3 Sheets—Sheet 1.

# J. W. HYATT.

## Mills for Pulverizing.

No. 201,347. Patented March 19, 1878.

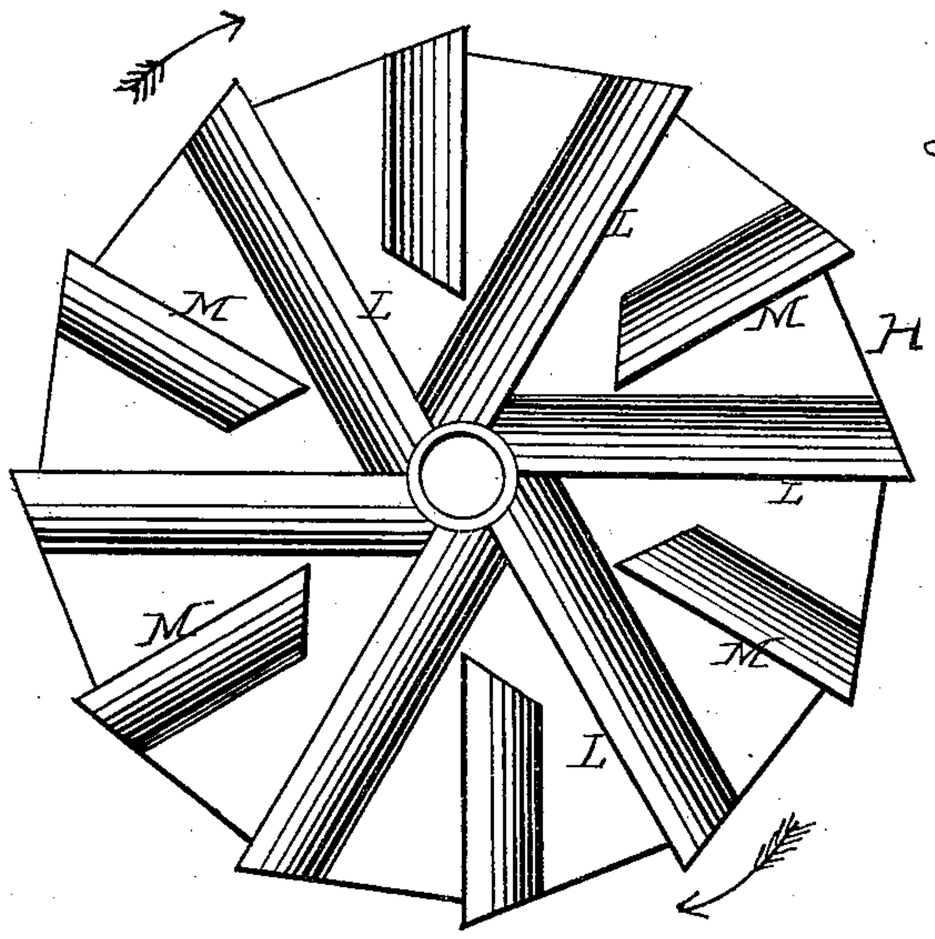



Fig. 1.

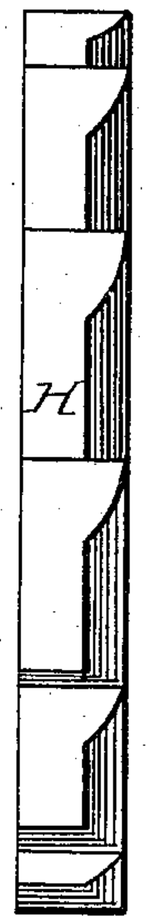
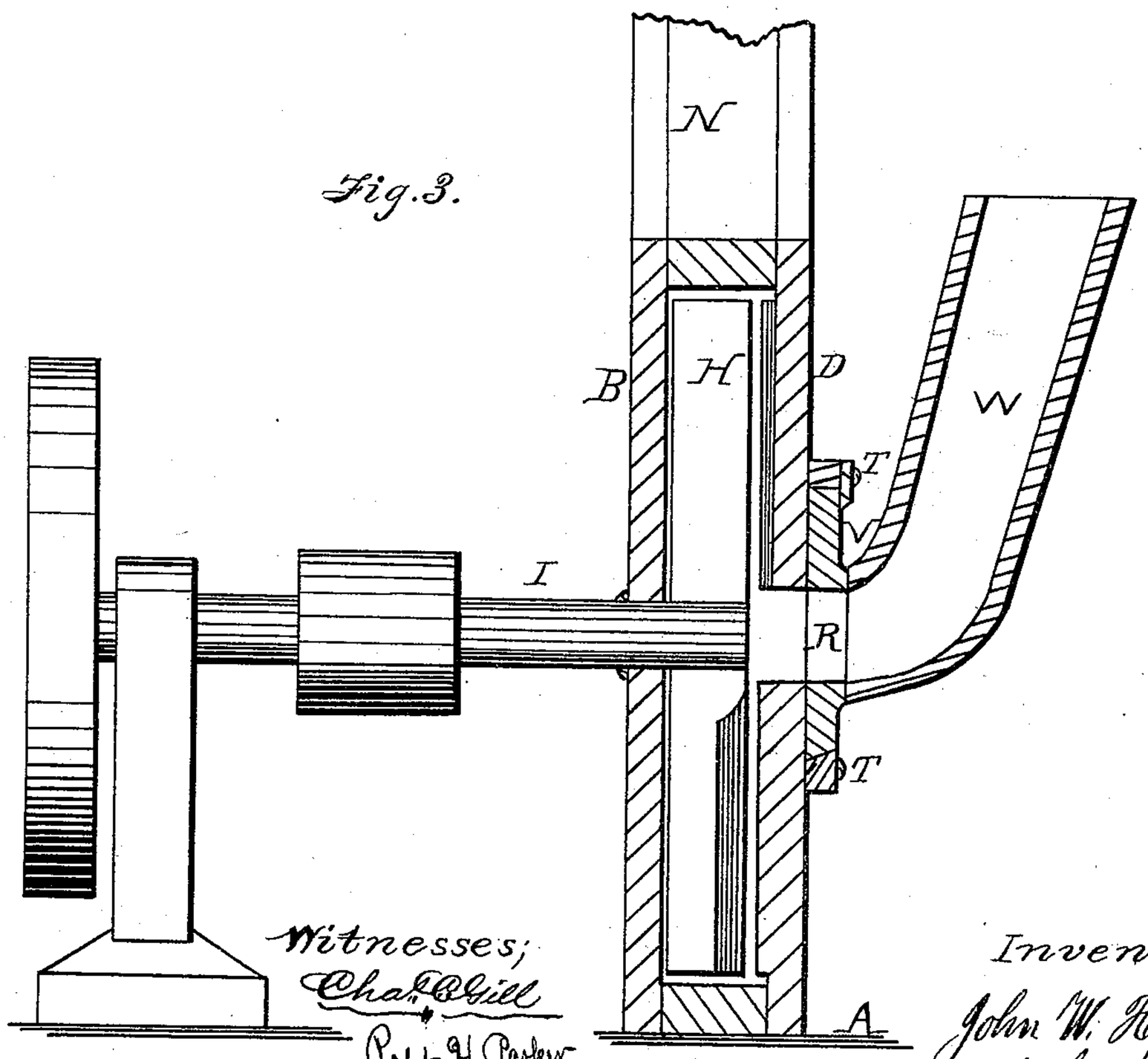



Fig. 2.

Fig. 3.




Witnesses;
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Robt. H. Parker.

Inventor;
John W. Hyatt
by his Attys.
Cox & Coy

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# J. W. HYATT.

## Mills for Pulverizing.

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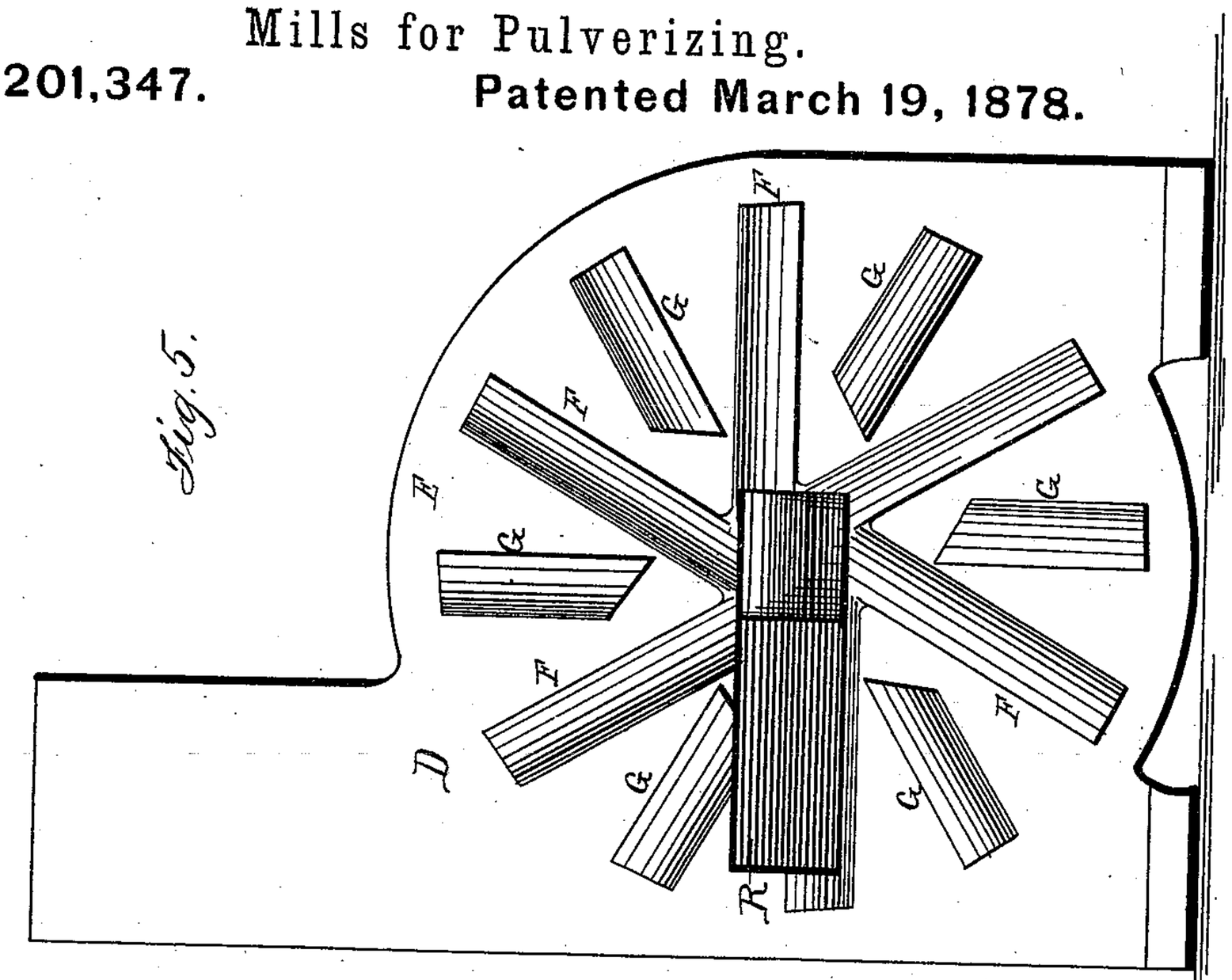


Fig. 5.




Fig. 4.

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3 Sheets—Sheet 3.

# J. W. HYATT.

## Mills for Pulverizing.

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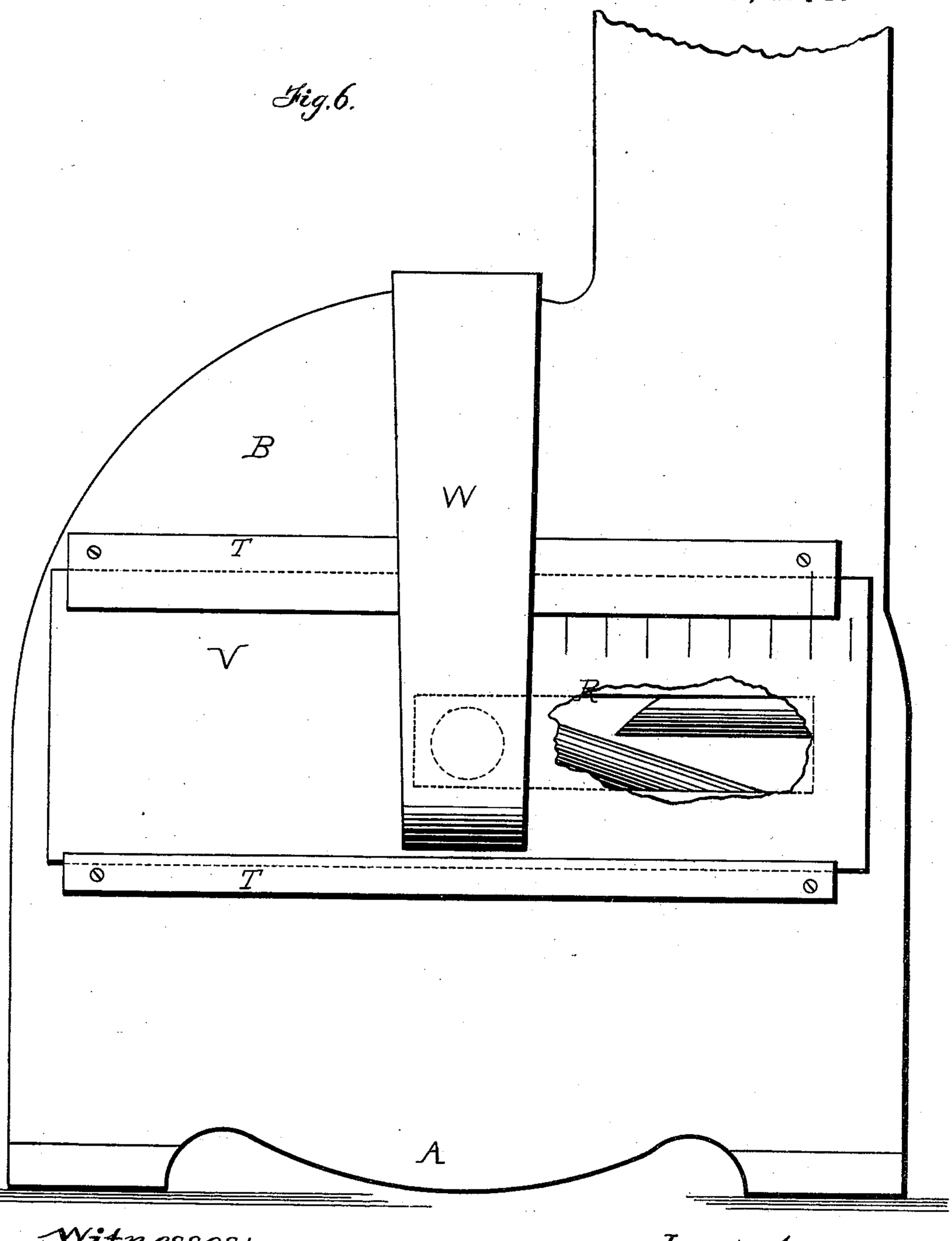
*Fig. 6.*




Witnesses;
Chas. C. Gill
Robt. H. Parker.

Inventor;
John W. Hyatt
by his Attys
Cox & Cox

# UNITED STATES PATENT OFFICE.

JOHN W. HYATT, OF NEWARK, NEW JERSEY.

## IMPROVEMENT IN MILLS FOR PULVERIZING.

Specification forming part of Letters Patent No. **201,347**, dated March 19, 1878; application filed August 25, 1877.

*To all whom it may concern:*

Be it known that I, JOHN W. HYATT, of Newark, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Mills for Pulverizing, of which the following is a specification, reference being had to the accompanying drawings.

The invention relates to an improved mill for pulverizing, and operates upon the principle of comminuting material by percussive contact.

It also relates to a means of feeding a rotating crushing-surface, or such a mill as aforesaid, so that the material to be reduced may be supplied at a less or greater distance from the center of revolution, to effect, respectively, a greater or less comminution.

It also relates to providing a reducing-mill with a delivery-shaft, which prevents the escape of particles of excessive dimensions.

The object of the invention is to provide a mill for comminuting material to a desired degree without the use of screens, bolting-cloths, fans, or other analogous mechanisms.

In the accompanying drawing, Figure 1 is a vertical elevation of the grinding-face of disk. Fig. 2 is a side or edge view of same. Fig. 3 is a vertical central transverse section through the hopper-spout and disk and plates. Fig. 4 is a view of the plate, showing the shell and blast-spout N. Fig. 5 is a view of the interior of plate. Fig. 6 is a side elevation of the device, with a portion of the hopper-slide broken out.

In the accompanying drawings, A represents the base or frame, upon which is mounted the shell B, the superficies of the interior of which are of suitable size and contour to receive the disk H, hereinafter described. The circumference of said superficies is provided with the teeth *a*, which may be cast with the shell or inlet in sections, the teeth projecting in a direction contrary to the movement of the disk. The platform A, shell B, with its section of the delivery-shaft, are preferably cast in one piece.

Directly opposite and firmly secured to the shell is provided the plate D, about the central portions of which is arranged a raised circular boss, E, which fits within the circle formed by the teeth *a*. This circular surface is corrugated, or, as in the present instance, provided with the projecting radial elevations F, which extend from the center of the plate D to the circumference of the boss E, being separated near their outer ends, and in these spaces are provided the elevations G, the outer ends of which extend to the circumference of the boss, their inner ends being in close relation to the adjacent elevations F.

The elevations F and G are similar in section, being vertical on one side, thence sloping on the other to the surface of the boss, which, when the device is in operation, stands directly opposite the area of the disk H, occupied by the elevations hereinafter described.

The shell B and plate D form, when united, the case to receive the disk H, which is rotated vertically therein by means of a shaft, I, passing through the center of the shell, and rotating on bearings placed outside of it. This shaft, preferably, should be provided with a fly-wheel and operated by a band or pulley wheel.

The disk H is a circular piece of. metal or other suitable substance, flat on one side, and on the other provided with the radial elevations L, which extend from the center of the disk beyond its edge, their outer extremities being reduced to a sharp angle, which lies transversely across the edge of the disk, opposite which angle said extremities incline to the edge of the disk.

The spaces on the face of the disk H between the outer portions of the elevations L are occupied by the elevations M, having their outer extremities fashioned and placed similarly to the corresponding parts of the elevations L, while the inner extremities are in close relation to the edges of the elevations L on either side.

In cross-section these elevations are vertical on one side, and on the other incline gradually to the face of the disk. This construction affords a surface having a number of projecting radiating edges well calculated, as the disk revolves, to come in contact with any material in the case, although radial corrugations of other forms may be employed.

The space between the disk and adjacent

surfaces is always greater than the diameter of the particle to which the material is to be reduced.

The upper portion of the case is provided with the delivery or blow shaft N, which is placed at a tangent to the periphery of the disk and above and opening in a direction reverse of the direction of the motion of the periphery of the disk. In the present instance the shaft N is cast as extensions of the shell B and plate D, which, being united, the shaft is formed. Upon the interior of the shaft are placed, one above the other, the shelves P, having a downward inclination toward the axis of the shaft and overlapping edges, so as to arrest the direct movement of any except flotant particles. The non-flotant particles, being stopped, fall back into the case, while the lighter ones pass over the edges and escape from the upper end of the shaft moved by current of air produced by the revolution of the disk in the case.

Upon one side of the plate D is provided the inlet-slot R, extending from the center to near the circumference of the plate, and having upon each side the parallel guides T, to receive, secure, and yet permit the movement of the sliding plate V, wherein is provided an aperture forming the outlet of the feed-hopper spout W. By this means the hopper-spout W can be moved so that its outlet is opposite, near to, or removed from the center of the case and disk, even as it is desired to produce a less or greater degree of draft, and the consequent discharge of material less or more reduced.

Operation: Movement is communicated to the disk H so that it revolves very rapidly, carrying the vertical faces of the elevations in front. The hopper-slide is then set near to or removed from the center of the disk, accordingly as a greater or less comminution is desired. The material—bone, for example—is somewhat crushed, and then deposited in the pipe W, whence it passes into the case. The first action of the device is to grind or crush the material between the superficies of the edges and elevated portions of the mechanism within the case. This continues only, however, until the material is reduced, as it soon is, to particles of less diameter than the space between the elevations on the disk and the opposite plate. After this the particles are forced percussively against the elevations, and pass over them, being further reduced as they progress toward the periphery of the disk.

The movement of the disk generates a current of air in the case, which passes upward through the delivery-shaft N, which current is stronger nearer the periphery than at the center of the disk, and carries with it, in a pulverized flotant condition, the material which escapes over the sides of the shaft N, where it may be collected in a chamber permeable to the air, but impermeable to the pulverized material, the shelves P preventing the escape of all particles except those so light as to be moved by the current of air.

The trend of the bulk of the material is toward the periphery of the disk, and hence, while a very insignificant portion may temporarily move centrifugally, it is plain that the greater portion will not assume a position nearer the center of the disk than the point at which it is introduced.

It is obvious that the nearer the mouth of the hopper-spout is placed to the center of the disk the stronger will be the blast. Consequently, the power of expelling the comminuted material is regulated by the position of the mouth of the hopper-spout with relation to the center of the disk.

Now, as the material has a centrifugal movement only, and consequently but few particles approach the center of the disk, it is plain that as soon as the particles are reduced to such weight as to be acted upon by the blast they will be expelled from the delivery-shaft. Thus the degree of comminution is regulated by the position the hopper-spout occupies with relation to the center of the disk. When a great degree of comminution is desired, the hopper-spout is removed from the center of the disk. This causes a slight blast, which suffices only to expel the material when it has become very much comminuted. When a less degree of reduction is desired, the hopper-spout is placed closer to the center of the disk; a more powerful blast and the discharge of larger particles results.

It is to be distinctly noted that the ultimate reduction is effected, not by attrition between the particles or by attrition or crushing between moving surfaces, but by causing the semi-reduced particles to come in percussive contact with the mechanism, the disk and grinding-surfaces being separated for this purpose.

It is also plain that the use of screens, bolting-cloths, and sieves is entirely avoided, and the material is completely reduced before it is delivered.

The device is applicable to the pulverization of all mineral, animal, and vegetable substances, the reducing parts of the machine being made of suitable material, cast-iron answering all ordinary purposes.

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

1. As a means of feeding material to a mill, a hopper-spout adjustable with relation to the center of the reducing mechanism, substantially as set forth.

2. The hopper-spout W, adjustable by means of the plate V and guides T, substantially as specified.

3. The inlet-aperture R, in combination with means for moving the position of the outlet of the hopper-spout, substantially as set forth.

4. In a pulverizing-mill, a delivery-shaft provided with shelves deflecting in a direction transversely toward the movement of the ma-

terial being delivered, substantially as specified.

5. In a grinding-mill, the combination of a rotating mechanism producing a blast, a feed-aperture, adjustable to the center of the rotating mechanism, for regulating the blast, and a delivery-shaft placed over the outer edge of the revolving mechanism, substantially as specified.

6. The disk H, operating in a closed chamber provided with a hopper-spout, adjustable with relation to the center of the disk, and a delivery-shaft provided with shelves deflecting downward across the blast, substantially as specified.

In testimony that I claim the foregoing improvement in mills for pulverizing, as above described, I have hereunto set my hand this 22d day of August, 1877.

JOHN W. HYATT.

Witnesses:
WM. R. SANDS,
HARRY COX.