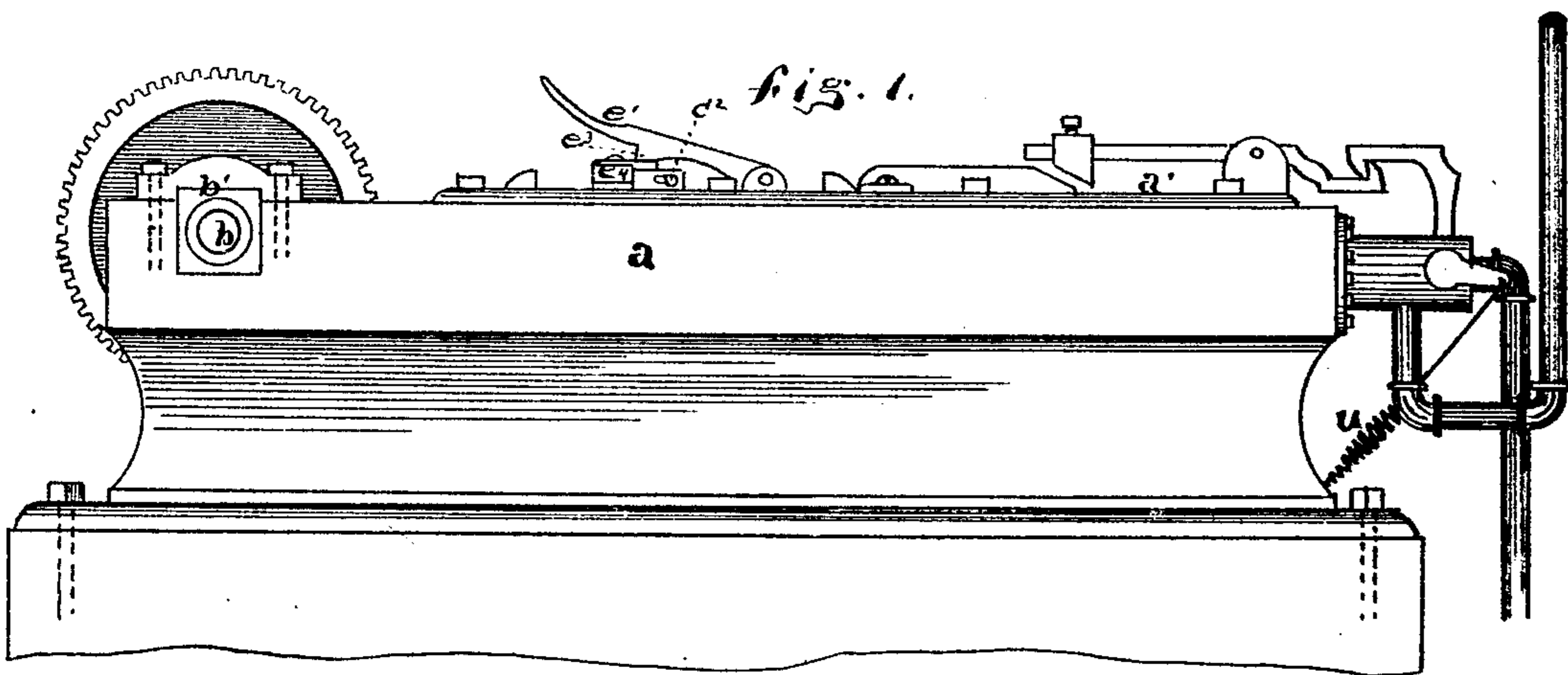
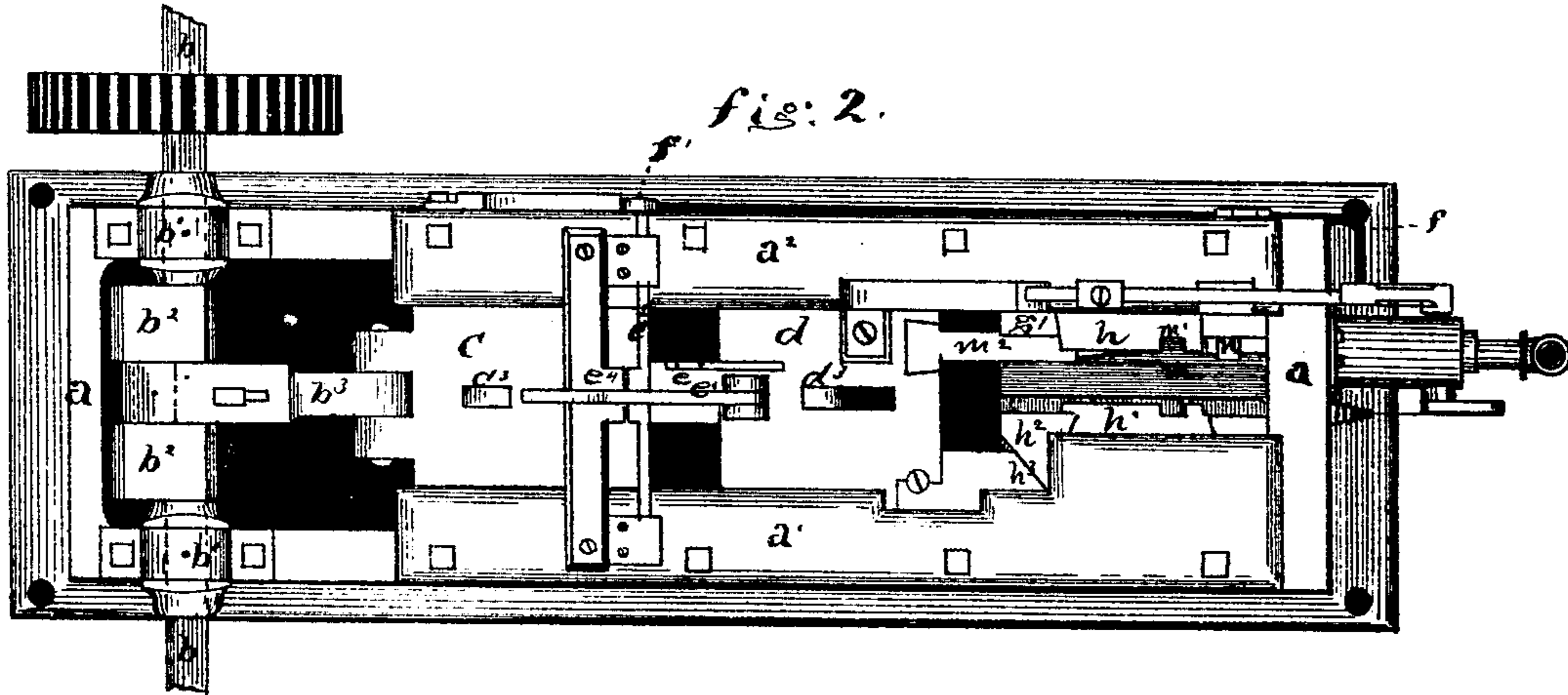


L. CHAPMAN.

MACHINES FOR PUNCHING AND SWAGING METALS.
No. 183,797. Patented Oct. 31, 1876.



Witnesses

John Pollitt
George C. Nolan

Inventor

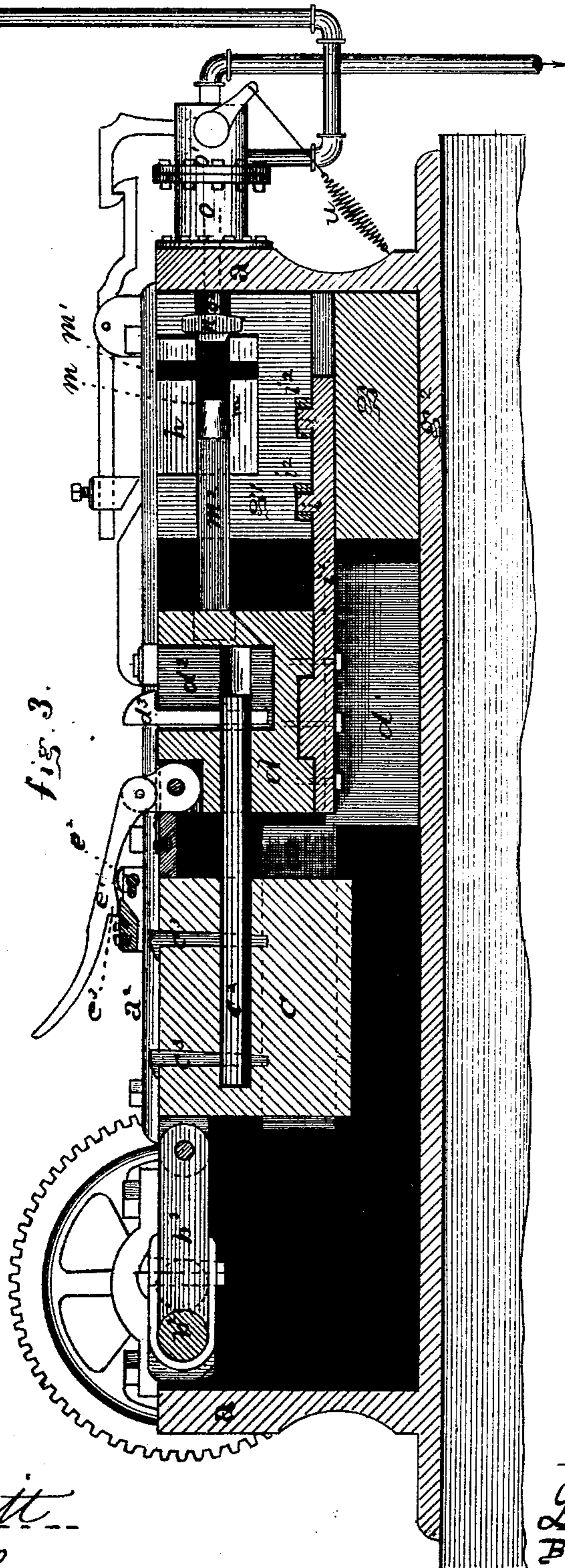
Luke Chapman
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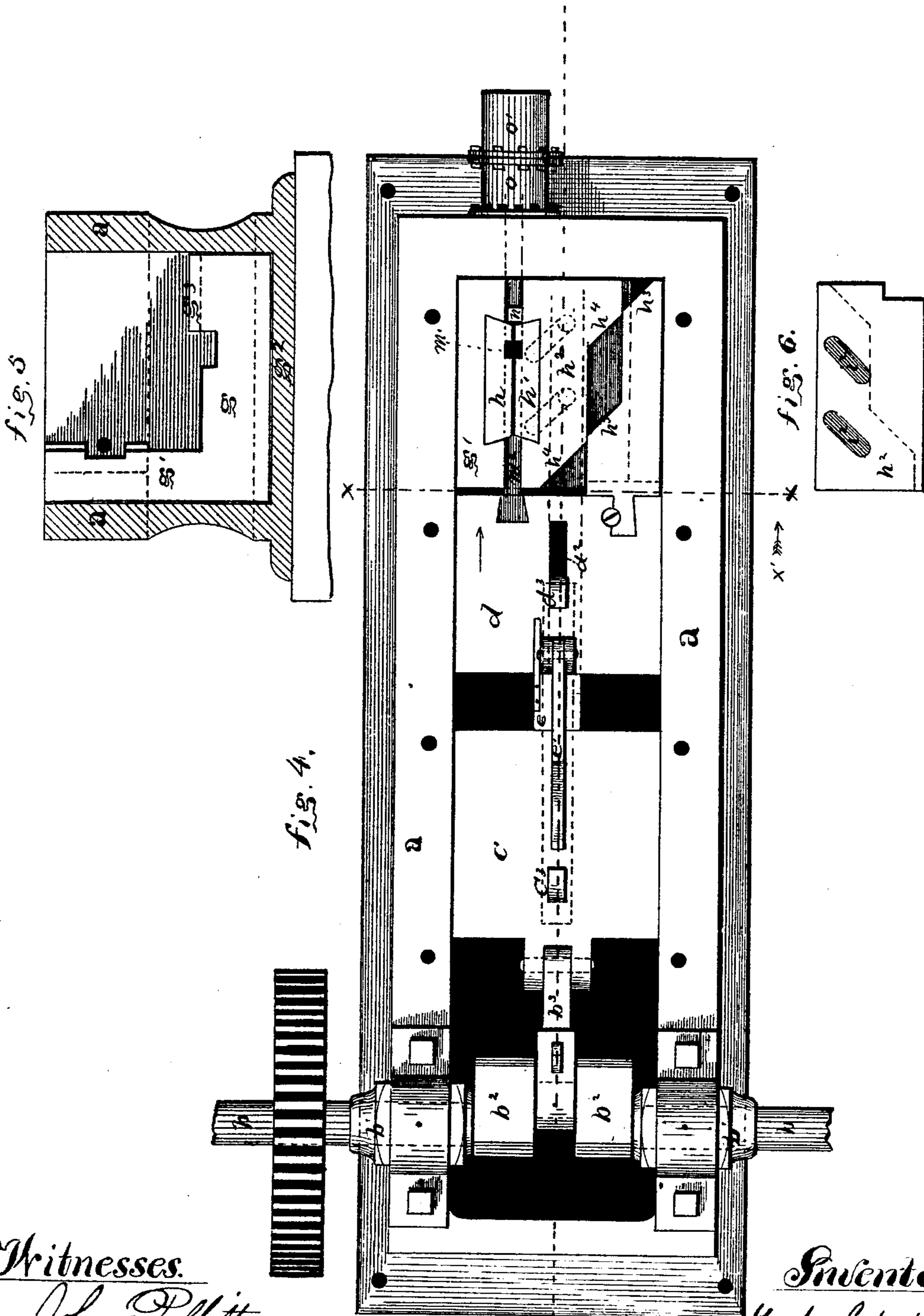
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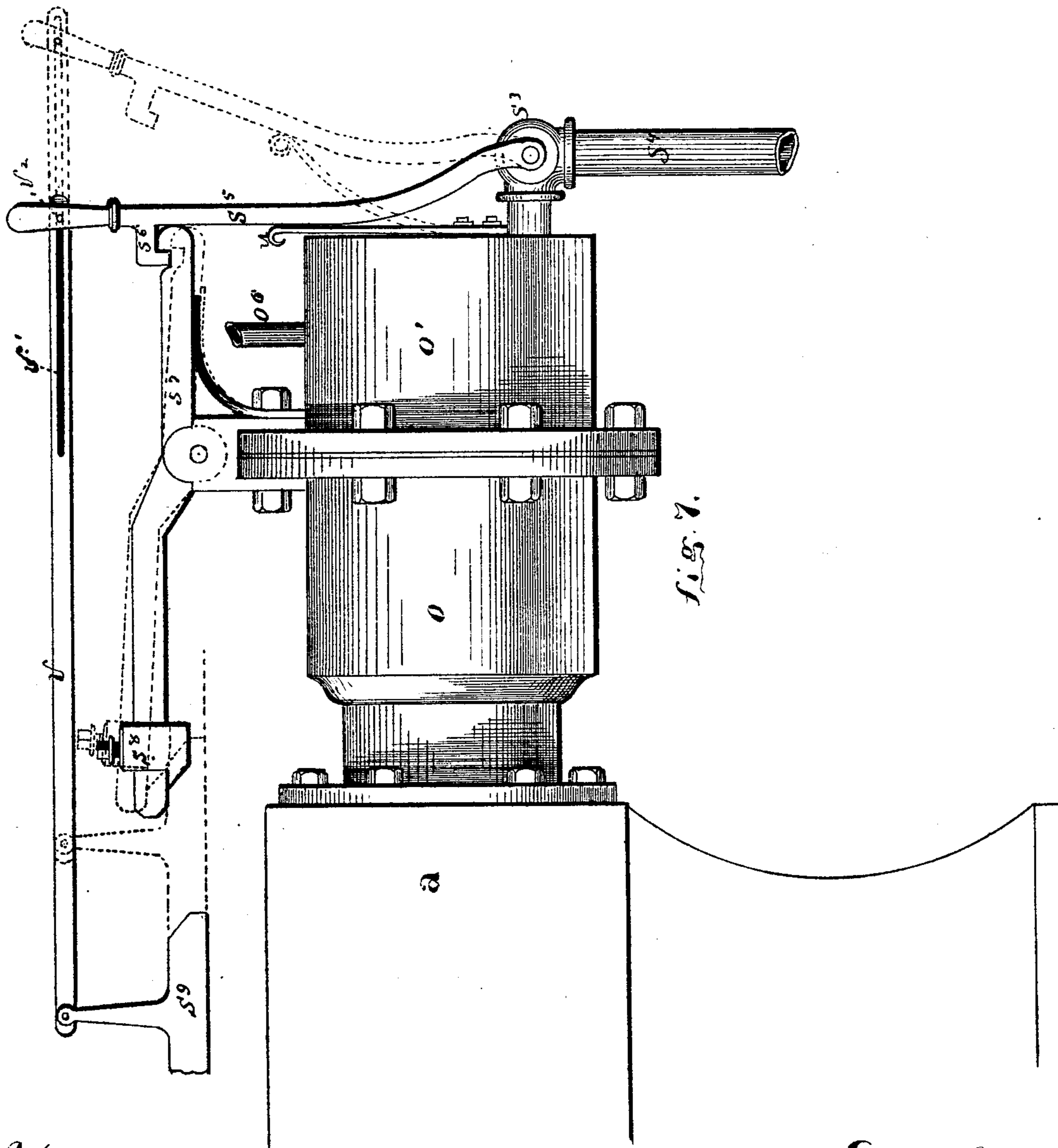
John T. Lott
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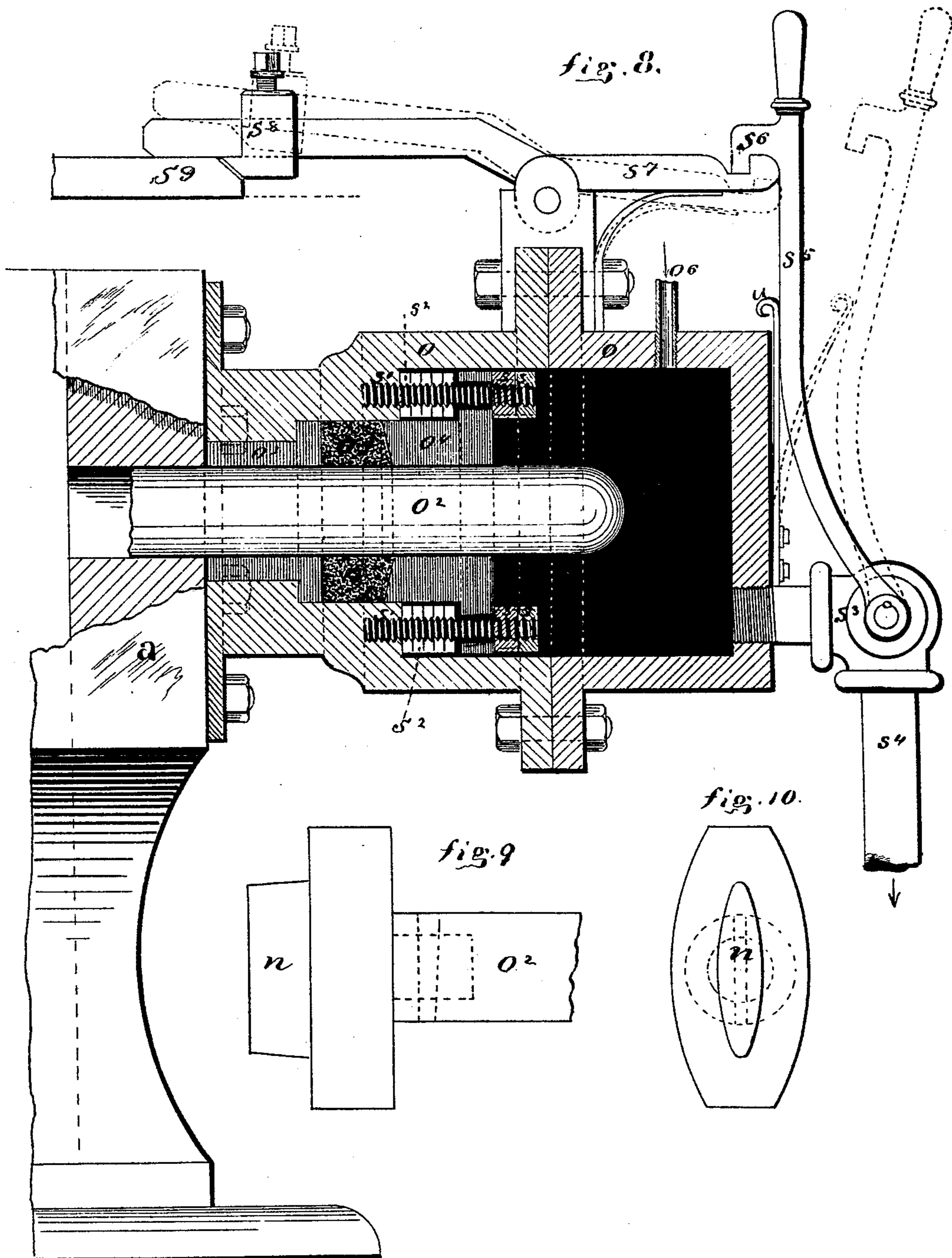
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UNITED STATES PATENT OFFICE.

LUKE CHAPMAN, OF COLLINSVILLE, CONNECTICUT, ASSIGNOR TO THE
COLLINS COMPANY, OF SAME PLACE.

IMPROVEMENT IN MACHINES FOR PUNCHING AND SWAGING METALS.

Specification forming part of Letters Patent No. 183,797, dated October 31, 1876; application filed
February 24, 1875.

To all whom it may concern:

Be it known that I, LUKE CHAPMAN, of Collinsville, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in and pertaining to a Machine for Punching, Upsetting, and Forming Metals, of which the following is a specification, reference being had to the accompanying drawings, where—

Figure 1 is a side elevation of a machine embodying my said improvements. Fig. 2 is a top view of the same. Fig. 3 is a view of the same in central vertical longitudinal section. Fig. 4 is a top view of the same, with the two top plates removed. Fig. 5 is a view of the same machine in cross-section, on the plane $x x$, looking in the direction indicated by the arrow x' , with the movable die-bed removed. Fig. 6 is a detail bottom view of the movable die-bed. Fig. 7 is a detail side view or elevation, on an enlarged scale, of the apparatus for holding the resisting or abutting punch to work, and, at the proper time, suddenly releasing it. Fig. 8 is a view of the apparatus shown in Fig. 7, in vertical central longitudinal section. Fig. 9 is a detail side view of the resisting or abutting punch made use of in applying the machine to the manufacture of elongated eyes for pickaxes. Fig. 10 is a front or face view of the punch shown in Fig. 9.

This machine is applicable to punching, upsetting, and forming purposes generally. It has already found practical application in the upsetting of wrench-heads, and the punching and forming of eyes for pickaxes and other similar articles in the process of their manufacture.

I will describe its operation, in this specification, as applied to the formation of an elongated eye for a pickax.

The letter a denotes the body of the machine, cast all in one piece for the purpose of giving great solidity and strength. Near one end, which I will call the rear end, is hung the main shaft b , its journal-boxes b^1 set into the body. This shaft b bears a crank, b^2 , from which the pitman b^3 runs to the cross-head c , and, as the crank-shaft b is allowed to revolve constantly, this cross-head c reciprocates con-

stantly on the ways c^1 , cast to the inside of the body a . In front of the cross-head c is another cross head, d , which reciprocates, at proper times, on the ways d^1 , cast to the inside of the body a . The top plates $a^1 a^2$ serve to keep these cross-heads down upon their ways, the top plates being screwed or bolted to the body a . A piston, c^2 , fastened to the cross-head c by keys $c^3 c^3$, projects forward and into a correspondingly-shaped orifice in the front cross-head d . In the front cross-head is a vertical mortise or slot, d^2 , and the key d^3 , driven into and through the piston c^2 , has some play in this slot; but when the rearmost cross-head moves back toward the rear this key strikes against the back of this slot and pulls the front cross-head back with it, where it remains till a lock-latch (which I will shortly describe) is thrown into mesh, and meanwhile the key d^3 plays back and forth in the slot d^2 .

The front cross-head is caused to move to the front, when desired, as follows: To the rear of the foremost cross-head is pivoted the pawl e , which, when permitted, will fall, by gravity or by spring-pressure, between the two cross-heads, so that the next forward movement of the rearmost cross-head will carry the foremost cross-head with it. To the top of the pawl e is pivoted the latch e^1 , riding the cam-shaft e^2 , and having underneath the set-notch e^3 . When the two cross-heads move back together the set-notch e^3 strikes the stop-bar e^4 , and so causes the pawl e to lift so that the next forward movement of the rearmost cross-head will not carry the foremost cross-head with it.

When the operator desires to throw the pawl e in mesh, and thus cause the foremost cross-head to make a movement toward the front, he pushes backward upon the rod f , the rear end of which is connected to the crank-arm f' , rigid upon the cam-shaft e^2 , and thus causes the cam on this shaft to lift the latch e^1 till the set-notch e^3 disengages from the stop-bar e^4 , thus permitting the pawl e to fall, and, as soon as the rearmost cross-head has moved rearward far enough, the pawl will fall in between the two cross-heads, so that the next forward movement of the rearmost cross-head will carry the foremost cross-head

with it. On the return movement the pawl *e* is raised and disengaged from the rearmost cross-head, as hereinbefore described. The rod *f* can be readily adapted to be operated by the operator's foot, if desired.

At the front of the machine, and inside the body thereof, is the stationary die-bed, having the horizontal part *g* and the vertical part *g*¹, the whole resting on the web *g*², cast to the body *a*. In the vertical part of this die-bed is a die-seat—a dovetail-mortise—into which slips the stationary die *h*. The letter *h*¹ denotes the movable die, held in a similar die-seat in the movable die-bed *h*², which has a lateral or transverse back-and-forth motion to open and close the dies, this motion being confined between the inside front of the body *a* and the way *g*³, this movable die-bed resting upon and traveling upon the horizontal part of the stationary die-bed.

The forward or closing motion of this movable die-bed is given by the double cam *h*³ attached to and moved by the foremost cross-head, so that these dies are closed by the forward movement of the foremost cross-head. The double cam *h*³ acts upon corresponding double cam *h*⁴, which forms the back of the movable die-bed, and both the double cams are so shaped that the forward movement of the cam *h*³ can continue after the dies are closed, without closing or pressing them still closer together, but the dies are held thus closed meanwhile. The purpose of this arrangement is that the dies may be properly closed upon the iron or steel to be manipulated before the punch, shortly to be described, commences its work. The opening or rearward movement of the movable die-bed is given by the pins *i*, covered with friction-rolls, borne on the bar *i*¹, projecting from the foremost cross-head, which pins *i* project into the oblique grooves *i*² in the bottom of the movable die-bed. The two dies are duplicates as to their faces. Each contains the horizontal groove *m*, for the passage and action of the punches, and the vertical groove *m*¹, wherein the bar to be manipulated is grasped. To describe the shape and contour of the faces of these dies in detail is not necessary here, for no claim upon them is to be made in this specification. Suffice it to say, that the properly-heated bar of which to make a pick-ax is grasped in the vertical grooves as the machine is thrown into operation, and the punch *m*², projecting from a dovetail seat in the foremost cross-head, comes forward and punches a hole for an eye. But the punch *m*² is not the only punch. The letter *n* denotes what I will term the resisting-punch, which may be set or adjusted so as to interrupt the advancing metal, moving before the action of the punch *m*², at any desired point, and prevent the metal from moving forward too far, and thereby cause it flow to the sides and fill out the shape of the dies. And this resisting-punch can be released at any desired moment, so that it will freely retreat before the ad-

vancing punch *m*², or its release may be so graduated that it will retreat with a certain steady motion.

To the front end of the body *a* is secured the water-container, composed of two parts, *o* *o*¹, flanged and bolted together. The stem *o*² of the resisting-punch runs into the water-space in this water-container, through the packing metal glands *o*³ and *o*⁴, and through the rubber or other packing *o*⁵ between the two glands; and the rear end of the stem *o*² is, by preference, rounded, as shown in the drawing. The gland *o*⁴ is held down upon the rubber packing by the check-nuts *s* on the body-screws *s*¹, the washers *s*² preventing the pressure of the water from forcing the gland *o*⁴ down too hard upon the rubber packing. The water-space in the water-container is filled with water through the pipe *o*⁶ connecting with a compressor, which maintains a regulated pressure upon the water when it is not allowed to escape. The water in the water-container, being incompressible, will hold the resisting-punch against any strain until some water is permitted to escape. The letter *s*³ denotes the escape-valve in the escape-pipe *s*⁴, from which extends the operating-lever *s*⁵, having a set-hook, *s*⁶, into which the pivoted latch-lever *s*⁷ shuts, and thus holds the escape-valve closed. On the opposite end of the lever *s*⁷ is a cam, *s*⁸, which can be set at any desired point on the lever, so as to adjust it for opening the escape-pipe at different times. At the desired and set time the cam *s*⁹ attached to the foremost cross-head lifts the cam *s*⁸, tripping the lever *s*⁵, and permitting the spring *u* so to open the escape-valve suddenly, and thereby suddenly release the resisting-punch. The distance to which the valve opens may be regulated, and then the resisting-punch will not be released all at once, but gradually and with a graduated receding motion. The rod *v*, pivoted at one end to the cam *s*⁹, has, at the other end, a slot, *v*¹, and thereby hangs on the pin *v*² projecting from the side of the lever *s*⁵, and when the foremost cross-head moves to the rear it brings up the lever *s*⁵, closing the valve, and the set-hook *s*⁶ catching on the end of the latch-lever *s*⁷, the valve is held closed till again tripped.

It will be seen from this description that this machine has the power to exert great pressure upon the stock to be manipulated, both longitudinally and transversely, and by making use of forming-dies or punches in connection with either or both of the motions, metal may be formed, punched, and pressed in a great variety of ways.

So far as the fluid resistant is concerned, it may be made to support a die as well as a punch. Instead of having the operation of the escape-valve made automatic, the latch-lever *s*⁷ may be taken off and the lever *s*⁵ operated by hand.

I claim as my invention—

1. The combination of the cross-head *c*, the cross-head *d*, pawl *e*, latch *e*¹, cam-shaft *e*², and

stop-bar e^4 , all constructed, arranged, and operating substantially as shown and described.

2. The combination of the movable slotted die-bed h^2 , having cams h^4 , and bar i^1 , having pins i , with the cross-head d and double cams h^3 , constructed and operating substantially as described.

3. The combination of the water-container o o^1 , the escape - valve s^3 , lever s^5 , and latch-lever s^7 , all substantially as shown and described.

4. The hydraulic resisting-punch n , in com-

bination with the water-container o o^1 , and automatic valve - operating mechanism, and the punch m^2 , substantially as shown and described.

5. The combination of the water-container o o^1 , escape - valve s^3 , lever s^5 , latch - lever s^7 , cam s^8 , and cam s^9 , all substantially as shown and described.

LUKE CHAPMAN.

Witnesses:

WM. EDGAR SIMONDS.

GEORGE E. NOLAN.