a receiving-table, not shown in these drawings.

On one side, and in the immediate vicinity of the swinging tooth 4, there is a lever, 31, attached to a short shaft, 32, which has its bearings in the framework A, shown in figs. 4 and 6.

To this shaft is attached a crank, 33, on the outside of the machine, by turning which, from a point marked a' to a point marked b' , the lever 31 will turn from a point marked c' to a point marked d' , thereby coming in contact with the lower part of the swinging tooth 4, which is placed in a horizontal position, as shown in red in fig. 4, and kept in this position by the lever 31, and thereby cuts off all motion of the shaft P, with its cog-wheels, attached to it.

The tympan, and nippers, and the carriage, can now traverse back and forth without coming in contact with the swinging tooth 4, which is often to be done by the operator of this machine, for the purpose of running the ink on to the rolls, or when he misses a sheet.

Operation.

The parts being in the position represented in figs. 1 and 2, the carriage N is caused to move in the direction of the arrow 3, through the connections already explained, by turning the crank V in the direction of the arrow 1.

The stone, being first moistened by the operator, passes under the ink-rolls 8, by which it is inked.

During this period, (and while the carriage A is moving in the direction of the arrow 3,) the projecting cam d' will arrive at, and come in contact with, the swinging tooth 4, by the action of which the gears Q Q are thrown into the racks S S, which revolve the former, in connection with the shaft P.

The tympan and nippers, through the connections already explained, commence to revolve, carrying the paper which has been before fed into the nippers.

When the forward part of the stone reaches a position immediately beneath the scraper T, the paper will have arrived at a proper point for commencing the impression, and the scraper T (through the connections already explained) is depressed, causing the tympan to bring the paper uniformly against the design upon the stone during its traverse. The tympan continues to revolve, thereby lifting the printed paper off the stone, and carrying it until it arrives at a point, 13, where it is arrested, as before stated. On the next movement of the tympan, the paper is carried around by the nippers until they are opened by the tappet s coming in contact with the projections t , when the paper falls, as before stated, upon a receiving-table, not shown in these drawings. When the carriage moves back in the opposite direction of the arrow 3, the stone will then first be moistened by the endless band of cloth X'', as it passes under the damping-roll z' , from where it passes under the ink-rolls 8, and, on returning in the direction of the arrow 3, the stone will be inked again before making an impression; so it will be seen that the stone is damped once, and inked twice.

Claims.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The arrangement and combination of the thimble or counter-bearing U and arm 3 with the cog-wheels J, L, and Q, and racks H, M, and S, substantially as and for the purpose described.
2. Also, the swinging tooth 4, pin 7, spring 6, cog-wheels Q, flange-wheels R, shaft P, lever 31, shaft 32, crank 33, arranged and operating in combination with the cams c' d' , substantially as and for the purpose described.
3. The truncated flange-wheels R R, in combination with the carriage N, substantially as and for the purpose described.
4. Also, operating the tympan and nippers from the shaft P, by means of cam 18, and rod U, and gears W X Y Z, substantially as described.
5. The endless cloth X'', combined and arranged with water-trough r' , and damping-roll z' , and the squeezing-rolls $w w''$, substantially in the manner and for the purpose described.

In testimony whereof, I have hereunto subscribed my name.

Witnesses:

WM. H. STUBBE,
G. B. BLODGETTE.

AMAZIAH G. SHACKFORD.