

R. PLUMMER.

Quartz Mill.

No. 81,680.

Patented Sept. 1, 1868.

Fig. 1

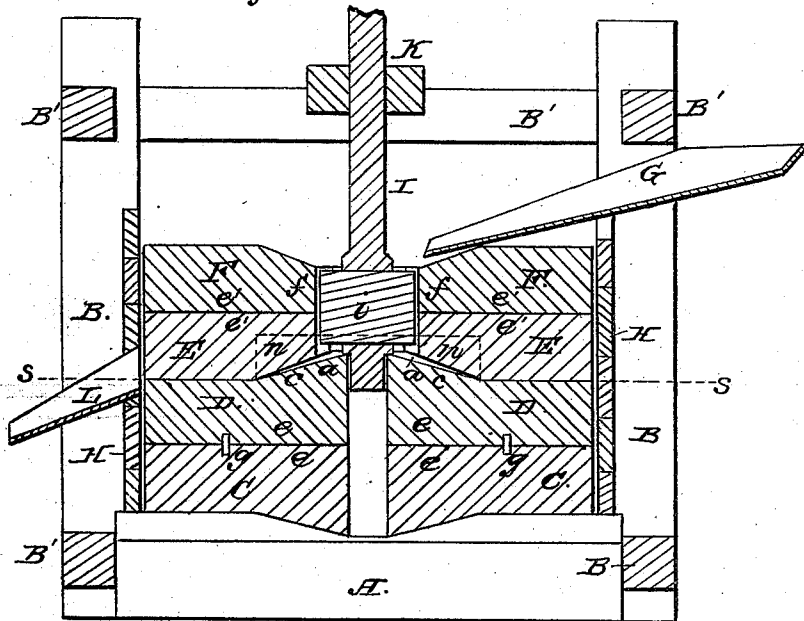
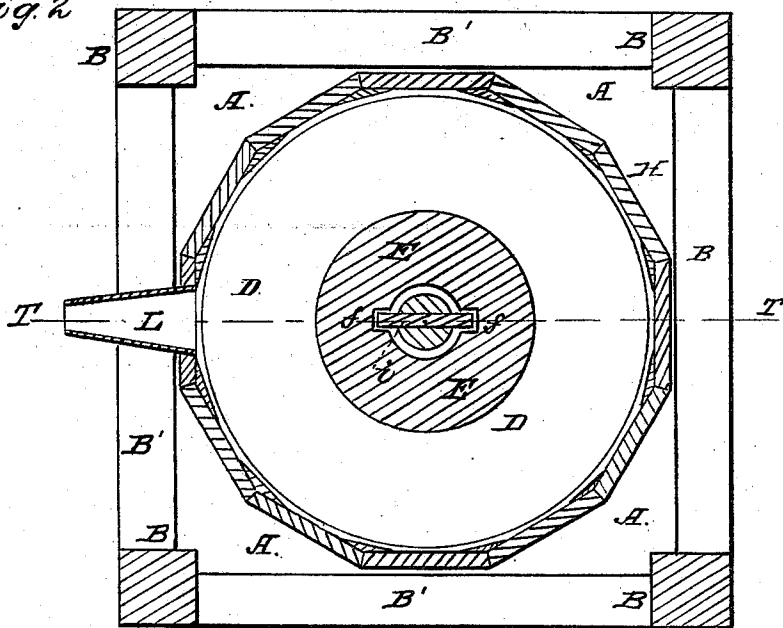


Fig. 2



Witnesses

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ROSWELL PLUMMER, OF BROOKLYN, NEW YORK.

Letters Patent No. 81,680, dated September 1, 1868.

IMPROVED QUARTZ-MILL.

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, ROSWELL PLUMMER, of Brooklyn, in the county of Kings, and State of New York, have invented certain new and useful Improvements in Mills for Grinding Quartz and analogous earthy material; and I do hereby declare that the following is a full and exact description thereof.

The accompanying drawings form a part of this specification.

Figure 1 is a central vertical section on the line T T in fig. 2.

Figure 2 is a section on the line S S in fig. 1.

Similar letters of reference indicate like parts in all the figures.

My invention consists in subjecting the material to a rubbing and rolling action between smooth or ungrooved revolving metallic surfaces, and I am able thereby very evenly and finely to pulverize the same at small cost, and in a very simple and rapid manner, and in certain arrangements of mechanism by which this is effected.

To enable others skilled in the art to make and use my invention, I will proceed to describe it by the aid of the drawings, and the letters of reference marked thereon.

A is a substantial bed, of wood or other material, suited to support the weight of my mill, surrounding which are upright posts B B B B. These posts are connected together by the several cross-pieces B', as represented, both at their upper and lower ends.

C and D are two precisely similar disks of iron lying directly upon each other. Their surfaces *e*, which lie in contact, are entirely plain, and their upper and lower surfaces are plain near their circumference, with conical projections *c* in their centres. The upper surface of these disks is my stationary working-surface, and the two are intended to be reversed in position when desired, so that when the working-surface of D is used up or disabled, it may be placed at the bottom, and the partially-conical surface of C caused to take its place as a working-surface. In the faces *e* of the disks C and D are placed dowels *g*, to prevent any lateral or twisting movement of one upon the other. Through the centre of these disks, in a line with their axis, a round hole is produced, extending entirely through them, and suited to receive the lower end of a driving-shaft, I, the upper end of which passes through a suitable cross-piece, K, and turns freely in both the cross-piece and disk.

E and F are two disks, similar in size to the disks C and D, but of different form. Their faces *e'* are plain, and lie in contact, as represented. The lower face of E is adapted to conform to the partially-conical surface of the disk D, but the conical hollow, *n*, in its centre, is of greater height than the conical projection *c*, thereby producing the cavity *a* between them, which tapers outwards from the centre to the base of the cone *c*. This forms the upper working-surface of my mill. The upper face of the disk F is precisely similar to the lower face of E, and the two are intended to be reversed, when desired, thus changing the upper face of F into a working-surface, by bringing it in contact with the upper face of D. These disks bear directly upon each other, and the weight of the whole is supported by the bed A.

Through the centre of the disks E and F, in a line with their axis, a hole is made to allow the shaft I to pass through, and also to form an opening, by which material is admitted between the working-surfaces of the disks D and E. This hole is considerably larger than the shaft I, and has longitudinal grooves *f* on opposite sides, into which project the ends of the driver, which are attached to the shaft I, and compel the disks E and F to revolve with it. H is a curb, of wood or other convenient material, surrounding the several disks, for the purpose of keeping the quartz, after having passed through the mill, from becoming scattered about. G is a spout, by which the material is introduced to the mill, and L is an opening through which it passes out after having been ground.

In operating my mill, a rotary motion is given to the disks E and F, through the shaft I, by any convenient power, and the material is introduced to the spout G, and from thence passes down all around the shaft I. As the material passes down, it strikes upon the inclined face of the cone *c*, and passes out into the space *a*, when it comes in contact with the moving surface of E, and is gradually reduced in size, and passes outward towards the circumference of the disks, at which point it is finally discharged in a fine and powdered condition.

When the moving disks of my mill are removed while the material fills the grinding-space, I find that, commencing in the centre, the material, as it lies upon the disk, grows finer in regular succession as it nears the outer edge, showing that it is continually subjected to a grinding as it passes through.

The degree of fineness to which the material is ground can be governed by admitting the material faster or slower to the mill. The faster it is admitted, the coarser it will be discharged, and the slower it is admitted, the finer it will be ground.

I have experimented with my invention for a number of months, with success, and at present consider the proportions here shown as the most desirable, but it will operate successfully with other proportions. The cone *c* may be higher or lower than represented, and may also be much smaller or much larger at its base, if desired. The space *a* may also be extended, so as to embrace the whole or any proportional part of the working-surface, but the gradual contraction of the space as it recedes from the centre must be preserved, and the throat or central portion must be of sufficient depth to admit the material between the disks. My experience leads me to the belief that in practice, the space *a* will, by wearing gradually, extend itself outward nearer to the circumference, or, in other words, that the outside or periphery of the disks will wear the least, thereby extending the space *a* entirely to the outside, but at present I prefer to make my disks in the form represented, until I find by experience the exact proportions of the cone and space desired.

The disks of my mill may be of any required size, but I think thirty inches in diameter the most desirable. I have operated with disks no more than ten inches in diameter, (the whole mill weighing less than seventy-five pounds, and turned by a boy, by means of a crank,) with good success, the material being discharged in a very finely pulverized condition, and think as high as two hundred pounds of quartz could be pulverized in a day by such a mill.

I do not consider my mill suited to work as a quartz-crusher, that is, to reduce the large pieces of stone to a fine condition, but only as a pulverizer of the ore after it has been once crushed or brought to a fine gravelly form.

It will be observed that as the central portion of the disk *D* is conical, with the space *a* immediately above it, that the material will readily slide outward on the cone *c*, and be gradually reduced in size, until they are pretty nearly uniform when they arrive at the base of the cone.

The surface of the disk *D* being plain near the periphery, the material will not roll off if at any time it be released from pressure between the disks by a momentary lifting of the upper disk, but will remain upon the lower surface until the action of the disk above carries it out and discharges it at the periphery, during which time it is thoroughly pulverized.

My mill is peculiarly desirable for use in highly-mountainous regions or places difficult of access, as by separating the disks *C D E F*, a large and effective mill may be conveyed upon the back of mules, and as it is so simple in its construction, and is composed of so few parts, it may be easily and very quickly set up and operated, even by persons who are deficient in mechanical skill and judgment. Mills large enough to be of much service, may be carried by hand to positions even where impossible for animals to go, and from which it would of course be extremely difficult to remove the ore to be treated in more favorable positions. Such mill could be easily worked by one man, and would be of great value in testing the quality of the ore of mines in uninhabited and newly-discovered localities.

The disks of my mill being made of metal, the surface of which is smooth or ungrooved, they are very cheaply made, and may be very roughly handled in transportation without injury, and do not require sharpening or dressing during use, but may be worn entirely out without any attention of that nature or repairs of any kind.

They also render available that peculiar property by which metals, when rubbing against flinty material, pick up and arm themselves with the loose particles and use them to operate upon the other particles, and by presenting more grinding-surface within the same space than if grooves were used, they enable me to contract my mill into a very compact form, and as I do not rely upon centrifugal force, but upon the gravity of the material, and the mechanical action of the mill to feed the material through the mill, I can work effectively at a very low speed, even by harnessing animals direct to a pole attached to the driving-shaft, if desired.

Having now fully described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

The within-described mill for grinding quartz, consisting of the reversible metallic disks *C D* and *E F*, constructed, arranged, and operating as and for the purpose set forth.

ROSWELL PLUMMER.

Witnesses:

KIMBALL W. STETSON,
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