

F. M. Mattice, 4, Sheets, Sheet 1.

Tile Machine.

No. 104,615.

Patented June 21, 1870.

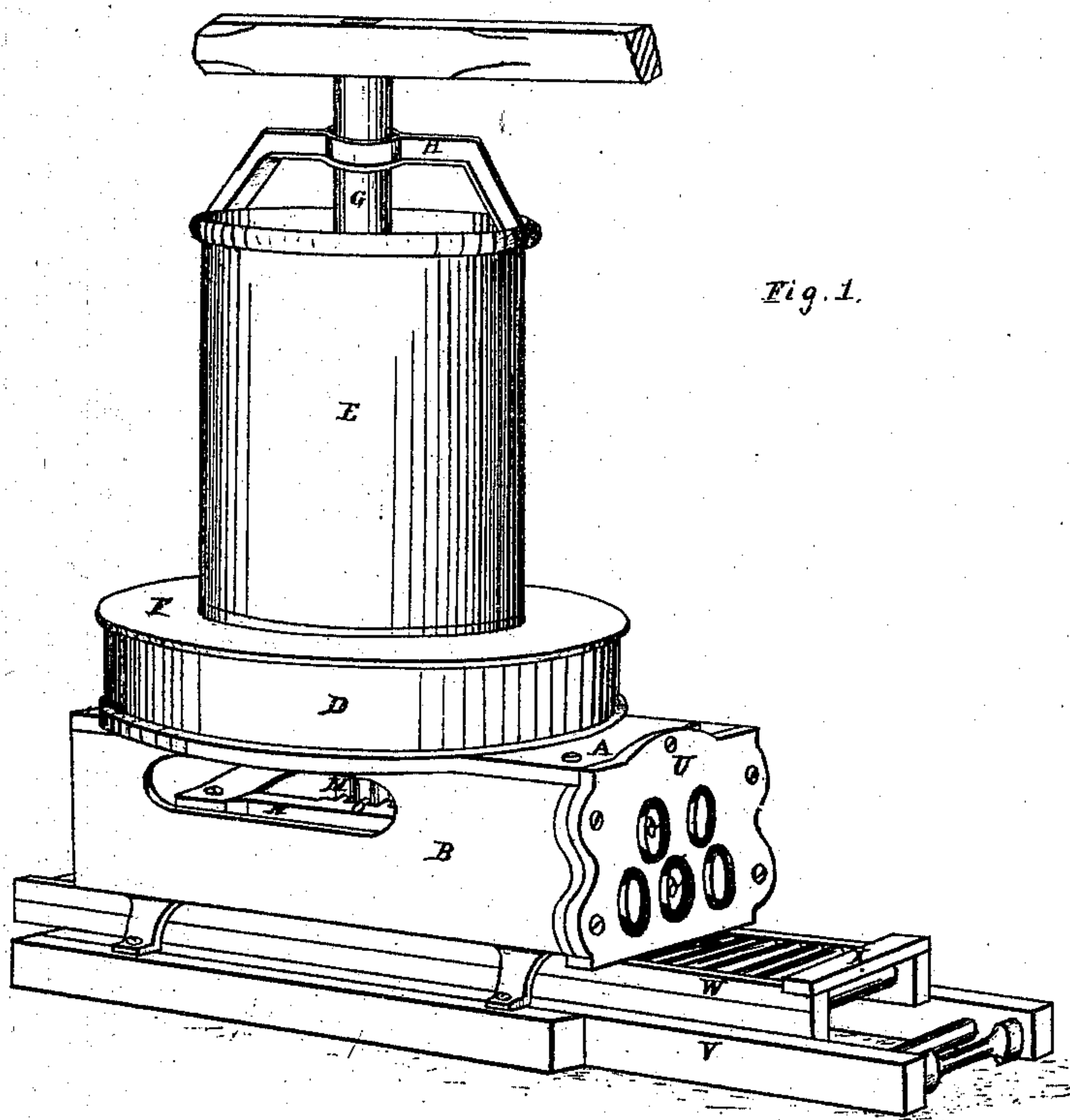
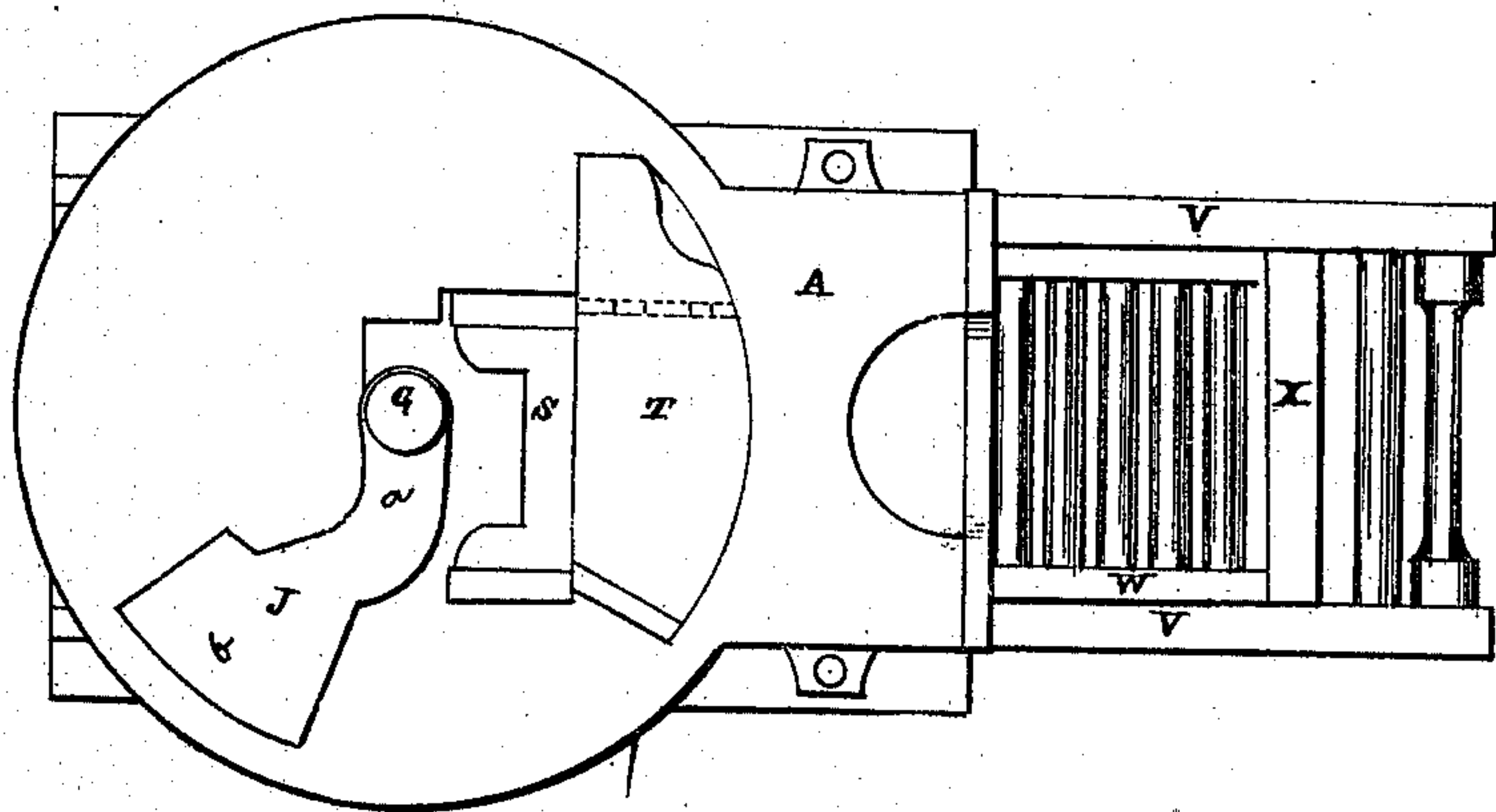


Fig. 1.

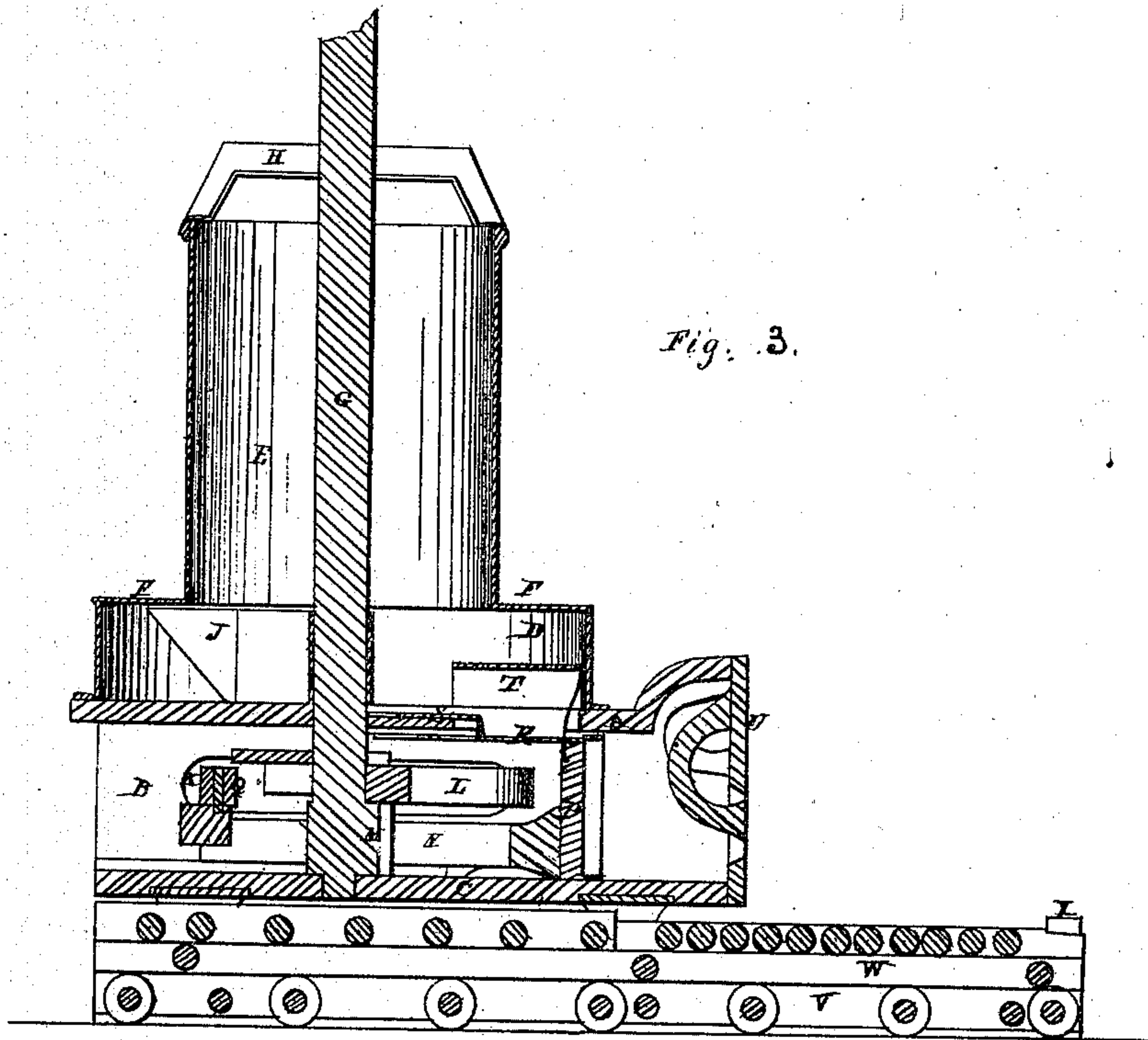
Fig. 2.



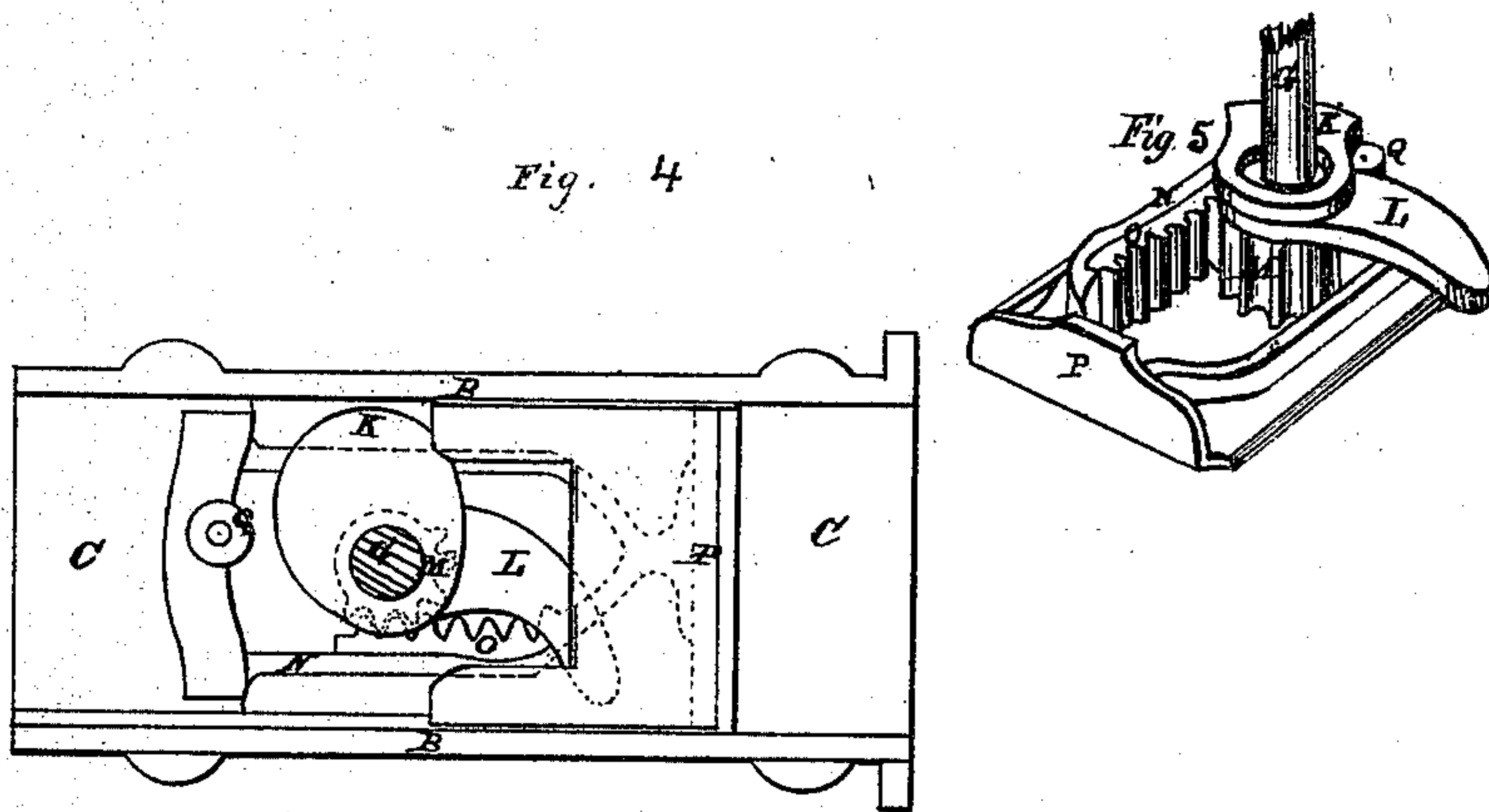
Witnesses  
Geo. W. Tibbitts  
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*F. M. Mattice,*  
*Tile Machine,*  
*No. 104,615.*      *Patented June 21, 1870.*



*Fig. 3.*



*Fig. 4*

*Fig 5*

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F. M. Mattice,

Tile Machine.

No. 104615.

Patented June 21. 1870.

Fig. 6.

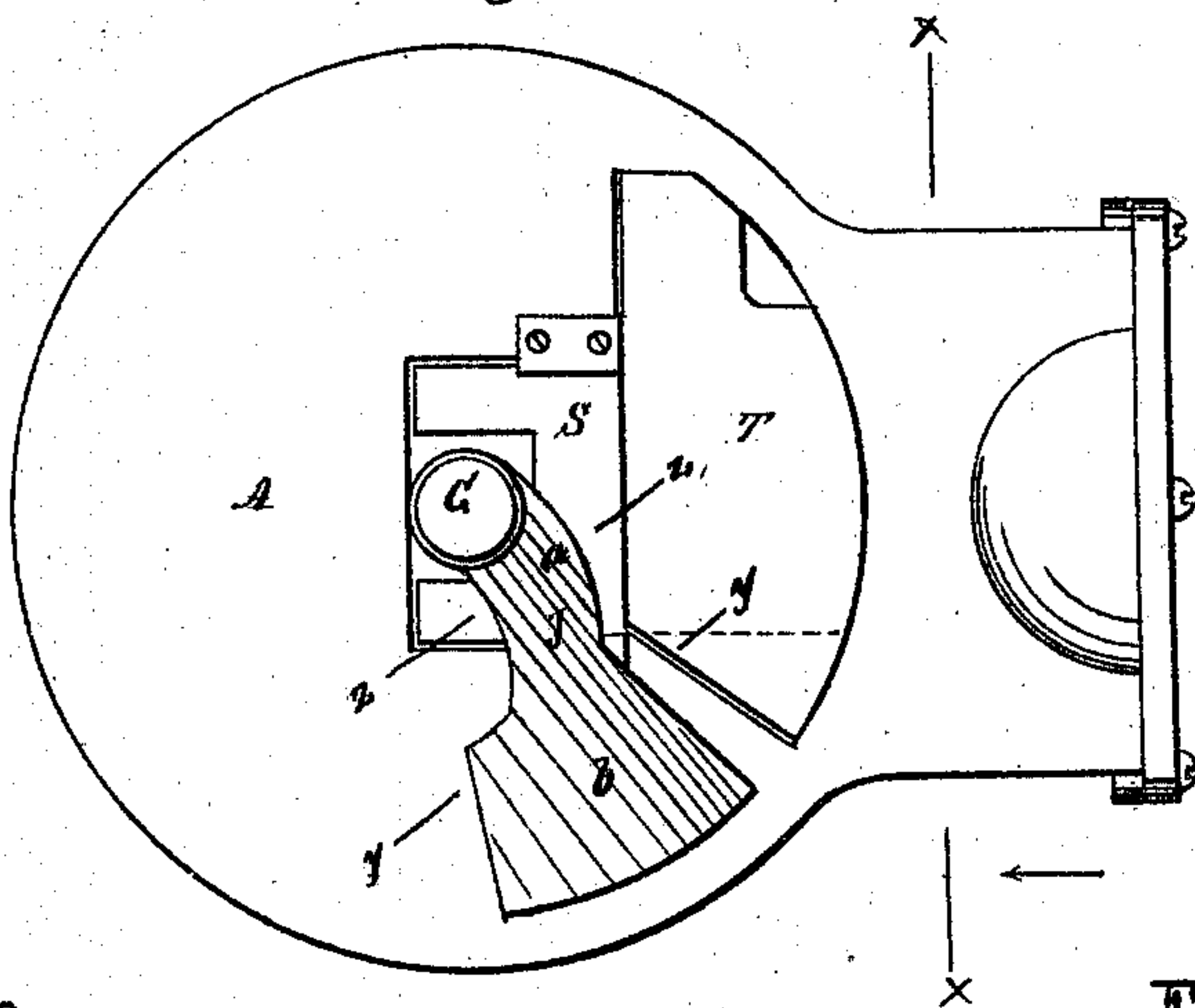


Fig. 8.

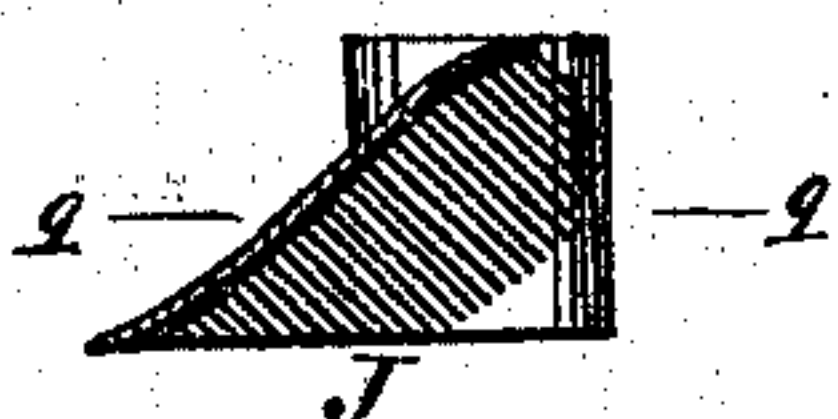


Fig. 7.

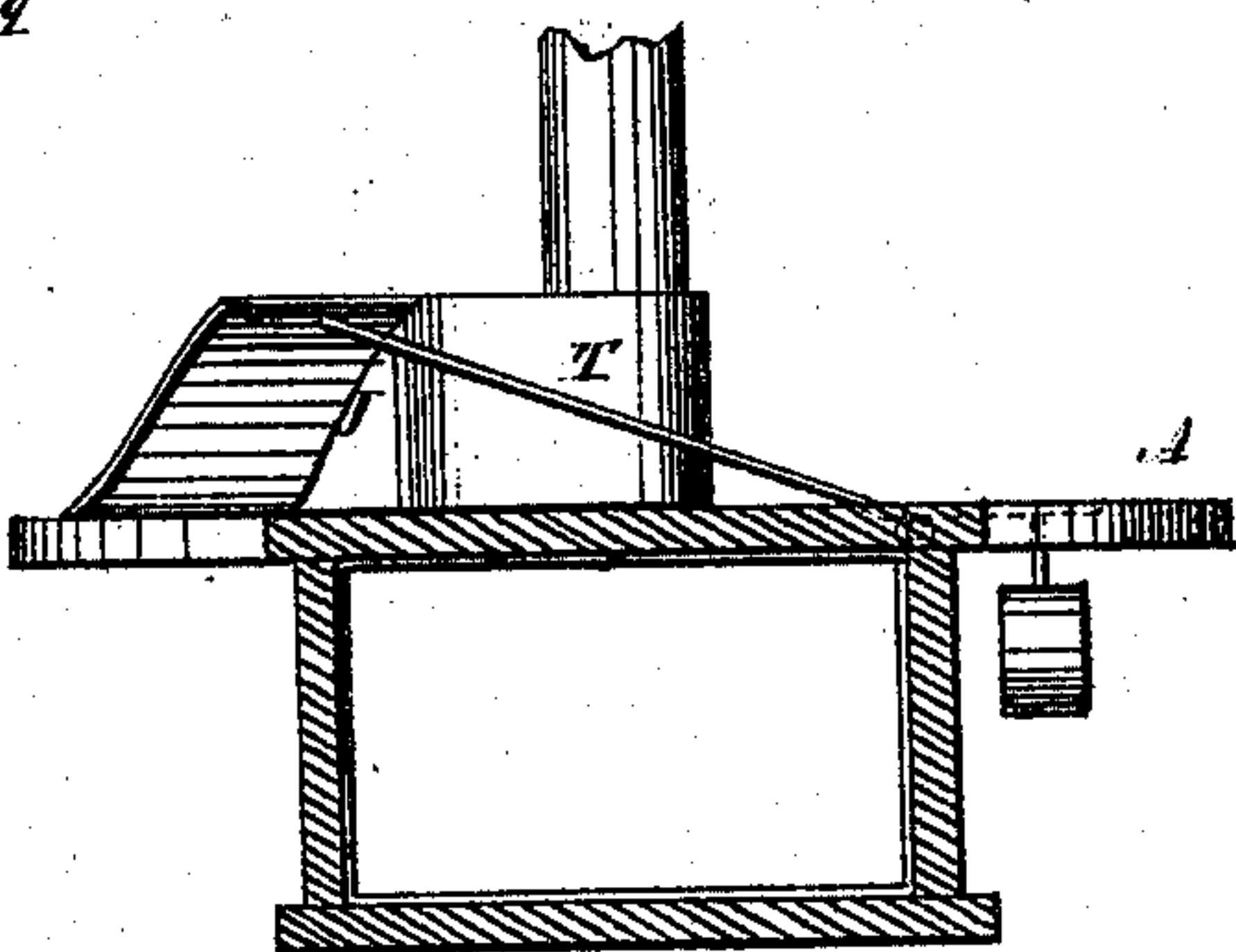
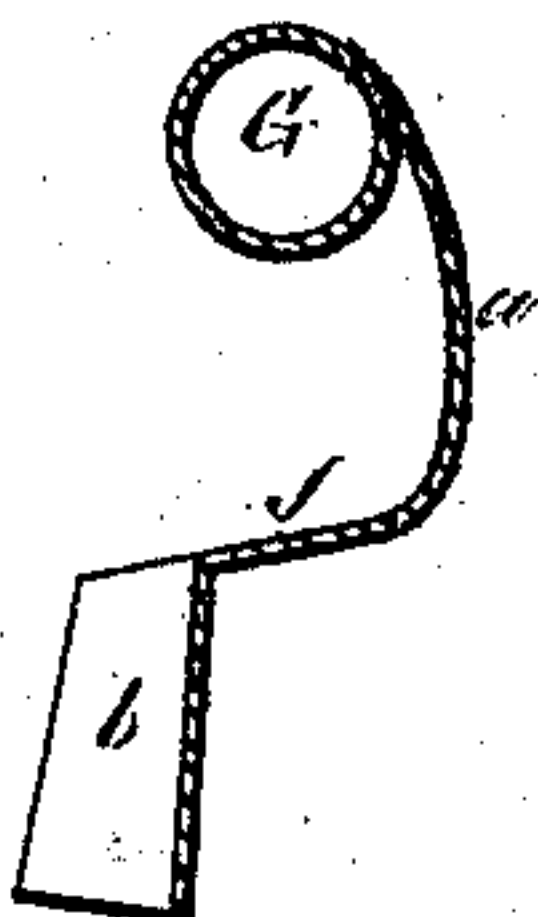


Fig. 9.



Fig. 10.



Witnesses.

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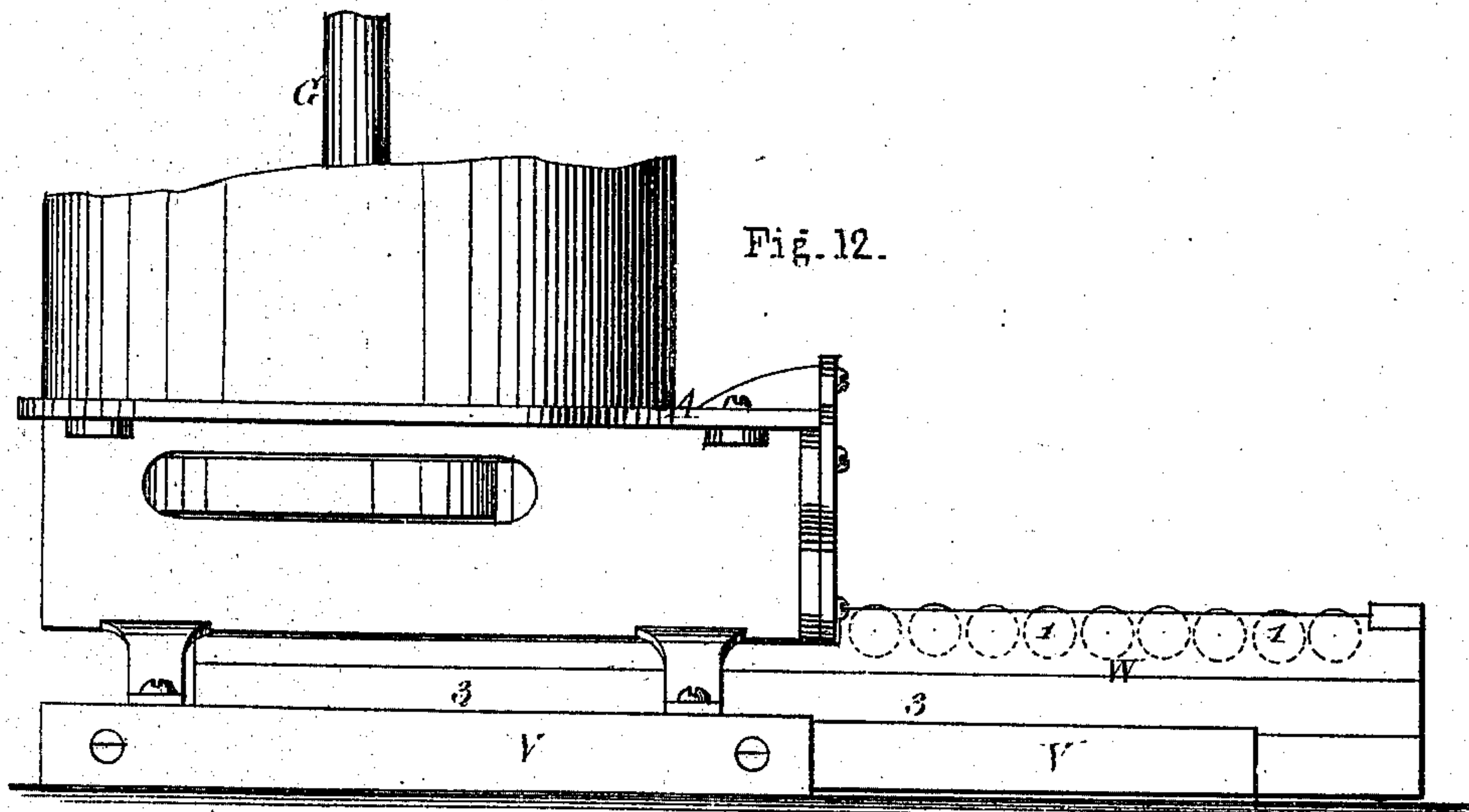
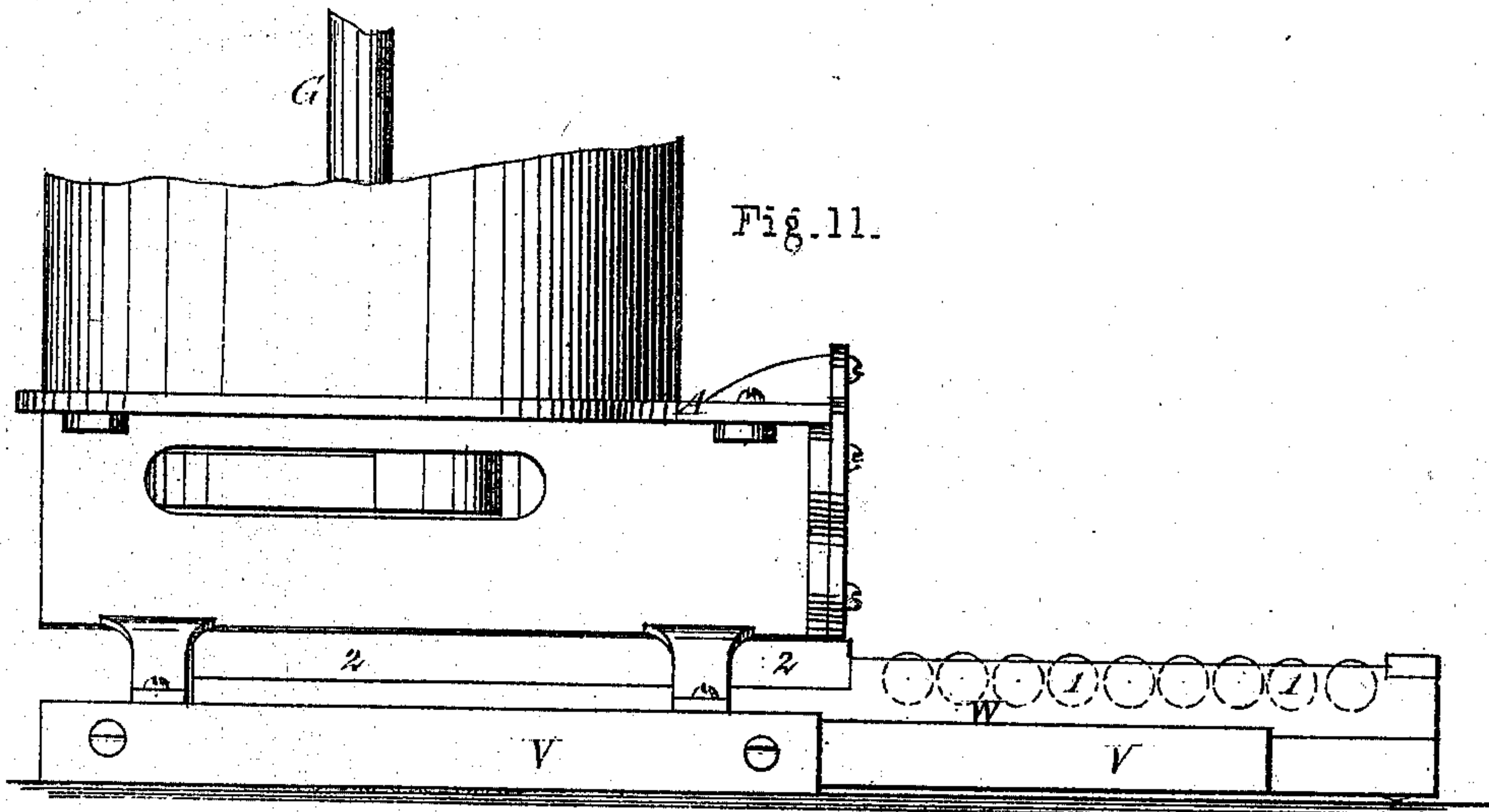
Attys

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Witnesses.

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*Fred. M. Mattice*  
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# UNITED STATES PATENT OFFICE.

FREDERICK M. MATTICE, OF CLEVELAND, OHIO.

## IMPROVEMENT IN DRAIN-TILE MACHINES.

Specification forming part of Letters Patent No. **104,615**, dated June 21, 1870.

I, FREDERICK M. MATTICE, of Cleveland, county of Cuyahoga, State of Ohio, have invented certain Improvements in Drain-Tile Machines, of which the following is a full description, reference being had to the accompanying drawing, and to the letters of reference marked thereon, in which drawing—

Figure 1 represents a perspective elevation of my machine, showing the front and one side of the same. Fig. 2 represents a plan view of the top of the same after the tub is removed. Fig. 3 represents a vertical longitudinal central section of my machine. Fig. 4 represents a plan top view of the mechanism operating the plunger and scrapers. Fig. 5 represents a perspective top view of the rack, pinion, cams, and slides of the operating machinery. Fig. 6 is a plan view of the top of the machine with the tub removed, and showing the wing and the scraper-valve in position. Fig. 7 is a front vertical section of the same on the line *xx* of Fig. 6. Fig. 8 is a front vertical section of the wing on the line *yy* of Fig. 6. Fig. 9 is a front vertical section of the same on the line *zz* of Fig. 6. Fig. 10 is a front horizontal section of the same on the line *qq* of Fig. 8. Fig. 11 is a side elevation of the machine, showing the carriage in its adjustment for small tiles; and Fig. 12 is a side elevation of the same, showing the carriage raised and adjusted for large tiles.

The object of my invention is an improvement in the construction of the puddling-tubs, in the combination and arrangement of the operating mechanism, in the means employed for preventing the clay from getting into and clogging the operating mechanism; also, in the devices for the better forcing of the clay to the press-chamber, in the arrangement of the dies, and, finally, in the devices for the reception and management of the tiles after they issue from the machine; and my invention consists in constructing the puddling-tub of two cylinders of different diameters, the larger of which serves as a base for the smaller; in the combination and arrangement of a rack, pinion, and cams, operated by the puddling-shaft so as to force, by a series of reciprocatory movements, the clay into the press chamber; in a self-adjusting scraper, to prevent the clay from getting into

the working mechanism; in a scraper, in connection with an automatic valve, for the forcing of the clay into the press-chamber; in the arrangement of the dies in two or more series vertically, and in the construction and arrangement of parts of the movable carriage for receiving and carrying away from the machine the tiles as they issue.

In the drawing, A forms the top, B the sides, and C the bottom, of a rectangular oblong box containing the operative machinery for pressing the clay into tiles, the forward part of which box composes the press-chamber. Upon this box is placed the puddling-tub D E, composed of the cylinder D, securely attached to said box, and the cylinder E, of much less diameter than the cylinder D, placed upon and secured to the top F of said cylinder D. This last-named cylinder is of little height vertically as compared with cylinder E, and serves as a base for it. A shaft, G, passes down through the center of these cylinders and through the plate A, and is pivoted at its foot upon the plate C, and retained in position near its top by passing through an arched brace, H, secured to the sides of the top of the cylinder E. It is provided at its top with an ordinary sweep, and has the usual arms arranged along that part of it which is within the cylinder E for the purpose of puddling the clay.

To that part of the shaft which is within the cylinder D the wing J is attached, of such length that its outer end, in its revolution, passes closely to the interior wall of said cylinder, and of such width as to fill, vertically, the height of said cylinder. This wing bends backward, in a convex curve upon its pressure side, and has an arm, *a*, in the form of a semicircle, presenting its concave portion, in a vertical plane, upon its pressure side, and a body, *b*, arranged diagonally within said cylinder, with its upper edge in front. The form of this wing, which is fully represented in Figs. 6, 7, 8, 9, and 10 of the drawing, causes it to press all the clay within the cylinder D toward the walls thereof.

In the front portion of cylinder D is an opening through the plate A, through which the clay passes down into the press-chamber, in front of the plunger-head. This opening is



covered by the scraper-valve T, (shown in Figs. 6 and 7 of the drawing,) which is pivoted, near its center, to the plate A, having one end extending to the wall of said cylinder, where it is provided with a weight, attached to a cord passing through plate A, which causes that end to press down upon the plate A, leaving the other end elevated to near the inner top of said cylinder.

In each revolution the wing J strikes against this raised end of the valve T, which end is so shaped as to scrape closely against the body of said wing, which, in its turn, passes over it and depresses it to the plate A, and closes, for a time, the opening into the press-chamber.

S is another scraper-valve in the top front center of the plate A, just behind and partly under the scraper-valve T, which valve S fits closely to said plate A, traversing in suitable guides upon it, and its front bent down at right angles, is connected with and operated by the plunger-head. In its forward movement the front of the valve S scrapes the bottom of the valve T, when the latter is pressed down to the plate A by the passage of the wing J over it.

Upon the under side of the plate A, and covering the passage through said plate into the press-chamber, is the valve R, which is attached at its front edge to the plunger-head, just below its top, and operated by it, and at its rear end is turned up so as to engage in a forward movement with the front end of the valve S, which is thus operated by said valve R.

That part of the shaft G which is within the box A B C passes through and operates the cams K and L and the pinion M, placed one above the other, in the order named, the cam K being uppermost, the cam L in the middle, and the pinion M at the bottom, and also almost touching the bottom of said box.

The cams K and L stand quartering upon the shaft G, and are included within the same quadrant of a circle. The cam K is short and curved upon its outer edge, where it is provided with a lip, projecting below it, which lip is concave upon its inner surface, which passes around and presses closely in each revolution of the shaft to a friction-roller, Q, secured in a vertical position to the sliding frame N.

The cam L is long, extending in its revolutions entirely through the sides of the box A B C, where suitable openings are made for it, and is curved backward, presenting a convex pressing-surface.

The pinion M is provided with teeth only on one-half of its periphery, and is so arranged that the teeth engage with those of the rack when the plunger-head is driven forward, and the smooth side of the pinion presented toward the rack when the plunger-head is drawn back. The tooth which first engages with the rack is shorter and more rounded than the remaining teeth.

The frame N is arranged closely to the sides of the box A B C with suitable guides, and upon

one side is provided with the rack O, having cog-teeth, the first of which the first tooth of the pinion M comes in contact with, being longer than the rest, so that the impact may be nearly at right angles, and the next tooth in order upon said rack being somewhat shorter than the remaining teeth, so that the second tooth of the cam M may clear itself properly. This frame N has a front cross-bar, upon the center of which the friction-roller Q is pivoted, connecting the side pieces, which, at their front ends, are connected with and by the plunger-head. A bar, c, attached to the front cross-piece of the frame, runs backward in a line with the rack to a point opposite the front end thereof, where it curves around and is attached both to the frame N at the front end and to said rack. This frame N traverses back and forth in the guides above mentioned, carrying the plunger P, which fills transversely the interior of the box A B C. The front of the box A B C is closed by a die-plate, U, having suitable openings d for the issue of tiles, which openings are arranged in two or more ranks, commonly of three openings in the lower row and two in the upper row. These openings are provided with suitable cores, each attached to a wire secured in the plate A, and bending with a curve downward, so as to present said die in the proper plane. A carriage, W, of about twice the length of the box A B C, passes under said box, traversing upon rollers upon the frame V, which rollers support the side pieces of said carriage. This carriage is also provided with rollers, placed closely together and journaled in the side pieces, and has a stop, X, at the top front end.

The rollers 1 in the front half of the carriage, as will be seen, are placed as closely together as possible, so that this part of the carriage in its adjustment for large tile may be used without covering or handling boards, the rollers in the rear half being about twice as far apart as the rollers 1.

The side pieces of the carriage W are cut away about half their depth on the rear half of said carriage, and riders 2, carrying the rollers on that part of the carriage, are pinned or placed in any readily-detachable manner upon said side pieces in the part cut away. When these riders are in position they fit closely under the bottom of the box A B C, leaving the roller 1 a little below the same, so that the thickness of the handling-boards when placed upon the top of the roller 1 will bring the top of said handling-boards up to the same horizontal plane with the top of the riders.

When large tiles are made (of necessity but one at a time) it is important that they should issue in a direct line from the dies upon the carriage or other receptacle, as any bending down of such tiles is injurious to them. To receive such tiles, I take off the riders 2 and raise the carriage by putting an additional frame, 3, under it, thereby raising the rear of the carriage up against the bottom of the box



A B C, and the front of said carriage above the bottom of said box, and the top of the rollers 1 in line with the bottom of the die from which the tile issues. Suitable drying-boards may be used in connection with it.

The method of operation of my machine and of its several parts is as follows: The clay being suitably puddled in the tub packs itself quite closely into the cylinder D, where it is swept around by the wing J until it is forced under the valve T into the opening through the plate A and into the pressure-chest in front of the plunger-head P. In this operation of the wing J passing over the valve T and pressing it down, this valve scrapes off the clay which adheres to said wing. At the instant that the valve T is pressed down the valve S, operated through the valve R by the plunger-head P, passes under the valve T, scrapes the clay from its under side, and deposits it upon the top of the valve R. Upon the return of the plunger-head the valve R passes under the valve S until the back part of the top of the plunger-head P strikes against the front lower edge of the valve S, when the front of said valve S pushes the clay, which has been deposited by the scraping above mentioned, into the opening in the pressure-chest.

When the wing J has passed over the valve T its front immediately, by means of the weight before mentioned, rises to the top of the cylinder D, and remains there until the wing J makes another revolution. The backward throw of the plunger-head uncovers the opening into the pressure-chest a little after the wing J passes over the valve T, so that the greater part of the clay within the cylinder D is forcibly pressed under said valve into said opening.

In the revolution of the shaft G the toothed side of the pinion M meshes with the rack O and drives the frame N and the plunger-head forward through the pressure-chest with a uniform steady movement, the latter part of which is aided by the lip upon the cam K, which passes around the friction-roller Q, holds the plunger-head in its front position an instant longer, so as to counteract the backward spring in the pressure-box and compel the issue of all the clay within it. Immediately after the passage of this cam K the long and comparatively straight cam L impinges upon the friction-wheel Q and drives back the frame and plunger-head with a rapid movement, to which the pinion M offers no resistance, as it presents at this time its smooth side toward the rack O. By the backward rapid movement of the plunger-head the opening into the pressure-chest is uncovered, and begins at once to fill with clay from the pressure of the wing J. The clay thus pressed out passes through the dies *d*, and is by them formed into tiles, which, as they issue, arrange themselves upon the carriage W, which has been previously run under the box A B C,

with its stop X near the die-plate U, and by their issue impel said carriage forward until it is pushed out its entire length.

When it is desired to make very large drain-tile, a suitable die-plate being placed in position, and the riders 2 being removed, and the additional frame 3 being placed under the carriage, as before described, the tile will issue in a direct line, without deflection, upon and over the rollers 1, the carriage remaining in position, from which they can readily be removed. For small tiles the carriage should be used adjusted as in Fig. 11, and movable, in which case it may be covered with suitable handling-boards for the tiles to fall upon as they issue. The tiles being cut into suitable lengths by any proper device may then be taken to the drying-ground.

The benefit derived from constructing the tub with two cylinders, in the form described, is as follows: The upper cylinder must have considerable altitude, in order that the clay in it may be thoroughly stirred, but does not need a very great diameter, as by increasing the length of the puddling-arms the resistance is very greatly increased, and a correspondingly greater power is required for operation. I find that a diameter of two feet to this portion of the tub is ample for ordinary tile-making.

The lower cylinder should be considerably greater in diameter than the upper one, usually about three feet, where the upper tub has a diameter of two feet, because it is essential to have sufficient room for the opening into the pressure-chest and for the working of the several covering-valves, but does not require much height, and should present flat upper and lower surfaces, so as to make a rectangular recess about its periphery, into which the clay may be driven and pressed before it is forced into the pressure-chest. This operation could not be had in a tub composed of one cylinder, even if the base was larger than its top, or in any cylinder of irregular form.

The advantage of pressing the clay in the cylinder and of the operation of the several valves is apparent upon inspection. The advantage of having two or more series of dies in the die-plate consists in the rapidity with which small tiles may be made and in the small amount of power required, as the greater number of tiles forced out the less the power required on account of the lessening of the resistance to the pressure. There is an additional advantage in the economy of carrying away the tiles, as one man may carry on a suitable fork seven or a greater number of small tiles at once to the drying-ground.

The benefit of the arrangement of the carriage consists in its convenience and ease in operation and in the great ease with which it may be adjusted vertically for use either with large or small tiles, and the great merit of the working mechanism of cams, pinion,



rack, and friction-wheel lies in simplicity of parts and convenience and efficacy in operation.

Having thus set out the nature and merits of my machine, what I claim as my invention, and desire to secure by Letters Patent, is—

1. The puddling-tub described, consisting of the cylinders D and E, in combination with the wing J and shaft G, when the several parts are constructed substantially as described and shown, and arranged to operate as and for the purpose set forth.

2. The combination of the shaft G, the cams K and L, the pinion M, the friction-wheel Q, the rack O, the frame N, and the plunger-head P, when constructed and arranged substantially as described, and for the purpose set forth.

3. The scraper-valve S, in combination with the valve R and the plunger-head P, when constructed, arranged, and operating as and for the purpose set forth.

4. The pivoted scraper-valve T, constructed as described and shown, and arranged to operate as and for the purpose set forth.

5. The wing J, constructed as described and shown, and arranged to operate as and for the purpose set forth.

6. The combination of the wing J, the scraper-valve T, and the scraper-valve S, when constructed as described, and arranged to operate as and for the purpose set forth.

7. The arrangement of the dies *d* in the plate U in two or more horizontal series of ranks, in combination with the pivoted scraper-valve T and wing J, when the several parts are constructed substantially as described and shown, and as and for the purpose set forth.

8. The arrangement of the carriage W, provided with the close rollers 1 and the riders 2, and the adjustable frame 3, in connection with the frame V, when the several parts are constructed substantially as described and shown, and as and for the purpose set forth.

FREDERICK M. MATTICE.

Witnesses:

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