

(No Model.)

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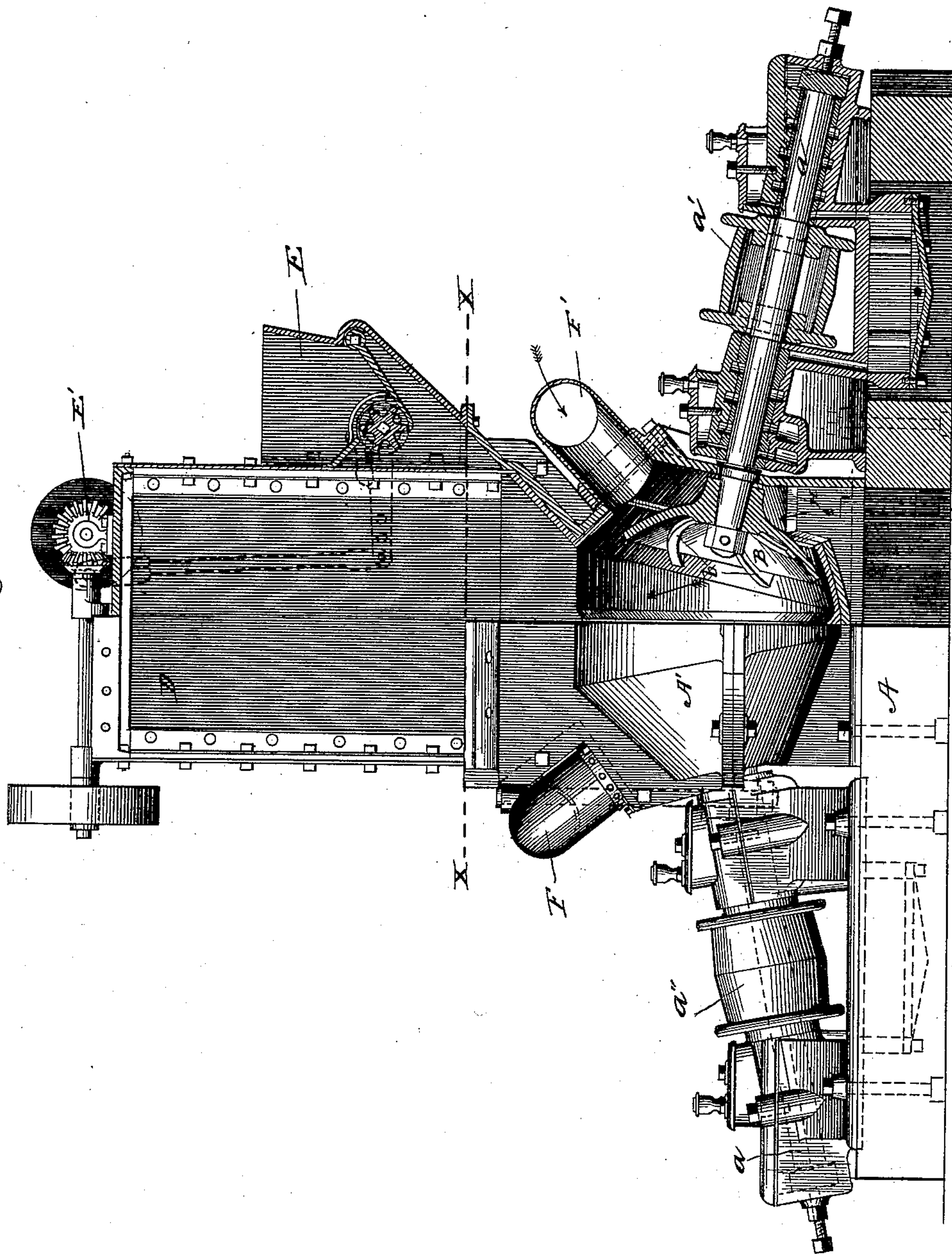
G. & A. RAYMOND.

MACHINE FOR REDUCING ORES, &c.

No. 387,446.

Patented Aug. 7, 1888.

Fig. 1.



Witnesses,

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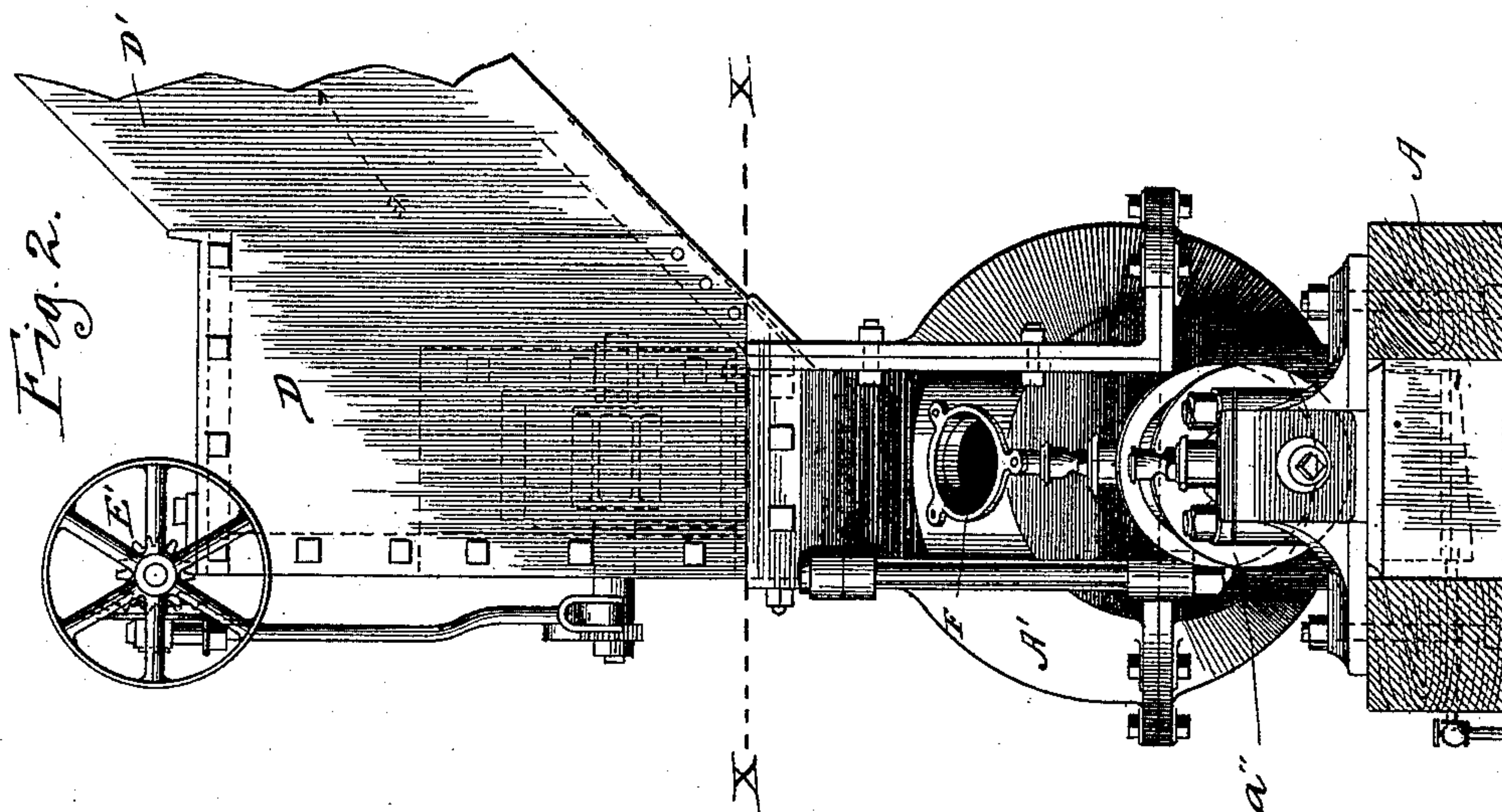
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3 Sheets—Sheet 3.

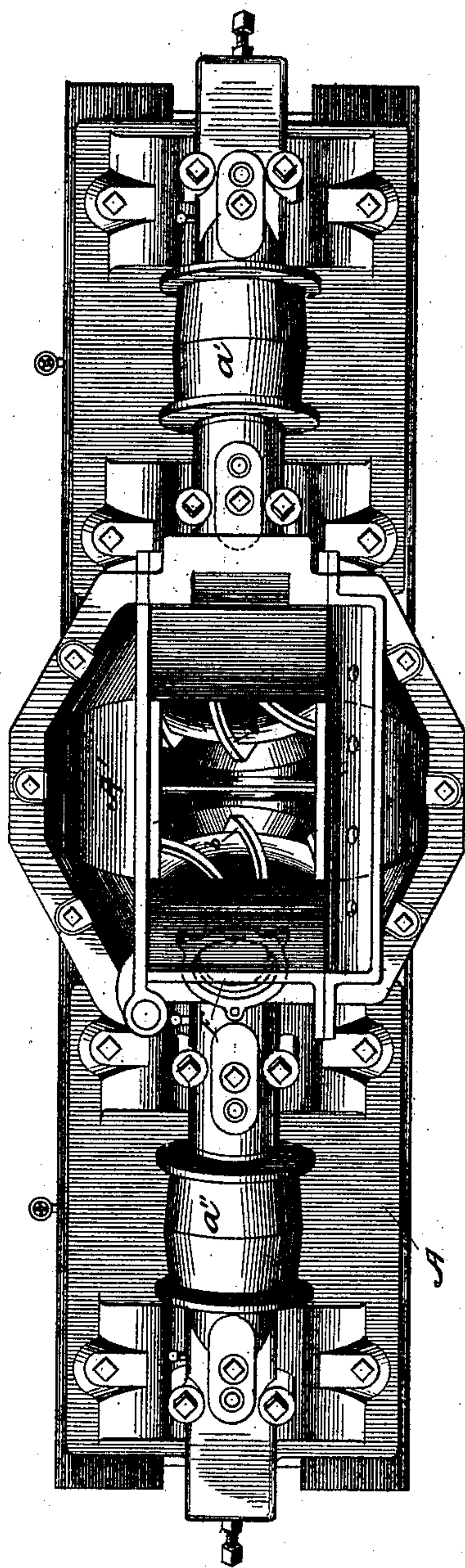
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Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE RAYMOND AND ALBERT RAYMOND, OF CHICAGO, ILLINOIS, ASSIGNORS TO THE CYCLONE PULVERIZER COMPANY OF THE UNITED STATES OF AMERICA, OF NEW YORK, N. Y.

MACHINE FOR REDUCING ORES, &c.

SPECIFICATION forming part of Letters Patent No. 387,446, dated August 7, 1888.

Application filed February 23, 1888. Serial No. 264,927. (No model.)

To all whom it may concern:

Be it known that we, GEORGE RAYMOND and ALBERT RAYMOND, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Reducing Ores, &c., which we desire to protect by Letters Patent of the United States, and of which the following is a specification.

Our invention relates to that class of machines for reducing ores for which Letters Patent were granted to us February 19, 1884, Nos. 293,786 and 293,787, and also embraced in more recent improvements for which application for patent, Serial No. 223,026, filed December 30, 1886, is now pending, in which the reduction is effected by impact and attrition between the fragments caused by counter-currents of air generated by oppositely-rotating beaters mounted within the reducing-chamber.

In the accompanying drawings, making part of this specification, Figure 1 is a side view of our machine, partly in elevation and partly in vertical section. Fig. 2 is an end elevation. Fig. 3 is a plan with the portions above line *x x*, Figs. 1 and 2, omitted.

Immediately upon the bed structure A are mounted in proper bearings for easy rotation shafts *a*, one of which is shown in the sectional portion of Fig. 1 and the other, which is its counterpart, is opposite and inclosed, the latter being preferably their normal condition, for the purpose of protection from dust. On these shafts, respectively, are pulleys *a'* and *a''*, by which it is designed that the shafts shall be rotated in opposite directions. On their inner or adjacent ends are provided concave reducing heads or plates B, having within their concave surfaces curved radial ribs *b*, which plates and ribs as a whole we designate for convenience "beaters." These beaters are inclosed, excepting above, by a casing, A', the space above forming communication between casing A' and an upper chamber, D, properly secured on said casing. A part, D', attached to chamber D, indicates an outlet to a settling-chamber, through which the reduced material passes from said chamber D. The part E is

a hopper, and the mechanism E' is designed for regulating feed through said hopper. F' and H are air-inlets to the chamber A'. These parts are all embraced, or substantially so, in the former patents and application, and the working thereof described. The departure in this example upon which our improvement is based lies chiefly in the inclination of axes, one with relation to the other, upon which the beaters rotate, and in the concavity of the beaters. We find that by a downward inclination of shafts *a* outwardly from the beaters, and the consequent inclination of the planes in which the said beaters rotate, great advantages are derived. This inclination of the axes separates the beaters farther at top than bottom. The ore is fed from hopper E through the top of case A' to the space between the beaters, due to their greater proximity to each other below; is received by the latter on their lower concave surfaces and is thrown from one to the other and returned by the action of the ribs and commotion of air, and, if expelled by the vortex, is again caught to be further subjected to the operation until so reduced as to be carried off. The reduction of ore in this class of machines is chiefly due to impact of one particle with another and attrition caused thereby in the powerful vortex created by the oppositely-rotating beaters.

It is obvious that the inclination with relation to each other of the ribbed beaters, aided by the concavity of the latter, tends to retain the material in a smaller compass within the vortex, by which the action of the particles upon each other is increased, thus materially facilitating the operation of reduction.

It is not essential that heads B should be concave, nor that they should be strictly in accordance with the form shown in the drawings.

The difference between the action of the machine above described and that of our machines described in said patents and in said application consists chiefly or mainly in this, that in said former machines the currents of air generated by the oppositely-revolving beaters form two annular parallel strata with a dead-air space or central vacuum between

them. The material on entering the chamber in such case will be carried into one or the other of these currents, and may be carried around for a time without being brought into
5 contact with the material of the other current. In our present type of machine, however, the opposite currents of air generated by the revolving beaters assume a vortical direction, the currents intersecting each other toward
10 the lower part of the chamber, and thus assuring the bringing of the fragments undergoing reduction into contact with each other, whereby their rapid and effectual reduction is secured.

15 Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A machine for reducing ores, &c., by impact and attrition between the fragments, comprising a reducing-chamber, two oppositely-
20 rotatable heads or beaters mounted opposite each other within said chamber in planes having upwardly-receding inclinations with relation one to the other, and suitable means for
25 rotating said heads, whereby the fragments are caused to move vortically, substantially as described.

2. In a machine for reducing ores, &c., by impact and attrition between the fragments, comprising a reducing-chamber, two oppositely-
30 rotatable heads or beaters mounted opposite each other within said chamber in planes having upwardly-receding inclinations with relation one to the other, and having radial curved ribs, and suitable means for rotating said heads,
35 whereby the fragments are caused to move vortically, substantially as described.

3. In a machine for reducing ores, &c., by impact and attrition between the fragments, comprising a reducing-chamber, two oppositely-
40 rotatable heads or beaters having concave adjacent surfaces and curved radial ribs mounted opposite each other within said chamber in planes having upwardly-receding inclinations
45 with relation one to the other, and suitable means for rotating said heads, whereby the fragments are caused to move vortically, substantially as described.

GEORGE RAYMOND.
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Witnesses:

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