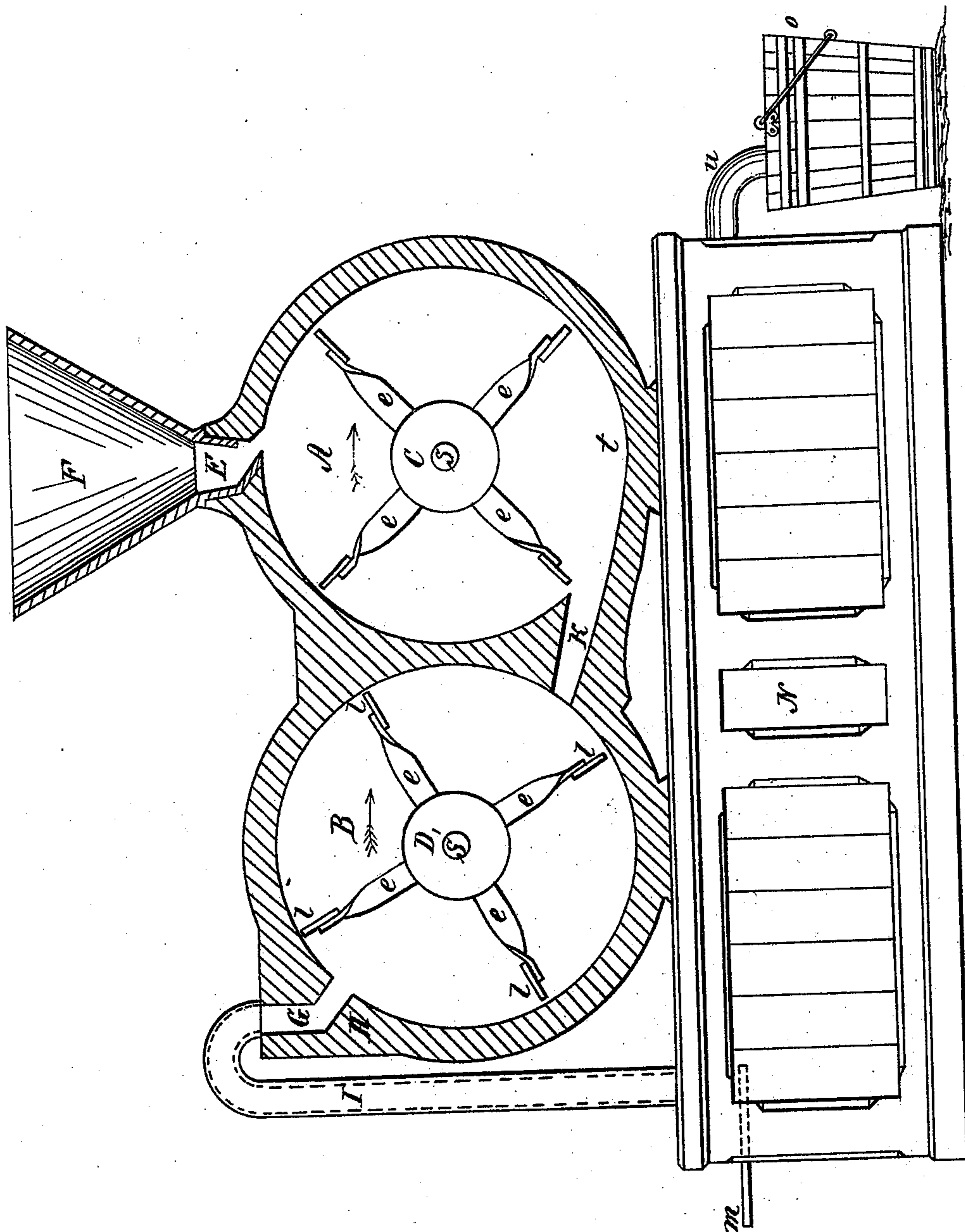


S. C. BRUCE.

Ore Mill.

No. 64,834.

Patented May 21, 1867.



Witnesses:

Walter Clarke
Charles J. Bateman

Inventor:

S. C. Bruce

United States Patent Office.

SAMUEL C. BRUCE, OF NEW YORK, N. Y.

Letters Patent No. 64,834, dated May 21, 1867.

IMPROVEMENT IN QUARTZ-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, SAMUEL C. BRUCE, of the city, county, and State of New York, have invented a new and useful crusher or pulverizing machine, called Vacuum Crusher; 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 drawing forming a part of this specification, which is a longitudinal section of the crushing cylinders and their wheels, with dust-chamber and appendages in elevation.

This invention is of the crushing machine protected by caveat of date August 6, A. D. 1866. It is designed for all kinds of crushing or pulverizing, such as ores, rock, minerals, and cereal grains. It operates by percussion, that is, by striking a quick blow with a hard and heavy hammer upon a body falling freely in the air, which body is at once shivered by the vibrations set up in it. To accomplish this work properly I have discovered the following conditions to be necessary: first, that the machine should be so arranged as to carry very little air, so that the hammers may deliver their blows upon bodies comparatively at rest; second, that the material to be broken should be attacked by a blow of greatest possible velocity; third, that the atmosphere within the machine should be as rare as possible, to avoid resistance to the shivering of the material; fourth, that every particle should receive more than one blow, and that the second blow should be delivered by a hammer moving more rapidly than the first hammer, in order to more thoroughly comminute the fine particles. In order to fulfill these conditions I have invented a machine, the description of which follows.

Two cylinders, A and B, are arranged as closely together as possible to fulfill the conditions. Cylinder A has the wheel C revolving in it, and cylinder B the wheel D. Wheel D revolves somewhat faster than wheel C, say in the proportion Velocity C : Velocity D :: 3 : 4, but this proportion may be changed. A free peripheral exhaust from case A to case B is provided, lettered K, and this is so adjusted by bevelling the sides that the tappets or beaters *l* of wheel D will quite cover the ingress into case B in their revolution, thus insuring a second blow to each particle of material fed through the machine. The exhaust G from the second wheel is arranged as drawn, so that its median line shall be a normal of the circle making the inner boundary of case B, so that heavy particles may be carried past the outlet, and receive a third blow if desirable. The shafts S S' of the wheels C and D are closely packed, so that no air may enter the cases C and D, except as supplied through peripheral feed-hole E. The quartz or other substance delivered from the machine is carried by pipe I into dust-chamber N, and this latter is relieved from the pressure of air by pipe U, which delivers its charge upon the surface of water in tub O. The exhaust K, from case A to case B, is so arranged that its median line shall be nearly coincident with an involute curve passing through shaft S' and tangent point *t*, so that material after having passed the first wheel shall be struck by the second at or nearly at right angles with its line of direction. A hopper, arranged as shown at F, feeds the material to the machine by and through the arrangement shown at E, which prevents puffing. The tappets are bolted to the ends of arms *e*, and may readily be reversed or changed, and parts exposed to heavy wear can be shod with removable friction surfaces. The two wheels should revolve at about the following rates: velocity of C > 800 turns a minute; velocity of D > 1000 turns a minute, and the proportional velocity of 3 : 4 seems to be very good ratio, though I do not confine myself to that rate. As very little air is taken at E, and as the demand for air of wheel D is greater than its supply, the atmosphere of cases A and B will be rarefied, thus reducing resistance to the attack of the tappets or hammers. If desirable, a fan-blower can be arranged in connection with pipe I, to withdraw dust from the machine and improve the vacuum. *m* is a steam pipe surrounding pipe I, to wet down the dust.

What I claim as my invention, is—

1. Revolving wheels C and D with velocities varying in some regular ratio, so that wheel D shall always revolve faster than, and in the same direction as wheel C, and for the purpose described.
2. The arrangement of wheels C and D revolving in the same direction, in separate but communicating cases A and B, and so constructing said cases and arranging them with reference to said wheels and their shafts that the external air can enter at aperture E only in the periphery of the case A, substantially as and for the purpose described.

Witnesses:

THOS. WM. CLARKE,
CHARLES J. BATEMAN.

S. C. BRUCE.