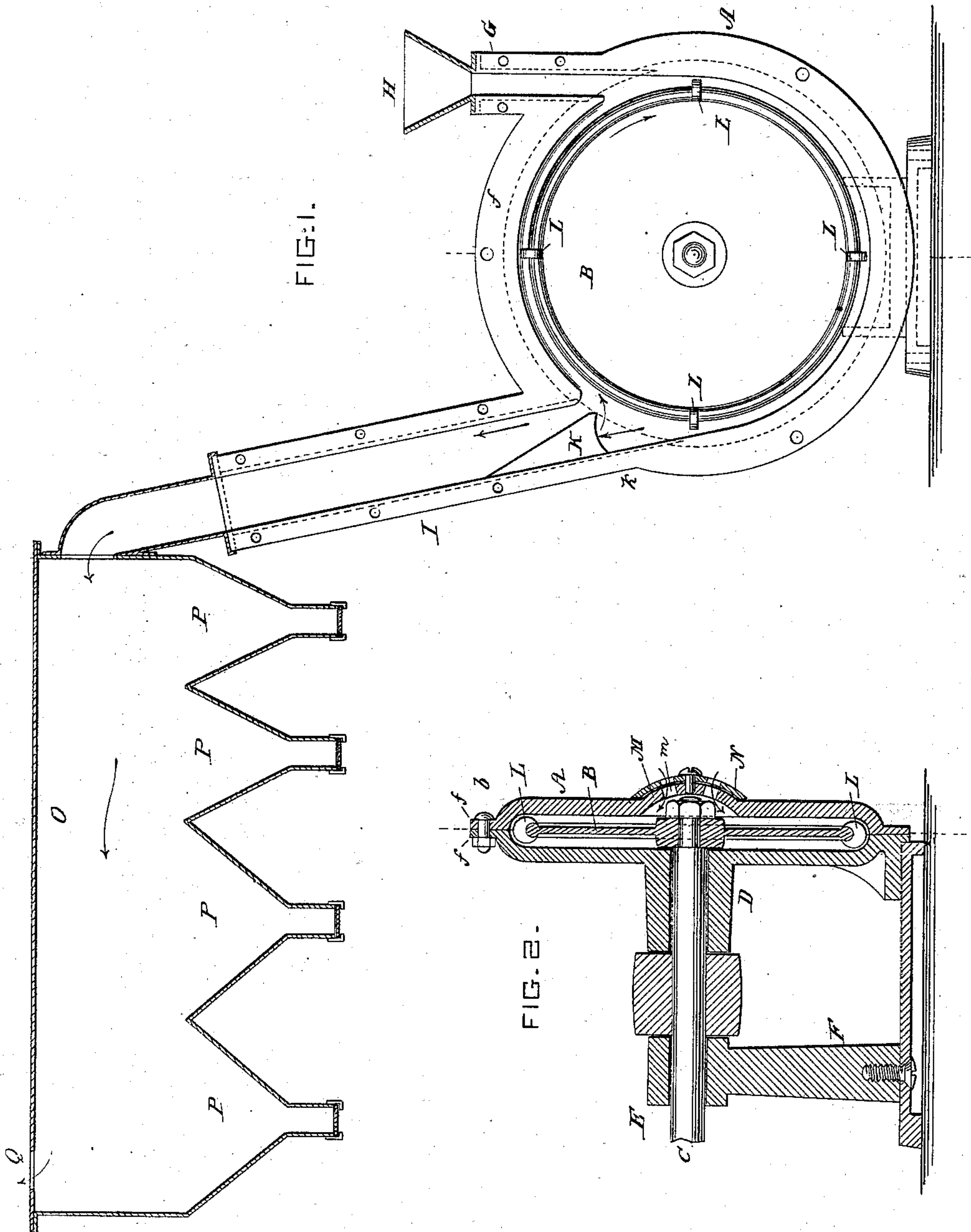


(No Model.)

C. ROSS, Jr.
Mill for Pulverizing Hard and Refractory Materials.

No. 241,513.

Patented May 17, 1881.



WITNESSES =

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UNITED STATES PATENT OFFICE.

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MILL FOR PULVERIZING HARD AND REFRACTORY MATERIALS.

SPECIFICATION forming part of Letters Patent No. 241,513, dated May 17, 1881.

Application filed June 8, 1880. (No model.)

To all whom it may concern:

Be it known that I, CHARLES ROSS, JR., of Brooklyn, East District, in the county of Kings and State of New York, have invented an Improvement in Mills for Pulverizing Hard and Refractory Materials; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

In the drawings, Figure 1 represents a vertical longitudinal and central section of a machine constructed in accordance with my invention. Fig. 2 represents a vertical central cross-section of the same.

The object of my invention is to carry out the principle of grinding quartz or any other hard refractory substance whatever by the attrition and percussion of coarsely ground or pulverized particles of the same against and upon each other, and by which may be obtained any desired degree of fineness in pulverizing such substances.

In studying machines in which this principle has hitherto been applied I have found that the packing of the finely-pulverized material between the coarser particles prevents, or at least very greatly obstructs, their operation; and a principal feature of my present invention is a provision of means for the constant removal of the finely-pulverized particles from the interstices of the coarser particles.

Another feature of the invention is a device whereby the coarser particles are retained in the mill until such time as they are reduced to the requisite fineness, while the finer particles are permitted to pass out unobstructedly.

Still another feature which aids in the accomplishment of the above purposes is an upward discharge through which air admitted in regulated quantity among the coarser particles and forced through their interstitial spaces by the action of centrifugal force passes with a uniform velocity sufficient to overbalance the action of gravity upon the finely-ground particles and carry them out of the mill, while the heavier particles fall back into the mill and are further triturated.

A is a case, circular in form, flat on the sides and rounded at its perimeter.

B is a disk keyed to a shaft, C, which is journaled in a long bearing, D, in a boss cast

on one side of said case, and also in a bearing, E, supported by the frame F, which also supports the case A.

The case A is preferably made in halves, as shown, each half being provided with a peripheral flange, *f*, the two parts thus formed being held together by bolts *b*. On one edge or side of said case is formed a feed-chute, G, provided with a hopper, H, and on the other edge or side is formed a discharge-chute, I. The hopper chute is preferably placed so that its inner side nearest the center is tangent to the perimeter of the disk or wheel B. The discharge-chute has its inner extremity placed just below, at, or above the center of the machine, and is preferably arranged in such manner that its inner side farthest from the center is tangent to the periphery of the interior of the case; and within the lower part of this chute is placed a triangular-shaped stop, K, which is preferably hollowed out at the bottom, as shown at *k*.

Formed on or inserted in the edge of the disk or wheel B, at suitable angular intervals—say ninety degrees—are projections L, preferably of circular form, and having their diameters at right angles with the diameters of the disk B, which intersect their diameters.

At the middle of the side of the case opposite the bearing D is formed a curvilinear projection, M, in which are perforations *m*. These perforations are air-inlets. A register-valve, N, is pivoted to the center of M, by which the amount of air admitted to the interior of the case can be accurately regulated to the desired quantity, dependent upon the nature of the material to be pulverized; but I do not limit myself strictly to this method, as other means may be employed.

The discharge-chute delivers the pulverized material into a chamber, O, the floor of which is divided into bins P, and at the end remote from said chute is formed in the top an opening, Q.

The operation of the invention is as follows: Coarsely-pulverized material to be more finely pulverized is fed into the hopper H, and it falls into the unoccupied space in the case A in a direction tangent to the perimeter of the disk B, which is rotated at a high speed by power transmitted to its shaft C. The material is struck by the projections L and carried with great velocity around the interior of the case

A till it arrives at the stop K. Here its velocity is suddenly checked, and dropping back toward the center of the disk B it is violently struck by other material of the same kind,
 5 which has subsequently passed into the machine, or which, having passed by the stop K, has been brought around again under high velocity by the revolution of the disk. The violent impact of the particles of the material to
 10 be pulverized against other similar particles thus effected performs the principal part of the pulverizing. The separation of the sufficiently-pulverized material all the while proceeds as follows: The register-valve is opened more or
 15 less, according to the nature of the material to be pulverized and the fineness desired. The exact position of said valve suited to the attainment of the desired result can be found after a short trial with any material, and as
 20 different materials vary greatly in cohesive force, brittleness, &c., no exact rule for setting the valve can be given. The opening of said valve permits the inflow of air to the center of the case A. Centrifugal force carries the air to-
 25 ward the periphery of said case, and, thus moving, the air passes forcibly through the interstitial spaces between the particles of the material in the mill, carrying along with it such particles as are small enough to be blown out
 30 by the movement of the air. Finally the air passes out through the discharge-chute I, carrying with it all particles whose mass is sufficiently small into the chamber or apartment
 35 O. Here the velocity of the air-current is suddenly and greatly lessened in its movement to-

ward the opening Q. The dust or finely-powdered material now begins to settle. The coarser particles fall first, and the material falls in the order of its degrees of fineness into the bins in said chamber.

In some cases I arrange two of these machines to be driven by one pulley on the shaft C common to both disks, and lead back the coarser material from the bins in the chamber O to the second mill for further grinding.

What I claim as my invention is—

1. In a pulverizing-mill, the case A, inclosing the rotary disk B and provided with a peripheral feed-chute directed downward tangential to the disk, an opposite peripheral discharge-chute directed upward, and central air-inlets provided with a register, substantially as described, and for the purpose set forth.

2. The combination of the case A, provided with a feed-chute and discharge-chute, arranged, as set forth, with the rotary disk B and stop K, having its lower face hollowed out, substantially as described, and for the purpose set forth.

3. The combination, with the case A, provided with a feed-chute and discharge-chute, arranged as set forth, central air-inlets, *m m*, and register N, of the chamber O, provided with the opening Q and bins P, substantially as described, and for the purpose set forth.

CHARLES ROSS, JR.

Witnesses:

EDWARD H. WALES,
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