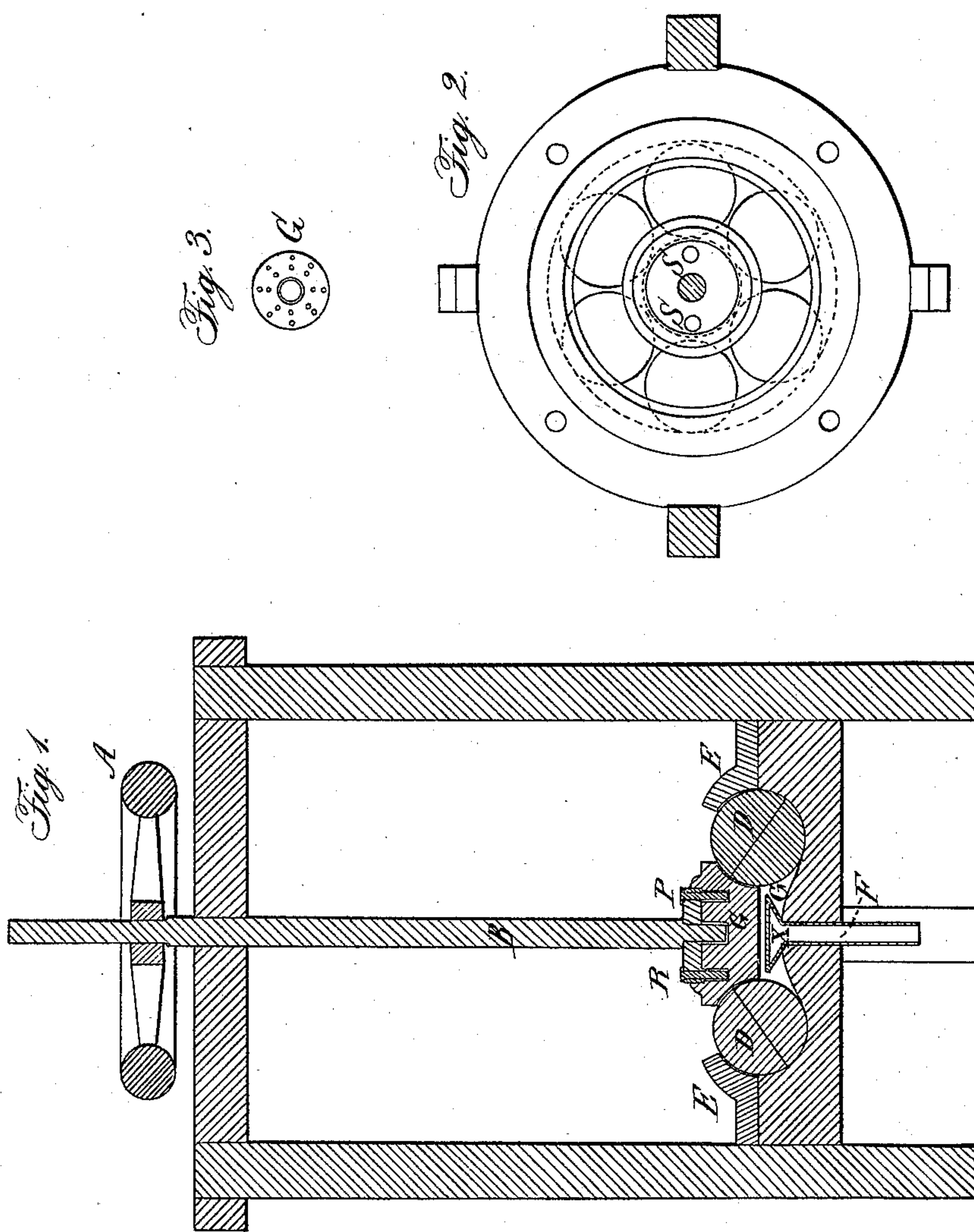


W. BALL.

Ore Mill.

No. 10,754.

Patented Apr. 11, 1854.



UNITED STATES PATENT OFFICE.

WILLIAM BALL, OF CHICOPEE, MASSACHUSETTS.

IMPROVEMENT IN MILLS FOR GRINDING ORES, &c.

Specification forming part of Letters Patent No. 10,754, dated April 11, 1854.

To all whom it may concern:

Be it known that I, WILLIAM BALL, of Chicopee, Massachusetts, have invented a new and useful Improvement in Machines for Crushing and Grinding Ores, &c., of which the following is a full, clear, and exact description, reference being had to the annexed drawings.

Figure 1 is a vertical section through the middle of the mill. Fig. 2 is a top view of the concave and rollers. Fig. 3 is a plan of the screen or sifter.

My mill belongs to that class where balls are used in the concave for grinding, the balls being carried round by a weighted table resting upon them.

My improvement consists, chiefly, in applying the pressure obliquely to the vertical diameter of the balls, instead of the mode hitherto practiced, where the pressure is applied directly upon the top of the balls, and I find that this improvement embraces many advantages over others in use. The grinding operation of the balls is thrown where it is most favorably conducted over on the bottom or bed of the concave, and the crushing operation of the balls is thrown to the sides of the concave near to the feeding-point. In the machines where the pressure is made upon the top of the balls, known as the "turn-table" machines, they are limited to low velocities, while the velocity of my machines is usually double that of others. I am familiar with a machine of this class patented by J. W. Cochran and find by actual trial that I can perform in a given time about three times the amount of work done in his machine. My follower, being near the center of the machine, allows, also, better opportunity for feeding in the material to be ground, and there is also a varying pressure upon the material to be ground incident to the lateral or oblique action of the follower, as will be seen by reference to Fig. 1. As the follower rises and falls, the pressure will vary accordingly, the pressure being greatest when the follower is at its lowest point, the balls and follower together acting like a toggle-joint.

Another feature of improvement in this machine is in the connection of the follower with the driving-shaft by means of a universal joint, so that whenever from obstructions

one of the crushing-balls should be pushed up the pressure shall be continued upon the other balls and preserve the parallelism of the shaft.

Another improvement in this machine is in placing the screen or sifter in the center of the machine, or rather, I may say that by virtue of my first-named improvement I am enabled to give the screen this desirable position.

Fourth. I have formed the screen in such manner that it does not choke, for two reasons—viz., as it screens upward the larger particles will fall away from it, and light particles—such as wood, &c.—are swept off by the revolving currents in the operation of grinding.

In the drawings, A represents the fly-wheel, which helps by its weight to give the crushing force; B, the driving-shaft; C, the follower, which is made concave on the surface opposed to the balls; D, the balls; E, the concave; G, the screen, and F the escape-pipe. The follower is connected with the driving-shaft by means of bolts R, projecting from the plate or disk P on the foot of the shaft, which enter holes S S in the top of the follower, thus forming what I call the "rocking step." The cap of the screen X is closed, so that the screening is all done through the inclined surface G. The bolts R have sufficient play in the holes in the follower to allow them freedom of motion in all directions to accommodate the action of the machine.

The whole machine is made of iron and of great strength, and the diameter of the iron balls I am using at present is two feet.

Of course it will appear that the efficiency of my crusher will not depend upon loading the disk or the driver, as the balls in my machine are driven with great velocity and operate by centrifugal force, the pressure being no more upon them than is necessary to give them the required motion.

I am aware that crushing-machines have been made similar in some respects to mine—viz., in the use of balls made to revolve by means of a flat plate or disk resting upon the top of the balls, and this disk loaded so as to give crushing force to the balls, and to these devices I lay no claim; but I regard my invention and improvement as consisting chiefly

in the manner in which I apply pressure to the balls and the advantages resulting therefrom, and

Therefore I claim as my invention and desire to secure by Letters Patent—

1. The mode, substantially as herein described, of applying pressure to the balls—that is to say, making the pressure diagonally or obliquely to the line of axis of the pressing-shaft, or obliquely to the vertical diameter of the balls, as a distinct feature from that which is known as the “turn-table” machine, where the pressure is on the top of

the balls, this oblique pressure being effected by the curved central driver or its equivalent, as hereinabove set forth.

2. The rocking step, in combination with the oblique pressure upon the balls, in the manner and for the purposes set forth.

3. Making such screen with a conical head having the lower or conical surface the screening part, for the purpose specified.

WM. BALL.

Witnesses:

WM. GREENOUGH,
R. CLEARY.