S. B. PIKE.

Quartz Crusher.

No. 56,150. Patented July 3, 1866.

Fig. 1.

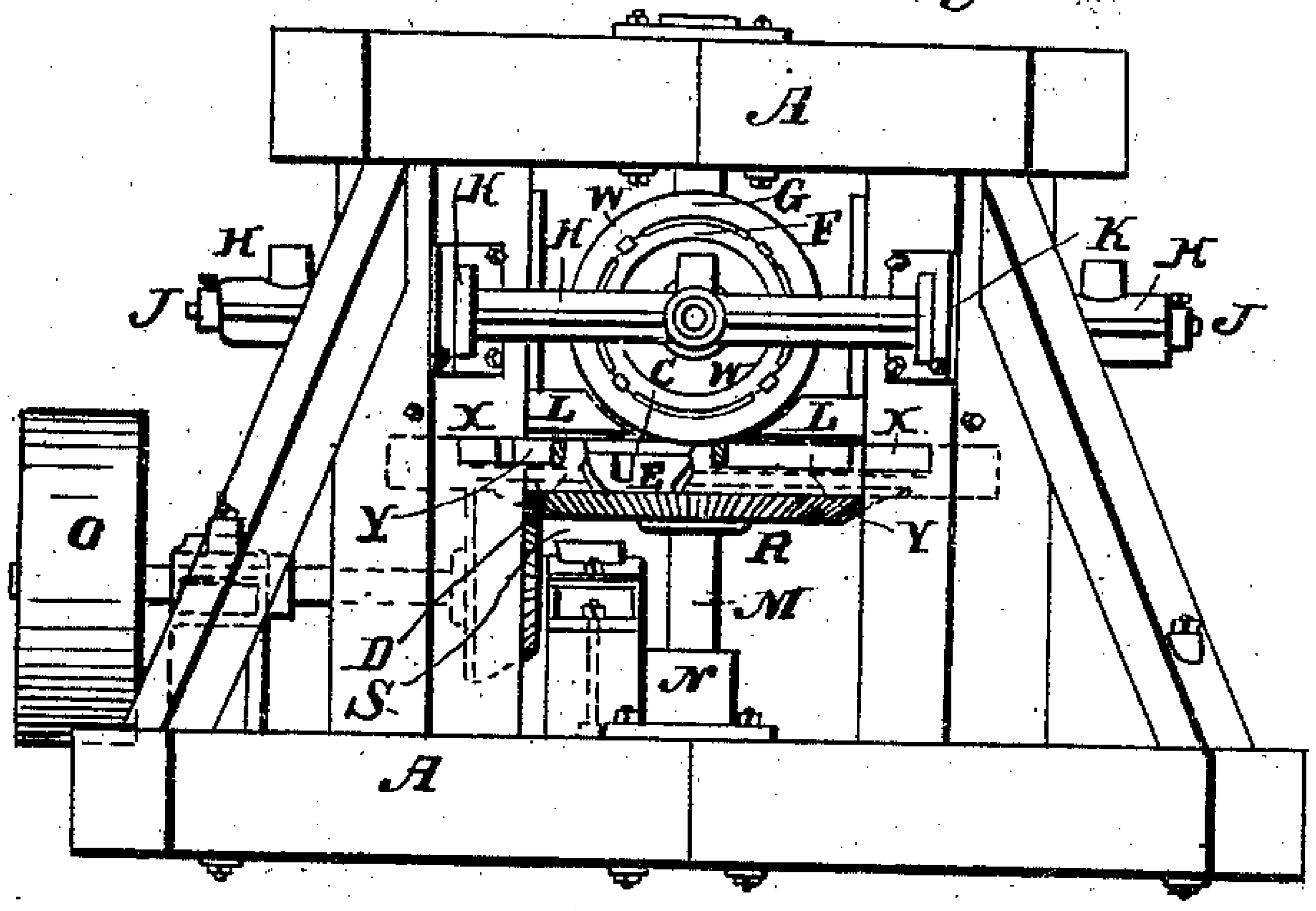


Fig. 2.

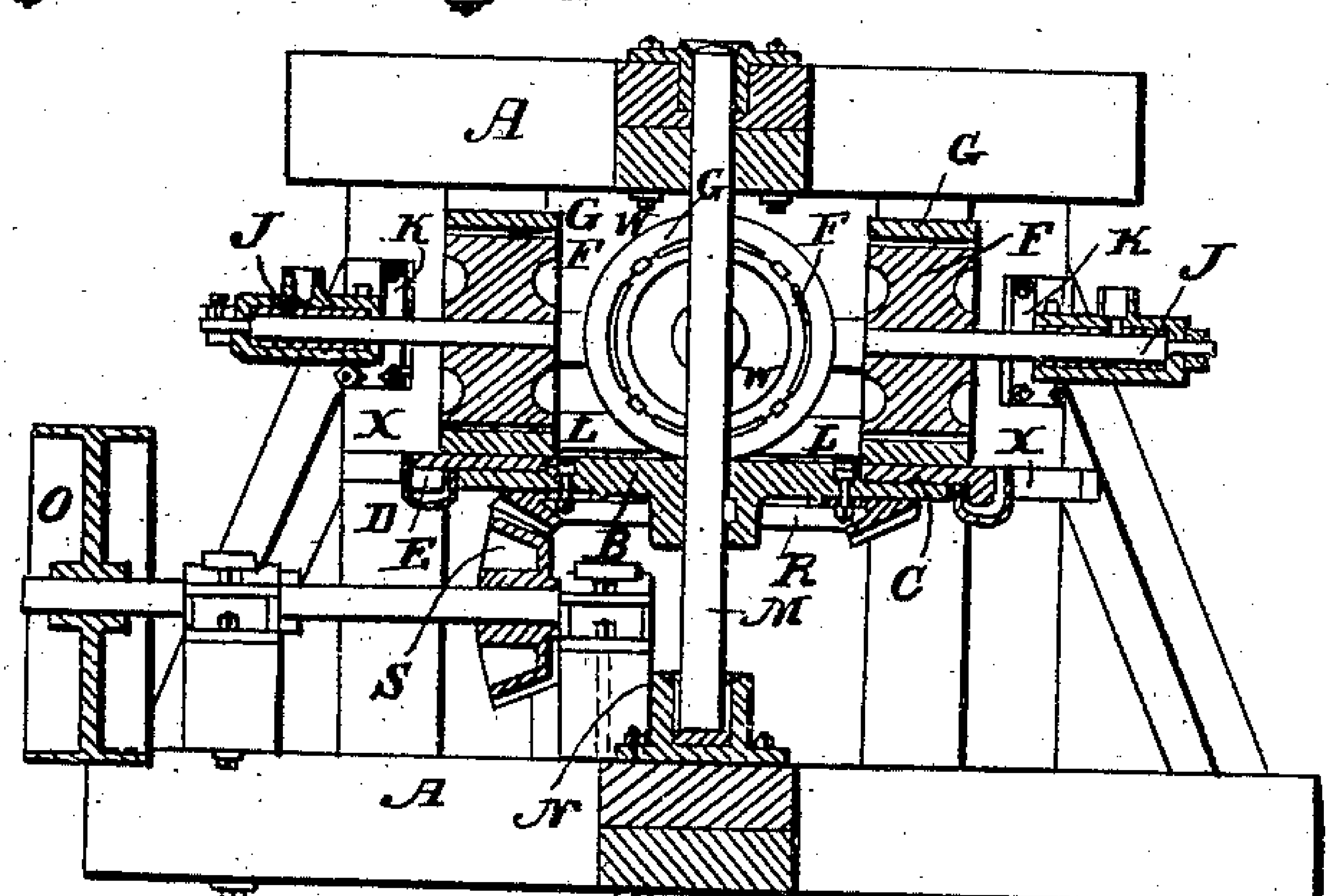
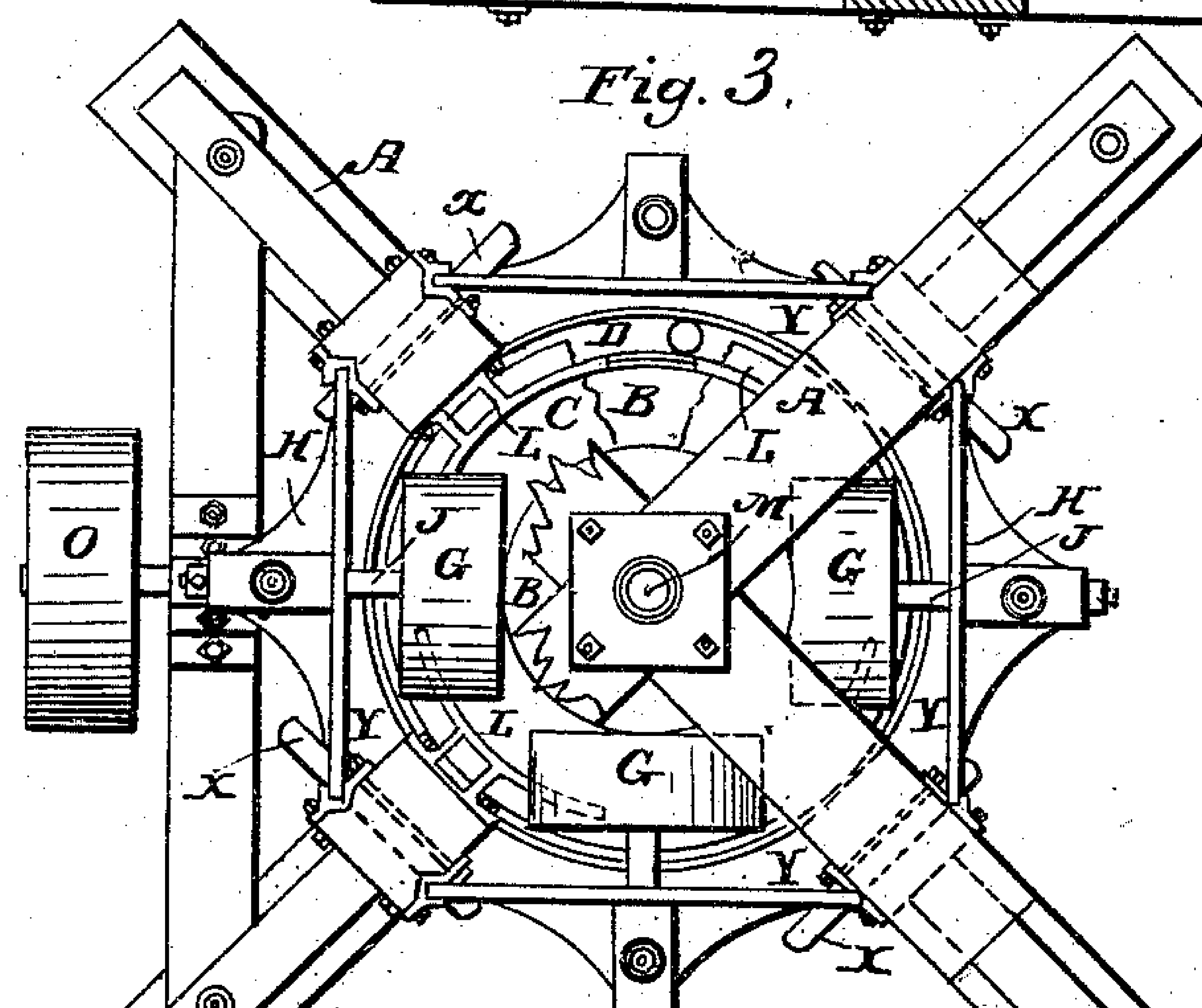


Fig. 3.



Witnesses

J. Kochemier

C. W. M. Smith

Inventor:

S. B. Pike

Assigned to himself and R. A. Vance

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

S. B. PIKE, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO HIMSELF AND ROBT. H. VANCE.

IMPROVEMENT IN QUARTZ-CRUSHERS.

Specification forming part of Letters Patent No. **56,150**, dated July 3, 1866.

To all whom it may concern:

Be it known that I, SAMUEL BARNARD PIKE, of the city and county of San Francisco, and State of California, have invented certain new and useful Improvements on Machines for Grinding and Pulverizing Quartz or other Ores Containing Metals, called "Pike's Improved Quartz-Pulverizer, 'Little Giant;'" and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making part of this specification.

The nature of my invention consists of an improved mechanical device for the dry crushing and pulverization of ores and other hard substances, and relates to the employment of a flat-surfaced circular revolving disk or table, upon which are placed heavy rollers of about eight hundred pounds weight, and having a flat face, and which conform and adjust themselves to the surface of the disk or table by means of a journal and bearing in a horizontal bar resting in slotted guide-boxes and having a vertical but not lateral motion in the same.

The nature of its operation consists in the ore, when it is fed upon the revolving disk, being thown by its own inertia and the centrifugal force of the plate or disk under the rollers and off of the plate into a gutter placed for its reception, either before or after it has received a change of direction from guides placed around between the rollers on the upper surface of the disk, the ore from this arrangement being all obliged to pass under the rollers, and with the least possible cushion between the rollers and disk. From the gutter, which is suspended under the edge of the plate and attached to the frame, the ore is removed by means of scrapers into a cylindrical bolt or sieve, from whence all that will not pass through the sieve is returned by means of an elevator to the revolving plate, to be again passed under the rollers and reground.

In the accompanying drawing, A A is a strong wooden frame, mortised, tenoned, braced, bolted, and keyed together, for the support of the machinery and the attachment of its fixed parts. B B is a circular plate, having a recess for the reception of a hard-iron die, C, which extends beyond B B edge like a flange. B B revolves on a vertical axis, M, which is stepped at N and held in a perpendicular position by a box inserted in the upper part of the frame in rear of P.

D is a gutter, adjusted under the edge of the plate B by means of the wooden binders Y Y and keys X, and supported by brackets attached to the frame A A. E is a scraper, attached to the die C and fitting the gutter D. F F are self-adjusting rollers, two or more, (I prefer to use four, as this number is best adapted to balancing the working of my machine,) which rest upon the annular die C and receive motion from its surface. These rollers are shod with a hard-iron shoe or tire fastened with keys W W.

L L are guides, attached by bolts to the posts of the frame A A and between the rollers F F, and adjusted above the upper surface of the revolving plate by means of slots in their base, near to but sufficiently removed to avoid friction on the plate. These guides fill that part of the circumference of a circle not occupied by the rollers F F, except sufficient space on each side for these rollers to play without friction.

The hub I, bar H, and slotted guides K K allow the rollers F F to revolve and rise or fall to accommodate the varying size of the pieces of ore over which they pass without admitting lateral or traveling motion.

The gutter D is used for the reception of the ground ore which passes off of the edge of the revolving plate, and its outer rim extends about one inch above the upper surface of the plate, and is from a quarter to a half of an inch removed from the revolving plate's outer edge. A spout from D delivers ore as brought around by the scrapers E into a revolving or other formed screen, T, from which the coarser particles are returned, to be reground by means of an elevator, (shown at U,) which delivers its contents into the hopper P.

The operation of my machine is as follows: The ore or other hard substance is first passed through an ordinary crusher, V, to the hopper P, from whence a pipe delivers it upon the revolving plate B B when in rapid motion, and which is given by means of the gearing R and

S by a belt upon the pulley O. I have found forty to fifty revolutions of the plate per minute to be the most desirable rate of speed at which to revolve it; yet the speed should be governed by the character of the ore to be reduced. Should it be very hard the speed may be increased. The ore falling upon the plate B when in rapid motion is thrown by centrifugal force outward over the surface of the die C, being prevented from passing too far by the guides L L, and, being carried by the motion of the plate beneath the rollers F F, is crushed or ground, and is, by the same force which impels it under the rollers, still carried outward over the edge of the die C into the gutter D, whence the scraper E carries it to a spout, which delivers it into the screen T.

Some of the advantages of my machine over those as ordinarily constructed may be enumerated as follows, viz:

First, by its feeding and discharging itself rapidly by centrifugal force all packing and cushioning of the ore under the rollers, which is so detrimental to a rapid pulverization, is prevented, and by revolving the table upon which the rollers rest a striking force can be obtained upon the face of each roller, which is increased in proportion to the square of the velocity obtained, and consequently its grinding effects are increased in the same ratio.

Second, it will reduce ore to any required degree of fineness, and can be made to grade its production suitable for concentration.

Third, its grinding parts are entirely inclosed. Its journals and bearings are all remote and protected from dust or grit, thereby preventing any cutting or heating of parts, and obviating one great objection to dry crushing, and the floating dust, which is so injurious to health, is also securely confined.

Fourth, the hard-iron die C and the shoes G on the rollers—the wearing parts of the machine—can be easily replaced at a trifling expense, while the first cost of the machine enables prospectors and men of moderate means to have a mill of paying capacity at a small outlay, while its total weight being but some four tons, and its largest piece not weighing over one thousand pounds, allows of its being transported into the new and mountainous districts of the interior at a small expense compared with the ponderous machines now in use.

Fifth, by using a flat table on which to revolve the rollers the ore can be distributed under and discharged from them in a most regular and thorough manner.

Having thus described my improved mill for grinding and pulverization so as to enable others skilled in the art to make and use the same without further invention or experiment, I will now proceed to state what I claim, and desire to secure by Letters Patent—that is to say, I do not claim as my invention revolving rollers moved by a revolving bed, for that device is known and in use; but

What I do claim is—

1. The use of the guides L L, when arranged, as described, to insure the passage of all the ore under the rollers, substantially as herein specified, and for the purpose set forth.

2. The employment of the horizontal bar H, hub I, and slotted boxes K K, or their equivalents, for the purpose of allowing the rollers F F to accommodate themselves to the varying amount of ore on the revolving plate B and die C, substantially as described, and for the purposes as set forth.

3. The gutter D, operated by the binders Y Y and keys X X, in combination with the revolving plate B B, rollers F F, guides L L, annular die C, and scrapers E, when constructed to operate in the manner specified, and for the purposes set forth.

In witness whereof I have hereunto set my hand and seal this 29th day of November, A. D. 1865.

S. B. PIKE. [L. S.]

Witnesses:
C. W. M. SMITH,
T. L. MOORE.