C. M. BROWN.

Ore Crusher and Grinder.

No. 201,646. Patented March 26, 1878.

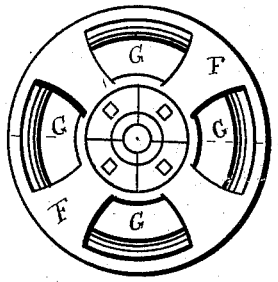
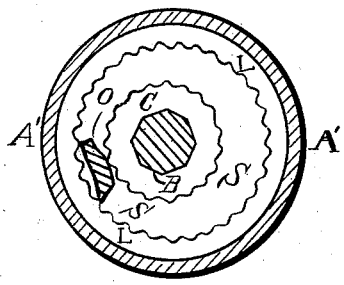


Fig 3

Fig 2



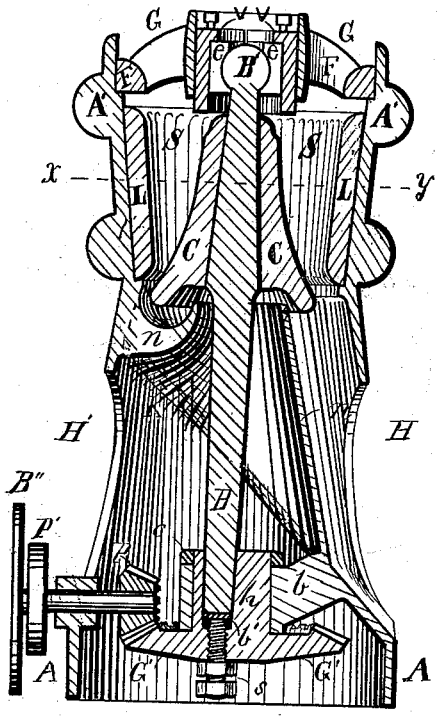


Fig 1

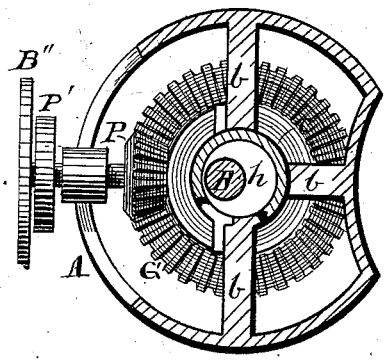


Fig 4

Witnesses

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CHARLES M. BROWN, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN ORE CRUSHERS AND GRINDERS.

Specification forming part of Letters Patent No. **201,646**, dated March 26, 1878; application filed June 23, 1877.

To all whom it may concern:

Be it known that I, CHARLES M. BROWN, of the city of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Ore-Crushers, which is fully described in the following specification and accompanying drawing, in which—

Figure 1 is a vertical section through the center of my machine. Fig. 2 is a horizontal section on the line *x y*. Fig. 3 is a plan view of the cover which fits in at the top of the machine, and Fig. 4 is a plan view of the bracket which carries the larger driving-gear.

The object of my invention is to furnish a strong compact machine in which large pieces of ore may be broken into smaller fragments by the regular continuous movement of the mechanism, and also in which the power used for crushing the ore shall be applied in a more advantageous manner than has been done heretofore in machines designed for this purpose.

In Fig. 1, A A A′ A′ represent an upright circular shell, its longitudinal form being indicated by the outlines of the figure. This shell has also an opening, H, on one side, for the egress of the crushed ore, and another, H′, on the opposite side, to allow of ready access to the mechanism within the lower part of the shell. F F is a circular cap or cover, which is accurately fitted within the top of the shell A A A′ A′. B B′ is an upright shaft or spindle, whose upper end is pivoted within an opening in the center of F F, with a ball-and-socket bearing, B′ *e e*. The sides of this circular opening in F F are bored or planed straight and parallel with each other, and the outside of the socket *e e* is made to fit this opening, so that the end of the spindle, with its socket, may move upward or downward through the center of F F. It being desirable to take up any lost motion in this socket which may result from wear, it may be made of two concentric rings, which fit together in the form of conical surfaces, the one within the other. These rings are divided longitudinally, and the segments of the outside ring are drawn, as wedges, over those of the inner ring by means of set-screws through the overhanging lips *v v*. The lower end of B B′ is pivoted in a bearing in the hub *h* of the bevel-gear G′ G′. This bearing is placed in an eccentric position with reference to the center of the center of the hub. The end of the spindle rests on a loose plate or button, *b′*, which is raised or lowered by the adjusting-screw *s*, which passes through the lower part of the hub *h* in a line with the axis of the spindle. Below the bolt B′ the spindle is contracted to form a neck, and below this neck it is again enlarged in the form of a pyramidal section, to receive the conical breaking-head C C, which is accurately fitted thereon.

L L is a circular lining, made in sections, and placed in the interior of the outside shell, nearly opposite the breaking-head C C. Between this circular lining and the breaking-head the ore is crushed, and these pieces are made separate from the adjoining parts of the machine, that they may be made of harder and more durable material, and that they may be readily replaced by similar pieces when they are worn out by use. Their wearing-surfaces may be either smooth or corrugated. The bevel-gear G′ G′ revolves, near the lower center of the machine, in a bearing connected by the bracket *b b b* with the outside shell. A collar, *c*, tightly fastened around the top of the hub *h*, holds the gear in its position. This gear receives its motion from a bevel-pinion, P, on a shaft, which carries the pulley P′ and balance-wheel B″. This shaft revolves in a bearing in the side of the shell A A A′ A′. Across the interior of the outside shell extends the inclined plate K, having an opening in its center, around which rises the conical shell *n n*, which incloses the spindle B B′, and extends upward beneath the overhanging rim of the breaking-head C C. The interior of this shell is of sufficient size to allow of the required movement of the spindle.

The operation of the machine is as follows: Ore is fed in at the top through the openings at G G, and falls into the annular space S S around the breaking-head C C. The driving mechanism being set in operation, the breaking-head receives an eccentric gyratory motion from the eccentrically-placed bearing in the hub of the gear below, and advances successively toward every portion of the outer wall, crushing the ore which is confined between these two surfaces. As the breaking-head ad-

vances on one side it recedes on the opposite, thus allowing the partially-broken ore to fall still lower in the wedge-like space S S, to be again and again acted upon by the breaking-head until it is reduced to fragments sufficiently small to pass through the opening at the bottom of the space. Here it falls on the inclined plate K, and passes out of the machine through the opening at H, the conical shell *n n* preventing any fragments from falling into the mechanism below.

It will be observed that the width of the bottom of the space S S limits the size of the broken ore which passes through the machine. The breaking-head C C being of conical form, and its lower portion extending below the lower edge of the breaking-surface formed by L L, as this head is raised or lowered by the adjusting-screw *s* beneath the end of the spindle, the width of the opening for the passage of the ore will be thereby increased or diminished, and thus regulate the coarseness or fineness of the product of the machine.

The ore being broken between the concave surface of the outer wall L L and the convex surface of the breaking-head C C, it will be observed, by reference to Fig. 2, that a flat piece of ore like *o* will bear at its ends on the outer wall, while the pressure to crush it will be applied at its center on the opposite side. The piece will thus be broken much easier than though it were compressed between two flat surfaces.

It is evident that motion may be given to the eccentric bearing at the bottom of the spindle B B′ by other means than by the bevel gear and pinion here described—as, for instance, by a spur-gear or pulley in the place of the bevel-gear G′ G′.

I do not limit the use of this machine to the crushing of ores, but apply it to the breaking of all kinds of stones, glass, and other substances to which a machine of this class may be applied.

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

1. The combination of the gyrating spindle B B′ and conical breaking-head C C with the exterior breaking-surface L L, the sliding socket-bearing *e e*, the eccentric bearing at the bottom of the spindle B B′, and the adjusting-screw *s*, substantially as described.

2. The breaking-head C, constructed with a concave base, as shown, combined with the inner edge of trough *n*, which said base overhangs to prevent the escape of fragments of ore into the driving-gears, substantially as described.

3. The circular concave die L, combined with the conical breaking-die C, mounted upon an eccentrically-gyrating spindle B, the upper end of which has a sliding bearing, *e*, for the spherical head B′, and a vertically-adjustable step at the bottom.

4. In an ore-breaking machine, a shell or case frame, A A′, inclosing at its upper part the concave breaker L, and provided with the oblique trough *n*, integral with the frame, the inner edge of which extends upward and within the concave base of the breaker C all around, and having a low-down discharge at one side, as shown.

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Witnesses:
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