

H. BREVOORT.
QUARTZ CRUSHING MACHINE.

No. 25,243.

Patented Aug. 30, 1859.

Fig. 1

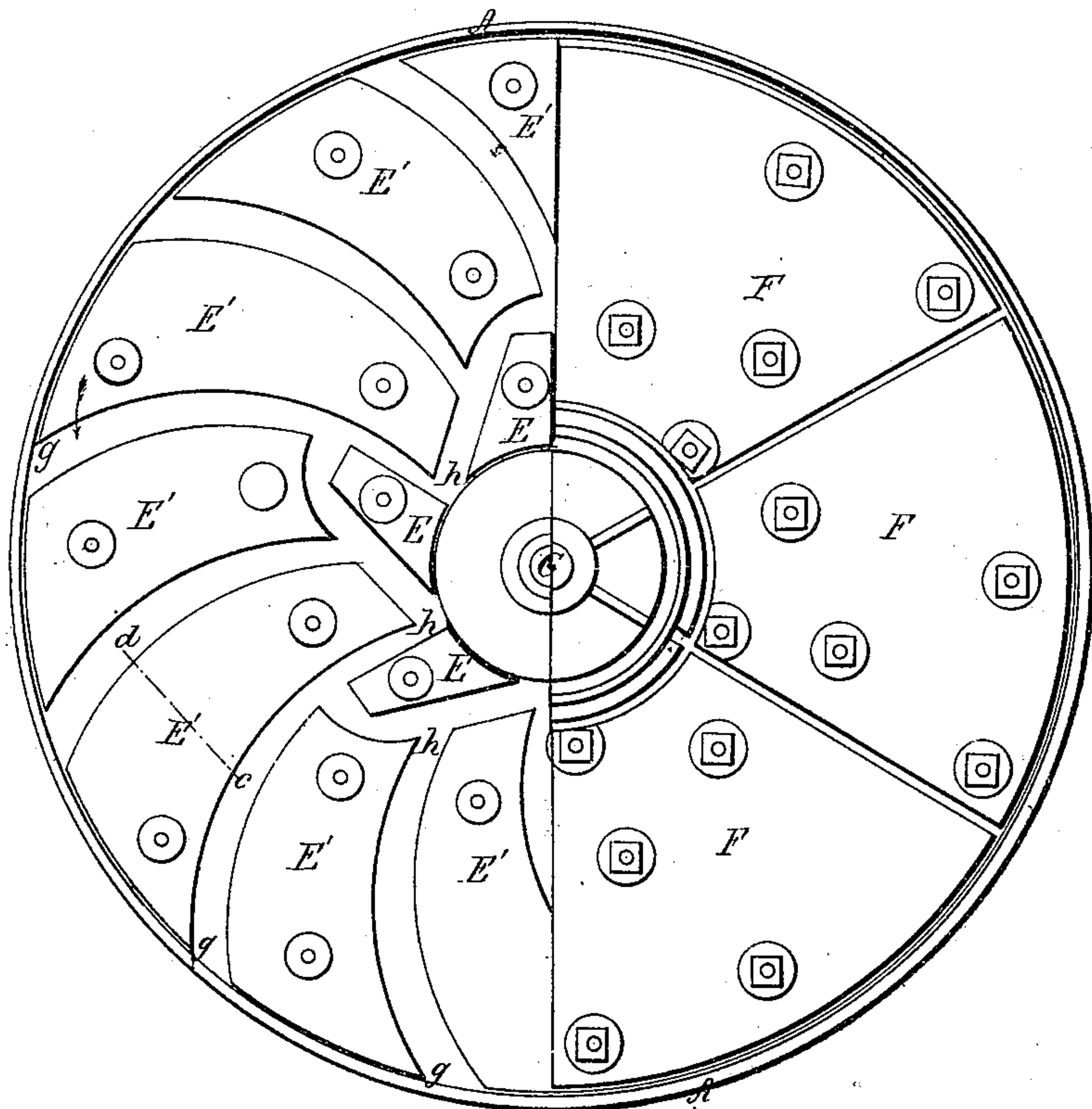
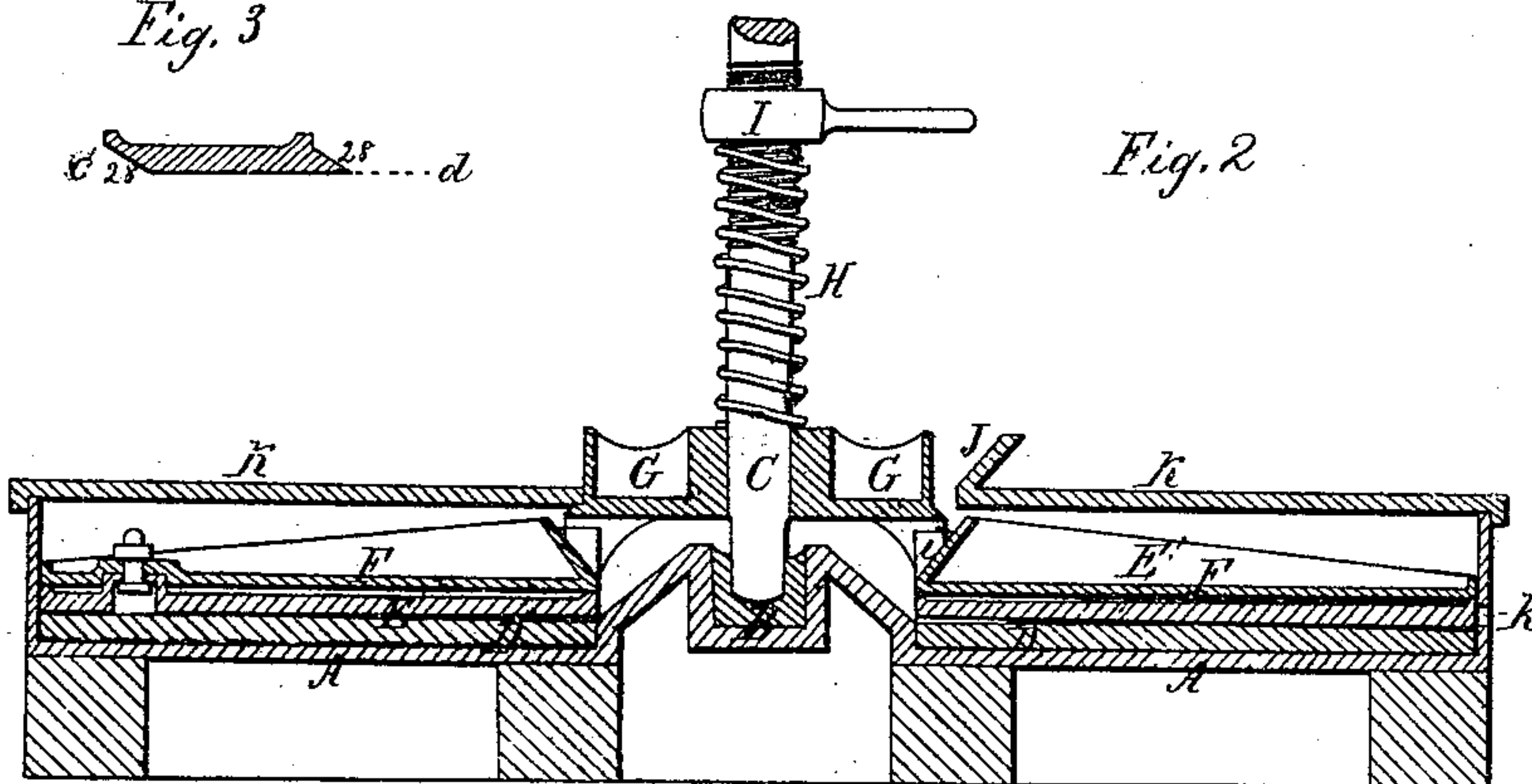


Fig. 3



Fig. 2



Witnesses
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HENRY BREVOORT, OF SAN FRANCISCO, CALIFORNIA.

QUARTZ-CRUSHING MACHINE.

Specification of Letters Patent No. 25,243, dated August 30, 1859.

To all whom it may concern:

Be it known that I, HENRY BREVOORT, of the city and county of San Francisco and State of California, have invented certain
5 new and useful Improvements in Apparatus for Pulverizing Quartz and other Rocks from Which Gold is to be Extracted, and that the following is a full, clear, and exact description of my said invention, reference
10 being had to the accompanying drawing, which forms part of this specification, and in which—

Figure 1 represents a plan of a quartz pulverizer embodying my improvements
15 with certain parts removed to show its interior construction, Fig. 2 represents a vertical cross section of the same through the center thereof, and Fig. 3 is a cross section of one of the pulverizing shoes at the line
20 *c d* of Fig. 1.

My apparatus is adapted particularly to the pulverization of quartz rock after it has been crushed or stamped by a dry battery, and the object of my improvement is to in-
25 sure the pulverization of the coarse fragments so that the whole mass is reduced to an impalpable powder, and to permit the grinding surfaces to be removed and re-
placed at a small expense.

30 Quartz as it issues from a dry battery of stamps has the form of fragments varying from the size of sand to that of small gravel. In order therefore to reduce it to powder the coarser fragments must be cracked and
35 the whole thoroughly ground. In order to effect these two processes simultaneously my pulverizer is composed of two series of surfaces acting in combination, the one series adapted to cracking the coarse fragments
40 and reducing them to the form of sand, while the other grinds the sand to powder and returns the fragments which have not been sufficiently reduced to the cracking series of surfaces, so that during the oper-
45 ation of the apparatus the grinding and discharge of fine powder and the re-cracking of the coarser fragments proceed continuously.

50 The pulverizer represented in the annexed drawing, and in which my improvements are embodied, has a flat circular pan *A* of about $4\frac{1}{2}$ feet in diameter into which is fitted the grinding bed *D*. This bed is stationary and should be made of chilled cast-
55 iron or other hard material, it is surmounted by a circular plate *F*, which has a large eye

at the center and carries upon its lower face the two series of removable grinding surfaces or shoes. The shoes of the inner series *E E*, have the form represented in the
60 drawing, their front edges inclining backward from a radial line; they are also beveled upon their under sides and upon their front edges, so to ride over, bear upon, and crush all matter fed in at the central
65 eye of the pulverizer and all matter which may be presented to their front edges. Outside of these cracking or reducing shoes are the pulverizers *E'* which constitute the second series and have a curved form as rep-
70 resented at Fig. 1, their front edges, *g h*, curving forward in advance of a radial line drawn across their innermost corners. The front edges of these pulverizing shoes are also beveled as shown at Fig. 3, the best
75 angle of bevel so far as my experience dictates being 28° . There are two of these curved pulverizers for each reducing shoe, and the two are so arranged (as represented in the drawing) that the inner end of each
80 alternate one enters in the space between the reducing shoes. The pulverizing and reducing shoes must be made of some hard material, chilled iron being that which I prefer. They are secured to the circular
85 plate by means of bolts whose heads are sunk in sockets to protect them from wear, so that the same set of bolts may be used to secure many different sets of shoes.

The circular plate *F* is funnel shaped at
90 its center and is surmounted by a plate *K* which has also a funnel shaped opening at its center to which a wooden hopper is fitted. The eye of the circular plate is also fitted with lugs *i* which project radially toward
95 its center and are borne against by a series of drivers secured to a driving hub *G*. The latter is carried by an upright driving shaft *C*, which is stepped in a step brass secured in a boss at the center of the pan, and is sup-
10 ported above by a suitable framework. The driving shaft has a screw thread formed upon it to which an adjustable screw nut *I* is applied, and the space between the lower
10 face of this nut and the upper face of the driving hub is occupied by a coiled spring
11 *H*, whose tension can be regulated by adjusting the screw nut so as to cause the shoes to press upon the material on which they are acting with greater or less force as may be found expedient.

When the machine is to be used, power is

applied to the driving shaft to cause it and the circular plate with its shoes to revolve at the rate of about 45 revolutions per minute, and the material to be acted upon is fed in at the central eye. As it enters it is acted upon by the reducing shoes, which reduce it in size and deliver it to the pulverizing shoes by which they are surrounded; these grind the reduced material to powder. As the operation proceeds those portions which are pulverized are gradually worked outward to the periphery of the pan and are discharged at an opening $\frac{1}{2}$ therein. Such fragments as are not reduced sufficiently fine to pass beneath the pulverizing shoes are borne upon by their front curved edges, which, sloping backward from their outer corners and entering between the reducing or cracking shoes, gather these fragments inward and redeliver them to the cracking shoes to be again acted upon by them, so that the operations of reducing, pulverizing, and recracking of coarse fragments, proceeds continuously in the same apparatus. The pressure of the spring determines the fineness of the pulverization, and in practice I find it expedient to employ two pulverizers such as I have described to operate in succession upon the material, so that the first reduces it to about the fineness obtained by the use of wet stamps and the second delivers it in the state of impalpable powder. In case the material contains metallic sulfurets, I remove it to a furnace after it has been discharged from the first pulverizer and roast it to decompose the sulfurets before feeding it to the second pulverizer. This roasting is best effected in a reverberatory furnace having a chamber above its roof heated by a flue and communicating by an opening with the bed of the

furnace below. The material is charged into the upper chamber and is thoroughly heated by the waste heat while a charge is being roasted on the bed of the furnace beneath. When the charge below is withdrawn, that above is let down to take its place, the emptied chamber above being recharged with fresh material. In roasting ores, I sometimes mix with them salt, nitrate of soda, nitrate of potash, or lime, or a mixture of these. I also sometimes inject steam into the mass to assist in the oxidation of the sulfurets and reduce them to peroxids.

Having thus described my apparatus and the mode of constructing and using it what I claim as my invention and desire to secure by Letters Patent is—

1. The relative arrangement and combination of the curved grinding shoes (E' , E') having their front edges beveled and inclined backward from their outer corners and caused to revolve as described so as to gather in and return the coarser fragments toward the center of the series substantially as herein set forth.

2. I also claim the arrangement and combination of a series of grinding shoes (E') with their front edges curved or inclined backward as described with a corresponding inner series of reducing shoes (E) so that the coarser fragments are redelivered in an inward direction to the reducing shoes while the grinding and outward movement of the fine particles proceed continuously substantially as herein set forth.

In testimony whereof I have hereunto subscribed my name.

HENRY BREVOORT.

Witnesses:

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I. OTTE.