

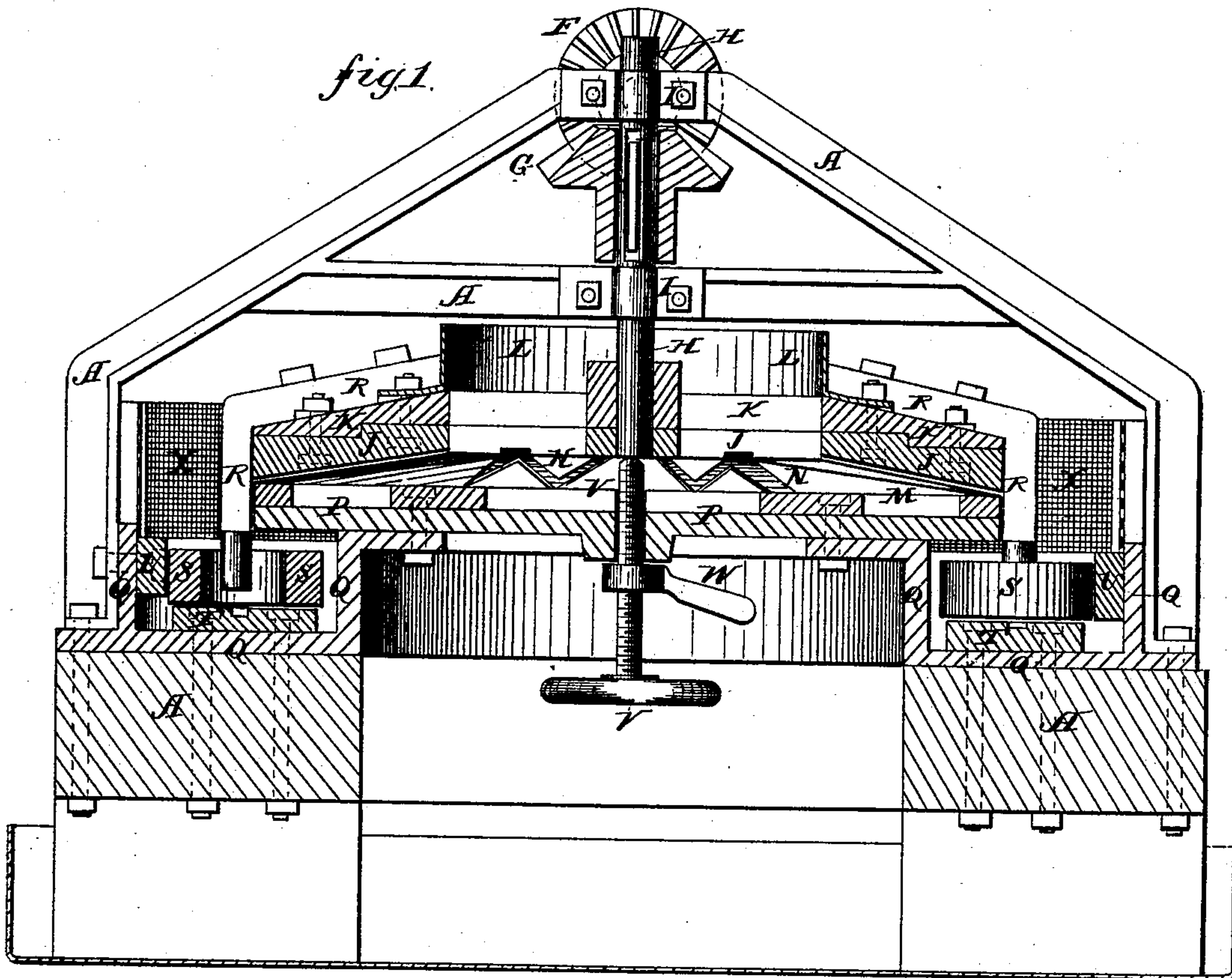
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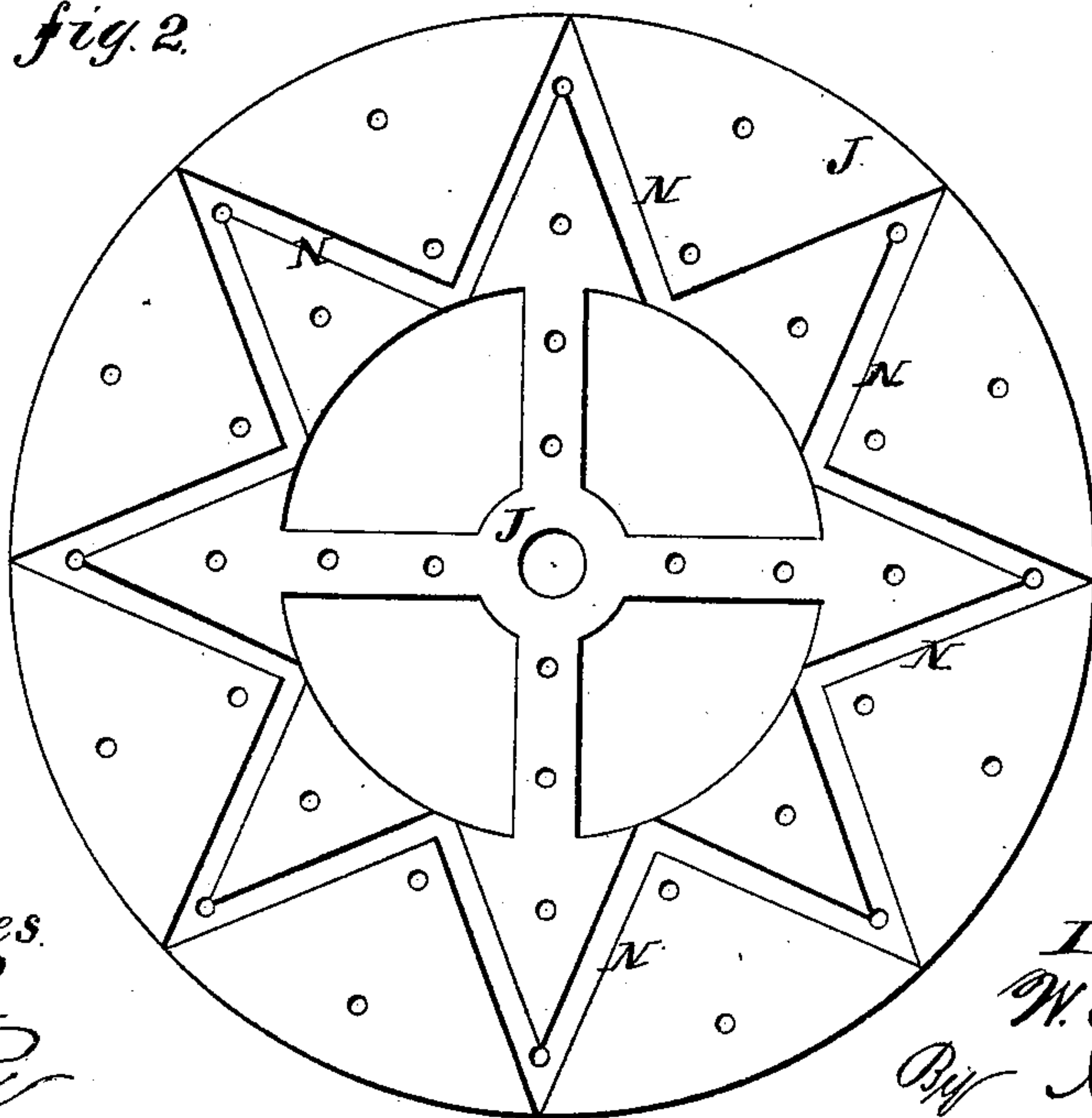
W. E. HARRIS.  
ORE GRINDING MILL.

No. 253,476.

Patented Feb. 7, 1882.



*fig. 2.*



Witnesses.  
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(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

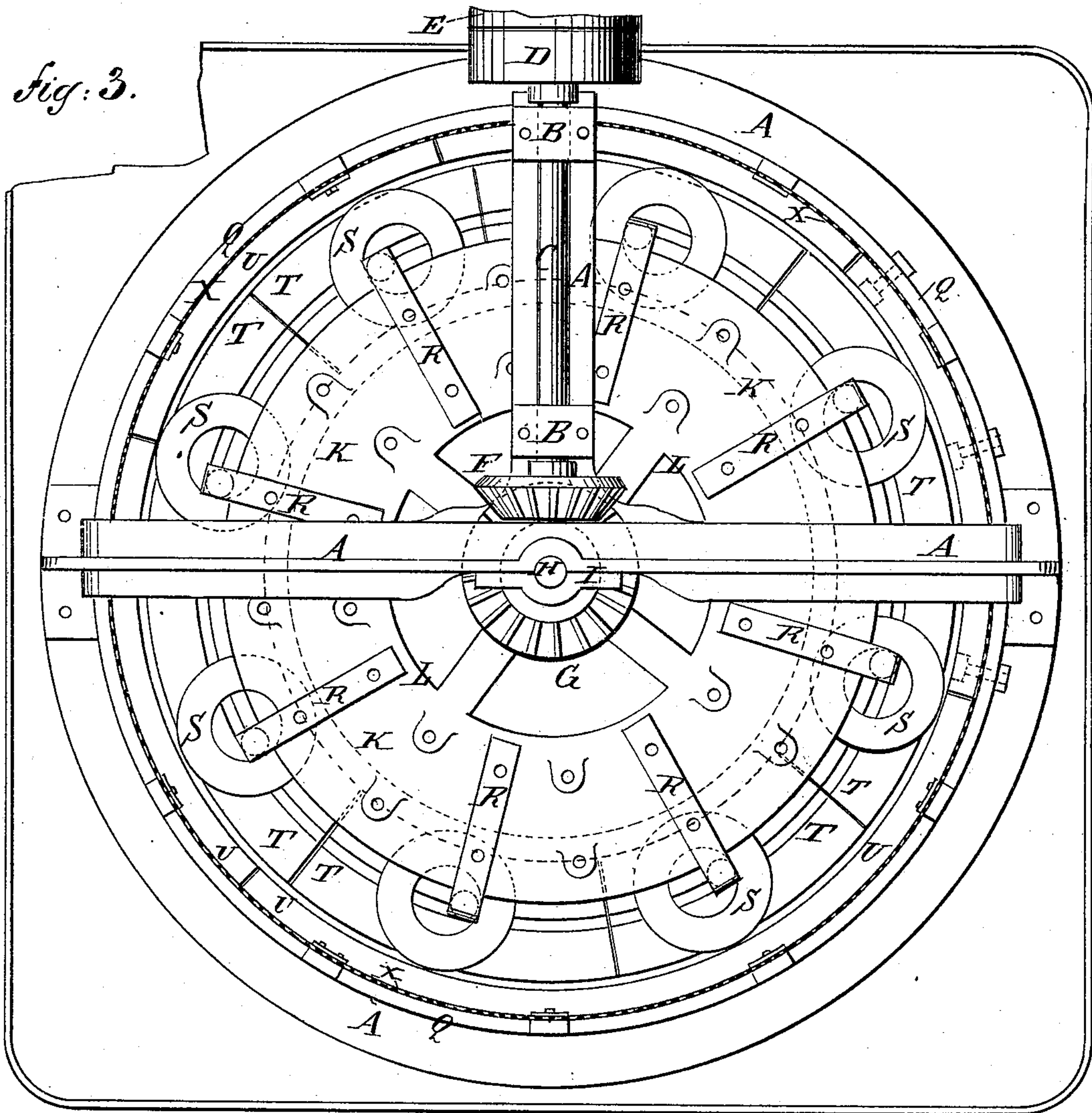
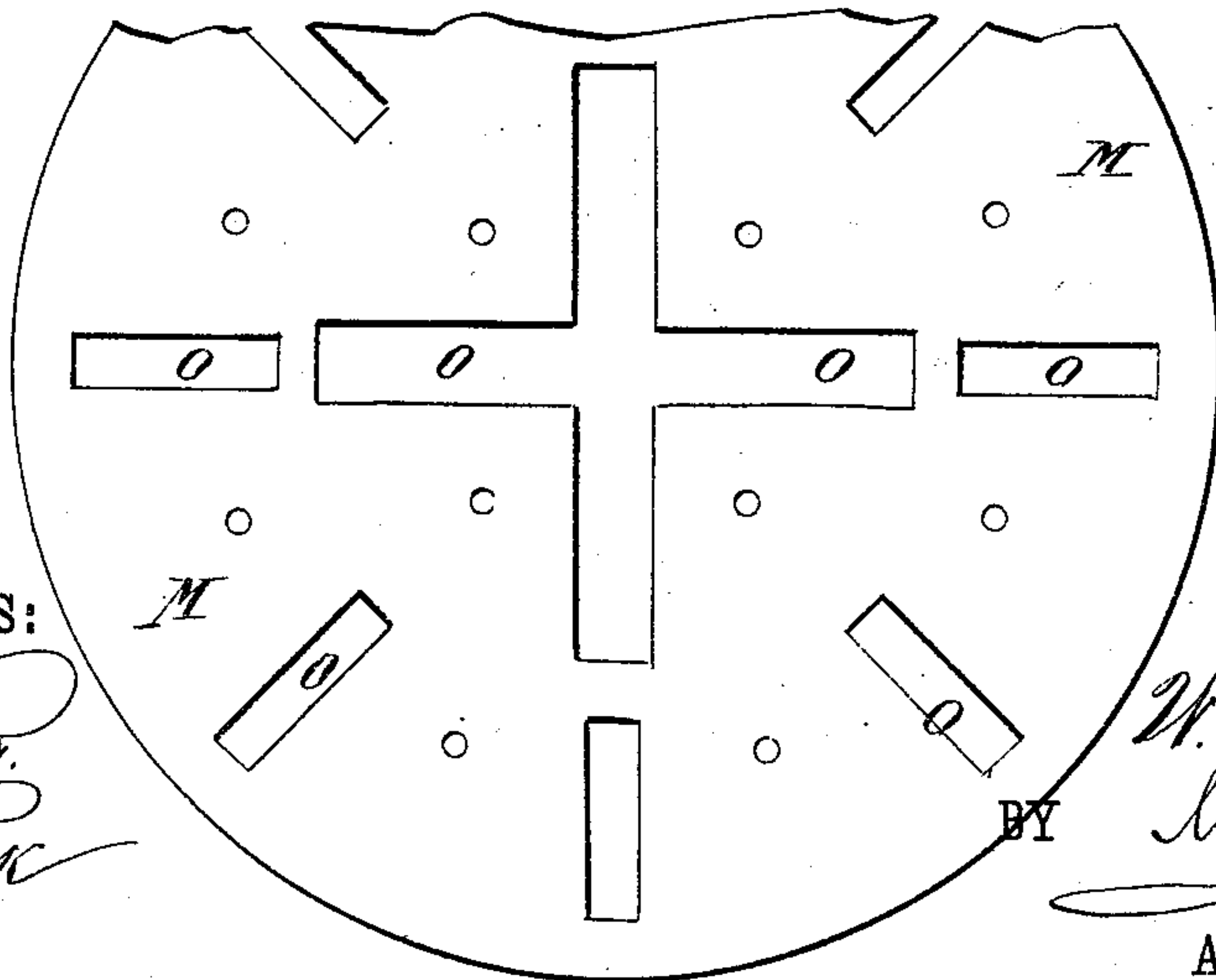


Fig. 4.



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# UNITED STATES PATENT OFFICE.

WILLIAM E. HARRIS, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF AND  
HENRY C. HEPBURN, OF SAME PLACE.

## ORE-GRINDING MILL.

SPECIFICATION forming part of Letters Patent No. 253,476, dated February 7, 1882.

Application filed May 25, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM E. HARRIS, of the city, county, and State of New York, have invented a new and Improved Ore-Grinding Mill, of which the following is a specification.

Figure 1, Sheet 1, is a sectional side elevation of my improvement. Fig. 2, Sheet 1, is a face view of the upper grinding-plate. Fig. 3, Sheet 2, is a plan view of the improvement; and Fig. 4, Sheet 2, is a face view of the lower grinding-plate.

Similar letters of reference indicate corresponding parts.

The object of this invention is to facilitate the grinding of ores.

The invention consists in an ore-grinding apparatus constructed with a horizontal and a vertical shaft, beveled gear-wheels connecting the shafts, the upper grinding-plate attached to the upright shaft, having its lower side or face concaved and provided with V-shaped or angular grooves, and having a strengthening-plate attached to its upper side, the lower grinding-plate having radial grooves or slots in its face, and having a strengthening-plate attached to its lower side, the ring-trough provided with facing-plates, and the ring-plates carried around by angular bars attached to the strengthening-plate of the upper grinding-plate, as will be hereinafter fully described.

A represents the frame of the machine.

To the upper part of the frame A are attached bearings B, in which revolves a horizontal shaft, C, having a fast pulley, D, and a loose pulley, E, upon its outer end to receive the driving-belt.

To the inner end of the shaft C is attached a beveled gear-wheel, F, the teeth of which mesh into the teeth of a beveled gear-wheel, G, placed upon the vertical shaft H, and connected with it by a tongue and groove, so that the said gear-wheel will carry the said shaft with it in its revolutions, but will allow the said shaft to move up and down freely, the beveled gear-wheel G being kept in place by the bearings I, attached to the frame A, to receive the said shaft H.

To the lower end of the upright shaft H is keyed or otherwise secured the upper grind-

ing-plate, J, which is strengthened by a plate, K, bolted to its upper side, as shown in Fig. 1.

To the upper side of the strengthening-plate K is attached a hopper, L, to receive the ore. Through the middle parts of the plates J K are formed openings, through which the ore passes into the space between the upper grinding-plate, J, and the lower grinding-plate, M. The lower face of the upper grinding-plate, J, is made conical, as shown in Fig. 1, and has angular or V-shaped grooves N formed in it, as shown in Fig. 2, to serve as a dress for crushing or breaking the ore. The face of the lower or stationary grinding-plate, M, has radial grooves or slots O formed in it to operate in connection with the V-shaped grooves N in crushing the ore. The lower grinding-plate, M, is bolted to a strengthening plate, P, which is bolted to a ring-flange formed around the upper inner edge of the ring-trough Q.

To the upper side of the strengthening plate K are bolted the upper arms of the angular bars R, the lower arms of which project into the trough Q, and have their lower ends rounded to serve as journals for the ring-plates S, placed within the trough Q, and resting upon the lining-plate T, attached to the bottom of said trough.

In the upper sides of the lining-plates T are formed longitudinal grooves to serve as a dress, in connection with the ring-plates S, for grinding the ore.

To the inner surface of the outer sides of the trough Q are bolted lining-plates U, against which the outer sides of the ring-plates S work. The trough Q is securely bolted to the frame A.

Through a screw-hole in the center of the strengthening-plate P passes a hand-screw, V, upon the upper end of which rests and revolves the lower end of the upright shaft H, that carries the upper grinding-plate, J, so that the said upper grinding-plate can be adjusted at any desired distance from the lower grinding-plate, M, as the character of the ore may require. The hand-screw V is provided with a jam-nut, W, for locking it in place when adjusted.

With this construction, as the ore is fed into the hopper L it passes into the space between the grinding-plates J M and is crushed. As the



ore is crushed it is fed outward by centrifugal force, and escapes at the outer edges of the grinding-plates J M into the trough Q, where it is further ground and pulverized between the ring grinding-plates S and the face-plates T U, attached to the said trough Q. The pulverized ore escapes through the screen X and falls into a receiver placed beneath the machine. The screen X is secured to the outer side of the trough Q, or to supports attached to the said trough.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In an ore-grinding apparatus constructed substantially as herein shown and described, the combination of the shafts C H, the gear-wheels F G, the upper grinding-plate, J, attached to the shaft H, having its lower side or face concaved and provided with V-shaped or angular grooves N, and having a strengthening-plate, K, attached to its upper side, the lower grinding-plate, M, having radial grooves or slots in its face, the strengthening-plate P, attached to the grinding-plate M, the trough Q, provided with facing-plates T U, and the

ring-plates S, carried around by the angular bars R, attached to the plate K, as set forth.

2. In an ore-grinding apparatus, the upper grinding-plate, J, made with V-shaped grooves N in its concaved face, substantially as herein shown and described.

3. In an ore-grinding machine, the combination, with the upper grinding-plate, J, having V-shaped grooves N in its concaved face, and its supporting and driving mechanism, of the lower grinding-plate, M, having radial grooves or slots O in its face, substantially as herein shown and described, whereby the ore is crushed, as set forth.

4. In an ore-grinding apparatus, the combination, with the grinding-plates J M and the ring-trough Q, of the angular bars R, the ring-plates S, and the facing-plates T U, substantially as herein shown and described, whereby the grinding of the ore is completed, as set forth.

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Witnesses:

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