

J. H. Day.
Rock-Crushing Mill.

N^o 94,291.

Patented Aug. 31, 1869.
Fig. 1.

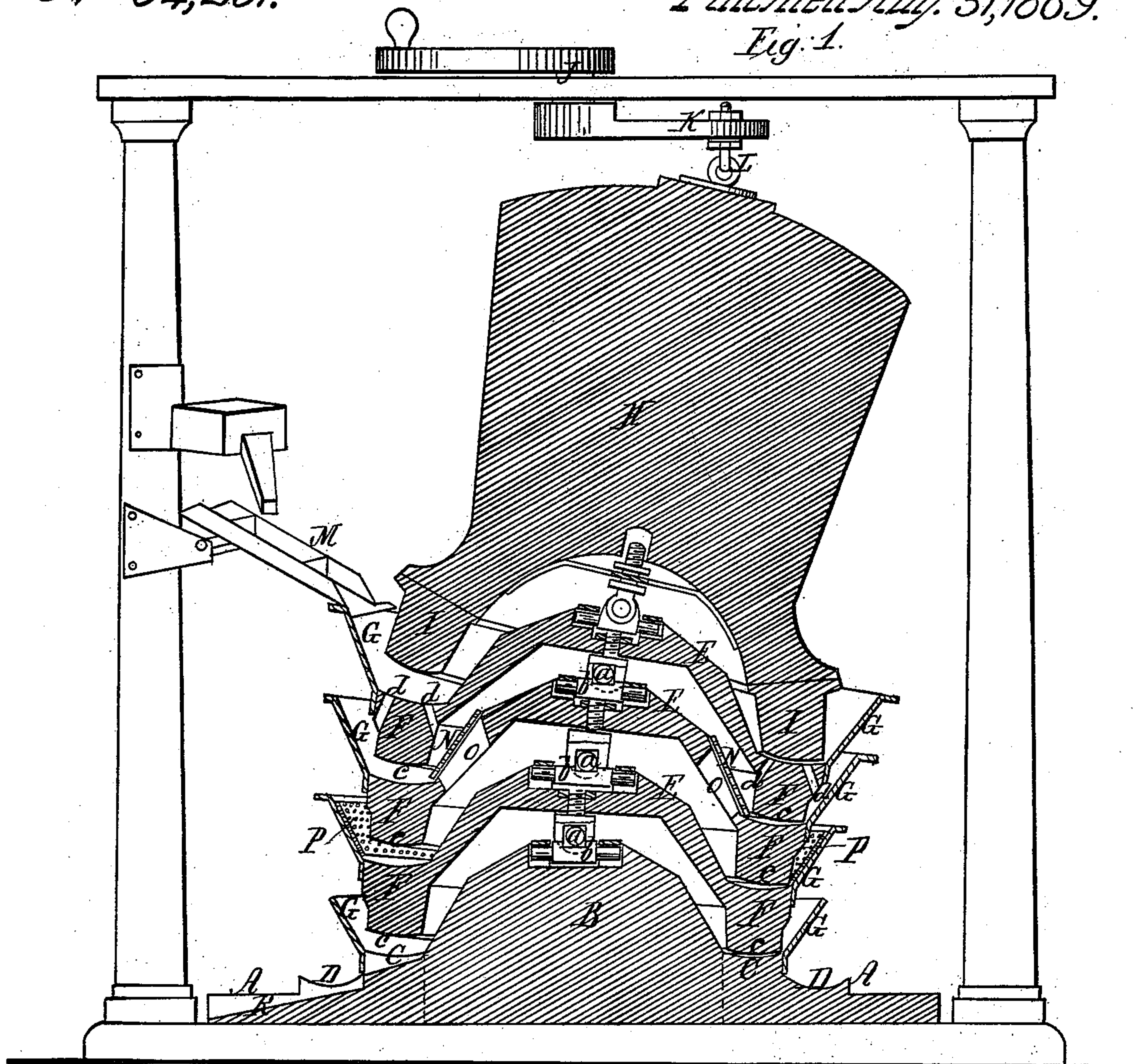
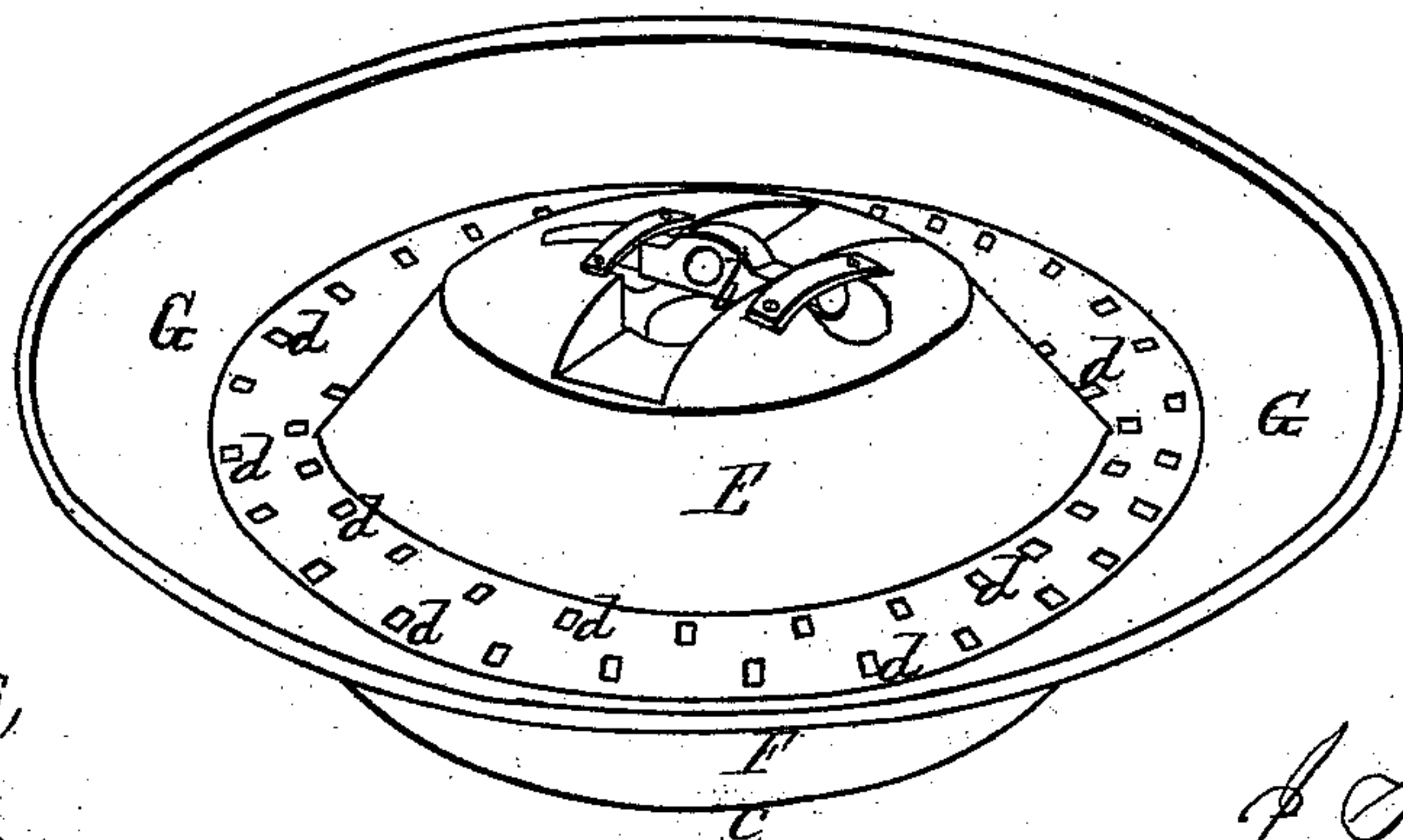


Fig. 2.



Witnesses,
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J. HARVEY DAY, OF WALLA WALLA, WASHINGTON TERRITORY.

Letters Patent No. 94,291, dated August 31, 1869.

IMPROVEMENT IN ROCK-CRUSHING MILLS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, J. HARVEY DAY, of the city and county of Walla Walla, Washington Territory, have invented an Improved Rock-Crusher; and I do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my said invention or improvements, without further invention or experiment.

The nature and object of my invention are to provide an improved apparatus for crushing and grinding quartz, or other gold or silver-bearing rocks, so that the precious metals may be afterwards extracted by amalgamation or other processes; and

It consists of a series of large disks, placed, one above another, each having a grinding-face on the lower side, at the periphery, and a track or containing-path, for the ore, on the upper side. These disks are connected together in the centre by some form of universal joint, and the whole pile is surmounted by a heavy weight, which is also connected to the upper disk by a universal joint, and has a grinding-surface at its lower outside edge. The weight and the plates or disks are so set, that when standing vertically, there will be a space between each pair of grinding-surfaces; but when inclined to one side, the grinding or crushing-face of the weight will rest on any ore that may be in the track, on the upper face of the first disk from the top, and the grinding-face of this disk, in turn, upon the track of the next disk below, and so on to the bottom. Motion is given to the weight, so that the centre at the top will revolve about a vertical line through the centre of the base, and this causes all the crushing-surfaces to come successively into contact. The ore is fed into the upper track, either continuously or intermittently, by any suitable device, and passes gradually, through a series of holes made through the track, to the next lower disk. From this, the ore, still further reduced, passes to the next disk through similar holes, and the remainder of the distance to the lowest disk through screens increasing in fineness as they descend, and placed alternately at the outside and inside of the tracks.

Referring to the accompanying drawings for a better explanation of my invention—

Figure 1 is a vertical section of my apparatus.

Figure 2 is a perspective view of one of the disks.

A is a base-plate, fastened and anchored as solidly as possible, which may be cast solid, or it may be made in separate pieces. The central cone B being cast, then the ring C, which contains the grinding-track, may be bolted upon the outside; and lastly, the part which contains the receiver D and discharge-spout.

The disks above this base-plate consist of a hollow central cone, E, and a rim, F, which may be cast solid, or made like the base-plate, in separate parts, and

bolted together. The rim F of each has a continuous shoe or crushing-surface, c, formed on its lower side, which works in the track C of the base-plate A, or that of the disk below.

The concavity of the cone E stands over the cone B of the bed-plate, so that they nearly touch each other. In the centre, between the two, is fixed a universal joint, which, as here shown, consists of two arms *a b*, crossing each other at right angles, and having journals turned at their ends.

The journals of the arm *a* turn in lugs or bearings which project downward from the inner side of the cone E, while the journals of the arm *b* turn in bearings made on the upper side of the cone B, and at right angles with those on the cone E.

The bearing or joint is so arranged, that when the disks stand vertically, there will be a small space between the track of the base-plate and the shoe of the lowest disk, and a gradually-increasing space between the crushing-surfaces of the disks to the upper one, which receives the largest fragments of rock.

Each of the disks may have a strengthening-band around the outside, and a thin metal rim, G, extends upward and outward, to catch the ore as it falls from the one above, and to hold the contents until fine enough to be discharged to the next below, the cone in each forming the inside rim of the trough or track, besides serving, by its height, to keep dust and dirt from the journals of the joint.

Any number of disks from two to ten may be used, and the upper one is surmounted by a very heavy weight, H.

This weight, in small machines, may be cast solid, and the rim I, which forms the crushing-shoe, may be bolted on.

In large machines, the weight may be formed of a pile of flat disks, bolted together; or a cylinder of boiler-iron may compose the upper portion, this cylinder being filled with stones, earth, or scrap-iron, to give it weight.

This weight is attached to the upper disk by a universal joint similar to those before described, and it is intended, when the machine is in motion, to allow this weight to incline as far as possible, and preserve its gravity.

An axle, J, passes through a frame, so that it is vertically above the centre of the base-plate; and it carries a crank, K, the pin of which is at a sufficient distance from the central line to give the weight the desired inclination.

The crank-pin is attached to the centre of the weight by a joint, L, which admits a motion in any direction; and, when the crank is turned, every portion of the shoe of the weight and the shoes of each of the disks are brought successively into contact with all of the grinding-surfaces or tracks of the plates beneath.

The feeding-device consists of a spout, M, attached

to the rim of the upper disk, and may feed the ore continuously; or, by two gates, shown in red, a certain quantity may be fed at stated intervals.

Any number of feeders may be employed at different points, and they may have flanges at the lower end, to distribute the ore. This ore reaches the upper track, and is there subjected to the action of the weight H, which reduces it, by a combined crushing and grinding-motion, till it is made fine enough to pass to the disk below. For this purpose, the track is perforated with a series of openings, *d d*, every alternate one of which is made to open outside of the shoe below, and each alternate one inside of the shoe; the ore thus reaching the second track, where it is again subjected to the crushing of the weight and of the first disk, by means of the shoe *c* of that disk, after which it passes through a series of holes, smaller, but similar to those made in the upper track, and by this means reaches the third track. After being again crushed in this track, the ore will be sufficiently fine to pass through screens N, which are placed over slots or openings O, made through the sides of the cone E. The ore thus reaches the fourth track, from which it passes, by screens P, in the outside rim G, and thus alternately, through the screens in the inside rim and the outside rim, the ore reaches the track of the base-plate, from which it is finally passed to the receiver D, and may be scraped around by appropriate mechanism, if crushed dry, so as to discharge into the trough R.

The crushing may be done either wet or dry, and amalgamation may also be carried on at the same time, by placing mercury in the third track, and having holes in the rim, through which it will gradually pass to the

bottom, and any free mercury will fall into a tank, from which it can be again pumped into the third track from the top.

The universal joints may be formed in various ways, by a chain passing from the bottom plate to the weight at the top, or by a ball-and-socket joint between each pair of disks, all that is necessary being to allow each of the disks and the weight a free motion around the fixed centres.

Having thus described my invention,

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

1. A crusher for ores, consisting of weight H, having a continuous grinding-shoe at its periphery, and moving about a universal joint at the lower side, substantially as herein described.

2. The disks, either consisting of the central cone E and the rim F, or made in any other shape, and all united together, as described, either for crushing or amalgamating, and having discharge-openings, substantially as herein described.

3. A crusher, or a crusher and amalgamator, consisting of a series of disks, one above another, in combination with the weight H, the whole united by universal joints, and operating substantially as herein described.

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

J. HARVEY DAY. [L. s.]

Witnesses:

JOHN L. BOONE,
GEO. H. STRONG.