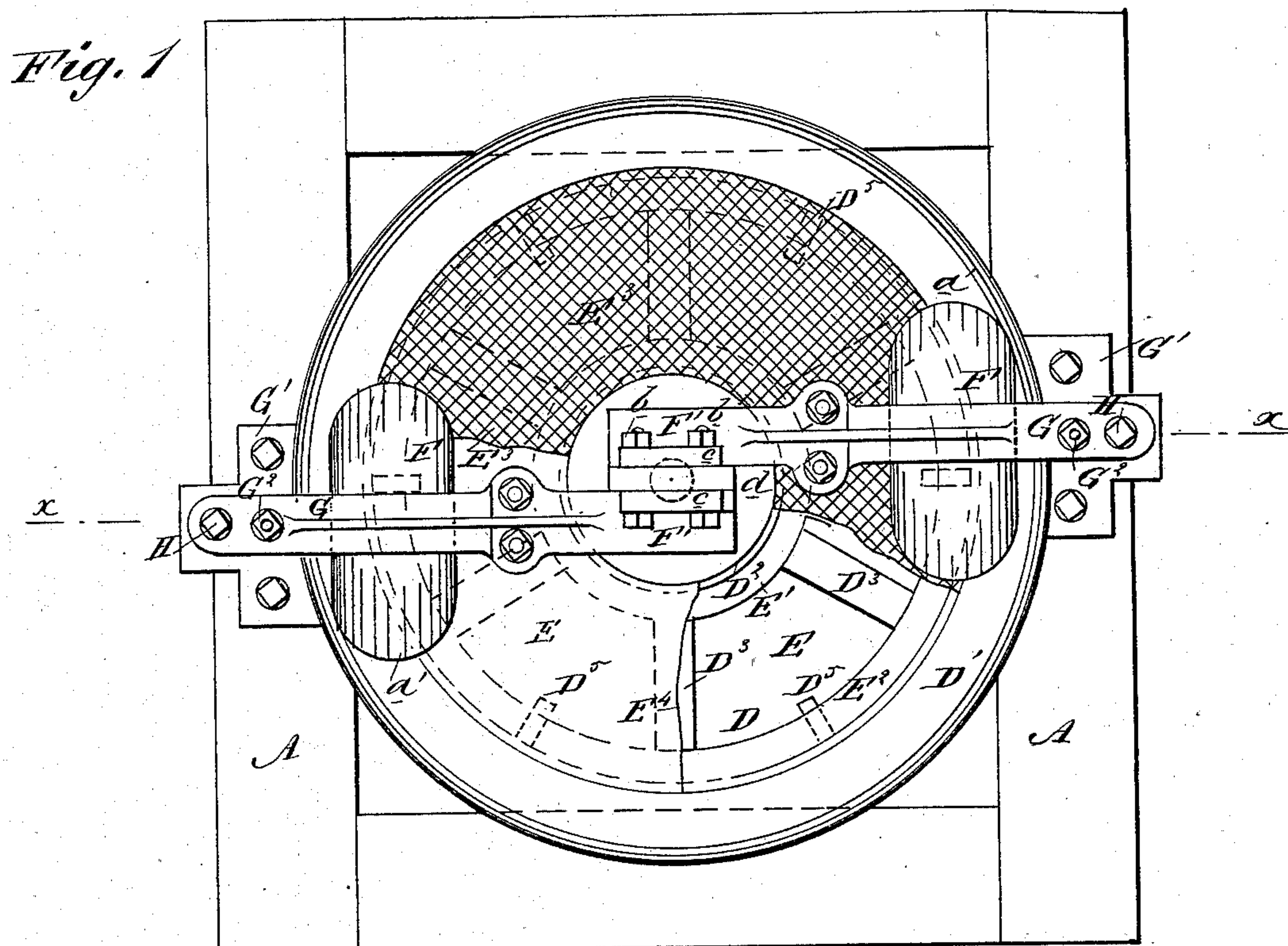


2 Sheets—Sheet 1.

MACHINE FOR GRINDING MINERALS, &c.

Patented May 29, 1883.



By  
Jesse J. Stott

Attorney

witnesses  
Jacob J. Stone  
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(No Model.)

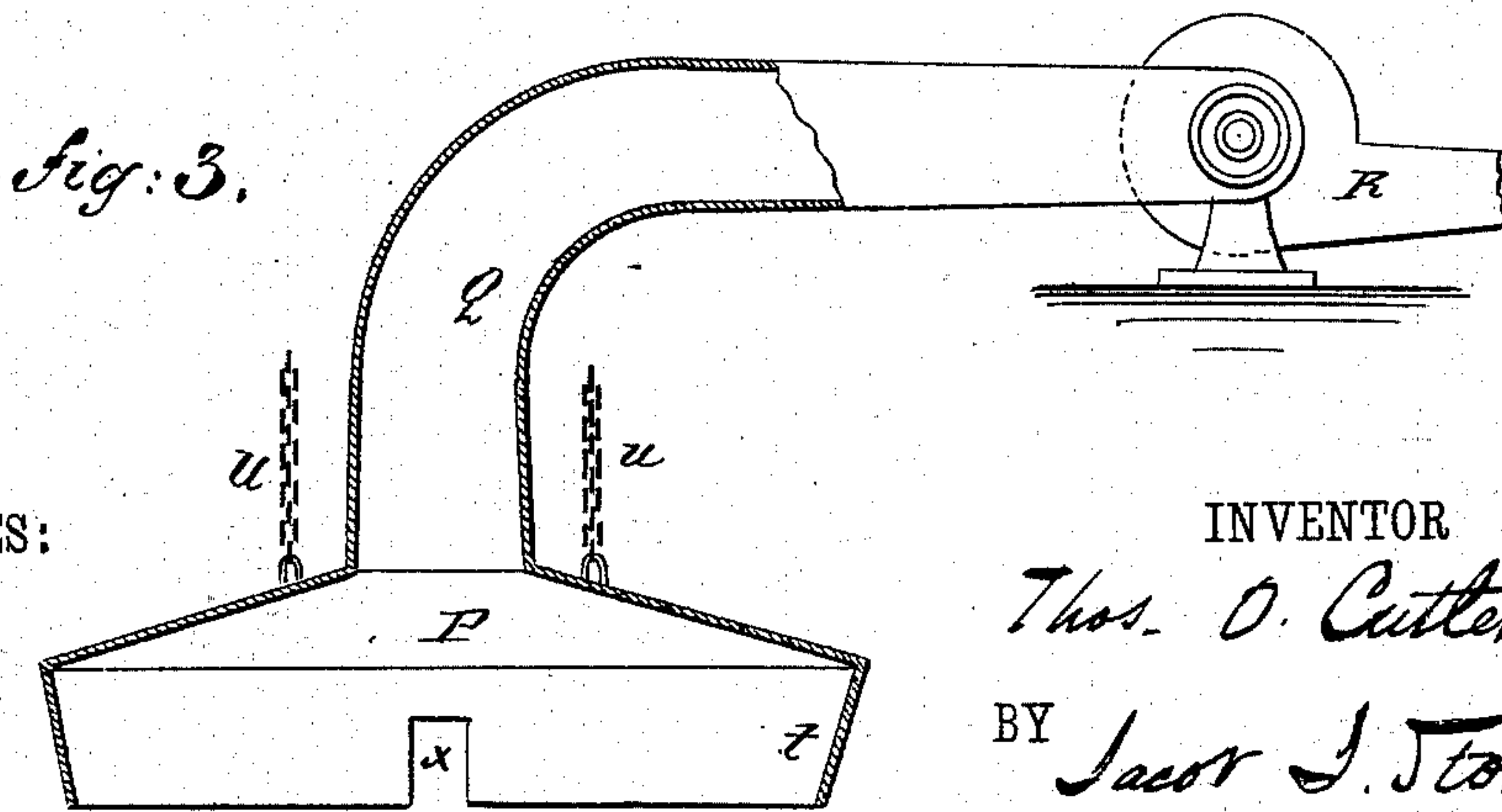
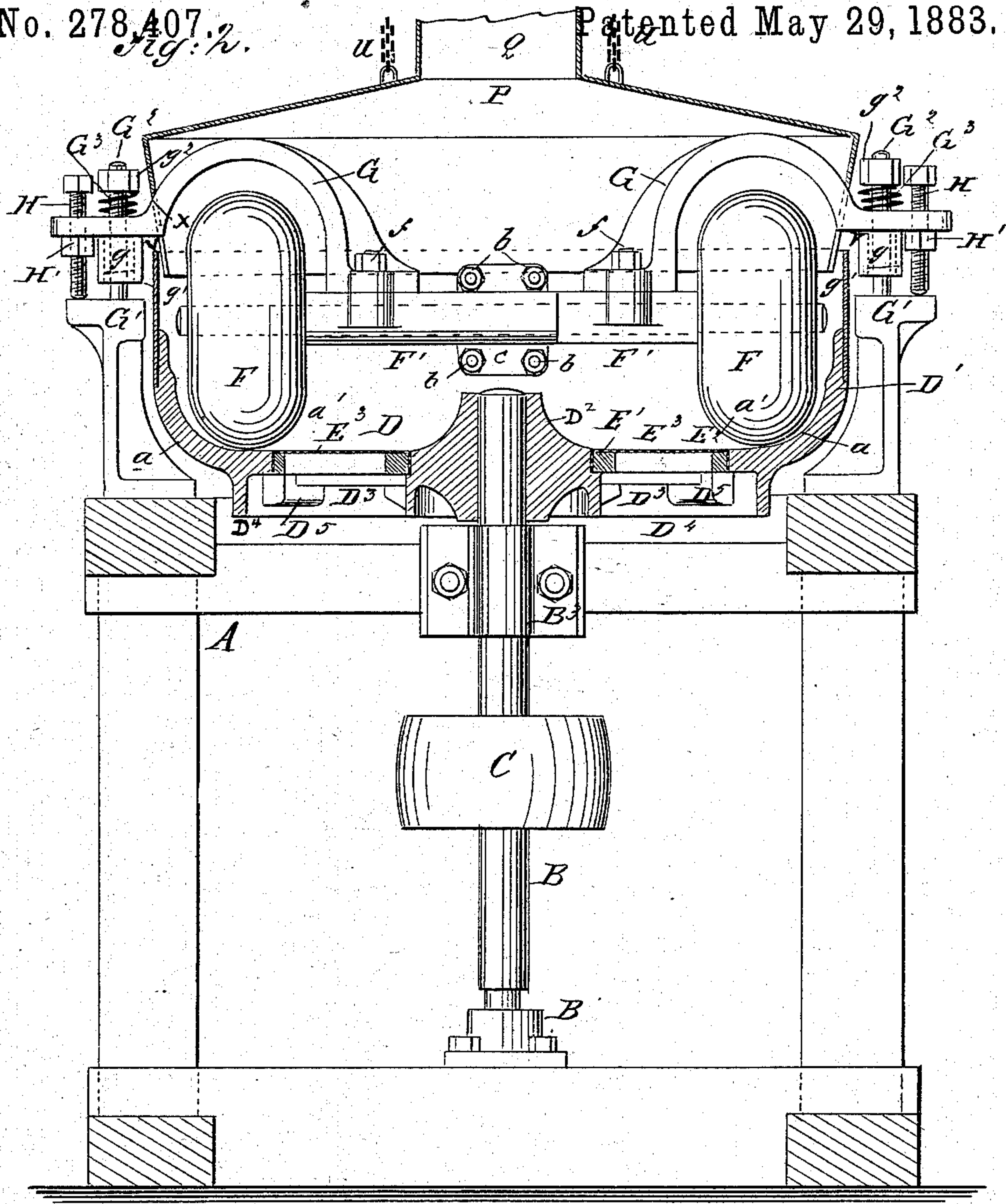
2 Sheets--Sheet 2.

T. O. CUTLER.

# MACHINE FOR GRINDING MINERALS, &c.

No. 278,407

No. 278,407. *Fig. 2.*  Patented May 29, 1883.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

THOMAS O. CUTLER, OF JERSEY CITY, NEW JERSEY.

## MACHINE FOR GRINDING MINERALS, &c.

SPECIFICATION forming part of Letters Patent No. 278,407, dated May 29, 1883.

Application filed September 2, 1881. Renewed March 1, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS O. CUTLER, of Jersey City, in the county of Hudson and State of New Jersey, have invented a new and Improved Machine for Grinding Minerals and other Substances, of which the following is a full, clear, and exact description.

This invention is designed as an improvement on the machine for which Letters Patent No. 12,054 were issued to me December 12, 1854; and it consists in certain novel details of construction and combination, as will be hereinafter fully set forth.

Figure 1 is a plan of the machine provided with two wheels, with parts removed and parts broken away to exhibit other parts. Fig. 2 is a sectional side elevation of the same on line *x*, Fig. 1, with hood applied. Fig. 3 is a side elevation of the hood and exhaust-fan.

Similar letters of reference indicate corresponding parts.

In the drawings, A represents the frame of the machine, and B a vertical shaft journaled in boxes B', and having secured on it a pulley, C, by means of which power is transmitted from a suitable source for driving the machine. On the upper end of this shaft B is secured the circular pan D, which has a flat bottom and an upward-flaring rim, D', whose inner surface is curved, as shown at *a*, so as to present in its cross-section nearly or quite a quarter of a circle. The rim D' is connected with the pan-hub D<sup>2</sup> by arms D<sup>3</sup>, radiating from the latter, and said rim D' is strengthened beneath by an annular downward-projecting flange, D<sup>4</sup>, and by converging blocks D<sup>5</sup>, as shown in Figs. 1 and 2. Between the arms D<sup>3</sup>, and extending from the hub D<sup>2</sup> to the rim D', are segmental openings E for the discharge, when desired, of the ground material. Resting on the arms D<sup>3</sup>, and encircling the hub D<sup>2</sup>, is a ring, E', of wood or other suitable material, and resting on the blocks D<sup>5</sup>, and in contact with the inner edge of the rim D', is a ring, E<sup>2</sup>, of wood or other suitable material, and on these rings E' E<sup>2</sup>, over the openings E, are secured sections E<sup>3</sup>, of wire-cloth, to serve as sieves to permit material operated upon to pass through when ground fine enough.

When it is desired to dispense with the use

of the sieves E<sup>3</sup> and to withdraw the ground material from the machine by means of an exhaust-fan, said sieves E<sup>3</sup> may be covered with metal plates, as shown at E<sup>4</sup>, or may be removed, and metal plates may be substituted for them, thus entirely closing the discharge-openings E.

In Figs. 1 and 2 is shown a machine with two grinding-wheels, F F, each secured on the outer end of an arm, F' F', in such a manner that it may revolve in a vertical plane. These wheels F F are double-faced, and the tread of each face is curved, as shown at *a'*, to nearly correspond with the curvature of the inner face of the pan-rim D'. The advantage of this double face is that when one tread *a'* is worn the wheel can be removed from its arm, and be reversed and replaced, thereby offering a fresh and unworn surface for action. The inner ends of these parallel arms F' overlap each other laterally, and are bolted together by bolts *b*, passing through their flanges *c*. The wheels F revolve loosely on the outer ends of the arms F', and they can be adjusted nearer to the pan-rim D' by separating the arms F' at their point of union and holding them apart by introducing shims or blocks between them at *d*, whereby said arms F', with their wheels F, are moved bodily in opposite directions from the central line of the pan D, by which means the said wheels F are brought closer to the pan-rim D'.

One device for holding the arms F' in place, so that the wheels F shall rotate only on their own axes, and not revolve about the pan D, is shown in Figs. 1 and 2, wherein curved braces G, elevated so that the wheels F can rotate beneath them, have their inner ends fastened by bolts *f* to the arms F', and their outer ends secured to opposite standards, G', that are located on the top of the frame A. On the under face of the outer end of each brace G is a boss, *g*, forming part thereof, and down through each boss *g* is passed a holding-bolt, G<sup>2</sup>, that taps into the top of a standard, G'. The bolt-holes through the bosses *g* and the corresponding holes through the braces G are enlarged to receive spiral springs G<sup>3</sup>, that encircle said bolts G<sup>2</sup> and press upward from the interior shoulders, *g'*, of the bosses *g*, against the bolt-



nuts  $g^2$ , thereby forming elastic outer bearings for the said arms and braces  $F' G$ , that permit the wheels  $F$  to rise and fall slightly, and thus accommodate themselves to the irregular general surface of the substances being ground by them.

Down through the extreme outer ends of the braces  $G$  are passed set-screws  $H$ , with their points resting on the standards  $G'$ , and having nuts  $H'$  turned on them beneath the said braces  $G$ . By turning these nuts  $H'$  up or down the wheels  $F$  can be elevated or depressed at will, as the case may be, so as to grind coarse or fine.

It is often desirable to retain in the machine the substance to be ground until said substance is reduced to very fine powder, and to remove the said powder as fast as formed. In order to effect this, I use a vertically-adjustable hood,  $P$ , of about the diameter of the pan  $D$ , and having a beveled rim, as shown at  $t$ , said hood  $P$  being adjustably suspended by cords or chains  $u$ , and having vertical slots  $x$  made in its rim to admit of its being adjusted over the arms  $F'$ . A pipe,  $Q$ , connects the top of the hood  $P$  with an exhaust-fan,  $R$ . The hood  $P$  being in position, as shown in Fig. 2, with its rim inside the rim of the pan  $D$ , an annular opening,  $v$ , is thereby formed, through which air may enter the said pan  $D$ . The exhaust-fan  $R$  being then put in motion, a current of air enters through the opening  $v$  and is deflected by the hood-rim to the bottom of the pan, and there, taking up the finely-powdered ground substance, is drawn through the pipe  $Q$  to the fan  $R$ , whence it is expelled into any suitable bag, chamber, or other receiver.

It is obvious that by lowering the hood  $P$  the annular opening  $v$  may be made smaller, and consequently the volume of air entering the fan is diminished, while the volume may be increased by elevating said hood  $P$ . Hence by regulating the admission of air into the machine the grade of the substance exhausted from the machine may be regulated, as the greater the volume of air, the velocity of the current remaining the same, the coarser will be the grade of the substance exhausted, while a decreased volume of air will exhaust only the finer powder.

When the exhaust-fan is used the bottom screens,  $E^3$ , are covered, or plates are substituted for them, as above set forth.

The grinding-surfaces of the machine may be of metal, glass, porcelain, or any other material best adapted to the substance to be ground. The substances to be ground are fed into the mill through a hopper, or in any other convenient manner. Power applied to the pulley  $C$  causes the pan  $D$  to revolve, and the wheels are rotated in a contrary direction on their own axes by frictional contact with the bottom or sides of the said pan  $D$ , or with the pan's contents.

One, two, or more grinding-wheels may be used, as desired, and when but one is used its arm or axle may be extended over the rim of the pan and be supported and fixed on a suitable standard rising from the machine-frame.

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

1. A machine for grinding minerals and other substances, constructed substantially as herein shown and described, consisting of a circular pan formed with curved upturned rim, the segmental screens in the bottom thereof, and suitable covers therefor, means for rotating said pan in a horizontal plane, the laterally-adjustable supporting-shafts, and double-faced wheels, adapted and arranged to be revolved on their own axes by contact with the bottom and rim of the pan, as set forth.

2. In combination with a circular bed or pan formed with upturned rim or edge, a vertically-adjustable pan-covering hood, an exhaust-fan, and a pipe connecting the hood and fan, whereby pulverized material in the pan may be continuously removed, as set forth.

3. The combination, with a circular bed or pan formed with upturned rim or sides, and suitable grinding-wheels, of the herein-described vertically-adjustable pan-covering hood, formed with tapering sides, an exhaust-fan, and connecting-pipe, all arranged and operating substantially as set forth.

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Witnesses:

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