(No Model.) 3 Sheets—Sheet 1.

J. H. ELWARD.

RIVETING MACHINE.

No. 356,033. Patented Jan. 11, 1887.

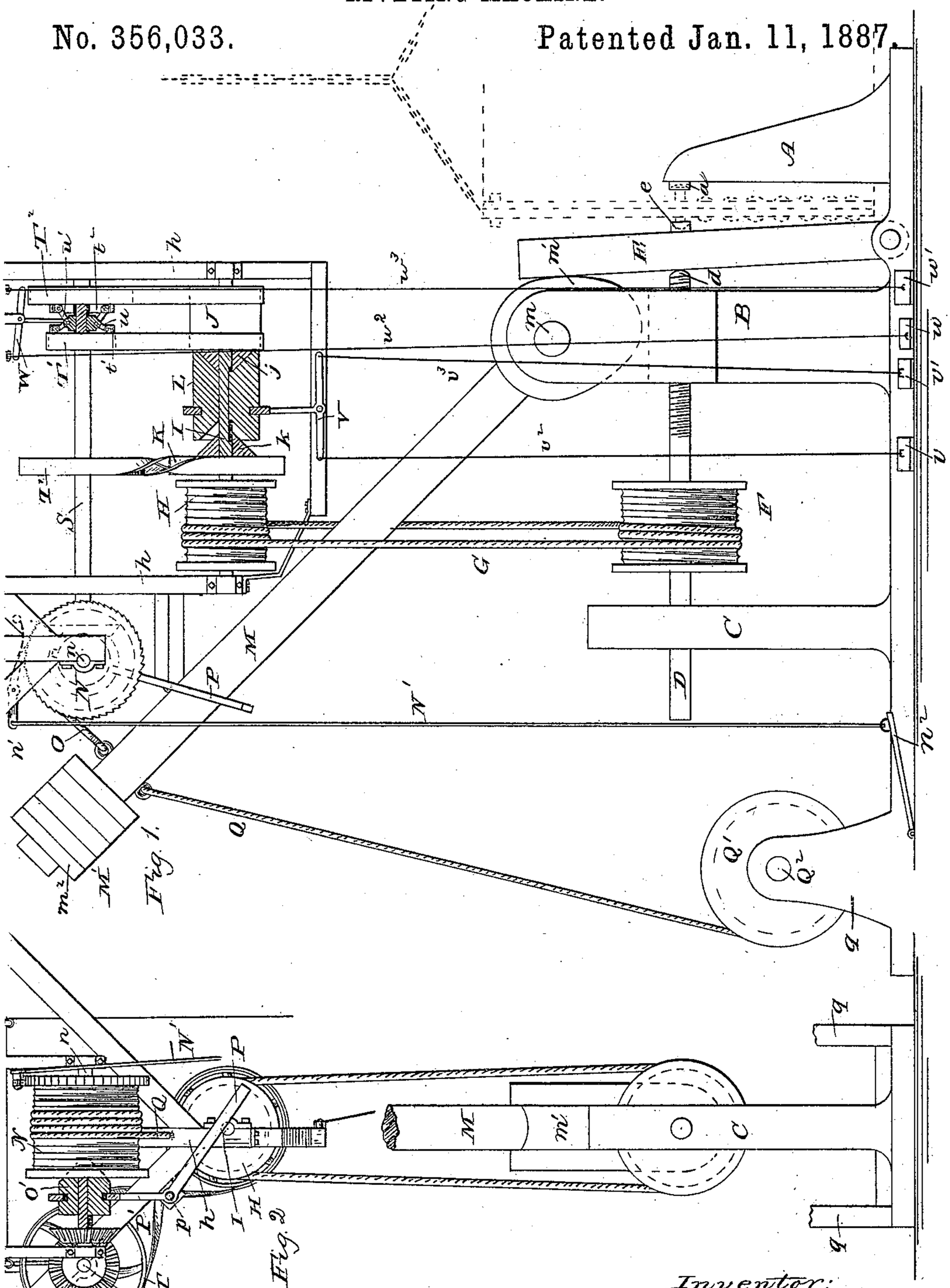


Fig. 1.

Fig. 2.

Witnesses:
A. N. Low
J. S. Barker.

Inventor:
John H. Elward
by Doubleday & Bliss
attys.

(No Model.) 3 Sheets—Sheet 2.

J. H. ELWARD.

RIVETING MACHINE.

No. 356,033. Patented Jan. 11, 1887.

Fig. 3

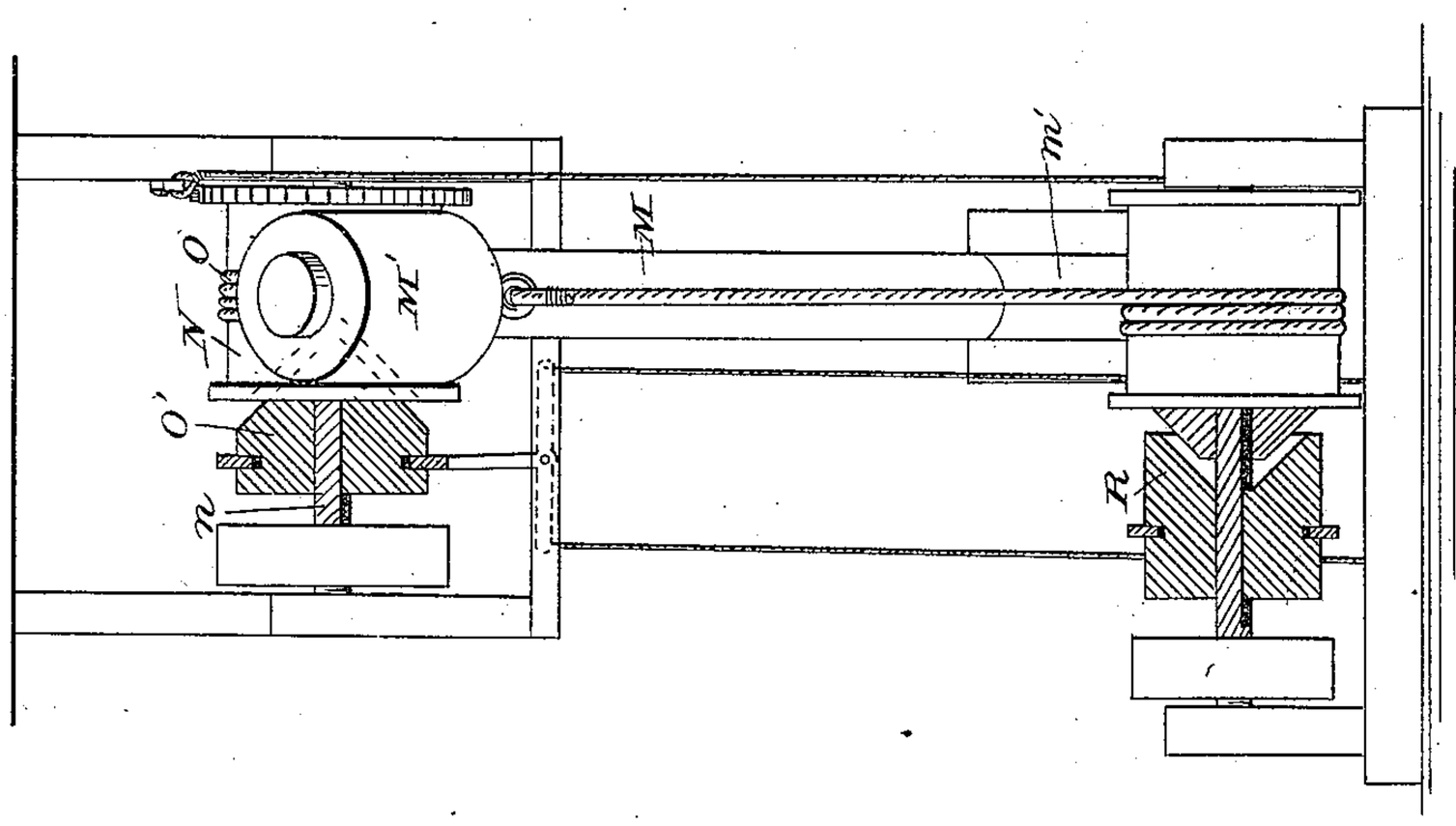
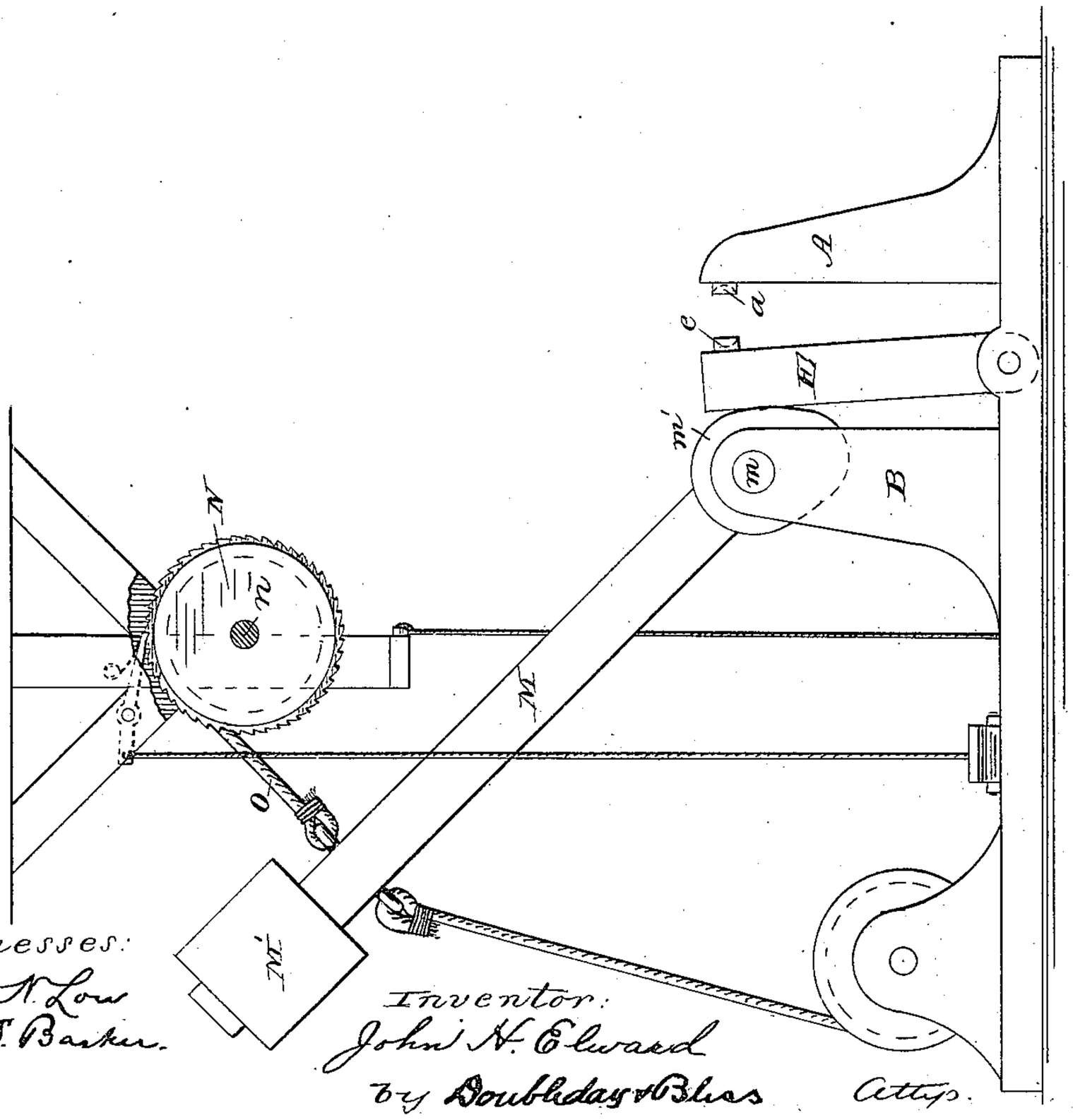


Fig. 4



Witnesses:
N. N. Low
J. S. Baker.

Inventor:
John H. Elward
by Doubleday & Bliss Attys.

(No Model.) 3 Sheets—Sheet 3.

J. H. ELWARD.

RIVETING MACHINE.

No. 356,033. Patented Jan. 11, 1887.

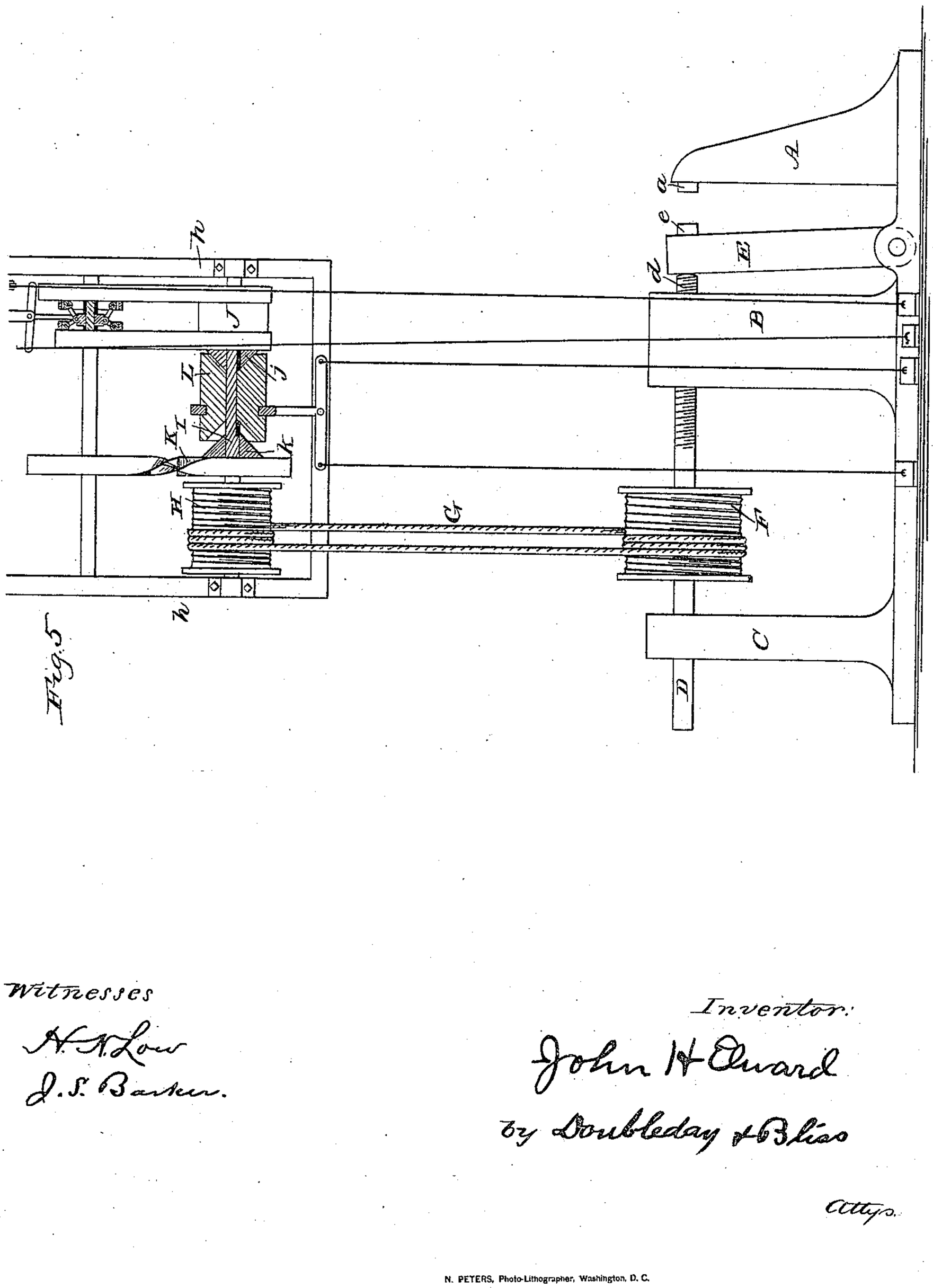


Fig. 5

Witnesses
A. N. Low
L. S. Baker.

Inventor:
John H Elward
by Doubleday & Bliss
Attys.

UNITED STATES PATENT OFFICE.

JOHN H. ELWARD, OF STILLWATER, MINNESOTA, ASSIGNOR TO HIMSELF AND D. M. SABIN, OF SAME PLACE.

RIVETING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 356,033, dated January 11, 1887.

Application filed January 11, 1882. Serial No. 49,866. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. ELWARD, a citizen of the United States of America, residing at Stillwater, in the county of Washington and State of Minnesota, have invented certain new and useful Improvements in Riveting-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 is a side elevation, partly in section, of a machine embodying my entire invention. Fig. 2 is an end view, partly in section, parts of the machine being broken away. Fig. 3 is an end view, partly in section, of a machine containing one part of my invention. Fig. 4 is a side view of Fig. 3, and Fig. 5 is a side view, partly in section, of a machine containing a portion of my invention.

In the drawings, A is an abutment made sufficiently strong and rigid to receive the end of a rivet and support it against such thrust or impact as it may be found necessary to subject it to.

B C are posts or standards, one or both of them being provided with a screw-threaded opening to receive and support a screw-shaft, D, the inner end, *d*, of which engages with a swinging arm or carrier, E, carrying upon its inner face a boss, punch, or projection, *e*, corresponding in position to a similar boss, *a*, on the abutment A, these punches being concaved to produce the desired form of rivet.

F is a drum keyed rigidly to screw-shaft D, and connected by an endless cord or belt, G, with a similar drum, H, which is keyed to a shaft, I, mounted to revolve in bearings or hangers *h*, which in turn are secured to any desired part of the building, or to a portion of a frame-work, to which also the abutment A and posts B C are attached. Thus when the screw-shaft is turned in the proper direction it operates as a pusher to thrust the carrier E and its attached punch *e* toward the stationary abutment to upset the end of the rivet.

J K are band-wheels or cogged wheels mounted loosely upon shaft I, and driven in opposite directions by means of any desired motor. Each of these wheels carries upon its inner face a friction-cone, (marked, respectively, *j k*.)

L is a double friction-clutch mounted on shaft I so as to slide thereon, but keyed or splined to it, and operated by means of a shipping-lever in such manner that when one end of said clutch is caused to engage with the friction-cone *j* the shaft I is caused to rotate in the same direction with wheel J, and thus impart a similar rotary motion to drums H F and screw-shaft D.

It will be readily seen that by means of the devices thus described the screw-shaft D and swinging arm E can be advanced toward or withdrawn from the abutment A at the will of the operator, it being understood that the screw-shaft is connected with the free end of arm E in such manner as to withdraw it from the abutment when the shaft is rotated in the opposite direction; or such connection may be dispensed with and the arm thrust from the abutment by means of a spring or otherwise. I propose to employ also a secondary or supplementary pusher to complete the riveting operation which has thus been commenced, and I will now describe devices which I have invented for that purpose.

M is a lever fulcrumed at *m* in the upper end of post B, which is slotted for that purpose, carrying at its lower end a cam, *m'*, in such position as to engage with the rear face of arm E.

M' is a weight attached to the upper swinging end of lever M, to impart a heavy forward thrust to arm F when the lever is permitted to swing from the position shown to a substantially horizontal position. The weight M' may be increased or diminished, as circumstances shall require, by changing the number of plates m^2 upon the end of the lever, or by shifting the position of the weight upon said lever.

N is a drum mounted loosely on shaft *n*, which rotates in suitable hangers or bearings, and is connected with lever M by a rope, O.

O' is a clutch feathered to shaft *n*, so as to rotate therewith, and slide thereon when actuated by a bell-crank lever, P P', which is pivoted at *p* to the frame-work, its arm P crossing the path of the lever M, so that said

lever near the close of its upward movement engages with this arm and withdraws the clutch O′ from contact with the drum N, and thus permits the said drum to remain at rest upon shaft *n*, which is driven continuously in one direction by the bevel-gears shown in Fig. 2.

The pawl *n′* engages with ratchet-teeth formed on one flange of the drum, and thus prevents the weight of the lever from turning the drum until at the proper time the ratchet is tripped by the attendant, thus allowing the weighted end of the lever to fall.

A rope, Q, connects one end of lever M with a drum, Q′, mounted loosely upon shaft Q^2, and connected therewith at intervals by means of a sliding clutch, R, the tapering face or cone of which engages with a corresponding clutch-cone formed on or attached rigidly to drum Q′, a continuous motion being imparted to shaft Q^2 from a motor. (Not shown.)

In Fig. 1 I have illustrated a device which, under some circumstances, I propose to use for imparting motion to wheels J K, as follows: S is a shaft carrying three band-wheels, T, T′, and T^2, T being keyed rigidly to the shaft, while T′ and T^2, of different sizes, are mounted loosely upon the shaft S, and alternately connected therewith by means of a friction-clutch, which is composed of a hub splined to shaft S, and carrying four arms, *u u u′ u′*, one end of each arm being pivoted to the hub, its opposite end being pivoted to a segment of a flange, two of these flanges being arranged to take hold of the inner face of a flange, *t′*, on the vertical face of band-wheel T′, the opposite segmental flanges taking hold of the inner face of a similar flange, t^2, which projects from the vertical face of band-wheel T^2. These band-wheels T′ T^2 are connected by belts with the band-wheel J, so that said band-wheel J can be driven at a higher or lower speed by sliding the clutch on shaft S in such manner as to connect either band-wheel T′ or T^2 with said shaft. The belt which connects band-wheels T K is crossed, so as to drive the band-wheel K in a direction the reverse of that in which band-wheel J is driven. By means of these last-described devices, as will be readily understood, the speed of rotation of screw-shaft D may be varied, the object in thus varying the speed being to enable the operator to apply either an increased pressure to the rivet or to give an accelerated speed to the screw, the speed of rotation of shaft S being constant.

My machine may be operated as follows: The parts to be riveted together may be placed between the bosses or punches *e a* and the screw-shaft D rotated in such direction as to force the boss or punch *e* against the rivet, the amount of pressure which is applied to the rivet depending upon the force which is required to slip the friction-clutch. After all the pressure which the machine is capable of imparting by this mode of operation has been applied to the rivet, the pawl *n′* may be tripped by treadle n^2 and cord N′, when the weight M′ will depress the swinging end of the lever, and the momentum thus acquired will, through the action of cam *m′*, impart an additional pressure to the rivet, and thus, under ordinary circumstances, complete the upsetting of the same; but if from any cause the momentum acquired by the falling weight should be found insufficient for this purpose, still further compression or upsetting may be effected by pulling down upon the end of the lever through the operation of the drum Q′ and rope Q. Both of the carrier-moving devices—that is, the screw and the cam—act as pushers to force the carrier toward the abutment, and do not depend upon any sudden impact or blow to effect the complete-upsetting of the rivet; or, under some circumstances, I may dispense with the use of band-wheels F H and force the arm E toward the abutment by means of the lever M and cam *m′*, employing the supplemental rope and drum Q Q′ to produce additional compression, if found necessary.

It will, of course, be understood that the friction-clutches are provided with suitable shifting-levers, V W, or other mechanism arranged within reach of the operator, so that he can by means of cords v^2 v^3 w^2 w^3 and hand-levers or foot-treadles *v v′ w w′* control the movement of the various parts of the mechanism, as may be found requisite.

It will be seen that by reason of the friction between the engaging clutch-faces when the drums F H are employed the screw-shaft D is kept constantly in firm contact with the swinging arm E, so as to take up or follow up any advance which is produced in that arm by the action of the cam *m′*.

It will be readily understood by an examination of Figs. 1 and 5 that riveting may be accomplished by the use of screw-shaft D and its actuating mechanism independently of the lever M and cam *m′*, and that where comparatively little power is required to upset the rivets satisfactorily the double speeding devices may be so employed as to do the work quite rapidly; and it will also be seen that by means of the treadles the power which shall be applied to the screw-shaft may be regulated practically at the will of the operator by increasing or diminishing the friction of the clutch mechanism. So, also, it will be seen by examination of Figs. 1, 2, 3, and 4 that the lever M, cam *m′*, and their actuating mechanism may be employed independently of the screw-shaft under some conditions; but in practice, particularly for heavy work, I prefer to use the screw-shaft and the lever and cam conjointly, as I have described.

In the above description and in the following claims I mention specifically the lever M and the screw-shaft as mechanical movements adapted to the purpose of carrying out my invention; but it will be understood that in place thereof may be substituted equivalents, so long as they are of such character as to attain the ends aimed at in using the screw movement and lever-movement set forth.

What I claim is—

1. In a riveting-machine, the combination, with a stationary support for the rivet and a movable arm or carrier adapted to engage with and upset the rivet, of the screw-shaft to advance the arm, and the lever M and cam *m'*, substantially as set forth.

2. In a riveting-machine, the combination of the stationary abutment A, a swinging arm or carrier, E, arranged oppositely thereto, and to be moved toward and from the abutment, a screw-threaded device adapted to move said carrier E toward the abutment A, and bearing against said carrier at substantially the same point at all times, devices which impart one speed to the threaded part, and devices which impart another speed to said threaded part, substantially as set forth.

3. In a riveting-machine, the combination of the stationary abutment A, the swinging arm or carrier E, arranged oppositely thereto, and to be moved toward and from the abutment, a screw which moves the carrier E, means for rotating said screw at one speed, and means for rotating said screw at a different speed, substantially as set forth.

4. In a riveting-machine, the combination, with the screw-shaft D, of the lever M, cam *m'*, and means for imparting additional impulse to said cam after the weight at the end of the lever has acted upon the rivet with its full force.

5. In combination with the screw-shaft and its driving rope or belt, the driving-pulley and a friction clutching mechanism, whereby the force exerted upon the screw-shaft may be varied at the will of the operator.

6. The combination, with the screw-shaft, the drums F H, and rope G, of two driving-wheels adapted to move in opposite directions, and a clutch mechanism adapted to engage each of said wheels alternately with the driving-shaft, which carries band-wheel H, substantially as set forth.

7. The combination, with lever M, of rope O, wheel N, pawl *n'*, and a tripping mechanism, substantially as set forth.

8. The combination, with lever M, rope O, belt-wheel N, and its supporting-shaft, of the clutch O' and means actuated by lever M for throwing said band-wheel N out of operation, substantially as set forth.

9. In a riveting-machine, the combination, with the abutment and the movable punch, of the cam, the lever, the means for elevating the free end of the lever, and means for drawing said end positively downward, substantially as set forth.

10. In a riveting-machine, the combination, with the abutment and the movable carrier, of the cam, the lever, the mechanism for elevating the free end of the lever, and a weight, which may be increased or diminished, secured to the lever, substantially as set forth.

11. In a riveting-machine, the combination, with the stationary abutment, of a swinging carrier, a pusher which bears against the swinging carrier and moves it with a comparatively slow speed to commence the upsetting of the rivet, and another pusher bearing against the carrier and adapted to move it with greater power and speed than the first pusher after said first pusher has partially completed the upsetting of the rivet, said pushers being arranged substantially as and for the purposes set forth.

12. In a riveting-machine, the combination, with a stationary abutment and a movable arm or carrier adapted to engage with and upset the rivet, of a screw-shaft independent of said arm or carrier, and mechanism, substantially as set forth, whereby the speed of the screw-shaft may be varied at the will of the operator, substantially as described.

13. In a riveting-machine, the combination of the stationary abutment A, the movable carrier E, the screw bearing against the carrier to move it toward the abutment, the cam adapted to bear against the carrier and move it after the screw has ceased its motion, and the mechanism for causing said screw to follow up any advance of the carrier caused by the cam, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN H. ELWARD.

Witnesses:
J. S. BARKER,
H. H. DOUBLEDAY.