W. C. MORISON.

Machine for Crushing and Grinding Rock, &c.

No. 217,474. Patented July 15, 1879.

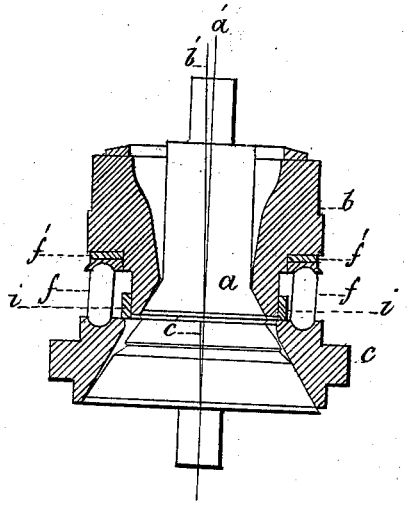

Fig: 1.

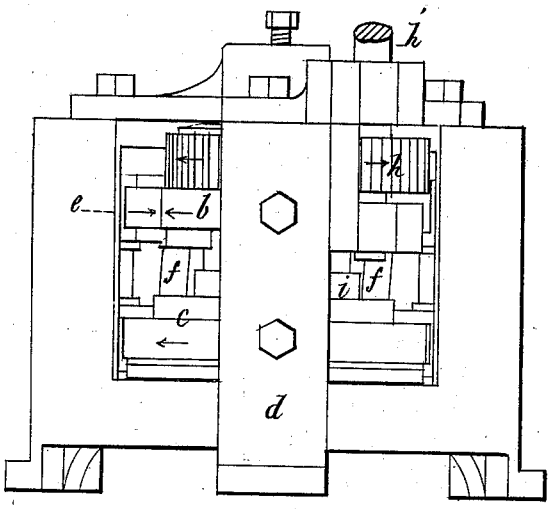

Fig: 3.

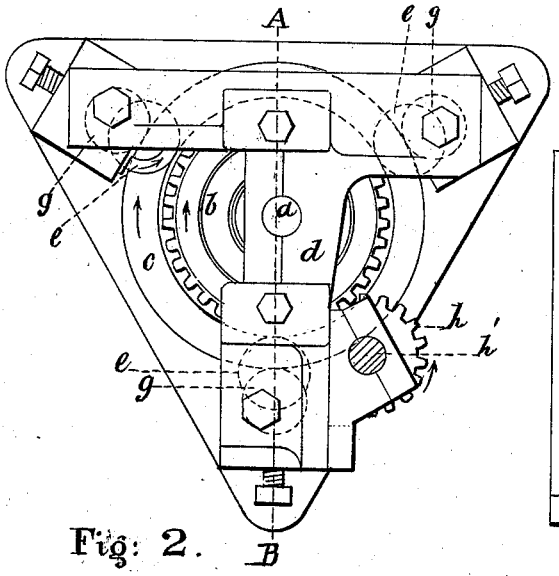

Fig: 2.

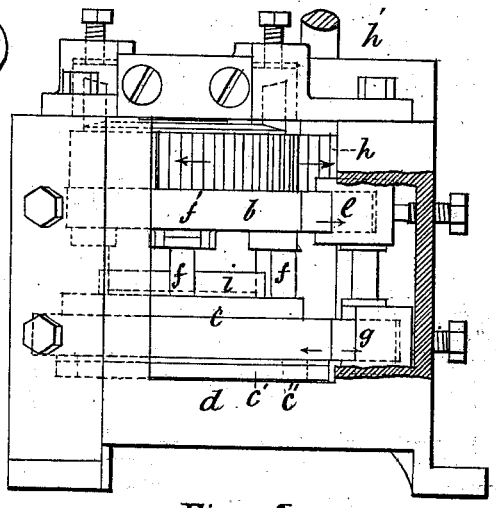

Fig: 4.

Witnesses;
W. H. Chipley
W. H. Allen.

Inventor;
William C Morison

UNITED STATES PATENT OFFICE.

WILLIAM C. MORISON, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE-HALF HIS RIGHT TO JOHN CALVERT, OF SAME PLACE.

IMPROVEMENT IN MACHINES FOR CRUSHING AND GRINDING ROCK, &c.

Specification forming part of Letters Patent No. **217,474**, dated July 15, 1879; application filed October 5, 1878.

To all whom it may concern:

Be it known that I, WILLIAM C. MORISON, of the city and county of San Francisco, State of California, have invented a new and useful Device or Machine for Crushing and Pulverizing Rock or other Suitable Material, of which machine the following is a specification.

My invention relates to rock-crushing machines; and consists of an inclined conoidal-shaped roller, having its inclined shaft set in rigid inclined bearings, in combination with a series of inclosing, revolving, and vertically-set shells, adjustable with reference to each other, whereby the material under treatment is subjected to a double pulverizing action at one operation, as hereinafter described.

The shaft of said roller is provided with a fixed bearing at each end, and revolves between said bearings within said series of vessels, the inclination of the shaft being such that the space around the roller at the upper end of each of said vessels is greater on one side than on the other; but the space at the lower end of said vessels is annular.

The vessels are set eccentrically with reference to each other to admit of the adjustment of the roller.

The material is crushed between the surface of the revolving roller and the inner surfaces of the revolving vessels. Owing, and in proportion, to the inclination of the roller, the material, while being crushed, is drawn or forced downward through the gradually-diminishing spaces within which it is crushed, the said spaces diminishing both downward and sidewise.

Figure 1 is a vertical section through the line A B of Fig. 2, and comprises the essential portions of my invention. Fig. 2 is a top plan of the machine. Fig. 3 is a view in elevation. Fig. 4 is also a view in elevation, with a part of the frame broken out to show some of the details.

The letters of reference apply to the same parts in the four figures.

When more than one inclosing-vessel is employed, for either coarse or fine crushing, with the roller *a*, the material is crushed to a certain degree in the upper vessel, *b*, whence it falls into the lower vessel, *c*, in which it is crushed as finely as desired.

By lowering or raising the vessels *b* and *c* and suitably adjusting the roller by means of set-screws or otherwise, acting on its journal-boxes, the annular space at the lower end of each of the vessels, through which the material must pass, may readily be increased or diminished, and the degree of fineness to which the material is crushed thus regulated.

In Fig. 1 the roller is inclined to the vessels *b* and *c*, and the said vessels are set eccentrically with reference to each other, to admit of the inclined roller being suitably adjusted within the said vessels. *a'* is the axis of the roller *a*, and is inclined to the axes *b'* and *c'* of the vessels *b* and *c*, respectively, so that the space around the roller *a* and between it and the inner surfaces of *b* and *c* is greater on one side than on the other at the top of the vessels, but at the bottom of the vessels the space is annular.

The roller *a* has a journal at each end. The journals fit inclined bearings in the rigid frame *d*, and the roller is free to revolve between the bearings within the vessels *b* and *c*. The vessel *c* is supported by means of the friction-ring *c''*, which rests on the ring *c'*. The ring *c'* rests on set-screws in the frame *d*. The vessel *c* may be raised or lowered by means of said set-screws.

The props *f f f f*, resting on *c*, have hemispherical ends, fitting sockets connected with *b* and *c*. The props support *b* and permit *c* to revolve somewhat eccentrically to *b*, and at a given level, while *c* is being caused to revolve by *b*, the vessels revolving on their respective centers. The said props may each be made in two pieces, suitably fitted to each other—as male and female screws—so that they can be lengthened or shortened, and thus the vessel *b* may be raised or lowered; or the said vessel *b* may be raised or lowered by means of shims *f'*, placed between *b* and the upper sockets.

The vessels *b* and *c* are maintained in position laterally by the rollers *e e e* and *g g g*, respectively. The rollers are adjustable by means of set-screws in the frame *d*, and have adjustable upright supports.

When motion is imparted to the pinion *h* by means of its shaft *h'* the cogs around *b*, which gear with *h*, cause *b* to revolve. The vessel *b*

has a dog or other suitable projection on its outer surface, which engages with a corresponding projection on *c*, causing *c* to revolve. The roller *a* remains stationary until connection is established between it and *b* by the material to be operated upon. The material, being dropped into *b* on the side from which *a* inclines, becomes wedged between the surfaces of *a* and *b*, owing to the gradual diminution of the space downward. The roller is then and thus caused to revolve with *b*, and the material is carried through the gradually-diminishing space toward the side of *b* toward which *a* inclines, and is crushed in proportion to the narrowness of the space through which it is carried. The material is also pulled downward in proportion to the degree of inclination of the roller. Motion may also be imparted directly to the said vessels or to the said roller either separately, to all of them, or to one or more of them, the others being left free.

I cover the roller *a* and line the vessels *b* and *c* with rings or staves of suitable material.

The vessel *b* being suitably fed with material, *a* is caused to revolve continuously, and the material is crushed to a greater degree of fineness as it is carried, in a measure, spirally downward, and discharged through the annular space between *a* and *b* at the bottom of *b*, whence it drops into *c*, between which and *a*, by an operation similar to the foregoing, the material is more finely crushed, even, if desired, to an impalpable powder, and discharged through the annular space between *a* and *c* at the bottom of *c*.

The ring *i* is for the purpose of confining the material within the machine as it passes from *b* into *c*.

Adjustable rollers connected with the frame *d*, and working on a suitable surface on the top of *b*, prevent *b*, and therefore *c*, from rising.

I claim as my invention—

The inclined conoidal-shaped roller *a*, having its inclined shaft set in rigid inclined bearings, in combination with a series of inclosing, revolving, and vertically-set vessels, *b* and *c*, all of which are adjustable with reference to each other, as and for the purposes described.

WILLIAM C. MORISON.

Witnesses:

L. D. CRAIG,

T. H. BERRY.