

C. C. PHILLIPS.

MILL FOR CRUSHING BONES, MINERALS, &c.

No. 408,515.

Patented Aug. 6, 1889.

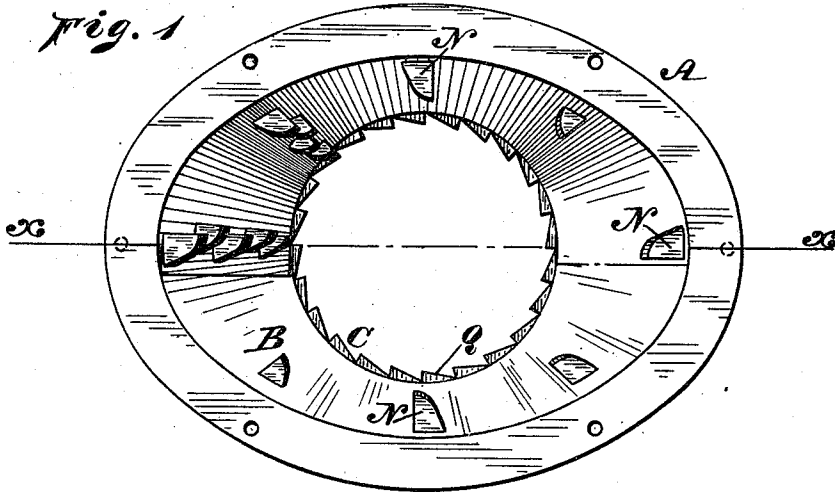


Fig. 2.

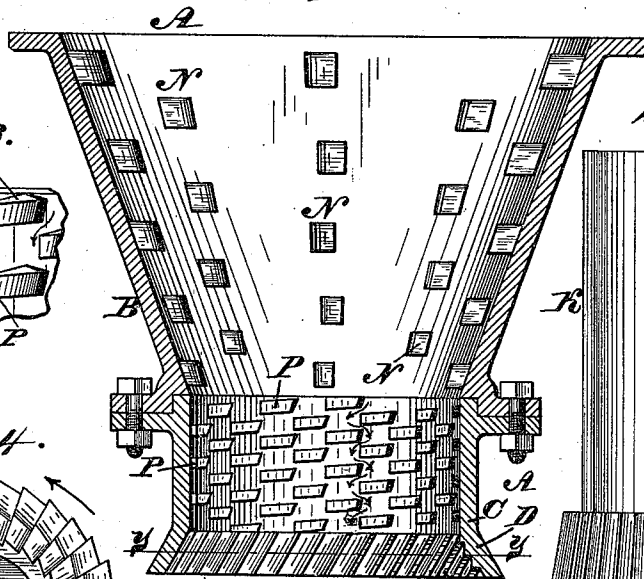


Fig. 3.

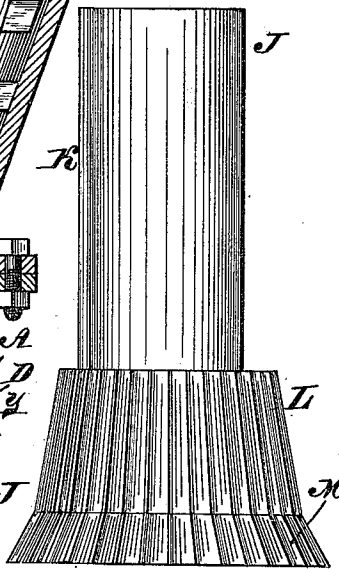


Fig. 6.

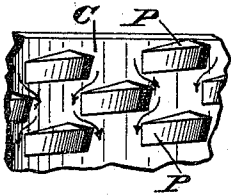
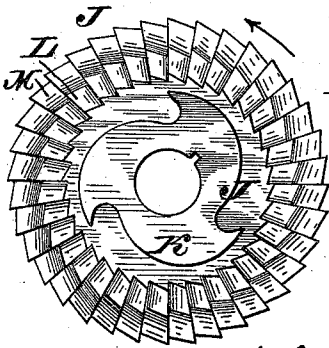
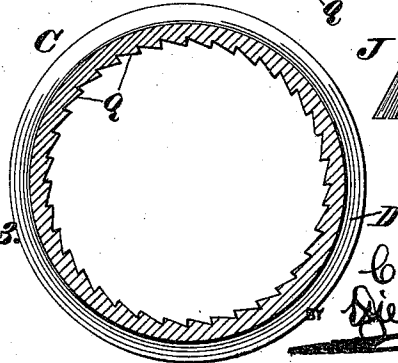


Fig. 4.



WITNESSES:

Fig. 5.



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L. Dowdell

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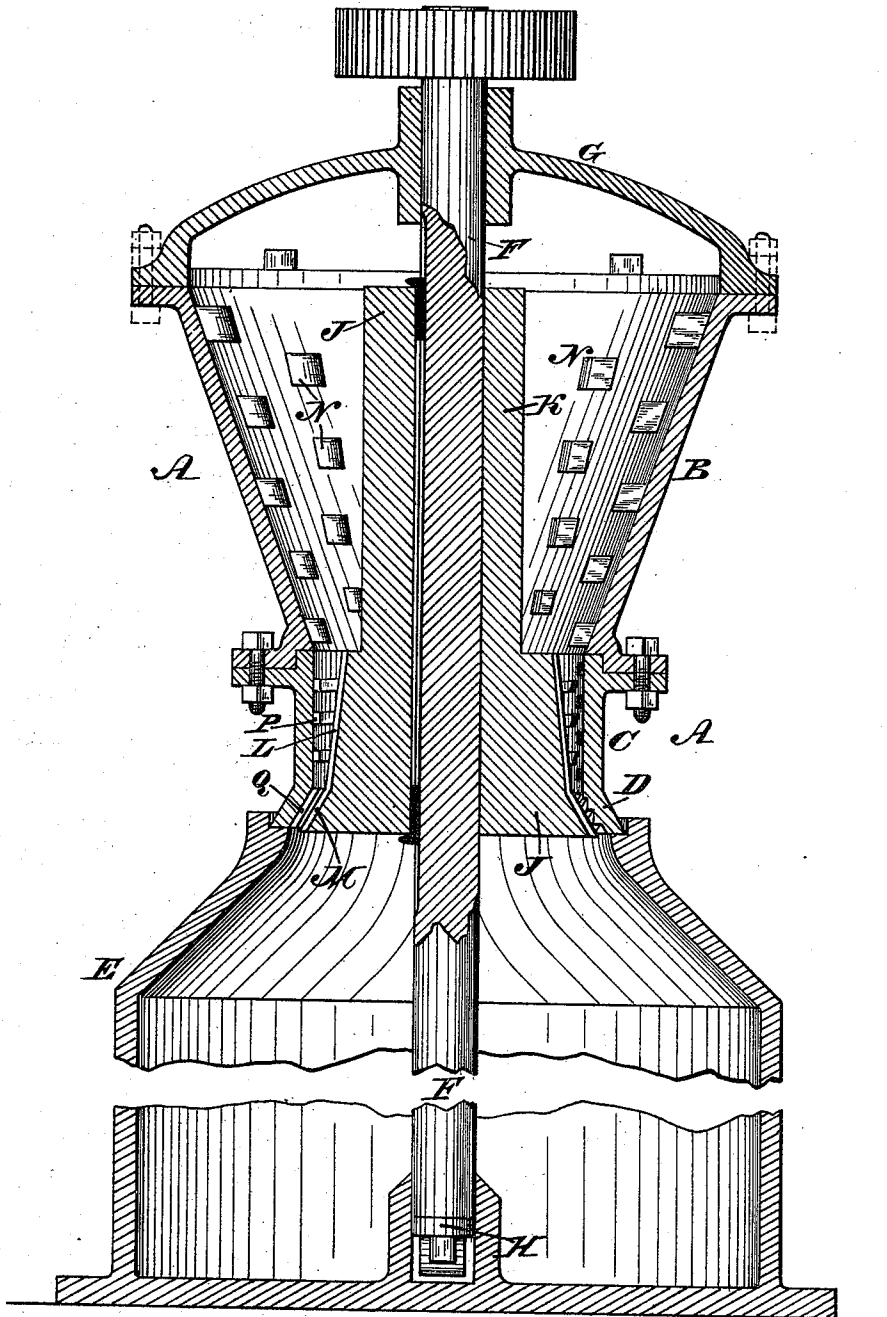
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Fig. 7.



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UNITED STATES PATENT OFFICE.

CALVIN C. PHILLIPS, OF PHILADELPHIA, PENNSYLVANIA.

MILL FOR CRUSHING BONES, MINERALS, &c.

SPECIFICATION forming part of Letters Patent No. 408,515, dated August 6, 1889.

Application filed November 20, 1888. Serial No. 291,340. (No model.)

To all whom it may concern:

Be it known that I, CALVIN C. PHILLIPS, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Mills for Crushing Bones, Minerals, &c., which improvement is fully set forth in the following specification and accompanying drawings.

My invention consists in improvements in mills as follows: First, of a hopper or pot of elliptical form in cross-section. Next, of a breaker or crusher which effectively reduces the material to a fineness suitable for a grinding-mill when grinding is required.

The construction and operation of each part will be hereinafter fully set forth.

Figure 1 represents a top or plan view of the casing of a mill embodying my invention. Fig. 2 represents a vertical section on line $x x$, Fig. 1. Fig. 3 represents a horizontal section on line $y y$, Fig. 2. Fig. 4 represents a top view of the runner or burr. Fig. 5 represents a side elevation thereof. Fig. 6 represents a perspective view of a portion of the lower part of the casing on an enlarged scale. Fig. 7 represents a vertical section of the mill.

Similar letters of reference indicate corresponding parts in the several figures.

Referring to the drawings, A represents the casing of a mill, the sections B C of which are respectively conical and cylindrical in vertical section, the bottom rim of the section C flaring, as at D, and resting on the base E, said sections being bolted or otherwise secured together.

F represents the driving-shaft, which is supported vertically at or near its upper end on the cross-head G and rests on the step H. Connected with the shaft F is the runner J, which is toothed or has toothed portions, as at K L M, the portion K being perpendicular and the portions L M being conical, the toothed portion M widening from the base of the portion L and occupying the rim D of the casing. The toothed portion L occupies the section C, and the toothed portion K occupies the section B, the teeth of said portion K being scroll-shaped in cross-section,

as will be seen in Fig. 4. On the inner face of the casing are teeth N P Q, respectively, on the sections B C and rim D, the teeth P extending in rows in spiral direction from the top to the bottom of section C.

It will be seen that when bone or other material is placed in the hopper and power imparted to the shaft F the material is unfaillingly carried around by the teeth K of the runner against the teeth N, and thus gradually crushed or broken. In this condition the material enters between the teeth L P, where it is further crushed or broken, and next enters between the teeth M Q, where it is reduced to a fineness sufficient for the stones of a grinding-mill.

The section or hopper B is elliptical in horizontal section, thus providing enlarged spaces in opposite sides of the same, adapting said section to receive skulls of animals, large bones, lumps or pieces of material, &c., in said spaces and cause the rapid breaking of such material as it is carried into the narrow spaces of the section.

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

1. In a crushing and grinding mill, the combination of the elliptical hopper provided with teeth, the cylindrical casing having the rows of spirally-arranged teeth, the flaring rim on said casing, provided with teeth, the runner having the scroll-shaped teeth for operating in conjunction with the teeth of the hopper, and the teeth for operating in conjunction with the teeth of the casing and rim thereof, substantially in the manner and for the purpose described.

2. In a grinding-mill, a hopper, in combination with a cylindrical casing, the latter having a flaring lower rim, the said hopper being provided with horizontal teeth and the casing with spirally-arranged teeth, a runner having a cylindrical portion with scroll-shaped teeth, and the conical portions L and M, said conical portions having teeth, all substantially as and for the purpose set forth.

3. In a crushing and grinding mill, the combination of the elliptical hopper having a series of horizontally-arranged teeth, the cylin-

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drical casing having the rows of spirally-
ranged teeth, and the flaring rim having teeth,
with the runner having the scroll-shaped
teeth for operating in conjunction with the
5 teeth of the rim, and the inclined teeth for
operating in conjunction with the teeth of
the casing and rim thereof, substantially in
the manner and for the purpose described.

4. In a grinding-mill, the combination of an
elliptical hopper provided with teeth on its 10
inner surface, a casing with teeth, and a run-
ner with teeth, substantially as described.

CALVIN C. PHILLIPS.

Witnesses:

JOHN A. WIEDERSHEIM,
JAMES F. KELLY.