

(No Model.)

C. S. JONES.  
ORE MILL.

No. 450,236.

Patented Apr. 14, 1891.

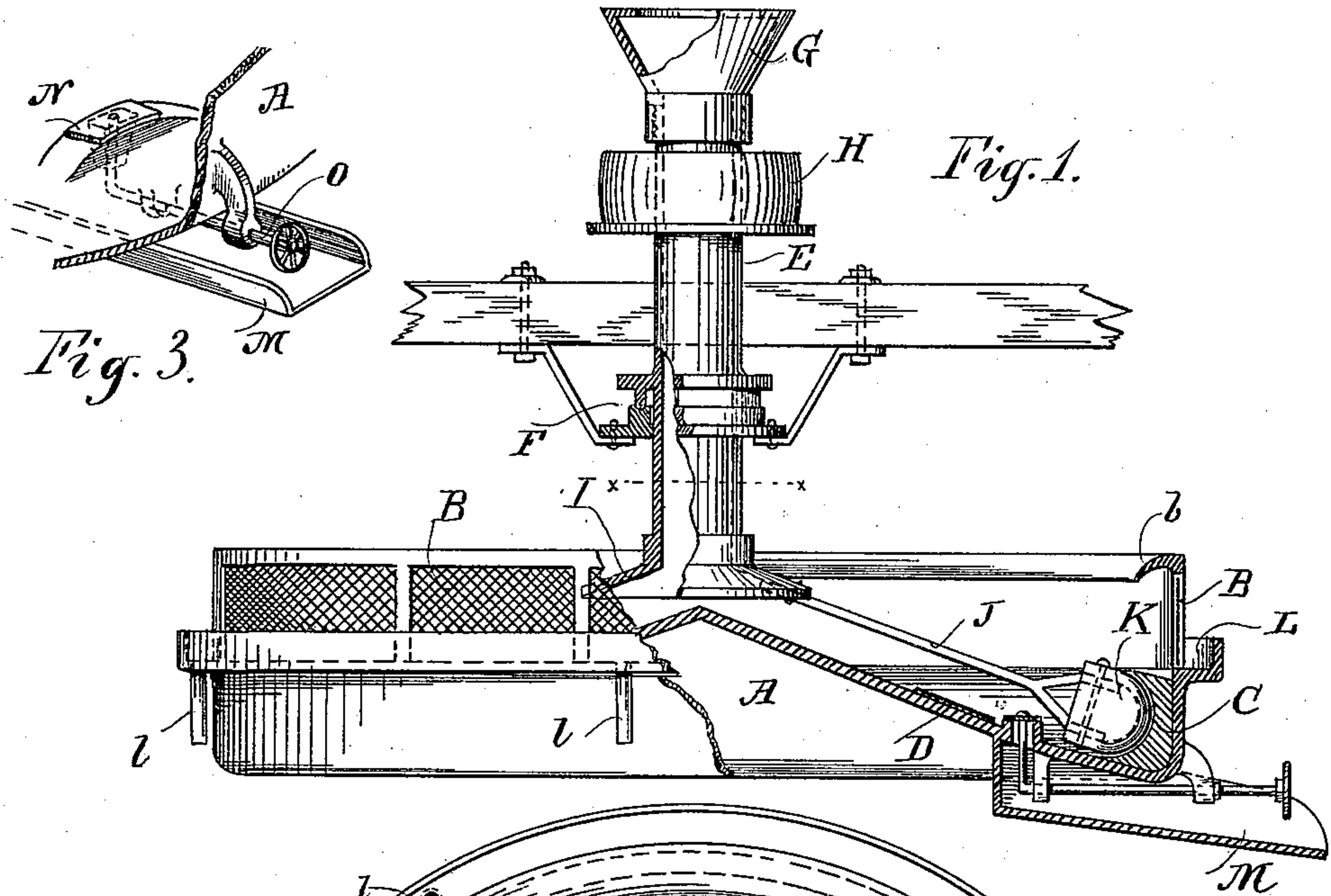
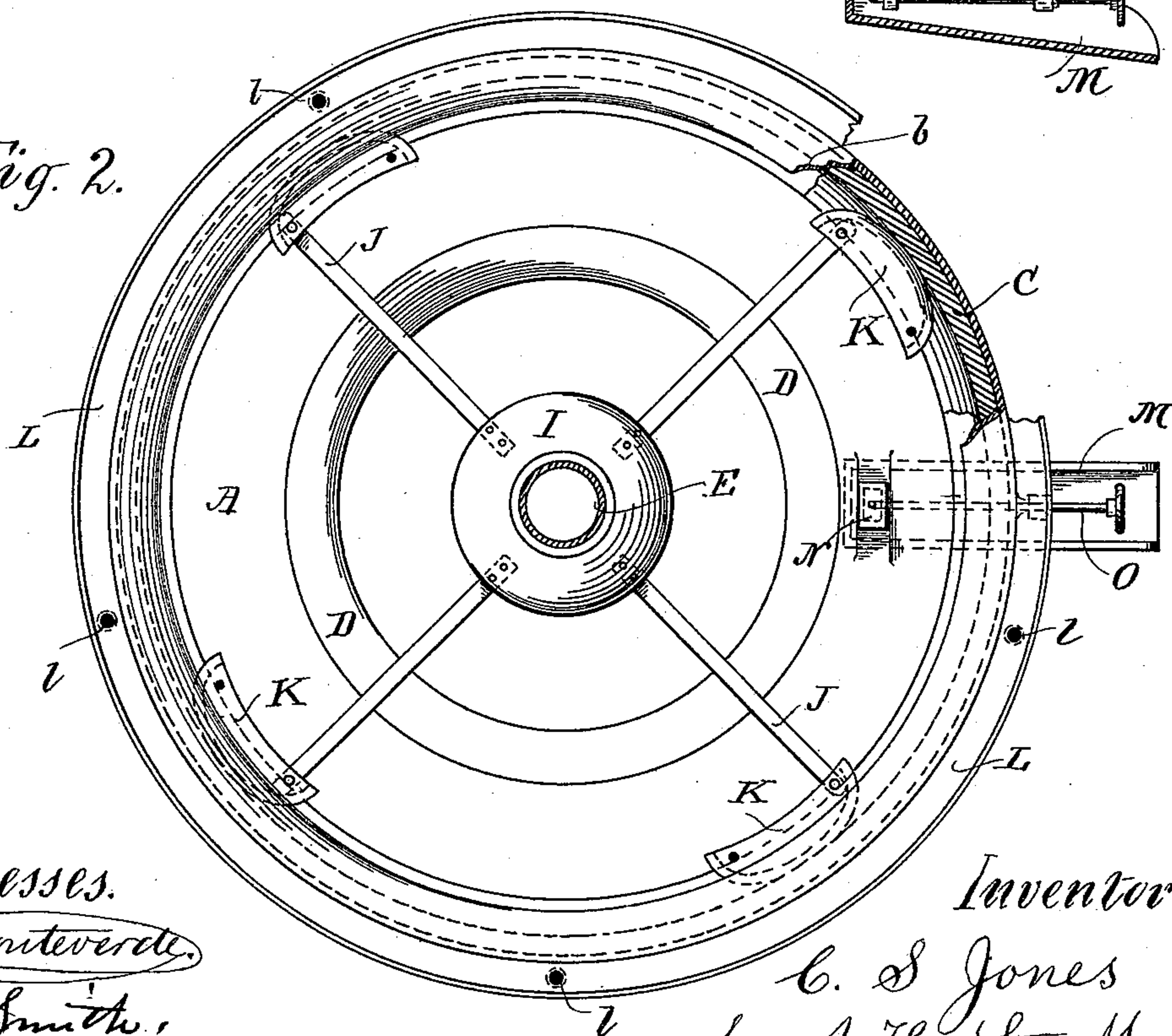


Fig. 1.



Witnesses.  
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att'y



# UNITED STATES PATENT OFFICE.

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## ORE-MILL.

SPECIFICATION forming part of Letters Patent No. 450,236, dated April 14, 1891.

Application filed July 8, 1890. Serial No. 358,066. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES S. JONES, a citizen of the United States, residing at Redding, in the county of Shasta and State of California, have invented a new and useful Ore-Mill, of which the following is a specification.

The main object of my invention is to produce a mill in which mineral ores, particularly gold-bearing quartz, may be ground in a regular and thorough manner with comparatively light machinery and little power, thereby insuring good work at low cost and with a small outlay.

A further object is to provide means whereby the free particles of metal may be amalgamated before leaving the battery, and, in fact, as fast as the ore is being pulverized.

My invention therefore relates to an apparatus for the comminution and amalgamation of ores; and it consists of the various novel features of construction and combinations of parts herein shown and described, and definitely pointed out in the claims.

Referring to the drawings herewith, which form part of this specification, Figure 1 is an elevation of my improved mill, partly broken to show the inside arrangement. Fig. 2 is a sectional plan of the same; and Fig. 3 is a detail view, in perspective, of the main discharge-opening and means for controlling it.

Like parts are designated by corresponding letters of reference in the three views.

A is the pan in which the ore is pulverized and amalgamated. This pan may be made of cast-iron in a single piece, as shown in Fig. 1, which represents a small-sized mill, or it may be formed of several sections and composed of divers materials, as preferred. Its bottom is raised centrally in the shape of a cone affording a gentle incline in every direction toward the periphery. The sides are vertical and overtopped by a reticulated or perforated screen B, which has an inwardly-projecting flange b, and is made to serve a double purpose, as will be explained further on.

Around the pan on the inside I provide a ring C, preferably made of cast-steel and distinct from the pan, though it may be formed integral therewith. It is on this ring that the grinding is done. The inner side of the ring

C has been shown as concave in the accompanying drawings, because this form is thought the most suitable, but a ring of different design would answer practically the same purpose.

D represents an amalgamating-plate, usually made of silvered copper. It is annular in shape and placed about half-way up the inclined bottom of the pan.

Above the cone formed by the pan-bottom I place a hollow shaft E, which rests and is adapted to revolve in a hanger F, secured to the timbers of a building or otherwise suitably supported. A hopper G is set at the upper end of this shaft and affords a convenient means through which the ore, water, and mercury may be dumped into the pan. The shaft is revolved through the medium of a pulley H, fastened to it and connected by a belt or similar means to a prime mover. The lower end of the shaft E is provided with a cap or outward flange I, the chief object of which is to prevent the ore from dashing upward upon encountering the bottom of the pan. To the cap I are secured arms J, extending down to near the periphery of the pan in a plane parallel with its bottom, and to these arms are pivoted by one end crushing-shoes K, which are rounded so as to fit in the groove presented by the concave ring C previously mentioned.

Two discharges are provided for the ore. One of these is an annular trough L, which is formed around and by preference cast integral with the exterior of the pan directly below the screen B. It is into this trough and thence through pipes l to a drain that the tailings are washed out when the screen is left uncovered. This is not always done, however, as it is often advisable to work the ore in a closed mill—that is to say, with the apertures of the screen B closed. Then one has to use the other discharge, which consists of a spout M, placed at the bottom of the pan and controlled by a gate N, which is worked by means of a rod O.

The operation of my improved mill is as follows: The ore with its required percentage of water and quicksilver being thrown into the hollow shaft E drops onto the point of the cone formed by the pan-bottom and there is parted. It then runs down evenly in all di-



rections toward the ring C until it has found its level. The shoes K, their pivoted end foremost, being in the meanwhile rapidly revolved together with the shaft E and arms J, the ore is strongly beaten and soon disintegrated, the coarser parts being constantly cast, owing to their gravity, toward the circumference of the pan and the finer in the opposite direction. The former are thus subjected to continuous grinding between the ring C and shoes K until reduced to the proper consistency, and the fine ore which comprises the freed particles of metal is shoved inwardly onto the plate D, where amalgamation takes place.

If the mill be worked open—that is, with the apertures of the screen B unobstructed—the surplus water and tailings are conveyed through the latter into the trough L and let out through the pipes *l*; but if the screen B is covered nothing is permitted to escape from the mill, as the screen and its flange *b* then confine the ore to the pan. In the latter case the pan is rid of its contents wholly through the discharge M after the ore has been thoroughly ground.

As will be observed, the chief advantage of the structure above described lies in that it insures a better distribution and more systematic working of the ore in the pan than are usually met in mills of this class. The ore is spread around in equal quantities irrespective of the size of the mill and gradually operated on until completely pulverized. The presence of the amalgamating-plate also adds to the excellence of the mill, inasmuch as it gathers the loose metal as soon as it is freed from its matrix, and therefore saves a greater percentage than could be done were the metal washed out of the battery before being amalgamated. Another advantage gained by my construction is the easy and powerful manner in which the crushing-shoes are operated. Their free end is thrown out by centrifugal force, it will be noticed, and consequently exercises a great pressure against the ore it comes in contact with. There is no concussion, though, but simply a continuous and steady friction, which is due to the fact that

the shoes swing readily on their pivots. Furthermore, these shoes are light, as well as the rest of the operating parts, and require but a light motive power. Thus the mill is not only effective in its work, but may be built at a moderate expense and operated cheaply.

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

1. In an ore-mill, the combination, with a pan having a cone-shaped bottom, of a hollow rotatable shaft provided at its upper end with a hopper and at its lower end with a downwardly-inclined flange, radial arms secured to said flange, and crushing-shoes secured to the outer ends of the arms, substantially as set forth.

2. In an ore-mill, the combination, with a horizontal pan having a cone-shaped bottom and vertical screened sides, and also formed or provided with an outstanding annular trough having depending pipes, said trough located directly below the screen, of a rotatable shaft having its lower end extending into the pan, radial arms secured to said lower end, and crushing-shoes pivotally secured to the outer ends of the arms, substantially as set forth.

3. In an ore-mill, the combination of a horizontal pan having a cone-shaped bottom, hopper located above the pan so as to discharge its contents upon the apex of the cone, an annular amalgamating-plate located about midway up the incline of said bottom, and means for crushing the ore within the pan, substantially as set forth.

4. In an ore-mill, the combination of a pan provided with a cone-shaped bottom having a discharge-opening therein, a gate for said opening, a spout beneath the opening, an angular rod for controlling the gate, and means for crushing the ore within the pan, substantially as set forth.

In witness whereof I have hereunto set my hand and seal.

C. S. JONES. [L. S.]

In presence of—

J. T. SMITH,  
WM. H. B. HAYWARD.