3 Sheets--Sheet 1.

D. H. GAGE.
Pug-Mills.

No. 138,628. Patented May 6, 1873.

Fig 1.

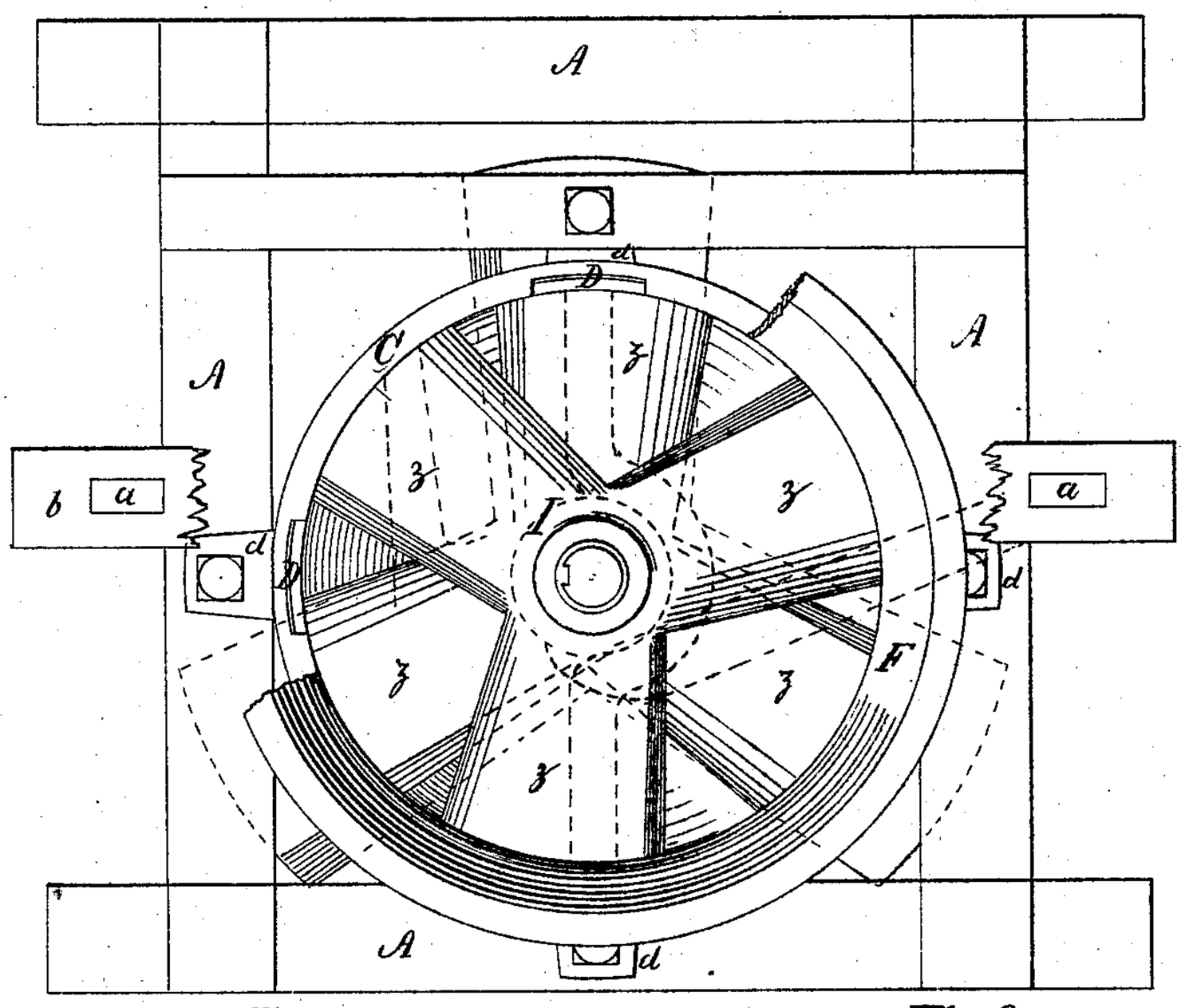

Fig 2.

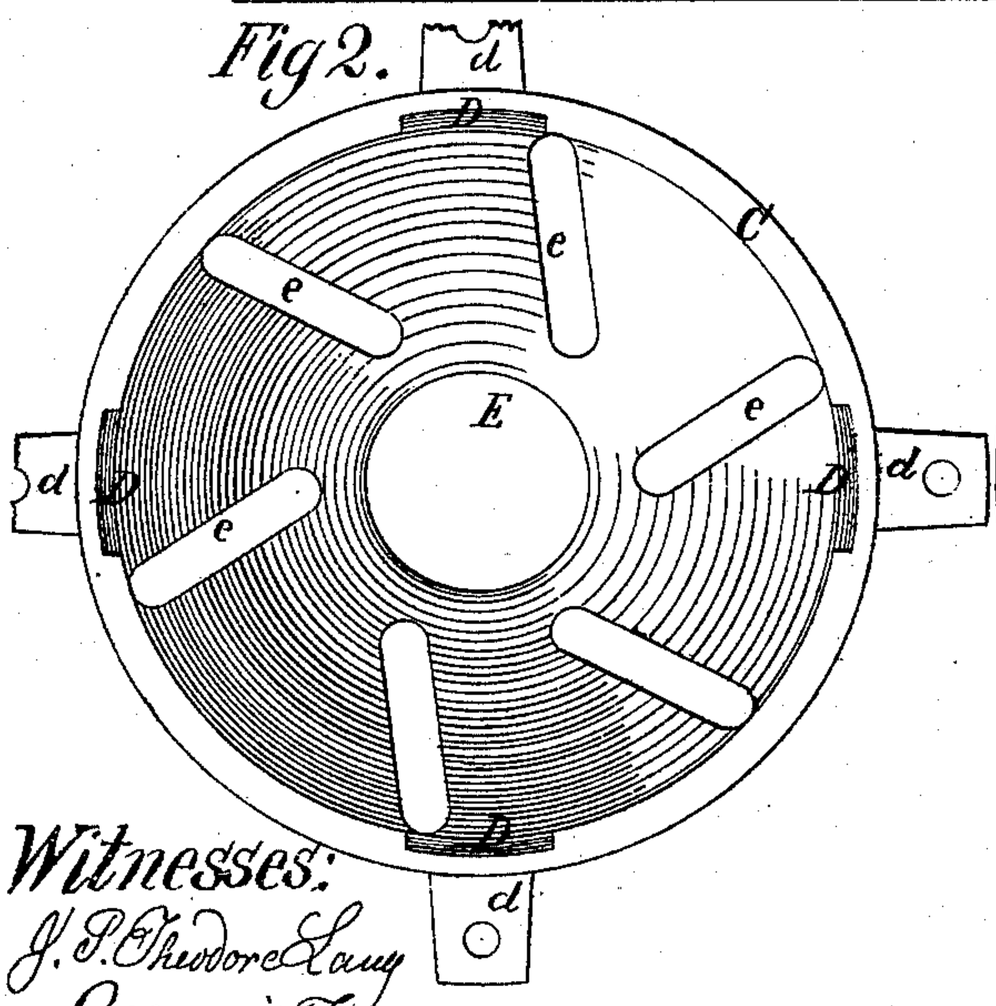

Fig 3.

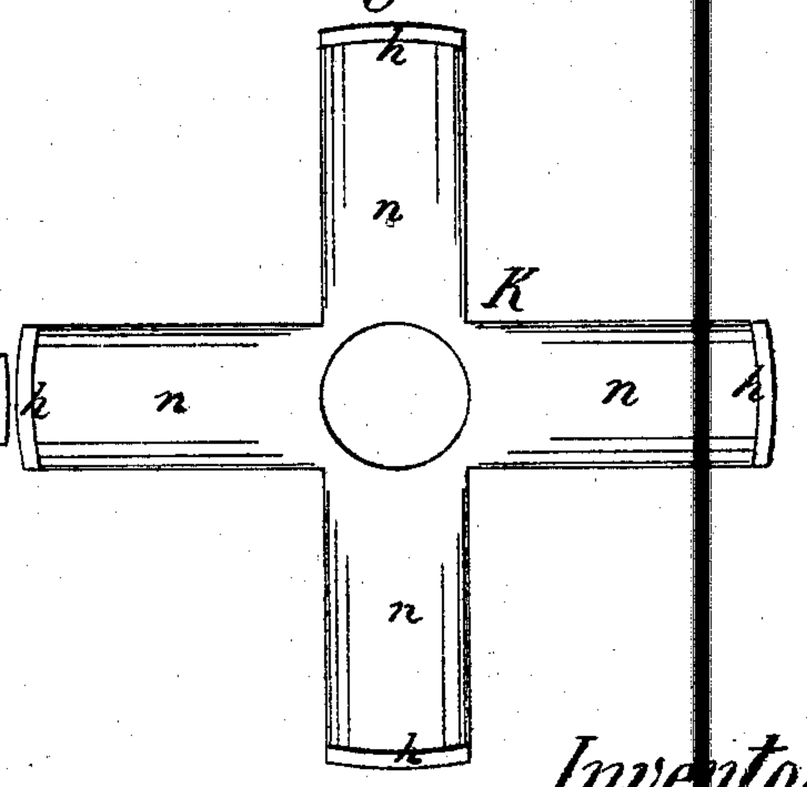

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Fig 4.

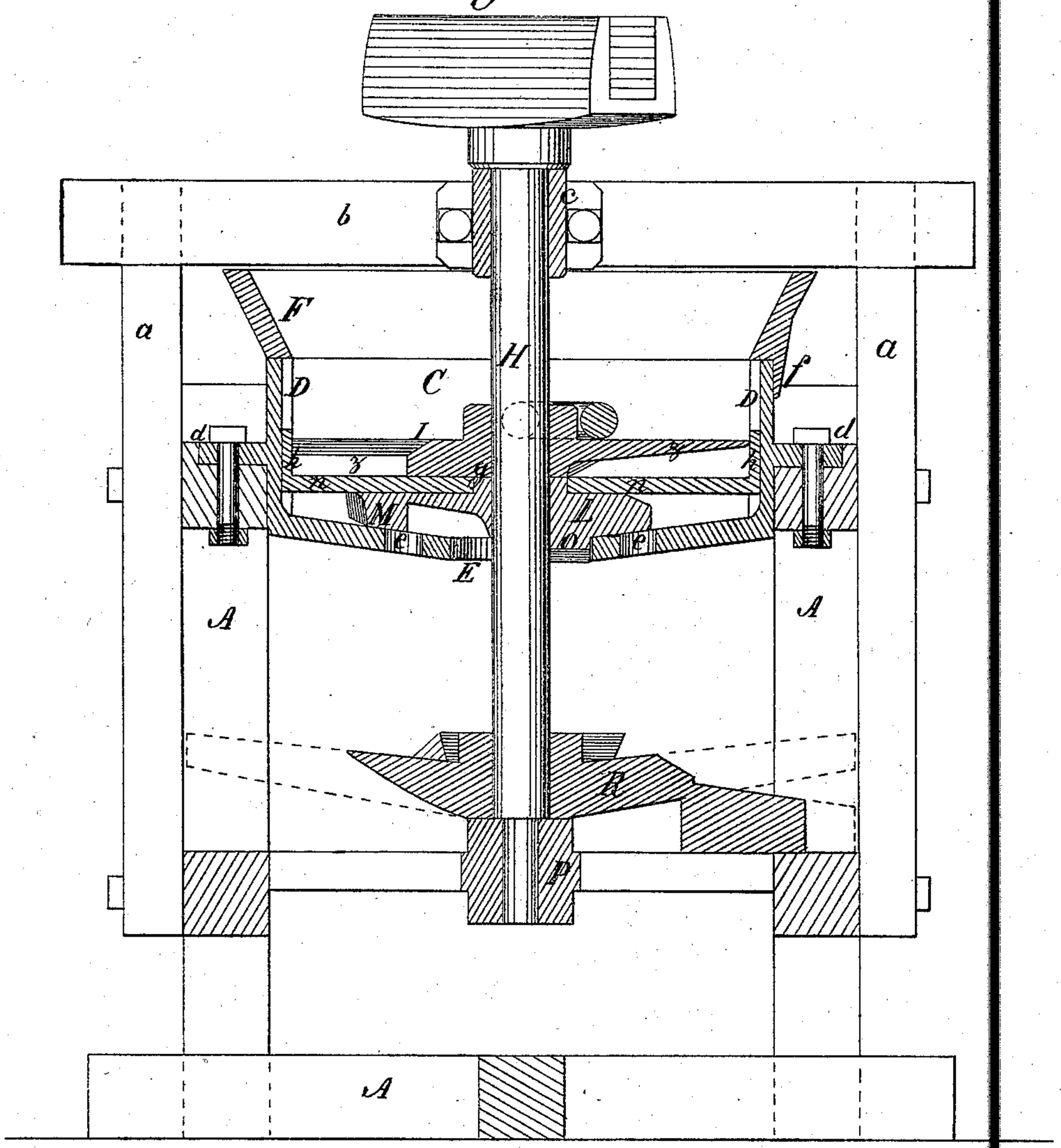

Fig. 5.

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Fig 6.

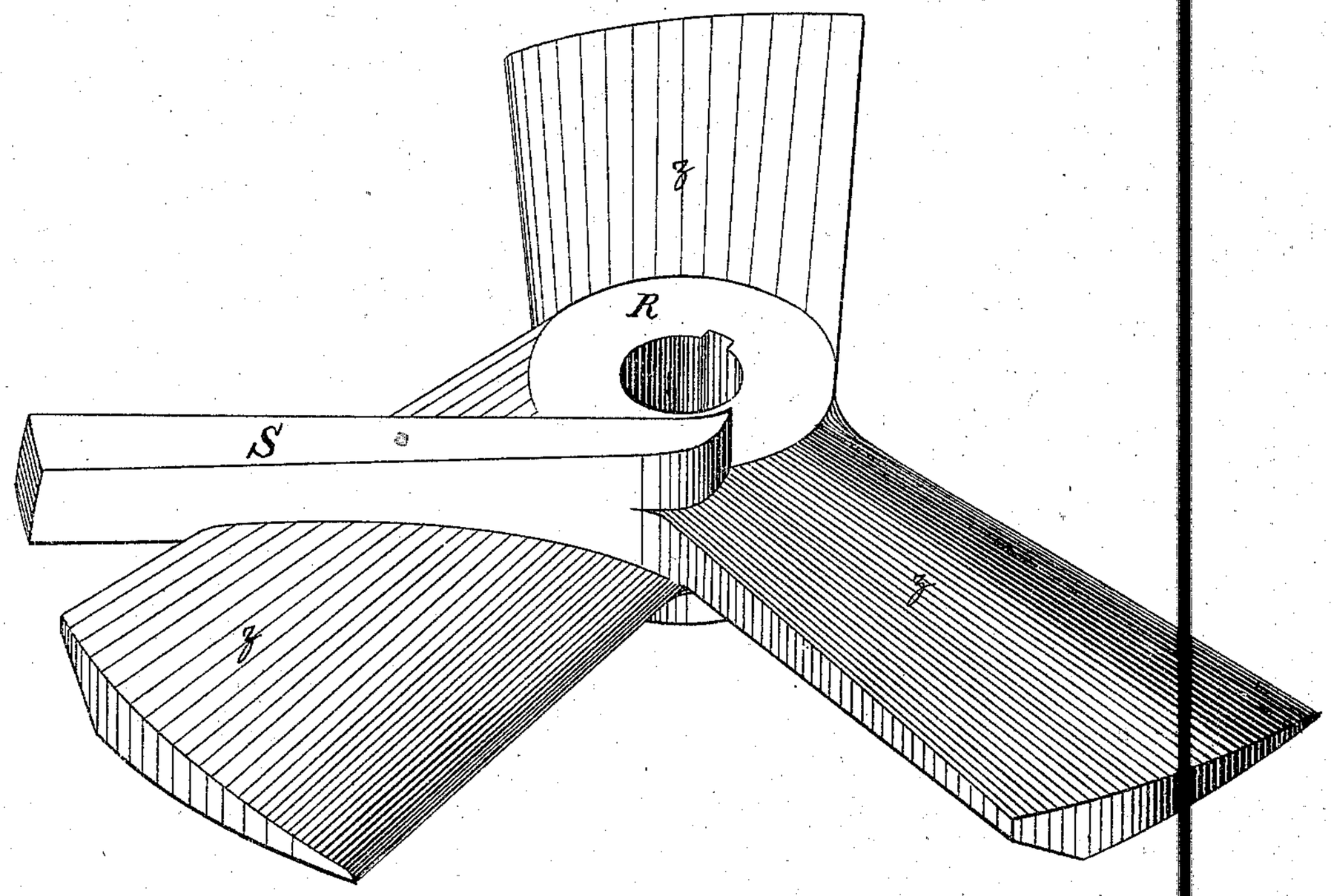
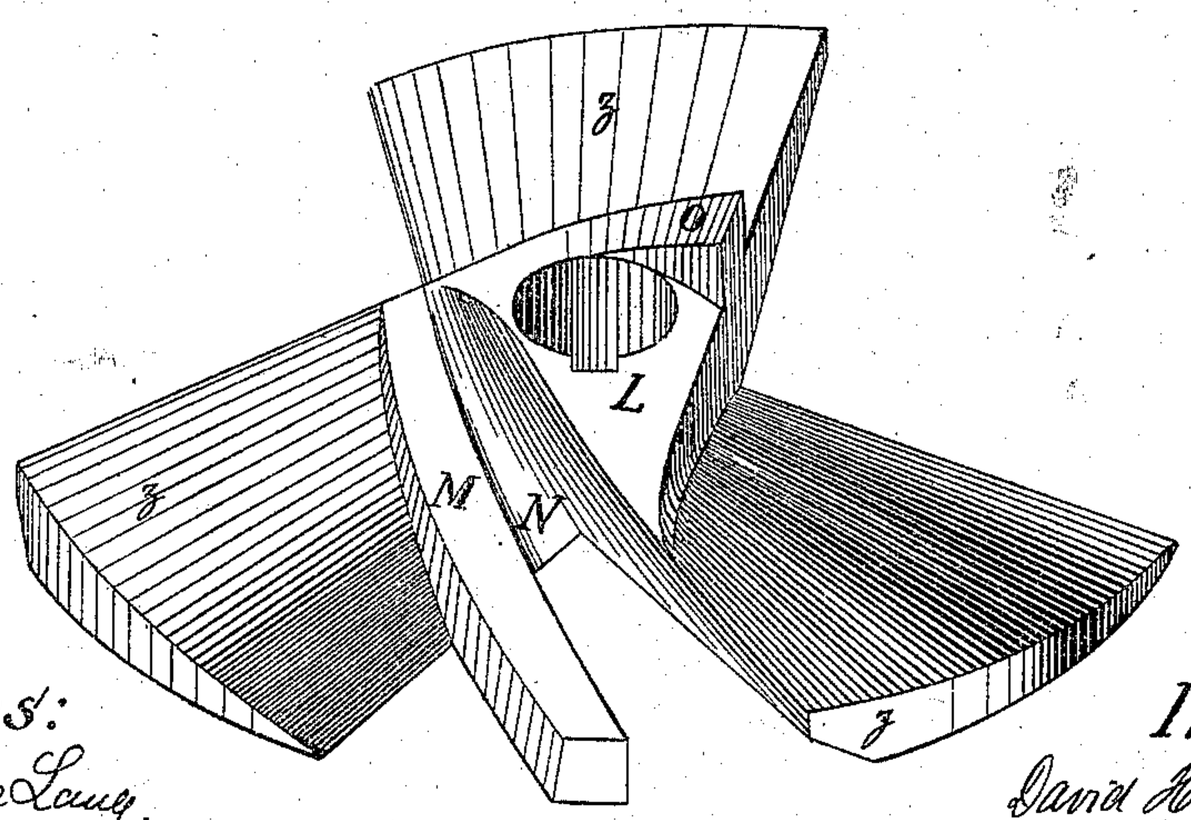


Fig 7.



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UNITED STATES PATENT OFFICE.

DAVID H. GAGE, OF DOVER, NEW HAMPSHIRE.

IMPROVEMENT IN PUG-MILLS.

Specification forming part of Letters Patent No. **138,628**, dated May 6, 1873; application filed March 7, 1873.

To all whom it may concern:

Be it known that I, DAVID H. GAGE, of Dover, New Hampshire, have invented certain new and useful Improvements in Pug-Mills, of which the following is a specification, reference being had to the accompanying drawing.

Nature and Objects of the Invention.

The invention relates to providing the shaft of the pug-mill with a rack of four arms having at their extremities a vertical flange fitting into recesses having inclines at their bases and sunk in the inner vertical face of the cylinder, said rack being placed between the upper and lower grinders; also, to providing the shaft of the pug-mill above the upper grinder with a bar arched at its center to receive the shaft or hub of the upper grinder, while its extremities are placed loose in the recesses aforesaid; also, to providing the lower grinder on its under side with a channel and sweep, the latter being secured at about a right angle to one of the blades of the grinder, and slightly curved on its inner and outer edge, opposite the inner end of which sweep is placed a stud in close relation to the shaft, and having one side vertical, the other inclined, and in width equal to the distance between the shaft and the edge of the circular aperture in the bottom of the cylinder; also, to providing the shaft where it passes into the mixing-tub with a set of blades, to the under side of one of which is secured a sweep so projecting as to give any resisting material a direction opposite to that given by the sweep on the lower grinder, and having its lower surface in close relation to the bottom of the mixing-tub. The object of the said several devices is as follows: The rack serves to clear the stones and clay from the grinders, as well as guide the same when passing over a stone. The bar with its arched center serves to strip the upper grinder and force the material into the spaces separating the blades. The channel and sweep on the lower grinder serve to gather the stones in the material to, while the stud thereon serves to force them through, the aperture in the center. When thus acted upon, the sweep on the mixer serves to force them to the edge of the mixing-tub, where they are collected and removed. The general object of the invention is to provide an attachment to pug-mills for removing stones and other resisting material from the clay while being ground. These devices are improvements upon the patent granted DAVID H. GAGE for improvements in grinding-attachments to pug-mills, dated March 23, 1858, and extended for the term of seven years March 23, 1872.

Description of the Accompanying Drawing.

Figure 1 is a top or plan view of a device embodying the elements of the invention. Fig. 2 is a plan view of the interior of the cylinder C. Fig. 3 is a similar view of the rack K. Fig. 4 is a vertical central section of a device embodying the elements of the invention. Fig. 5 is a detached view of the bar T. Fig. 6 is a bottom view of the mixer. Fig. 7 is a similar view of the lower grinder.

General Description.

A in the accompanying drawing is the frame, the lower portion of which is occupied by the mixing-tub, (not shown.) The uprights *a* are secured to the sides of the frame, projecting a proper distance above the same, their upper extremities being provided with a tongue fitting into the groove in the ends of the cross-bar *b*, which passes across the frame A, and is at its center provided with the journal *c*, secured to one side of the cross-bar in such position that the axis of its bore coincides with the vertical center of the cylinder C, which is placed directly below it and rigidly secured to the braces of the frame by bolts passing through the ears *d*. The cylinder C is circular, having vertical sides provided with the vertical equidistant recesses D, the bases of which are inclined from the vertical face of the recess downward toward the center of the cylinder, the bottom of which is concave or sloping, having at its center the aperture E of proper dimensions and also the transverse slot *e*. The upper edge of the cylinder is provided with the flared rim F having the ears *f*, serving to keep it in position upon the cylinder. The shaft H rotates in the journal *c*, and at a proper distance below the same is provided with the fixed grinder I, consisting in the present instance of the three blades *z*, united

at their center, and thence radiating in different directions. These blades are of similar construction, having vertical backs, from which the blade is reduced to an edge of proper acuteness, the bases vanishing on their under surface into each other on the line of their backs, while the extremities are rounded so that they may revolve snugly within the cylinder C. The upper surfaces of the blades are relatively in the same plane, the under surface being reduced from the back to the edge. The blades on the under side have each a common upward inclination, the upper surface of the grinder being provided with the hub *g*, projecting a proper distance above the grinder, and through which the shaft H passes. Below the grinder I is placed the rack K, provided at its center with an aperture of greater diameter than the hub *g*, which passes through it, and upon which it rotates. From this aperture project opposite and equidistant arms *n*, the extremities of which are bent upward into right-angle flanges *h*, which fit in the recesses D, while the under surface of the rack K rests upon the upper surface of the grinder L provided with the hub *g*, and rigidly secured to the shaft H. The construction of the grinder L is similar to that of the grinder I, except that the former has one of its blades provided with the sweep M, the base of which depends below the surface of the blade to which it is secured, thus forming a channel, N, between the inner edge of the sweep and the opposite parts of the back of the next blade, which channel vanishes near the back of the blade to which the sweep is attached. The extreme base of the sweep is flush with the blade. Its under surface has an outward and upward curve so as to conform to the upper surface of the bottom of the cylinder C. It projects with a slight curve at right angles from its blade and parallel to the back of the next blade. Its extreme outer end is convex, and approaches closely the vertical sides of the cylinder C moving on the same circle as the outer edges of the blades Z. Upon the lower surface of the grinder opposite the base of the sweep M, and in juxtaposition to the shaft H, is provided the stud O, properly inclined in the direction of the grinder, and in width equal to the distance between the peripheries of the shaft H and the aperture E. The center of the mixing-tub below the cylinder C is provided with the seat P, on which the shaft rotates, and immediately above which is rigidly secured to the shaft the mixer R, of similar construction to the grinder I, though of larger dimensions, and provided with the sweep S, secured upon the under side of the mixer in such manner as to project from the blade to which it is secured at an angle of about forty-five degrees, its rear edge being almost in the same vertical plane with the back of the opposite blade, while its under surface is in close relation to the bottom of the mixing-tub. In their several relations the sweeps M and S operate to give any resisting material, respectively, a centripetal and centrifugal movement. The bar or stripper T, having at its center the arch X, is placed in the cylinder C, its ends loose in two of the recesses D, while the arch is about the hub *g* on the grinder I.

Operation.

The cylinder A being filled with material to be manipulated into proper condition for the manufacture of bricks and other analogous uses, the shaft H is rotated, the material being forced by the bar T into the spaces between the blades of the grinder I, which are cleared by the stripper T, the blades at the same time pulverizing or grinding the material which now passes about the rack K, which in this connection serves also as a stripper; thence the material descends through the spaces between the blades of the grinder L, and is further pulverized by the movement of the grinder over the bottom of the cylinder C. Such stones or other resisting material as will not pass through the slots *e* are caught by the sweep M, and, as the grinder revolves, drawn toward the aperture E. If the resisting substance is of such size as that it cannot pass readily through the same, the expulsion is effected by the stud O, which, as the grinder revolves, operates to force the same through the aperture E. When the resisting material is being acted upon by the grinder L as its blades pass over the same the shaft H and the whole grinding mechanism is elevated, the ascent of the same being guided by the rack K, the flanges of the arms of which are in the recesses D. This rising is repeated as each blade of the grinder comes in contact with the resisting substance until it is finally caught in the space between the sweep M and blade; thence drawn into the channel N, and finally discharged through the aperture E. After the material has been manipulated, as aforesaid, it passes through the various openings in the bottom of the cylinder C, and descends into the mixing-tub below, wherein it is acted upon by the mixer R. The heavier materials, such as stones, sinking to the bottom of the mass, are, as the mixer revolves, gradually forced to the outer edge of the tub so that the clay prepared for use may be removed from the tub free from all coarse unpulverized matter.

Claims.

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

1. The sweep M, substantially as and for the purpose shown and described.

2. The grinder L, in combination with the sweep M and stud O, substantially as shown and described.

3. The cylinder C provided with the aperture E, in combination with the sweep M, channel N, and stud O, substantially as shown and described.

4. The sweep S, substantially as and for the purpose shown and described.

5. The grinder L provided with the sweep

M, in combination with the mixer R provided with the sweep S, substantially as shown and described.

6. The stripper T, for the purpose of cleaning the grinder I, substantially as shown and described.

In testimony that I claim the foregoing improvement in pug-mills, as above described, I have hereunto set my hand and seal this 3d day of March, 1873.

DAVID H. GAGE. [L. S.]

Witnesses:

JOSHUA VARNEY,

JASPER G. WALLACE.