

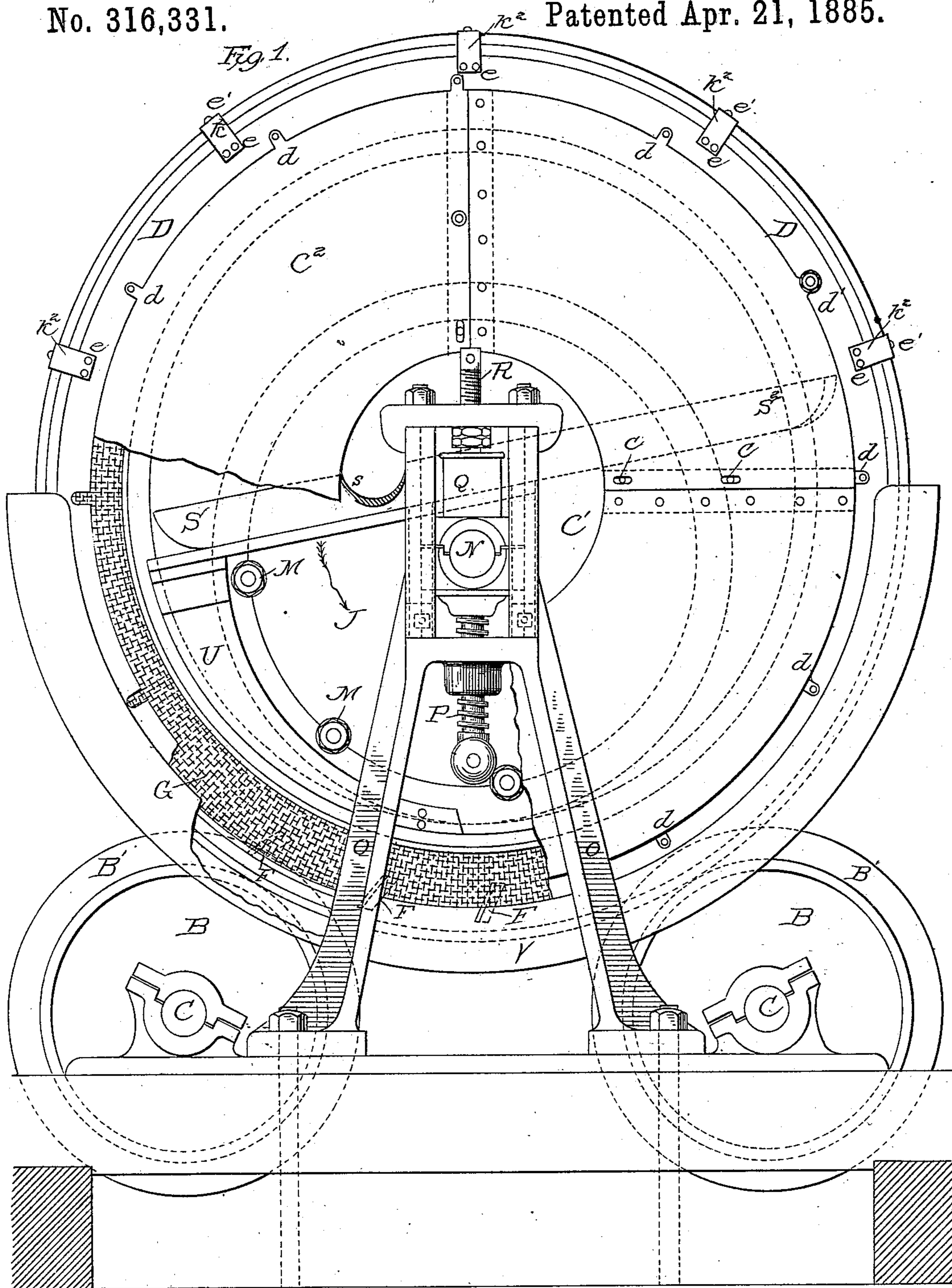
(No Model.)

2 Sheets—Sheet 1.

J. CHERNEY.  
CRUSHING AND PULVERIZING MILL.

No. 316,331.

Patented Apr. 21, 1885.



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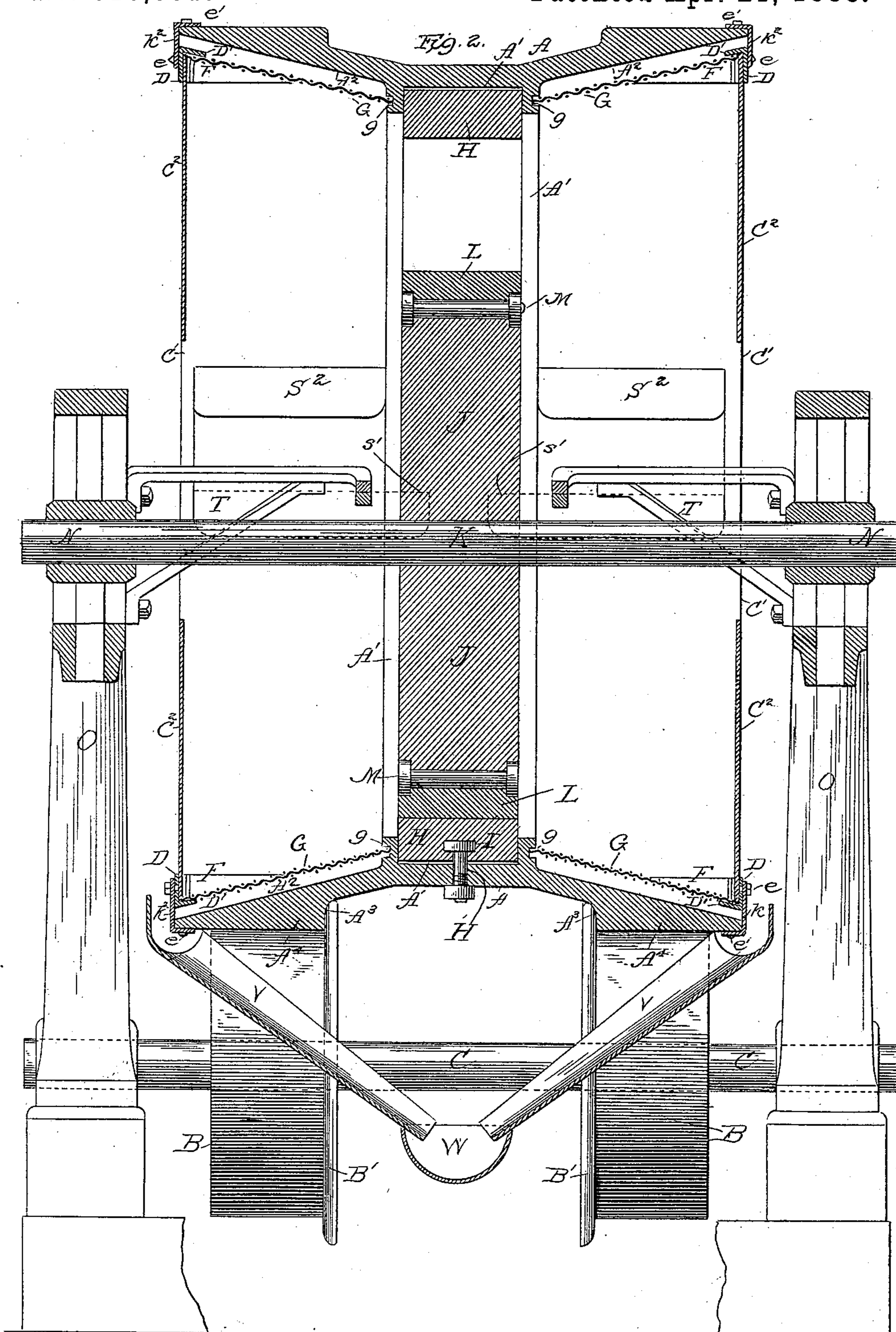
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Inventor  
*Jacob Cherney*  
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Attys.

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# UNITED STATES PATENT OFFICE.

JACOB CHERNEY, OF DENVER, COLORADO, ASSIGNOR OF ONE-HALF TO  
FRANCIS MARION DAVIS, OF SAME PLACE.

## CRUSHING AND PULVERIZING MILL.

SPECIFICATION forming part of Letters Patent No. 316,331, dated April 21, 1885.

Application filed November 21, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, JACOB CHERNEY, of Denver, in the county of Arapahoe and State of Colorado, have invented a new and useful  
5 Improvement in Crushing and Pulverizing Mills; and I do hereby declare that the following is a full, clear, and exact description of the same.

The invention relates to that class of crushing and pulverizing machines in which a revolving drum is employed, within which a roller rests and is revolved by the revolution of the drum, the crushing action being effected between the circumference or periphery of the  
15 inner free-running roller and the inner surface of the drum.

The object of the invention is to so construct the machine that it will be durable and not need an expensive foundation; will grind slow  
20 or fast, and either wet or dry ores; that will be of simple construction and operation; will not readily clog by over-feeding or burst if run empty, and which will be automatic in its action and adjust itself to the wear of its  
25 parts.

Figure 1 represents an elevation of the machine, a portion of the side casting of the drum being shown as broken away, so as to expose the interior free-running roller. Fig.  
30 2 is a central vertical cross-section of the machine.

The principal part of the drum consists of an approximately cylindrical casting, A, which has at each end cylindrical outside surfaces,  
35 A<sup>4</sup>, which bear upon the peripheries of wheels B. These wheels are four in number, and form the support of the drum, and they may also be used to impart to it the required rotary motion.

The central part of the casting is formed with a peripheral depression, the sides A<sup>3</sup> of which are fitted to receive the flanges B' of the supporting-wheels, which flanges thus prevent lateral motion of the drum. The  
45 wheels B are mounted upon shafts C, which have bearings on the supporting-frame.

On the central portion of the casting A is formed an interior groove or channel, A', running the entire periphery of the casting.  
50 Within this channel is placed a shoe, H, in form of a ring, of any convenient number of

sections, and forming the hard wearing-surface of the drum. These sections are held in place by bolts H', having heads I, secured in the section below the wearing-surface. From  
55 the annular ribs which form the groove in the inner periphery of the casting the sides slope or flare outward, forming continuously an inclined way, as shown at A<sup>2</sup>.

The end walls of the drum are formed of plates (preferably of sheet metal) C<sup>2</sup>. These plates rest upon and are secured to flanged rings D, these flanged rings being connected to the casting A by strips k, which are riveted or bolted to the end walls at e and to the edge  
65 of the casting at e'. This leaves an annular opening between the end walls and the casting, obstructed only at the points where the brackets are located.

On the flange D' of the flanged ring D rests  
70 the outer edge of the inclined annular screen G, the inner edge of which is supported in a groove, g, formed in the rib of the central groove. There is one of these screens on each side, and they have the same slope as the in-  
75 ner surface, A<sup>2</sup> A<sup>2</sup>, of the casting.

Pockets are formed upon the screens and within the drum by means of wings F, which run part way across the screen, as shown in Figs. 1 and 2. These may be bolted also to  
80 the flanged ring D through the edges of the end walls. The bolts which hold the end walls to the flanged ring pass through slots d cut in the edge of the flanged ring.

The sheet-metal walls C<sup>2</sup> are preferably made  
85 in quarter-sections united to each other by bolts, (shown at e e, Fig. 1,) the walls having central openings, C', through which the charging of the machine is effected. The screens G may also be made in sections, but it must extend continuously around the inner periphery  
90 of the inclined surface of the drum.

Within the drum is located a freely-running roller, J. This is mounted upon a shaft, K, supported in bearings N in the vertical  
95 grooved slots in the standards O. The bearings or boxes N are supported upon the screws P in holes tapped through the transverse parts of the standards directly beneath the bearings.

Upon each bearing rests a rubber cushion, to which suitable pressure may be applied by means of the screw R and suitable nuts. By

this means the roller may be adjusted to proper relation to the inner periphery of the drum, but at the same time may have slight rise against the springs Q, to permit vertical movement of this roller in passing substance too hard to crush.

The shaft K extends through the opening in the center of the side walls, which are large enough to admit the material to be crushed, and also to allow any desired amount of movement of the shaft. The bearings of the shaft move in guides against each side in the standards, as shown in Fig. 2.

The roller J has upon its circumference a hard wearing-shoe, L, made in any number of sections or entire, said sections being keyed to each other by transverse bolts M, or secured in any other suitable manner. The roller J receives its movement from the drum by frictional contact with the shoe H.

The feed-trough S is shown in Figs. 1 and 2 arranged within the drum, one on each side, in an inclined position above the axis of the shaft of the free-running roller. Its mouth s extends through the opening C' through which the material is introduced. The delivery-points s' extend into the space behind the roller J and between it and the grinding-surface on the drum. The troughs are supported upon brackets T, which are bolted to the inner surfaces of the standards O and extend through the openings C' into the drum. The upper ends of the troughs extend across, as shown at s<sup>2</sup>, into such relation to the pockets formed by the rings F that when the uncrushed material is brought up by the revolution of the drum the material will fall into the upper ends of the said troughs.

On each side of the roller J is a guide-plate, U, which extends down from the delivery ends of the troughs around in a curve to a point just beyond the crushing portion or point of contact of the roller and drum. The purpose of this plate U is to conduct the material directly to the crushing-roller and the drum-shoe and to insure that it will all enter properly at the point of grinding. After the material passes this point it escapes from the guide-plates, having been crushed in its passage, and passes out at the sides of the roller upon the inclined screens G. All of the material that has been properly ground will pass through the screens and find an exit down the inclined way A<sup>2</sup> over the edge into a suitable trough and to a conveyer, W. Meanwhile the coarse or uncrushed material lodges in the pockets formed by the wings F at the lowest portion of the screens, and as the machine revolves this is carried upward and dropped into the upper end of the troughs, and is then carried down to the crushing-point again.

The direction of the movement of the machine has been indicated by the description, and is shown in Fig. 1 by the arrow, the lower end of the trough being at the front.

I have found it best that the material be delivered to the machine in rear of the roller in-

stead of the front of it. The purpose of this is to cause the fresh ore to pass over the screens before it is lifted up by the elevator-buckets to the front. The feed is thereby better distributed and goes in from both sides; and, further, the material is screened before it is crushed, which is very desirable, as there is always some powder made by the rock-breaker, the screening of which before the material is crushed being an advantage. For this purpose the material must be delivered upon the screen first.

It is important that the pulverizing-surface of the roller should be capable of adjustment, and of being maintained in proper relation with the pulverizing-surface of the drum, and this is accomplished by supporting the drum and the crushing-roller J upon shafts having independent bearings.

The screens and the pulverizing-surfaces can be cleaned out at any time by introducing a stream of water or a jet of steam or blast of wind in the drum.

The construction is such that the roller may be raised when the wearing parts of the drum are to be removed. The side casings are also removable for this purpose.

The screens may be made in sections and fastened on light frames, such frames fitting into the grooves of the casting and resting upon the flanged ring D at the discharge edge.

The incline or flaring of the casting should be sufficient to carry pulverized material outward and discharge it freely, while the coarser particles are collected at the lower edges of the screens between the wings, and will be carried upward and dropped in the upper ends of the troughs.

I have shown the drum as being driven by the friction of the rollers; but it is obvious that it may be run by a gear on the outside meshing with a pinion driven by any suitable power.

I claim as my invention—

1. The drum of a crushing and pulverizing machine having an interior crushing-surface, an inclined surface between said surface and the edge of the drum, an end wall provided with a central and edge openings, an inclined screen over said inclined surface, and pockets on said screen, in combination with an interior crushing-roller, and a trough arranged in the drum to receive the coarser material from the pockets and deliver it to the crushing-surfaces, substantially as described.

2. In combination, the drum-casting having a central groove and a grinding and crushing ring held therein, inclined or flaring surfaces extending from the ribs bordering said groove to the margins of the drum-casting, sectional end walls supported on flanged rings, and inclined screens supported on said flanged rings and in the grooves g, and brackets k, connecting the flanged rings and the edges of the casting, all substantially as described.

3. A revolving grinding and crushing drum

5 having a central interior grinding and crushing surface and inclined or flaring surfaces, screens placed over said inclined surfaces, wings forming pockets on the screens, a central crushing-roller, and inclined troughs supported on brackets and having their upper ends near the inner periphery of the screens and their lower ends turned in front of the crushing-roller, all substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JACOB CHERNEY.

Witnesses:

JAMES A. FLEMING,  
H. P. PARMELEE.