

J. W. V. RAWLINS.  
Mill for Pulverizing Ore.

No. 210,360.

Patented Nov. 26, 1878.

Fig. 2.

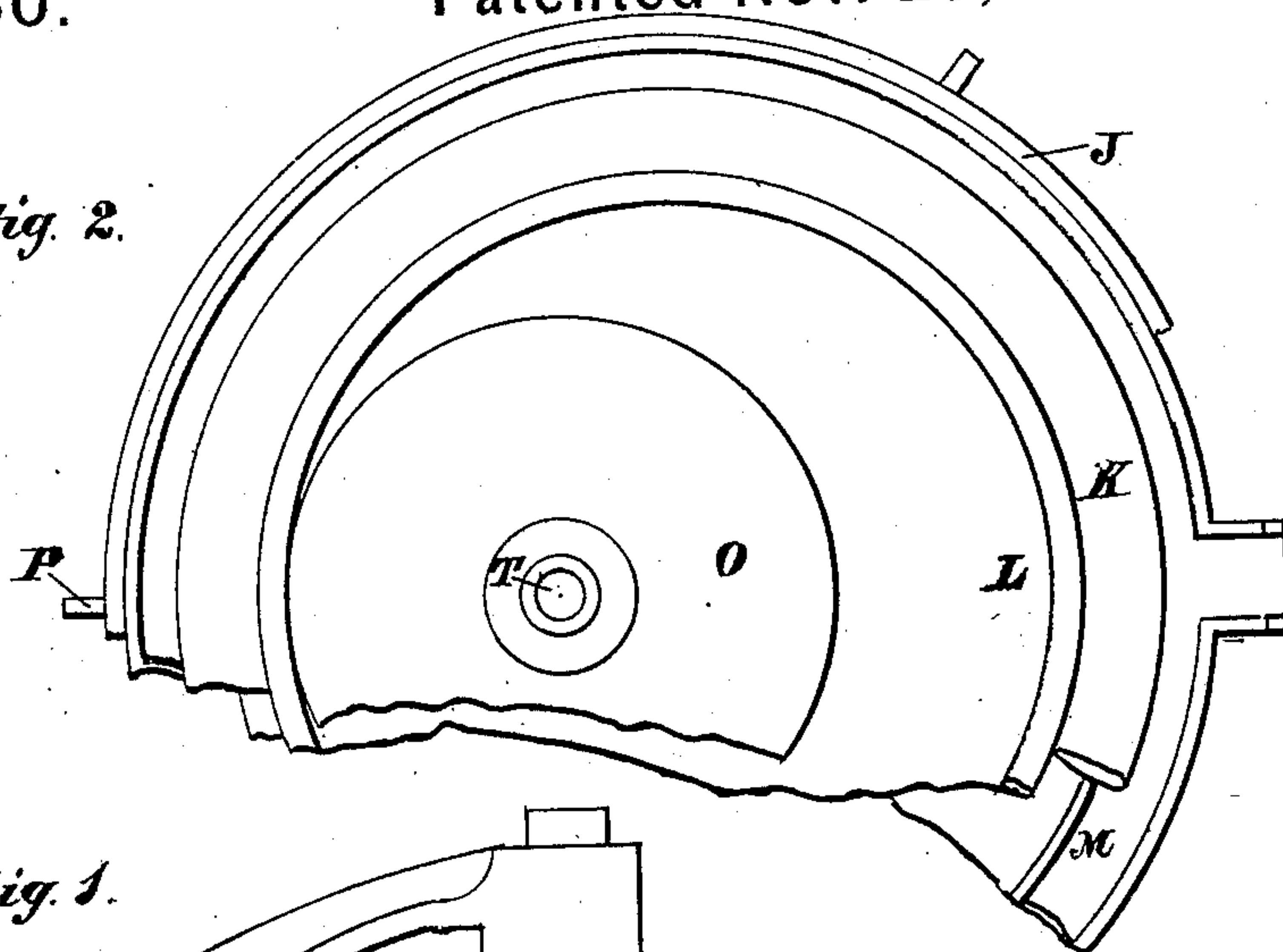


Fig. 1.

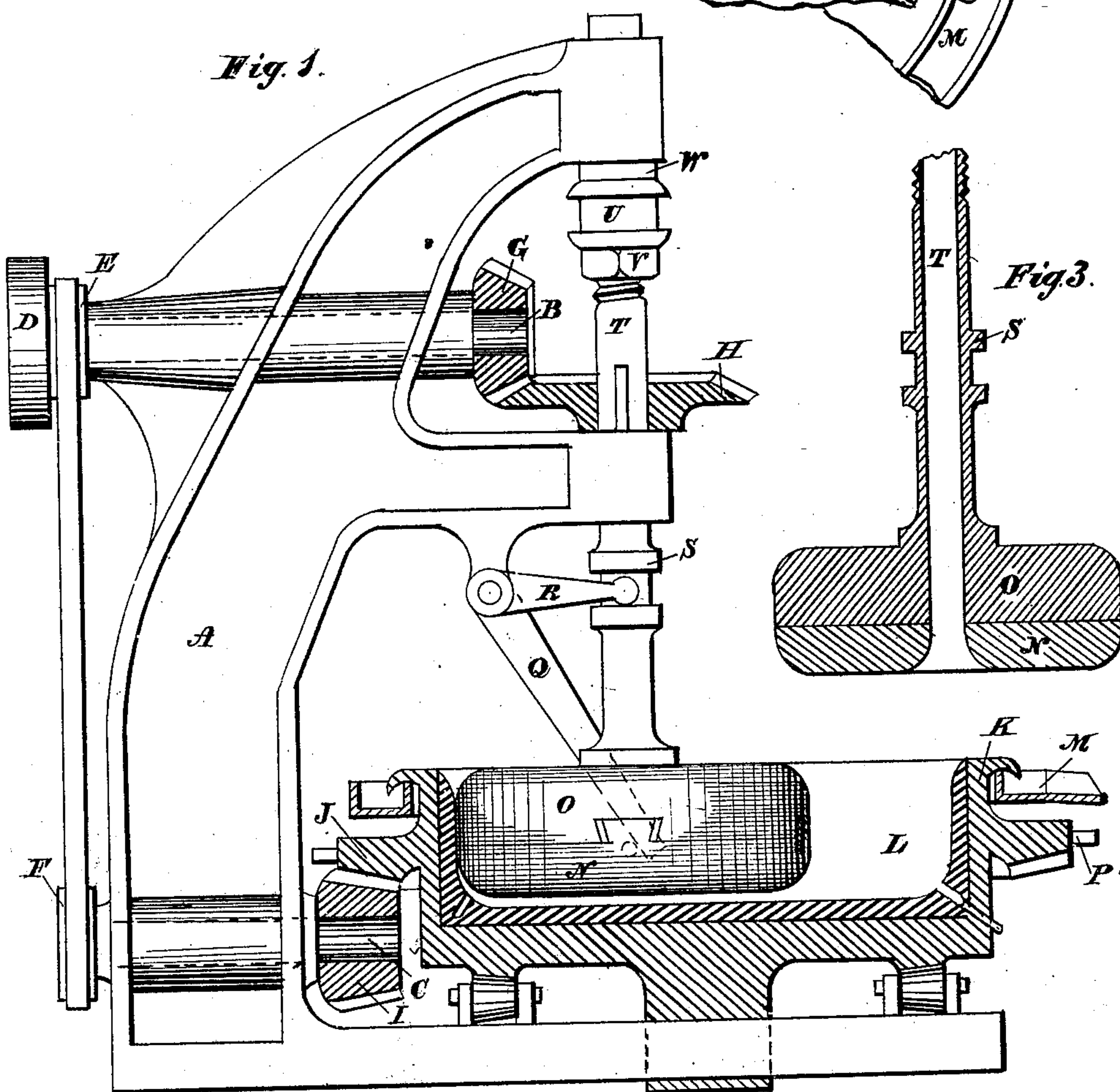
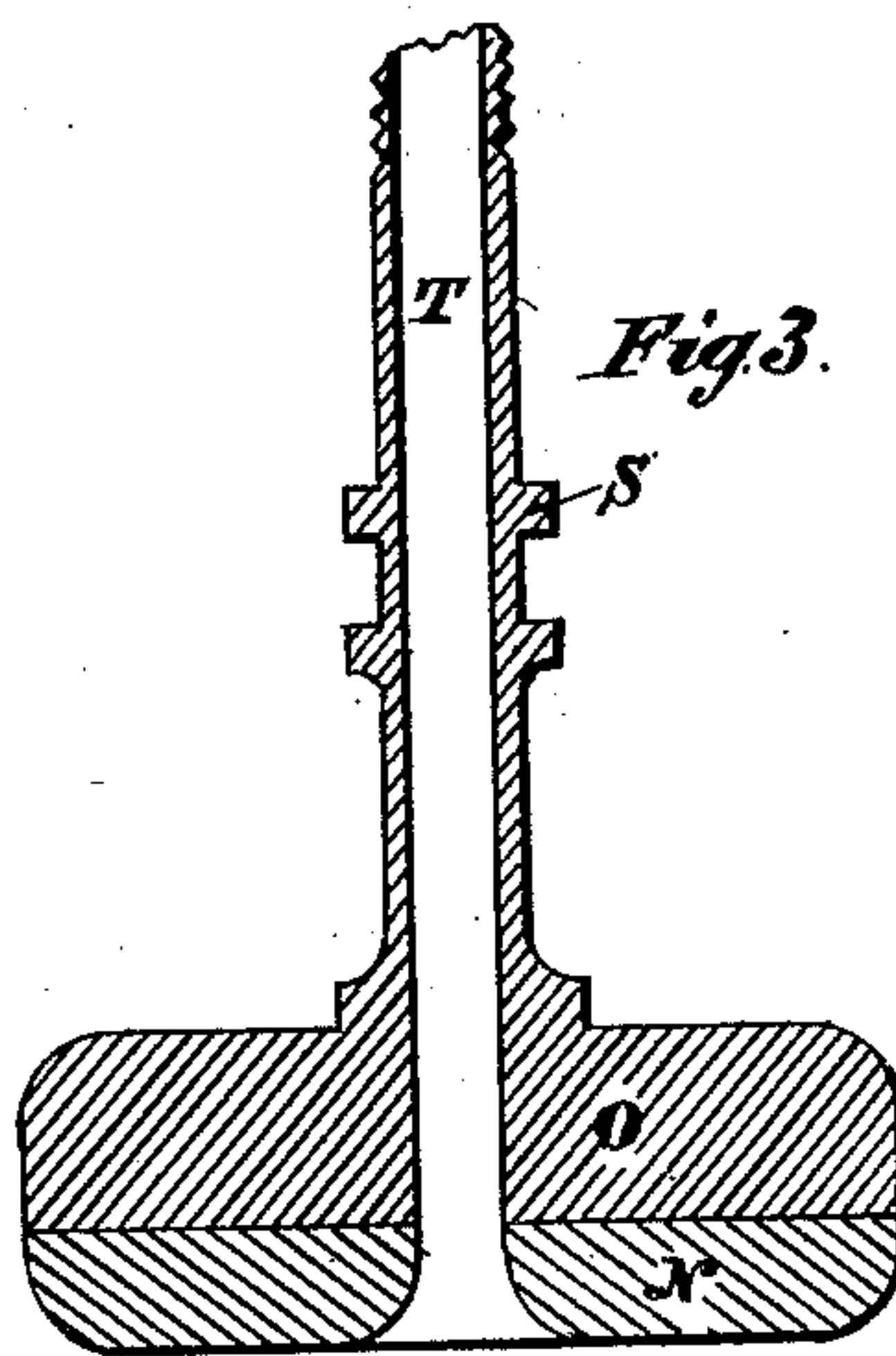


Fig. 3.



Witnesses:

Joseph A. Ames  
John H. Thomas

Inventor:

Joseph W. V. Rawlins



# UNITED STATES PATENT OFFICE.

JOSEPH W. V. RAWLINS, OF HOUGHTON, MICHIGAN, ASSIGNOR TO HIMSELF  
AND RICHARD UREN, OF SAME PLACE.

## IMPROVEMENT IN MILLS FOR PULVERIZING ORES.

Specification forming part of Letters Patent No. **210,360**, dated November 26, 1878; application filed  
April 24, 1878.

*To all whom it may concern:*

Be it known that I, JOSEPH W. V. RAWLINS, of Houghton, in the county of Houghton and State of Michigan, have invented a new and useful Improvement for Pulverizing Minerals and other Substances, of which the following is a specification:

In the accompanying drawing, in which similar letters of reference indicate like parts, Figure 1 is an elevation of the machine embodying my invention. Fig. 2 is a plan of mortar and pestle; and Fig. 3, a section of hollow shaft, pestle, and shoe.

Through the frame or standard A, which is secured to a proper foundation by bolts or otherwise, two horizontal shafts, B and C, one vertical hollow shaft, T, and a mortar, K, are suitably journaled and supported. Shafts B and C, carrying bevel-pinions G and I, give a revolving motion, through bevel-gears H and J, to mortar K and pestle O at any speed, variable or otherwise, as may be required. Bevel-gear J is fastened or cast onto the mortar, and has recesses in its periphery for the reception of pins or projections P P, for raising and dropping at proper intervals the revolving pestle O. To this pestle is fastened a shoe, N, which can be easily replaced when worn. The mortar K is also provided with a lining, L, which can be changed when necessary.

The hollow shaft T, attached to pestle O, which is lifted by the bell-crank Q R, pressing up against fixed collar S at regular intervals, compresses a spring, U, of rubber or some other suitable material, so that when the longer end of the bell-crank has traveled over the projection P the pestle shall strike a corresponding weight of blow to the pressure on said spring when lifted. By means of nut V any amount of pressure required, corresponding to the hardness of the material to be pulverized, can be attained by raising or lowering it on screwed part of hollow shaft T.

W is a loose collar on top of spring, against which the spring presses.

The hole in hollow shaft T is continued down through pestle O and shoe N, and through which a stream of clear water can be introduced for washing out the sufficiently-pulverized material from under the shoe and carrying it over the edge of mortar into circular launder M, or into an annular space in bottom of mortar lining, according to its specific gravity.

The operation of the device is as follows: When power is applied to pulley D, it drives, by means of bevel-pinion G, the bevel-gear H, which works on a feather or key in shaft T, giving a rotating motion to pestle O. It also drives, by belt or gears from shaft B, the shaft C, which gives a rotary motion to mortar K through the bevel-pinion I and bevel-gear J.

The material to be pulverized is thrown into the mortar and carried under the revolving pestle O, which is raised as often as the projection P passes under the bell-crank Q R, compressing the spring U as it rises, and letting it fall with a twisting blow sufficiently heavy to break the material into fragments, thus helping the crushing rotary motions of the pestle O and the mortar K.

What I claim is—

1. In combination with a revolving mortar, the revolving and vertically-reciprocating pestle, substantially as described.

2. The revolving mortar having the series of projections on its periphery, in combination with the bell-crank and revolving pestle having the shoulder S, whereby a vertical reciprocating motion is imparted to the pestle, substantially as described.

3. The pestle having the upright shaft T, provided with the shoulder S, and the spring U, near the top, in combination with the bell-crank and the revolving mortar and the frame, substantially as described.

JOSEPH W. V. RAWLINS.

Witnesses:

JOSEPH A. AMES,  
JOHN H. THOMAS.