

No. 630,511.

Patented Aug. 8, 1899.

J. H. KINKEAD.
ROCK CRUSHER AND GRINDER.

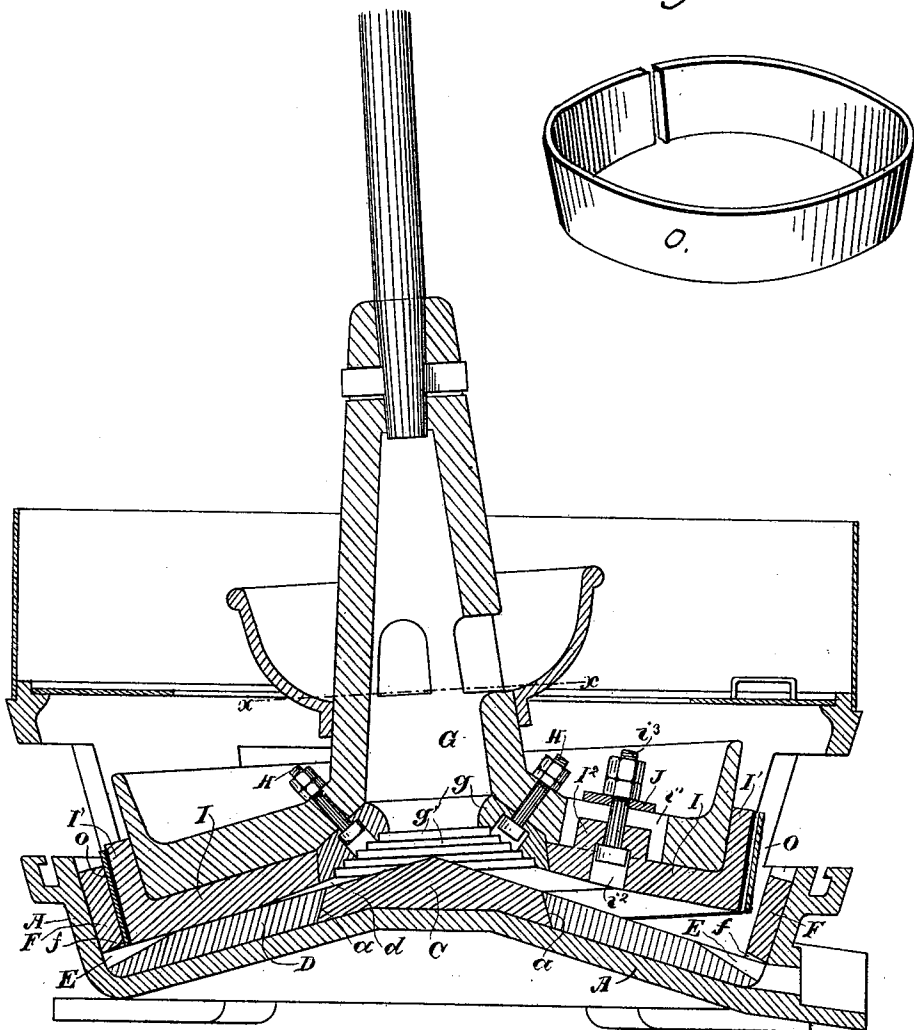
(Application filed Mar. 12, 1897.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

Fig. 3.



Witnesses,
J. H. Kinkead
J. F. Aschbeck

Inventor,
James H. Kinkead
By Duway & Co.
Att'ys

No 630,511.

Patented Aug. 8, 1899.

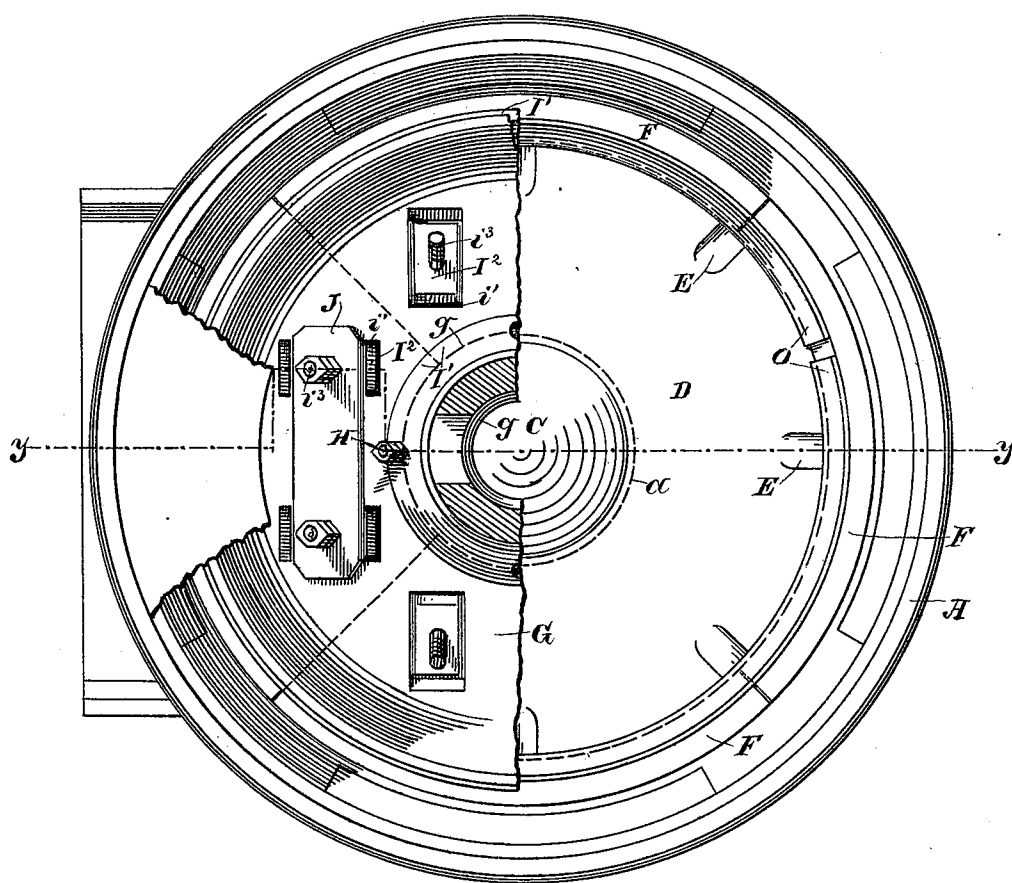
J. H. KINKEAD.
ROCK CRUSHER AND GRINDER.

(Application filed Mar. 12, 1897.)

(No Model.)

2 Sheets—Sheet 2.

Fig. 2.



Witnesses,
J. H. Kinkead
H. F. Elschick

Inventor,
James H. Kinkead
By *Dewey & Co* atty

UNITED STATES PATENT OFFICE.

JAMES HENRY KINKEAD, OF VIRGINIA CITY, NEVADA.

ROCK CRUSHER AND GRINDER.

SPECIFICATION forming part of Letters Patent No. 630,511, dated August 8, 1899.

Application filed March 12, 1897. Serial No. 627,140. (No model.)

To all whom it may concern:

Be it known that I, JAMES HENRY KINKEAD, a citizen of the United States, residing at Virginia City, county of Storey, State of Nevada, have invented an Improvement in Rock Crushers and Grinders; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in apparatus for crushing and grinding rock; and it consists in the parts and the constructions and combinations of parts hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a vertical section through my apparatus on line *y y* of Fig. 2. Fig. 2 is a plan of the same. The muller is shown in section on line *x x* of Fig. 1. Fig. 3 is a detached perspective view of one of the split rings O.

This invention is especially applicable to an apparatus in which a stationary pan of peculiar shape has a muller with connections by which it is gyrated so as to successively move over the bottom of the pan and pulverize material which is introduced between the muller and the pan-bottom. The wear of the crushing and grinding surfaces in this case is very great, and it is necessary to frequently replace the shoes and dies.

In the construction of the pan the sides A are made diverging. The bottom is made convex from the sides to a point near the center, where it becomes horizontal in the form of a frustum of a low cone. The object in thus making the central portion of the pan-bottom flat or horizontal and fitting the central portion of the die C to it is to cause the latter to seat itself fairly in the center, and when the outer die D is set down over it it practically locks the die C in place on account of the bevel of the meeting edges *d*, as shown in Fig. 1. Upon this low portion and extending a short way down the inclined part of the cone is fitted the central portion C of the die, the bottom of this die being of such shape as to fit the bottom of the pan previously described. The flat central portion of the pan receives the corresponding portion of the die, and as the periphery of this die is sloped or inclined to correspond with the incline of the pan-bottom it serves

to adjust this die centrally with relation to the pan. The upper surface of the die, however, extends to a point or complete cone, which gives a greater thickness of metal just where the preliminary crushing and greatest pressure and wear take place. The periphery of this central portion of the die is slightly beveled, as shown at *a*, and the exterior section of the bottom die D is in the form of an annulus, the inner periphery of which is shaped to fit the bevel *a*, so that when the die D is in place in the bottom of the pan these beveled portions fit together, and the outer part D locks the central portion C firmly in place and prevents its moving, the two parts then being for practical purposes a continuous die from the center to the periphery. Around the outer periphery of this die D are made radial grooves or channels E, which are deepest at the outside, extending a short distance inwardly toward the center of the die D and finally vanishing in the plain upper surface of the die. Around the periphery of the pan are fitted the segments F, which form the protection for the inner sides of the pan. These segments have grooves or channels *f* made at the bottom corresponding with the grooves E of the die D, and the two form spaces for the reception of mercury and any gold or amalgam which is caught thereby, these pockets protecting it and preventing it from being ground and mixed up to too great an extent.

The muller or grinder G has the lower portion made similar in shape to the interior of the pan; but the concavity of the bottom of this muller is less than the convexity of the pan-bottom, so as to allow of its gyratory motion and the successive contact of its surface with the bottom of the pan as it is gyrated. The interior of the muller is made of a sharper conical form than the bottom of the pan, and within it is fitted a circular die *g*, having a central opening through which the ore is delivered between the muller and the bottom of the pan. This die *g* is preferably made with a series of annular corrugations or steps *g'*, as shown, and is secured by bolts H, passing through the muller into it. The upper part of the outer periphery of the central shoe *g* is made conical or like the frustum of a cone

and essentially fits into the correspondingly-shaped inner portion of the muller G, to which it is secured by bolts II. The lower part of the periphery of the shoe *g* is of such shape as to fit within the corresponding curve formed by the inner ends of the shoe-sections I, which surround it and are bolted independently to the muller G, as hereinafter described. The outer periphery of the shoe-section I is upturned, as shown at I', to correspond approximately with the outward inclination of the sides of the pan and of the segmental dies F, which line the pan sides, so that a portion of the crushing takes place between these upturned rims and interposed wear-plates, to be hereinafter described. The muller has countersunk openings or slots made in the lower part, as shown at *i'*, and correspondingly-shaped lugs I² are cast upon the shoes, which fit into these openings. The shoe has also a countersunk opening *i*² extending up into the lug, so that when the bolts *i*², by which the shoe is secured to the muller, are inserted the heads of the bolts will be approximately level with or above the upper surface of the shoe. Nuts upon the upper ends of the bolts are screwed down, so that the bolts will secure the muller-shoe sections in place. These sections are preferably made in the form of quadrants, four of them covering the bottom of the muller, and each section has two of the projecting lugs fitting corresponding countersunk portions in the bottom of the muller, and a washer or plate J extends across from one to the other of these spaces on top of the muller, having holes at each end, through which the bolts pass, thus forming a firm means for securing the shoes to the muller.

In assembling the parts it is the practice to first place the sections I upon the bottom of the muller when the latter has been raised out of the pan, and the upturned outer portions I' being pressed against the correspondingly-shaped outer periphery of the muller the nuts are screwed upon the holding-bolts. The centers *g* are afterward inserted and secured to the interior of the muller G by the bolts II, as shown. By this construction it will be seen that the muller-shoes may be entirely worn down to the bolt-heads before being discarded and that new sections can be easily substituted at any time, and the dies in the bottom of the pan are likewise capable of renewal either as a whole or in sections by reason of the manner in which they are constructed and put together.

As there is considerable wear between the upturned edges I' of the muller-shoes and the peripheral dies F, I employ cast-steel rings O, having approximately the same depth as these sides and of a shape to fit the channel caused by the wear of the parts. These rings may be made of such thickness that whenever sufficient wear has taken place a ring of proper thickness may be introduced between the dies F and the muller, the latter,

with its shoes, being raised for that purpose and afterward lowered to its working position. Whenever further wear admits, another ring is introduced, and so on. The first ones may remain until worn out, in which condition they are reduced to about one-sixteenth of an inch thick.

In this type of machine there is always a space between the upturned sides of the muller and the corresponding sides of the dies, and this space constantly increases with wear. When it becomes large enough, a ring is dropped in place. It is not essential that this ring should closely hug the muller or dies, and, in fact, it fits loosely and presents two crushing or grinding faces, respectively, toward the dies F and toward the shoes I', so that material may pass between the faces on either side of the ring. Under such conditions wear would occur upon the dies and shoes as well as upon the ring, and when the spaces become sufficiently wide another ring may be dropped in, either outside or inside the ring already there, if it be not removed. The position of the new ring will depend upon which side the greatest wear has taken place, or, if preferred, the partially-worn ring may be removed and a thicker one introduced. It is intended in any case to have both surfaces of the ring act, and the rolling motion of the muller within the pan will insure such action. The split in the ring allows for a certain amount of spring and adjustability to the movements.

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

1. A grinding-pan having a convex bottom with a flat circular central portion and inclined sides extending upwardly and outwardly at approximately right angles with the conical portion of the bottom, an independent circular central die having a conical upper surface and outwardly and downwardly diverging periphery, and a concave bottom fitting the flat central surface of the pan-bottom and extending a short distance down the inclined portion thereof, a die having a central opening fitting over the periphery of the central die and locking it in place, said die extending to the inner periphery of the pan and having radial grooves or channels made at intervals around the periphery, independent removable segments resting upon the periphery of said die and forming a lining for the interior periphery of the pan, said segments having grooves or channels made in their lower edges coincident with those of the bottom die, substantially as described.

2. In a grinding-pan of the character described, a convex bottom with a central flat circular portion and outwardly-diverging sides with sectional protecting-dies as shown, a central die fitting said flat circular portion of the pan and having its upper surface formed with a central apex, a circular muller having a concaved bottom of lower pitch than

the bottom of the pan and adapted to contact at successive points with the pan-bottom by gyrations of the muller, shoes fitting the muller consisting of a hollow central conical section fitting the corresponding hollow interior of the central portion of the muller, and bolts whereby it is secured thereto, sectional shoes fitting the sides and bottom of the remaining portion of the muller, with their inner peripheries abutting against the periphery of the hollow shoe, lugs cast upon the upper surfaces of the outer shoe-sections, corresponding concavities made in the bottom of the muller to receive said lugs, and bolt-holes through the lugs having countersunk spaces in the bottom to receive the heads of the bolts

whereby the latter are coincident with or above the bottom of the muller.

3. In combination with a grinding-pan having a muller and shoes and dies of the character described, of one or more split rings adapted to loosely fit between the inner periphery of the dies which cover the pan sides and the outer peripheries of the corresponding shoes which cover the periphery of the muller.

In witness whereof I have hereunto set my hand.

JAMES HENRY KINKEAD.

Witnesses:

J. MATHESON,
F. CAVANAGH.