

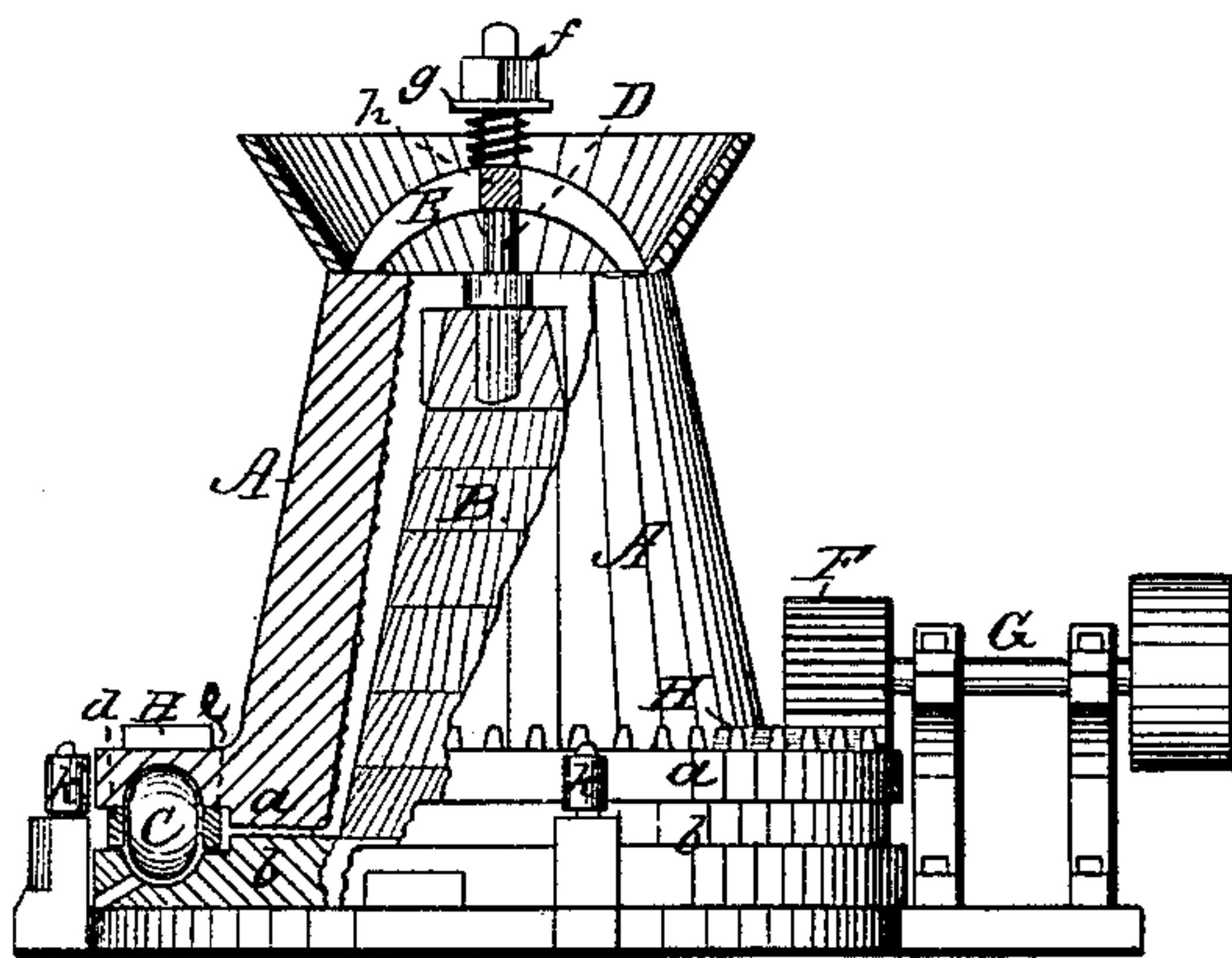
(No Model.)

R. C. GRANT.  
Ore Grinding Mill.

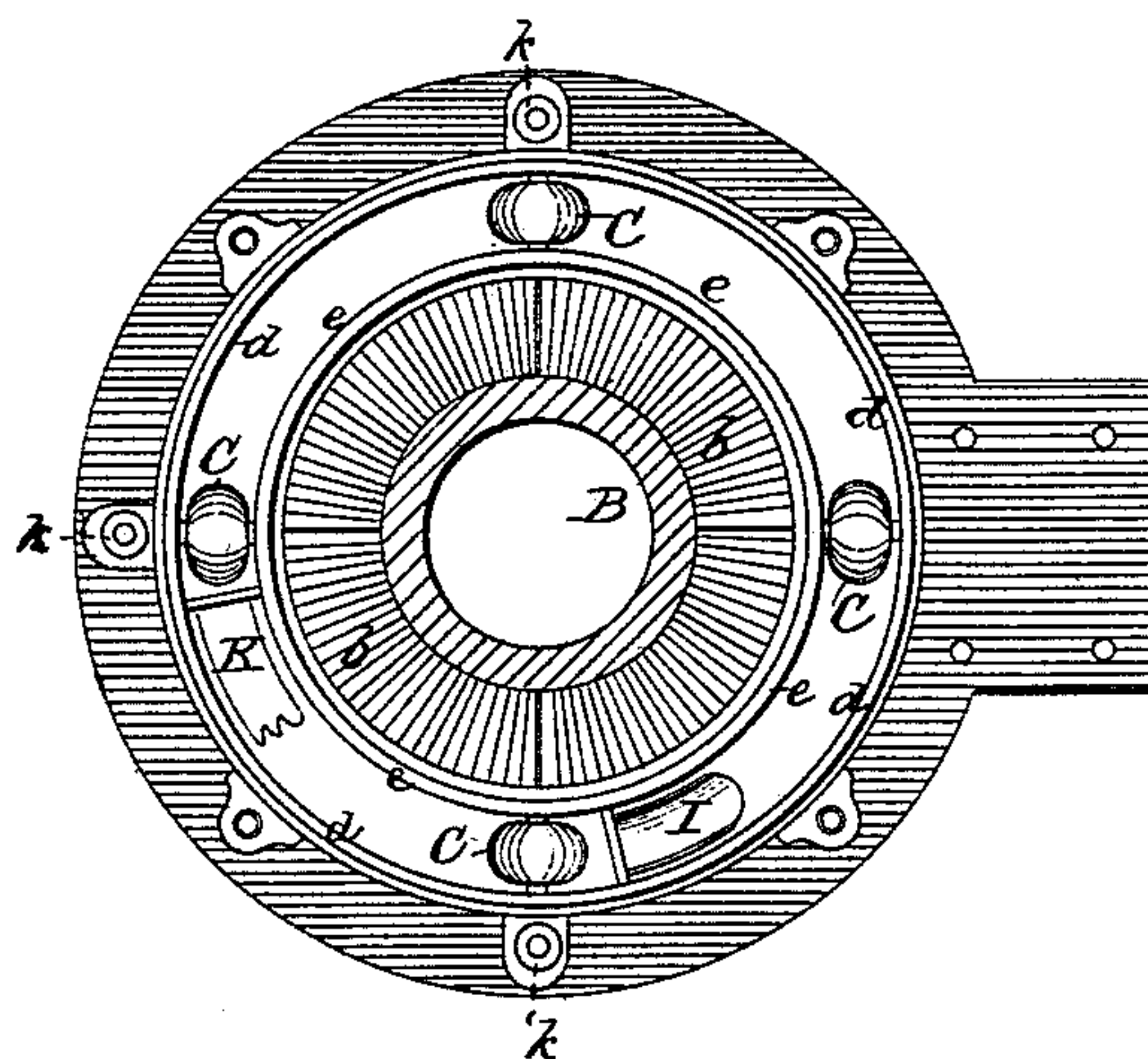
No. 234,027.

Patented Nov. 2, 1880.

*Fig. 1.*



*Fig. 2.*



WITNESSES:

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INVENTOR:

*R. C. Grant*  
BY *Rum*

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# UNITED STATES PATENT OFFICE.

ROYAL C. GRANT, OF MIDDLEPORT, OHIO.

## ORE-GRINDING MILL.

SPECIFICATION forming part of Letters Patent No. 234,027, dated November 2, 1880.

Application filed July 7, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, ROYAL C. GRANT, of Middleport, in the county of Meigs and State of Ohio, have invented a new and useful Improvement in Ore Crushing, Grinding, and Pulverizing Mills; and I do hereby declare that the following is a full, clear, and exact description of the same.

The object of my invention is to provide an improved machine for crushing, grinding, and pulverizing the valuable ores in order that by comminution the metallic portion may be separated from the gangue.

The machine I have devised is of that class in which a tapering or cone-like shell revolves around a core of corresponding shape.

The features of novelty and improvement are the means hereinafter described for lessening the friction between the core and shell and also pulverizing the ore, and for facilitating the discharge of the pulverized ore from the machine.

In accompanying drawings, forming part of this specification, Figure 1 is partly a side view and partly a section of my improved mill. Fig. 2 is a plan view of a portion of the mill with the shell removed, the cone being in section.

The tapered or conical truncated shell A has a flaring top or rim, which forms the hopper for receiving the ore to be crushed, ground, and pulverized. The core B has a like tapered shape, and both shell and core are lined with ribbed chilled iron or steelified plates that are secured in place by screws and lugs. The shell and core have also horizontal or base portions *a b*, which are similarly provided with detachable grinding-plates and with coincident circular grooves to accommodate the rollers C. The latter have rounded edges, and are mounted loose on short shafts, whose ends enter and are secured in holes in the opposite circular coincident bands *d e*, that revolve or slide on the bed-plate and core B. Thus half the thickness of the rollers lies in the groove in the bed-plate *b* and the other half projects into the coincident groove in the base *a* of shell A. The latter is therefore supported on said rollers as it rotates around the core

B. The core has a stem or shaft, D, which extends vertically from its upper end, and passes through a four-armed cross-head spider, E, attached to the top of the shell. A screw-nut, *f*, is applied to the end of the stem D, and metal washers *g* and elastic blocks or spiral springs *h* are placed between the nut and cross-head.

By these devices the shell A may be held down on the rollers C with a yielding pressure. By adjusting the nut *f* the downward pressure of the shell A can be varied at will, and the ore thus crushed and ground more or less finely. At the same time the slight vertical movement permitted by the spring *h* allows the shell A to accommodate itself somewhat to the variation in size or quantity of pieces of ore descending from the hopper. The shell A is rotated by a gear, F, which is keyed on a horizontal driving-shaft, G, and meshes with a gear or toothed plate, H, attached horizontally to the base of the shell.

In order to keep the base of the shell A in proper position—*i. e.*, concentric with the core B—I employ friction-rollers *k*, mounted loose on studs fixed in the bed-piece. The friction of the shell A with the rollers C and the friction of the latter with the bottom of the circular channel or groove in the bed-piece causes the rollers and bands *d e* to travel around the core at the same time with the shell, although the bands will not always move at the same speed. The ore is therefore pulverized by the action of the rollers C on the same in such channel or groove, and thus the rollers are made to subserve an important function in addition to supporting the shell A and relieving friction.

As a means of discharging the pulverized ore from the channel, I employ scrapers or pushers I, which are hinged onto the rings *d e*, Fig. 2, so that their free ends rest and travel on the bottom of the channel; and to loosen the ore so that the said scrapers may easily remove it, I employ hinged plates K, having their free ends serrated, as shown.

What I claim is—

1. The combination, with the grooved bed-piece having a discharge-opening and the

rotating shell and traveling-rollers C, of the  
hinged plates, having their lower edges ser-  
rated to adapt them for loosening the com-  
pacted ore, and the hinged plates for scrap-  
5 ing the bottom of the groove and removing  
the ore thus loosened, all as shown and de-  
scribed, for the purpose specified.

2. The combination, with the core and the

rotating shell and bed-piece, grooved as speci-  
fied, of rollers C, journaled upon the traveling ro  
bands *d e*, all as shown and described, to op-  
erate as specified.

ROYAL CLARK GRANT.

Witnesses:

E. R. GRANT,

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