D. D. MALLORY.

QUARTZ-MILL.

No. 183,583. Patented Oct. 24, 1876.

Fig: 1.

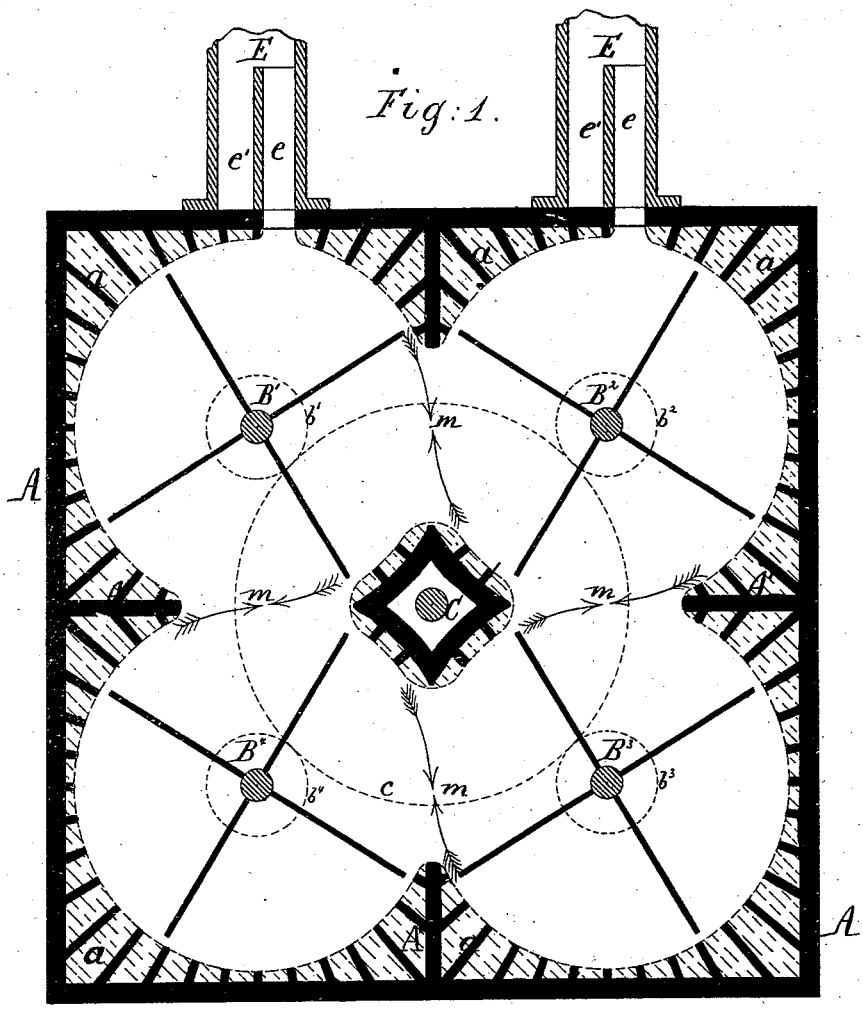
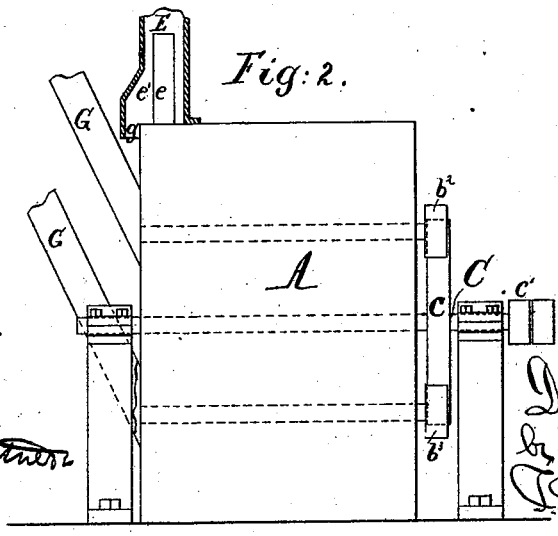


Fig: 2.



Witnesses:

M. A. Leaffless

A. B. Burr Jr.

Inventor:

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by his atty

T. D. Stetson

UNITED STATES PATENT OFFICE.

DAVID DICKINSON MALLORY, OF MYSTIC BRIDGE, CONNECTICUT.

IMPROVEMENT IN QUARTZ-MILLS.

Specification forming part of Letters Patent No. **183,583**, dated October 24, 1876; application filed August 17, 1876.

To all whom it may concern:

Be it known that I, DAVID D. MALLORY, of Mystic Bridge, in the county of New London and State of Connecticut, have invented certain new and useful Improvements Relating to Quartz-Mills, of which the following is a specification:

My improved mill or machine acts on the principle of throwing the particles of uniform or differing degrees of fineness violently against each other as a means of crushing.

It is a well-known law in mechanics that the destructive effect of impact is proportional not to the velocity simply, but to the square of the velocity. Thus, a particle striking another moving with the same velocity in the opposite direction will be shattered with four times the effect which would result from simply striking a fixed surface. The system is a valuable one, and has been many times referred to in patents, with various attempts to work it out to a practical success.

My invention is an improvement in mechanism for disintegrating refractory material by that means.

I employ two or more rapidly-whirling wheels, provided with floats, and whirled, both or all, in the same direction. This, in addition to other advantages, facilitates the communication of power.

I make the interior of the casing something larger than is required to inclose the revolving wheels, and provide for accumulating a lining of the material within the casing, so that impacts, abrasion, and disintegration occurring between the violently-impelled particles and the inclosing walls shall be largely or entirely against a lining of similar particles.

I provide for an automatic separation of the coarser from the finer particles. They are borne away in the current of air escaping from my machine, the finer particles being carried away into a long chamber or settling-room, and allowed to fall at their leisure, while the coarser particles are thrown out of the current by their momentum at an early period in the movement, and are again automatically introduced into the mill to be retreated.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a vertical section, showing my apparatus, and Fig. 2 is a side elevation on a smaller scale, certain parts being shown in section.

Similar letters of reference indicate corresponding parts in both the figures.

A is a fixed casing. B^1 B^2 B^3 B^4 are shafts mounted in suitable bearings, well guarded against grit, and carrying wings or floats of chilled iron, or analogous material, as indicated. These shafts are equipped with pulleys b^1 b^2, &c., which may be each covered with leather, rubber, or the like, to increase the adhesion to a frictional driving-pulley, *c*, mounted on a shaft, C, which extends through an aperture in the casing, as shown, and receives motion through a belt running on a smaller pulley, *c'*, from a steam-engine or other power. (Not represented.)

The material is received through passages G, supplied with automatic regulation, or otherwise, from hoppers. (Not represented.) There is also a duct, *g*, communicating with one or each of these feed-passages, for bringing down coarser particles, if they have been thrown up, as will be detailed farther on.

The particles received at or near each shaft B^1 B^2, &c., are thrown out by the centrifugal force, and may accumulate with more or less adhesion in the interior of the casing A, as indicated by *a*. These particles form a lining, which protects the interior of the casing A from destruction. Any wear or disintegration which is effected between the rapidly-revolving particles and the fixed particles is obviously no injury when the lining is constantly replaced. I provide for retaining the lining by means of fixed internal projections or wings A' in the casing. I can furthermore promote the accumulation of particles by the use of extra heat, or other means for promoting the union of the particles.

The loose matter received through the passage G receives violent blows from the floats as it is whirled around, and, seeking to escape by virtue of its centrifugal force, it is thrown off tangentially, and meets a current in the opposite direction at each point *m*. The par-

ticles which escape contact with each other move past the point *m*, and strike violently against the projecting float of another wheel. Under either condition the impact is violent, and the pulverizing effect is very rapid.

From one or more of the winged shafts B the current of air, laden with the disintegrated stone, is allowed to escape by rapid motion through the small passage *e*. On arriving at the point E the chamber rapidly enlarges, and the particles tend to be thrown by their momentum out of the current of air. If the particles are very fine, the force of the momentum is too slight to be effective, and the particles are drawn along with the current of air, and are thrown out through a nozzle (not shown) into a suitable settling-room. (Not represented.) The heavier particles, however, move out of the current, and, arriving at a place where the air is comparatively quiet, sink rapidly down into the space *e'*, whence they fall, through a duct, *g*, into a passage, G, where they mingle with the fresh or raw incoming material, and are carried into the mill to be subjected anew to the treatment.

I am aware that a cylinder with roughened interior and transverse flanges has been before known in grinding-mills, as shown in patent to J. A. Moore, No. 180,149, July 25, 1876, and such I do not claim; but

I claim as my improvement in quartz-crushing—

1. The combination, with a suitable casing, A, of two or more wheels or beaters, B^1 B^2, &c., revolving in the same direction, and projecting the particles of matter to be crushed in opposing streams meeting at the points *m*, substantially as and for the purposes herein specified.

2. In combination with the two or more wheels or beaters B^1 B^2, &c., the inclosing casing A, having a ridged or roughened interior holding the lining *a*, of like material to that being treated, substantially as and for the purposes herein specified.

3. In combination with the casing A, and two or more wheels or beaters, B^1 B^2, revolving in the same direction, the discharge-passage *c*, separating-chamber E, and return-passage *e'*, to assort the particles, and carry the coarser particles into the feed-passage G, substantially as and for the purposes herein specified.

In testimony whereof I have hereunto set my hand this 19th day of July, 1876, in the presence of two subscribing witnesses.

DAVID D. MALLORY.

Witnesses:

GEO. W. MALLORY,

S. E. GRISWOLD.