

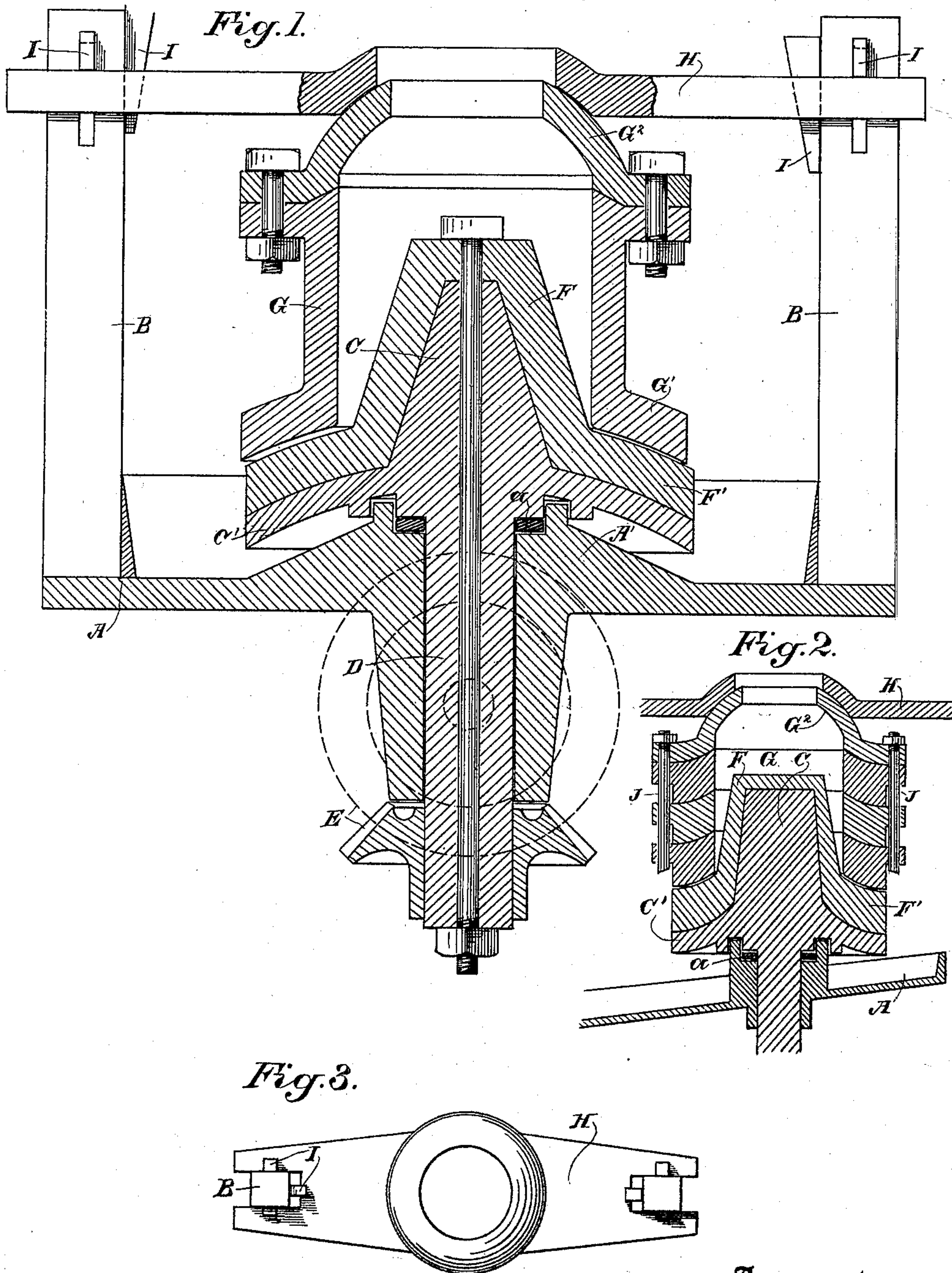
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Patented Oct. 17, 1899.

J. M. DYER.
CRUSHING AND GRINDING MILL.

(Application filed Jan. 26, 1899.)

(No Model.)



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UNITED STATES PATENT OFFICE.

JAMES M. DYER, OF SAN FRANCISCO, CALIFORNIA.

CRUSHING AND GRINDING MILL.

SPECIFICATION forming part of Letters Patent No. 635,011, dated October 17, 1899.

Application filed January 26, 1899. Serial No. 703,484. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. DYER, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Crushing and Grinding Mills; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to a combined crushing and grinding or pulverizing apparatus for rock.

It consists, essentially, in the combination of a central cone having annular extended flanges around the base and an inclosing cylindrical casing having corresponding annular bottom flanges adapted to rest and grind upon the flanges of the central cone, while by an adjustment of the casing with reference to the cone an eccentric movement between the interior of the casing and the exterior of the cone acts to crush the rock and prepare it for the pulverizing-surfaces.

My invention also comprises details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a sectional elevation of my apparatus. Fig. 2 is a similar view showing a different construction. Fig. 3 is a top view of the upper bearing-plate.

A is a base or foundation suitably supported, having vertical posts B and a raised central hub A', with a central hole through this base and an annular chamber *a*, adapted to receive a washer and form a joint between the base A and the cone C. This cone is cast and fitted to extend through the central opening in the base A and has a shaft D, which is suitably supported at the bottom. Power to rotate this cone is derived through a beveled gear E or any usual or suitable mechanism for the purpose.

The cone C has annular extensions C' and is chambered so as to fit and form a joint with the washer in the chamber *a* of the base to prevent the entrance of grit or dirt at this point. The annular flanges C' are curved with either concave or convex faces uppermost. In the latter case the curvature is essentially radial about the base of the shaft D.

F is a conical shoe adapted to fit over the cone C, having corresponding annular flanges

F', which rest upon the flanges C', and the upper surface of the shoe forms one part of the grinding or pulverizing surface.

G is a cylinder of an interior diameter slightly greater than that of the base of the shoe F, so that it can be moved slightly to one side or the other, as will be hereinafter described. This cylinder has an annular flange G', the lower surface of which is coincident in shape with the upper surface of the shoe F', and when the cylinder is set with its axis central with the axis of the cone it rests evenly upon the surface of the shoe.

The upper part of the cone has a globular-shaped head G², with a central opening of sufficient size for the admission of the rock to be crushed. This head fits an opening formed in the transverse plate H, this central opening being so formed as to provide a bearing for the globular head G².

The plate H is secured in the upper ends of the standards B by keys or other means, as shown at I, and is slotted so as to be movable with relation to the standards B and to be forced to one side by means of the keys. When this plate is thus forced to one side, it carries with it the globular head G² and the upper part of the cylinder G, the base G' of the cylinder sliding upon the corresponding surface of the shoe F', so that the cylinder G will then be set to stand slightly eccentric with its axis at a little angle with the axis of the cone C and the shoe F. This forms a space between the interior of the cylinder, and as the apparatus is rotated the rock which falls between the cylinder G and the shoe F of the cone will be constantly crushed smaller as it moves down between the two surfaces where the space is the narrowest. The friction of the rock and its binding between the two surfaces causes them to rotate in unison, so that the action is a rolling crushing one, the surfaces moving in unison instead of an independent movement of the two. The rock thus crushed gradually moves down between these surfaces until it can pass between the curved grinding-surfaces between the annular flanges F' G', and the movement of these surfaces upon each other acts to grind and pulverize the rock to a very great degree of fineness, and it then escapes around the periphery between the edges of these dies. The surface of the

base A upon which the pulverized rock thus falls may be slightly inclined, as shown, and the pulverized material can be washed or otherwise carried off and collected, as desired.

The cylinder G may be made in a single casting or it may be made in independent rings, as shown in Fig. 2, these rings being secured together by bolts J and suitable nuts or locking devices. In this construction the curvature of the upper and lower faces of the rings is such that they will fit together when superposed and form the complete cylinder, and when the lower ring has been worn so that a change is necessary it may be removed and placed on the top, while the next one above it will take its place and provide the grinding or wearing surface to contact with the shoe F'.

Any suitable arrangement for feeding the ore or rock into the space between the cylinder and the cone may be adopted.

If it be desired to alter the method of grinding, it can be done by locking the cylinder G to prevent its rotation and allowing the cone to rotate independently within it. This in some cases is useful for rapid grinding between the annular ring-surfaces.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A crushing and grinding apparatus consisting of a vertically-journaled rotary cone having an annular projecting flange at the base, a cylinder surrounding said cone and adapted to be moved laterally thereon, and having a corresponding annular base-flange adapted to contact with that of the cone, and adjusting mechanism whereby the axis of the cylinder may be set out of line with that of the cone.

2. A grinding and crushing apparatus consisting of a vertically-journaled rotary cone having a peripheral base-flange with a curved surface, a hollow cylinder adapted to fit over the cone having a correspondingly shaped and curved base-flange fitting and resting upon that of the cone, a globular head having a central opening and a centrally-perforated

plate fitting said head and means whereby said plate may be adjusted to adjust the cylinder laterally on the cone and to set the axis of the cylinder out of line with that of the cone.

3. A crushing and grinding apparatus consisting of a vertically-journaled rotary cone having a peripheral base-flange, a correspondingly-shaped removable shoe fitting upon the cone and having a projecting annular flange with a curved face, a laterally-adjustable cylinder having a central diameter greater than that of the base of the cone and an annular curved flange adapted to fit upon the flange of the cone-shoe, a globular head at the upper end of the cylinder, a plate having a central guide-opening within which the head fits and means for adjusting said plate whereby the axis of the cylinder is set out of line with that of the cone.

4. In a crushing and grinding apparatus of the character described, a rotary cone having a vertical axis, a laterally-adjustable cylinder surrounding said cone, annular grinding-flanges around the cone and cylinder, a base through which the cone-shaft passes, an annular chamber and a washer whereby a dust-joint is formed between the bottom of the cone and the base-plate.

5. In an apparatus of the character described, a vertically-journaled rotary cone having an annular base-flange and a correspondingly-shaped grinding-shoe carried thereby, in combination with a hollow cylinder surrounding the cone, a means for adjusting said cylinder laterally so that its axis stands out of line with that of the cone, said cylinder being formed of sectional rings having their bases made of a curvature to fit that of the cone-shoe, and bolts whereby the rings are locked together whereby they may be interchangeable substantially as described.

In witness whereof I have hereunto set my hand.

JAMES M. DYER.

Witnesses:

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JESSIE C. BRODIE.