

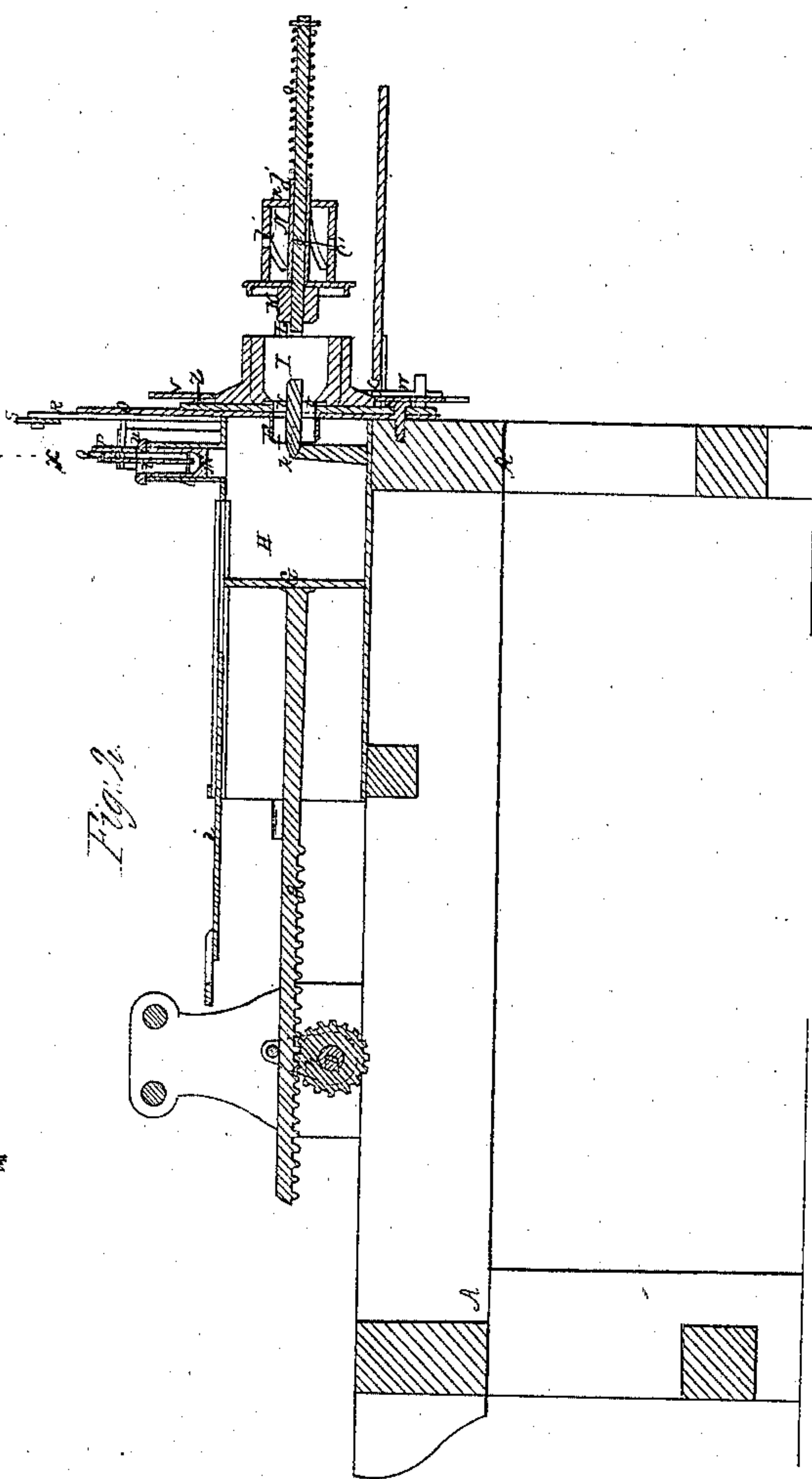
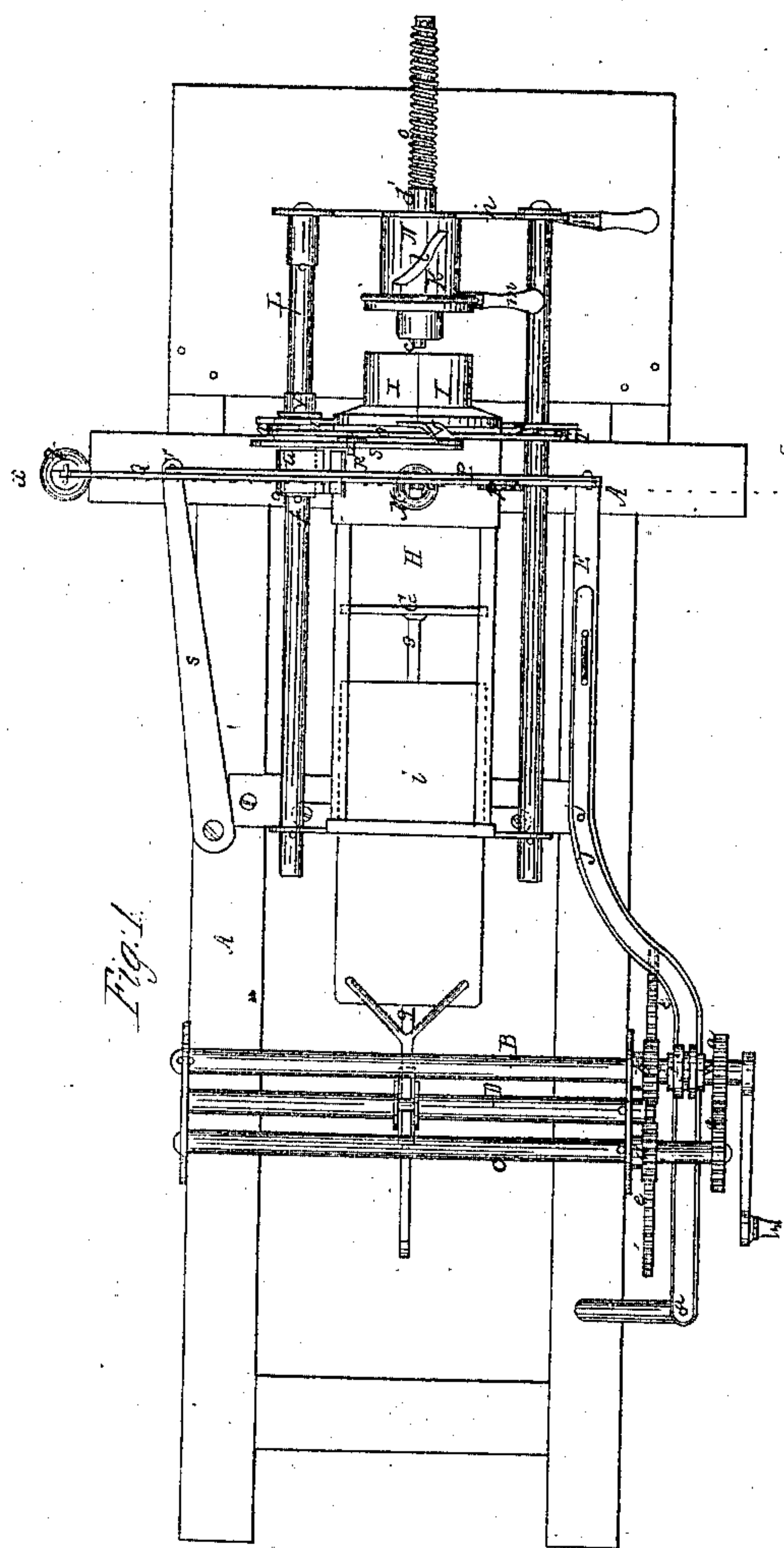
C. P. S. Wardwell,

Sheet 1-2, Sheets.

Tile Machine,

No 17,125,

Patented Apr. 21, 1857.



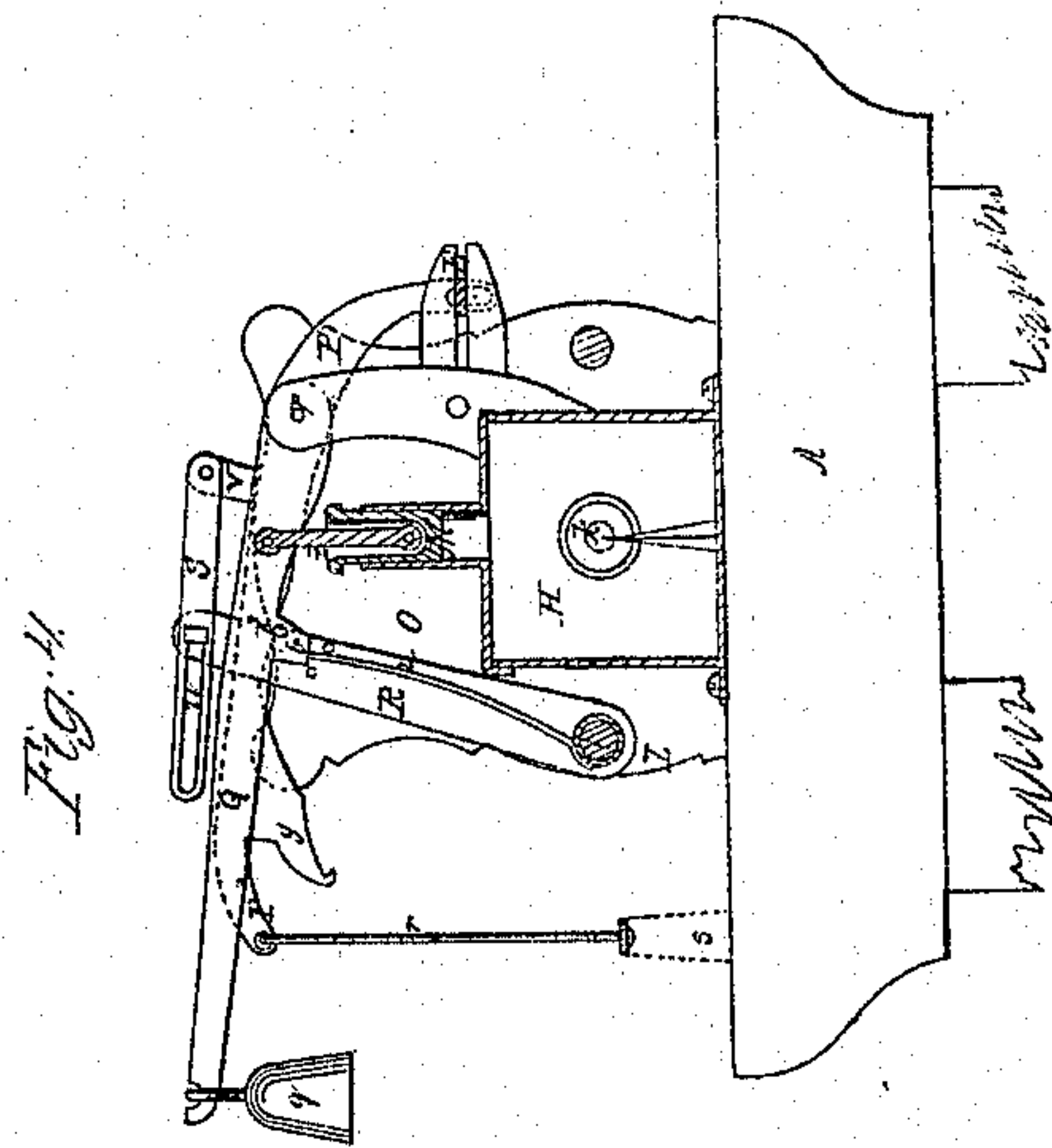
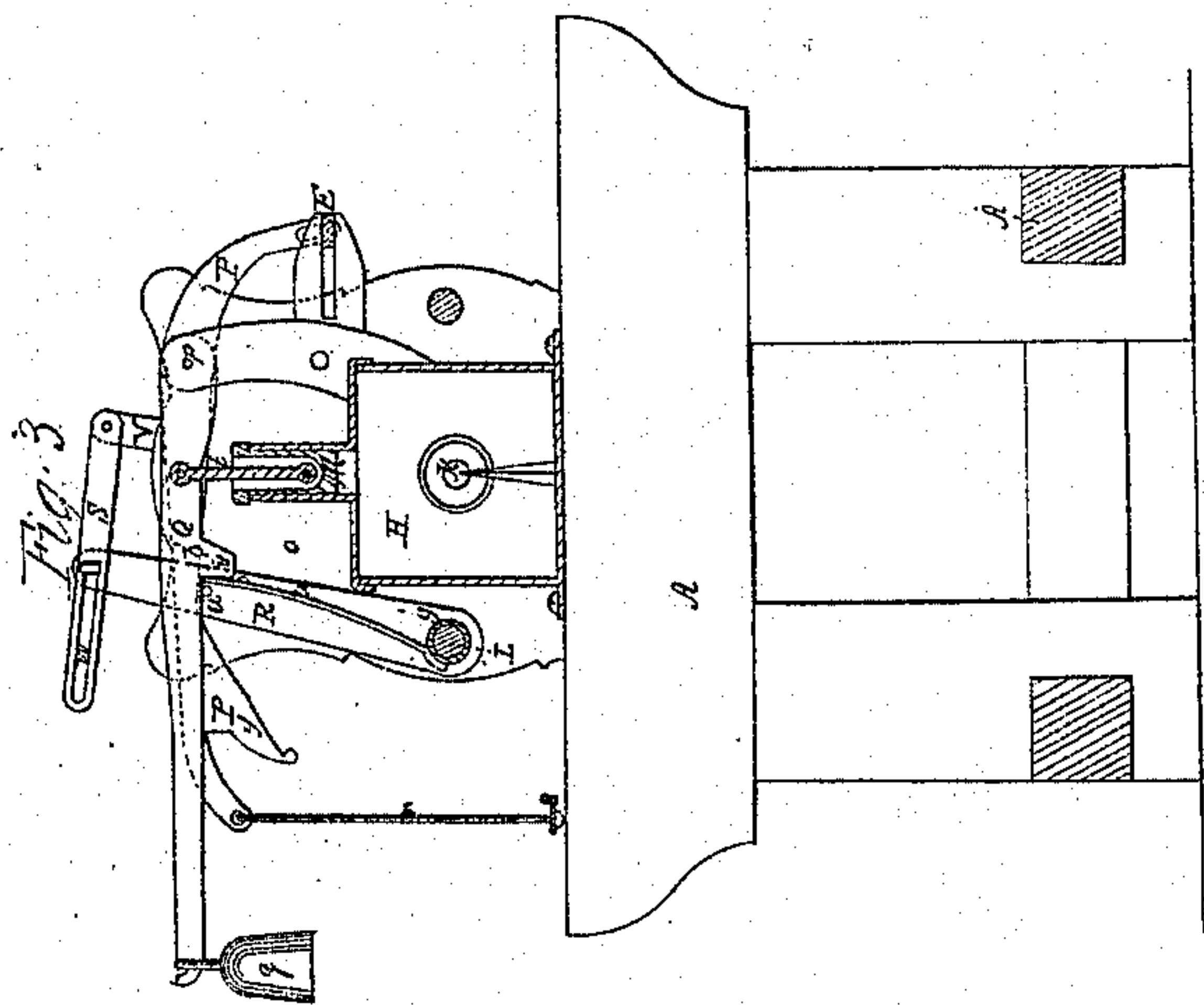
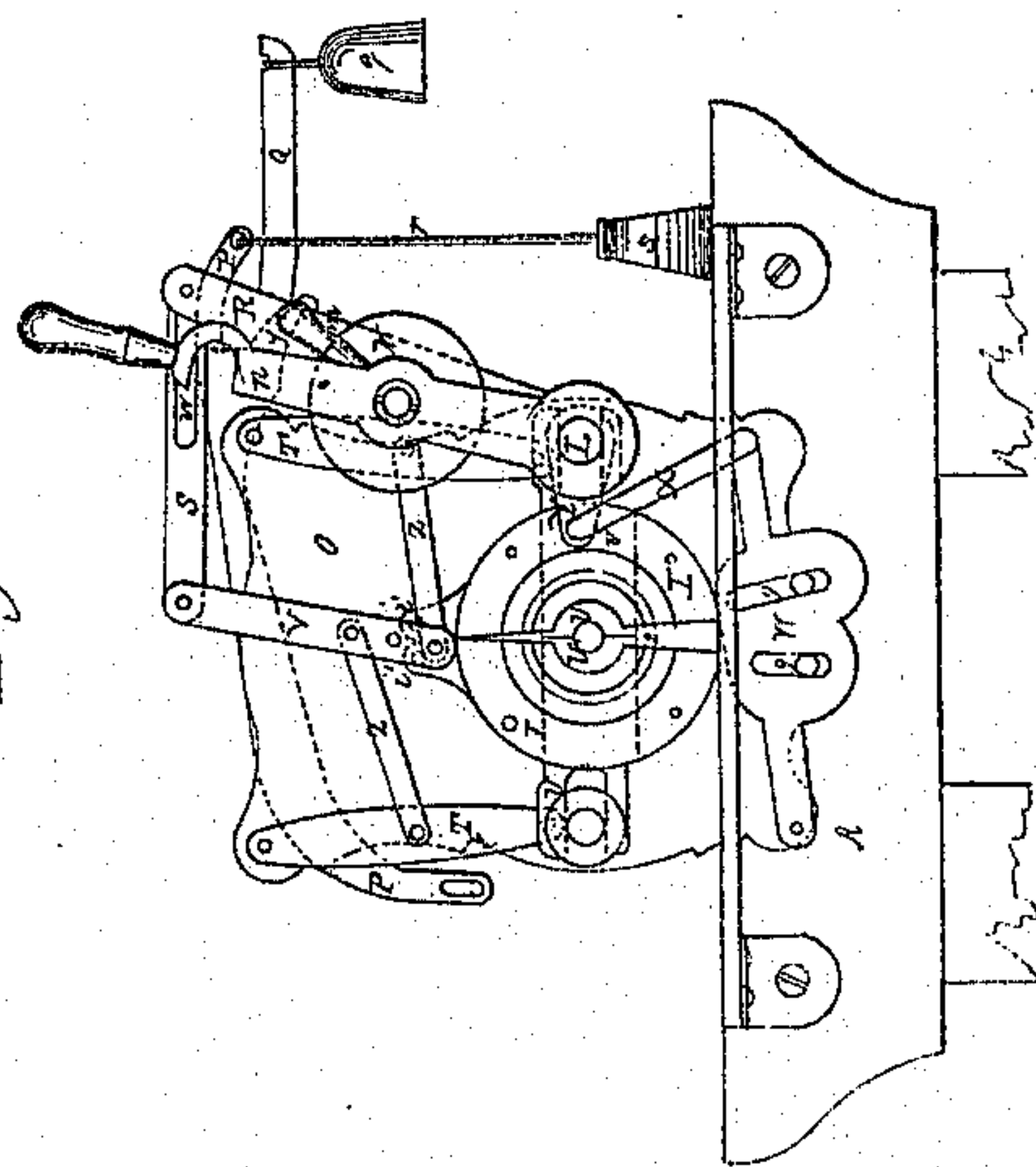
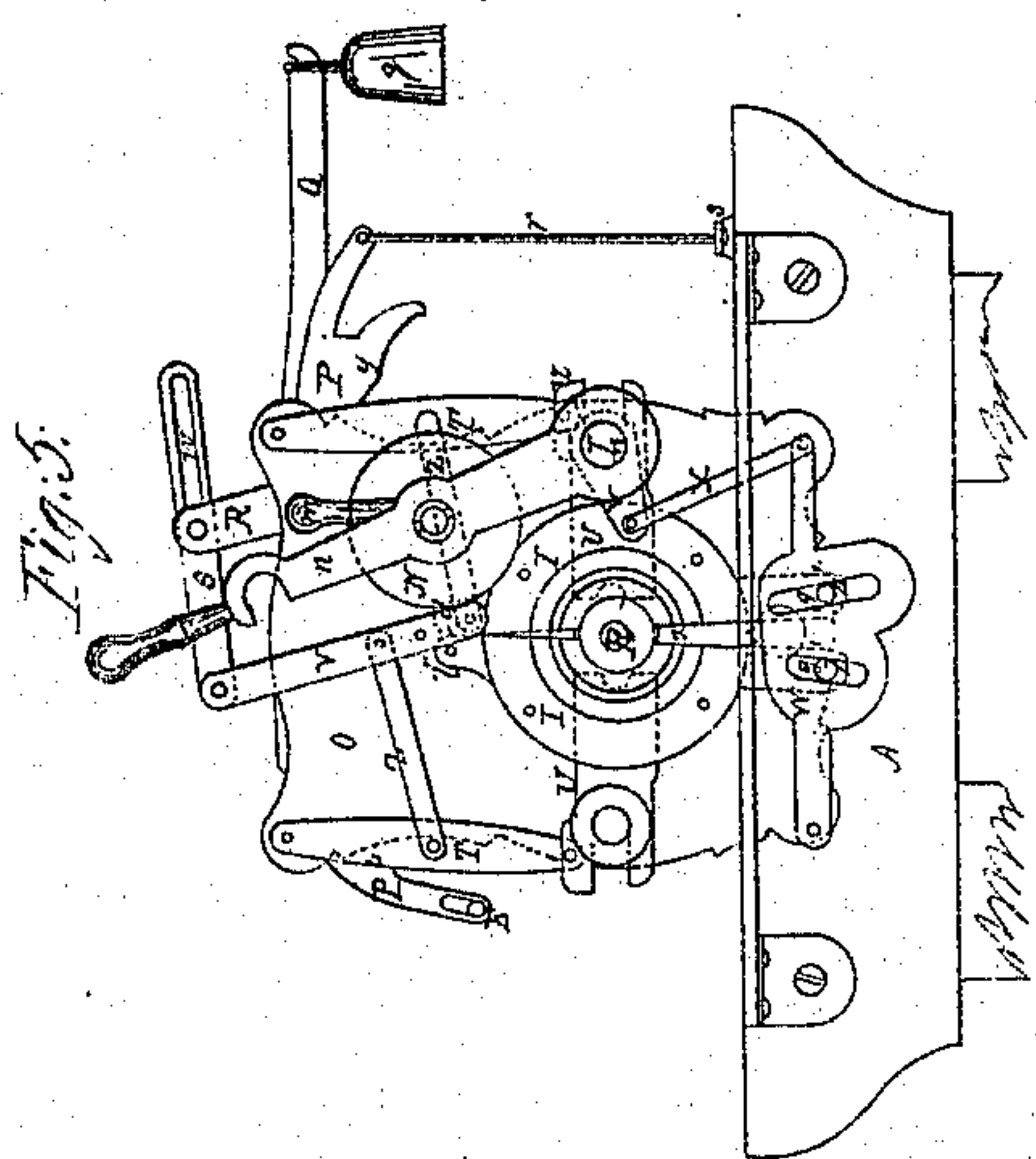
Sheet 2 of 2 Sheets.

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UNITED STATES PATENT OFFICE.

CHARLES P. S. WARDWELL OF LAKE VILLAGE, NEW HAMPSHIRE.

MACHINE FOR FORMING CLAY PIPES, &c.

Specification of Letters Patent No. 17,125, dated April 21, 1857.

To all whom it may concern:

Be it known that I, CHARLES P. S. WARDWELL, of Lake Village, in the county of Belknap and State of New Hampshire, have invented a new and useful Machine for Molding Clay Pipes, Tiles, &c.; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification, Figure 1 being a plan of the machine; Fig. 2, a longitudinal vertical section thereof in the central plane; Fig. 3, a transverse vertical section of the same in the plane $x x$, Fig. 1, showing parts of the machine in certain positions; Fig. 4, a similar section showing some of the parts in different positions; Fig. 5, an end elevation of the machine, showing some of its parts in other positions; Fig. 6, a similar view showing some parts in still different positions.

Like letters designate corresponding parts in all the figures.

The clay having been prepared, is placed in a strong box, or receptacle, H, the top of which is then pushed in, to tightly inclose it on every side. At one end of the receptacle the only outlet is through the tube F, which shapes the body of the pipes. The other end may be open, but is provided with a piston G, by which the clay is forced through the machine. The proper motions are communicated to this piston, by means of a rack g , into which gears a pinion h , situated on a shaft D. On one end of said shaft, is a cog-wheel e , into which gear two pinions b , and d , one situated on the driving shaft B, and the other, on the reversing shaft C. The pinion b , turns freely upon its shaft; and in a similar manner, turns another pinion a , upon the same shaft. The pinion d , is fast upon its shaft; and also another pinion c , which is situated on the same shaft, and gears into the loose pinion a , on the driving shaft. A clutch f , slides between the loose pinions a , b , on the driving shaft B, and by being moved into contact with either pinion, thereby couples it to the shaft. With the above described arrangement, when the pinion a , is coupled to the shaft B, the piston G, is moved forward; but when the pinion b , is coupled to the shaft, the piston is moved backward. When the clutch f , is half way between the two pinions, neither is coupled to the shaft,

which then turns without moving the piston in either direction.

A lever J, pivoted on a fulcrum a , is provided with a suitable projection, which enters a groove between two flanges on the periphery of the clutch f . Immediately under this lever, is another lever E, of similar form, and pivoted on the same fulcrum a . The lever J, is coupled to the lower lever E, by a pin j , on its lower side, fitting into a hole, or slot, in said lower lever, or by any other similar means. The object of two levers, is to allow the motion of the piston G, to be controlled by hand, distinct from the regular motion of the machine, when required, by simply uncoupling the upper lever J, from the lower lever, and thus uncoupling either pinion a , or b , from, or coupling either to, the shaft. And then, when it is required to have the piston governed by the movements of the machine itself, the said lever J, is coupled to the other lever E, which is controlled by the successive motions of the machine, in the manner now to be described. The movable end of said lever E, is jointed to one end of a vibratory lever P, which is pivoted to a standard at p . The long arm of the lever P, is held down in a horizontal position by a rod r , and spring s , or their equivalents; and while it is thus situated, the lever E, is held in the proper position to couple the pinion a , to its shaft, and thus cause the piston G, to move forward. In this condition the machine commences its movements after a charge of clay is placed in the receptacle H. The first motion of the piston G, forces the clay into the shaping tube F, and die I, and compresses the clay into a compact state. This pressure against the clay, which has a pastry, or semi-fluid, consistence, causes a small piston M, situated in a vertical tube on the top of the receptacle, to rise. The piston is connected by a rod t , with a horizontal lever Q, which is pivoted at one end to the fulcrum p , on which the lever P, moves. The other end of the lever Q, is held down by a poise q , or its equivalent, of sufficient weight, or force, to cause the desired degree of pressure to be given to the clay before the piston M, will be raised.

The long arm of the lever P, rests on a pin b' , projecting from the lever Q, so that when the latter lever is raised by the pressure of the clay against the piston M, the

lever P, is also raised, and consequently the lever E, is moved horizontally a distance proportional to the rise of the long arm of said lever P. As soon as the levers P and Q, are thus raised far enough to uncouple the clutch *f*, from the pinion *a*, a prop *u*, which is secured to a collar *g'*, on a rock-shaft L, springs under a shoulder or projection *v*, on the under side of the lever Q, and sustains both levers in that position, as seen in Fig. 4. The motion of the piston G, is thereby suspended till the formation of the joint-head for the end of the pipe, is completed in the following manner: The counter die is composed of two halves I, I, joined longitudinally; and into this sufficient clay to form the joint-head, is driven before the piston M, is lifted. The movable die K, is situated upon a shaft *c'*, which is allowed both to turn, and slide lengthwise in a bearing *d'*. An arm *n*, is secured to the rock-shaft L, so that it can be laid in a horizontal position, as seen in Fig. 1, or be raised up to other positions as shown in Figs. 5 and 6. The bearing *d'*, is attached to said arm *n*, in such a position that when the arm is resting horizontally, the center of the die shaft *c'*, will coincide with the central line, or axis, of the pipe to be formed. The die K, has a spiral, or wedge, face *l*, on its outer end, which fits against a cam N, of corresponding shape, on the arm *n*. The die is also provided with a handle *m*, by which it can be turned with its shaft *c'*. When the die is at rest, a coiled spring *o*, holds it back against the cam N; but when it is required to form the joint-head on the end of a pipe, the die is turned upon its axis by the handle *m*. By this movement, the cam N is made to force the die forward into the counter die I, I, and thus shape the joint-head of the pipe, while the piston G, moves forward as above described; after which the handle *m*, is let go, and the spring *o*, immediately withdraws said die K. The arm *n*, is then raised to the position shown in Fig. 5, and thus lifts the die K, with its fixtures, away from the position, where the pipe is to issue from the machine. This motion of the arm *n*, turns the rock-shaft L, upon its axis, till a pin *f'* thereon strikes a notch, or shoulder, on the collar *g'*, to which the prop *u*, is secured. Said prop is thus moved from under the projection *v*, on the under side of the lever Q; and since the mouth of the machine is, at this time, left open by the withdrawal of the die K, the pressure against the piston M, is removed and the levers Q and P, immediately fall back to their original positions. This movement again couples the pinion *a*, to its shaft, and starts the piston G, forward again, to form the body of the pipe and force it from the machine.

65 The movement of the rock-shaft L, pro-

duced by raising the arm *n*, as above described, by means of a projecting arm Y, attached to said rock-shaft, and a connecting rod X, lifts one end of a lever W, as represented in Fig. 5. Said lever is provided with two slots *g*, *g*, diverging downward, as shown; in which slots fit two pins *h'*, *h'*, projecting respectively from the lower extremities of the half-dies I, I. The upper extremities of these half-dies are hinged at *i'*, *i'*, to the standard O, of the machine, as shown in Figs. 5 and 6. Hence, the lifting of the lever W, separates the half-dies I, I, leaving an open space *z*, between them. The object of this is to remove the dies from contact with the pipe, and thereby permit it to be driven out more freely. It also obviates the liability to break, or deform the joint-head when starting from the dies.

A core K, (Fig. 2,) situated in the center of the die tube F, as represented, forms the aperture of the pipe, in the ordinary manner.

The pipe, as fast as it is formed and driven from the machine, is received in a suitable trough, to be conveyed away. As soon as it has become of the proper length, the arm *n*, is carried over to the position shown in Fig. 6, and thus turns the rock-shaft L, still farther. This last movement carries an arm R, attached to the roller or sleeve *g'*, above described, over to the position shown in Fig. 6. A pin secured to the upper end of said arm R, moves in a slot *w*, formed in a rod S. The first motion of the arm causes another pin *a'* projecting therefrom, to strike a cam *y*, on the lower side of the lever P, and lifts said lever far enough to uncouple the pinion *a*, from its shaft, and thus stop the motion of the piston G. While accomplishing this, the upper pin of said arm R, moves in the slot *w*; but as soon as the piston G, is stopped, the arm draws upon the rod S, the other end of which is jointed to a vibratory lever V. To this lever, at equal distances from opposite sides of its fulcrum, are hinged two connecting rods Z, Z, the other ends of which are hinged to arms T, T, as seen in Figs. 5 and 6. The upper ends of these arms are hinged to the standard O, and the lower ends, to the sliding knife plates U, U. With this arrangement, when the arm R draws upon the rod S, as above described, the knives U, U, which slide in slots between the die tube F, and the half dies I, I, are forced together and cut the pipe off, ready to be removed. The arm *n*, is then brought down to a horizontal position, which movement separates the knives U, U, again, so as not to interfere with the formation of the pipes, and brings the lever P, back to its horizontal position so as to start forward the piston G again, and commence the formation of an-

other pipe, as soon as the die K, is brought into the counter die I, I.

The movements of the die K, and arm *n*, are described above as being performed by hand; but they may be connected with the other parts of the machine, so as to render all their motions self-acting. A suitable contrivance may also be added, for reversing the motion of the piston G, at the termination of each stroke, by shifting the clutch from the pinion *a*, to the pinion *b*, and vice versa; and thus render the whole machine automatic. The whole machine is mounted in a suitable frame A, and driven by any power applied to the driving shaft B.

What I claim as my invention, is—

The arrangement and combination of the respective devices herein described, by

which the necessary and successive stoppings and startings of the piston G, are effected, by which the dies I, I, are opened and again closed, at the proper moments, and by which the knives U, U, are brought into action, when required, all by simply moving the lever *n*, up and back again, in connection with the pressure of the clay against the piston M, substantially as herein set forth.

The above specification of my improved machine for molding clay pipes, tiles, &c., signed by me this 18th day of October, 1856.

CHARLES P. S. WARDWELL.

Witnesses:

G. S. YOUNG,
JOSIAH F. ROBIN.