

No. 633,248.

Patented Sept. 19, 1899.

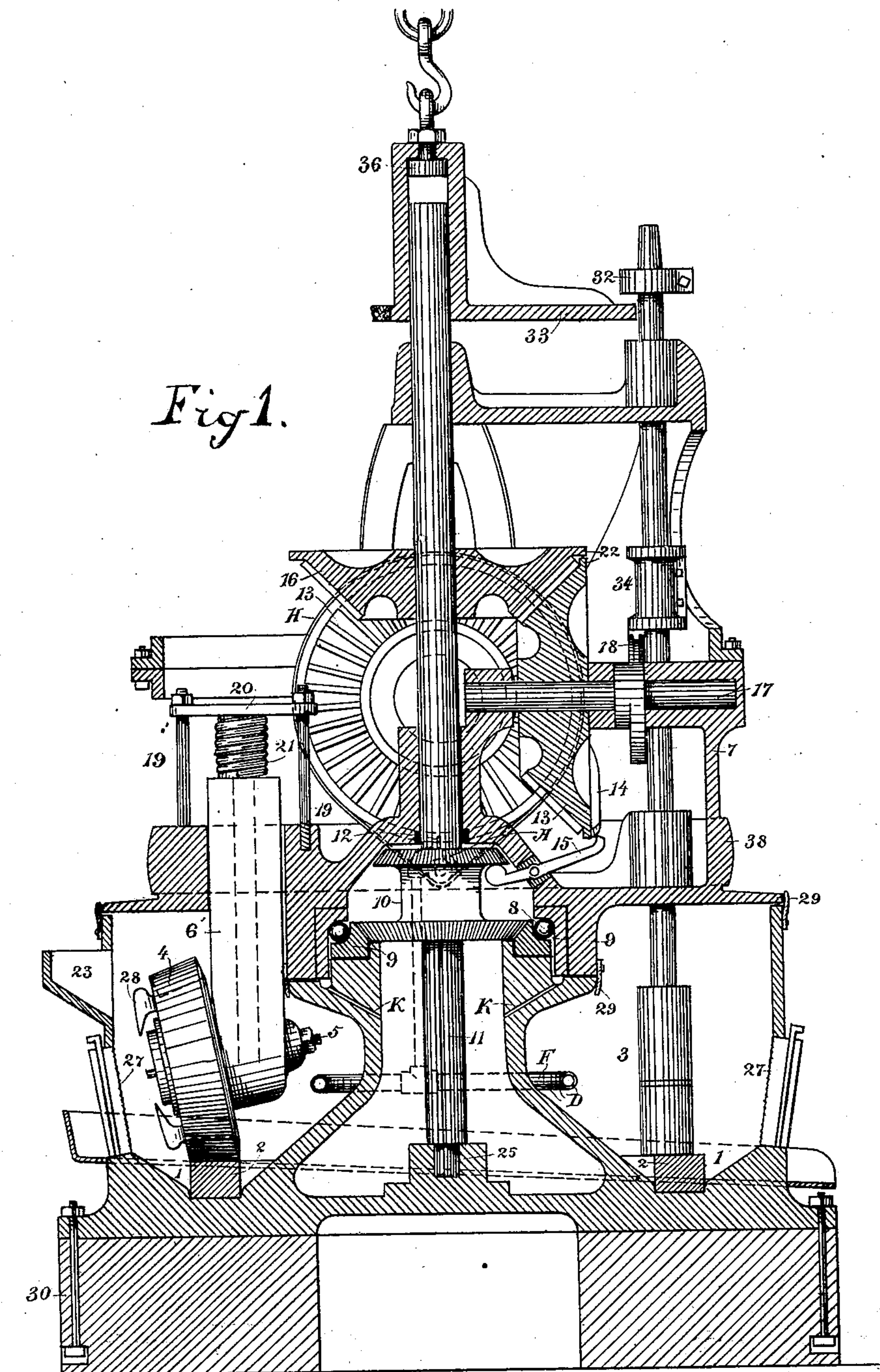
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STAMP AND ROLLER CRUSHER AND PULVERIZER.

(Application filed July 12, 1898.)

(No Model.)

2 Sheets—Sheet 1.



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2 Sheets—Sheet 2.

Fig. 2.

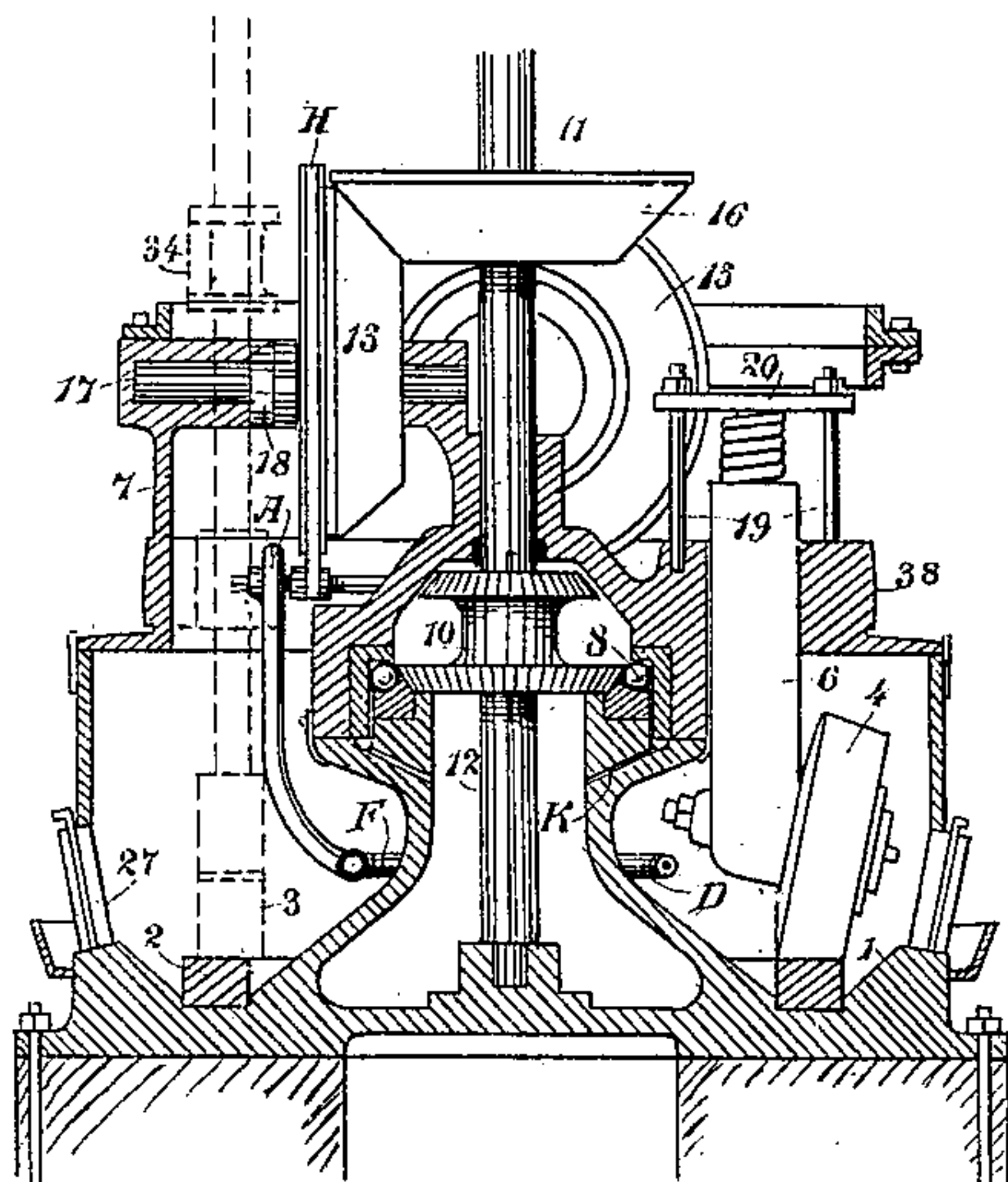


Fig. 4.

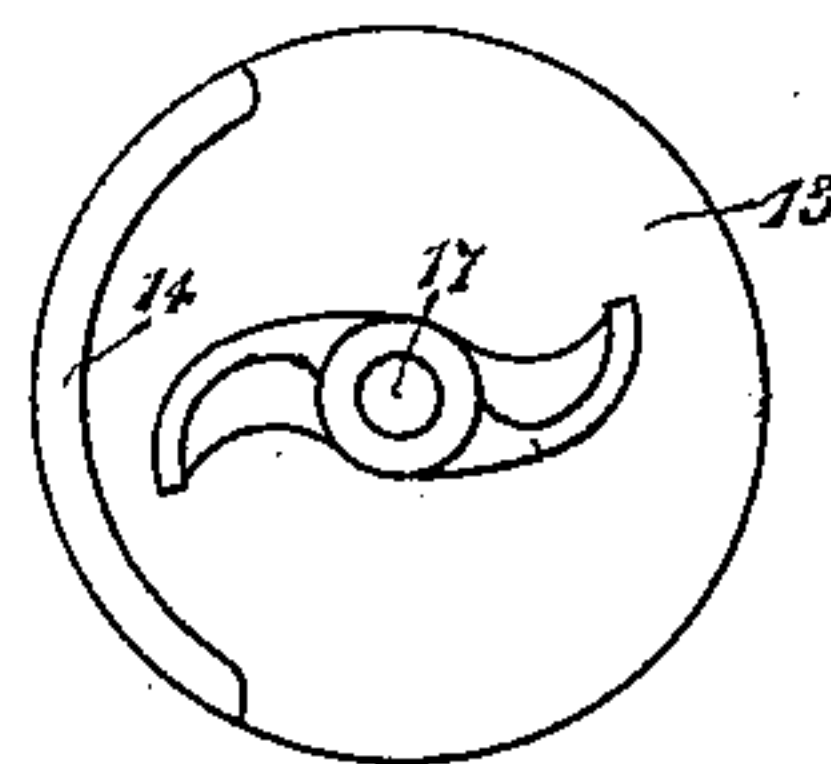
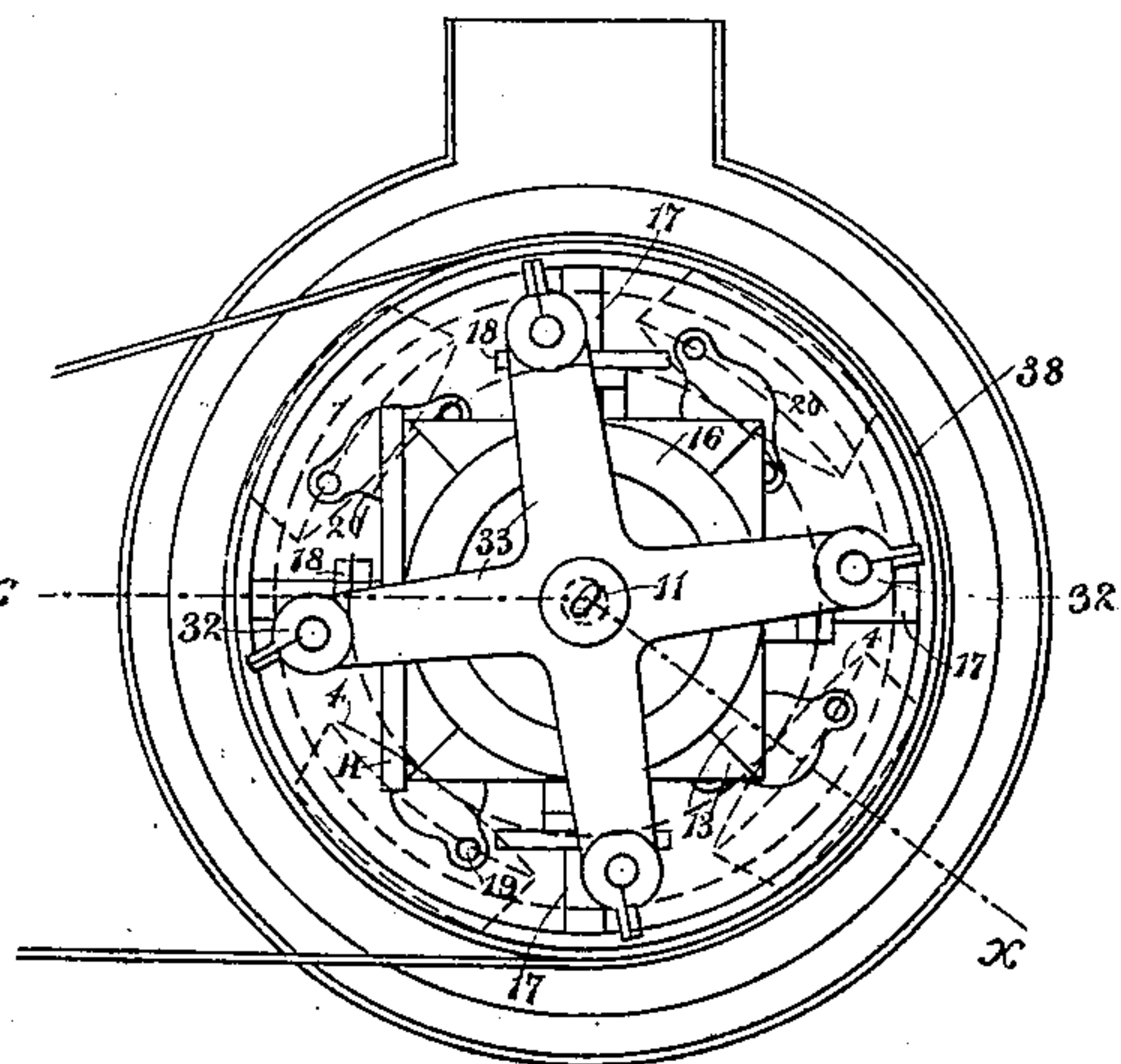


Fig. 3.



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UNITED STATES PATENT OFFICE.

ADOLPH J. PETTER, OF RANDBURG, CALIFORNIA.

STAMP AND ROLLER CRUSHER AND PULVERIZER.

SPECIFICATION forming part of Letters Patent No. 633,248, dated September 19, 1899.

Application filed July 12, 1898. Serial No. 685,756. (No model.)

To all whom it may concern:

Be it known that I, ADOLPH JOHN PETTER, a citizen of the United States, residing at Randburg, county of Kern, State of California, have invented an Improvement in Stamp and Roller Crushers and Pulverizers; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to an apparatus which is especially designed for crushing and pulverizing ores of precious metals, either wet or dry, and also for amalgamating.

It consists in the parts and the constructions and combination of parts hereinafter described and claimed.

Figure 1 represents a vertical section through my machine. Fig. 2 is a sectional view, on a reduced scale, on the line xx of Fig. 3. Fig. 3 is a plan view. Fig. 4 is a detail showing a rear view of one of the pinions 13 with its cam 14 and showing also the shaft 17 and tappet-cam.

The object of my invention is to combine vertically-reciprocating stamps with rolls which travel upon the dies of the mortar, so that the material is subject to the sweeping or oblique impact of the falling stamps and the horizontal dragging, rubbing, or muller-like motion of the stamps and conical rolls.

1 is a circular mortar or chamber having suitable flanges by which it is secured to the mortar-block 30. This mortar-block contains a ring or series of dies 2, arranged in a circle, and the stamps 3 are fixed upon vertical stamp-stems and adapted to rise and fall when the machine is in operation, so as to pulverize any material which is delivered into the mortar and upon the dies through a feed-hopper 23 or by other method.

The stamps are mounted in a movable upper framework or support 7, which is revolvable by means of belt or other connection to the belt-pulley or its equivalent driver 38, and this motion during the rise and fall of the stamps produces a glancing oblique sweeping stroke of the stamps, which greatly increases their pulverizing capacity. The bottom plate of 7 is supported upon an anti-friction-bearing, herein shown as including balls 8, which fit in suitable runways 9, so that the upper portion of the apparatus is carried upon these balls, thus enabling it to turn easily.

29 are felt or other flanges, which fit over the joints between the stationary mortar and movable upper part to prevent dirt from entering the bearings on the inside and to prevent the pulp or dust escaping outside. This upper part 7 carries vertically-movable standards 6, which are slidable in guides and which are pressed downwardly by springs 21, the upper ends of which abut against the caps 20. These caps are fitted to bolts 19, fixed in frame 7 and having nuts upon the upper ends, and by screwing these nuts down the tension of the springs 21 is increased and the pressure through the standard 6 is correspondingly increased. The lower ends of the standards 6 carry shafts which are rotatable with relation thereto. Upon the ends of these shafts are the conical rollers 4, the faces of which run upon the dies 2. The faces of these rollers converge outwardly, and the incline of the shafts 5 corresponds, so that the faces will roll upon the dies with the convergent ends outwardly instead of inwardly. Therefore it will be understood that as they roll upon the dies they will also produce a rubbing or grinding action which increases the capacity of the apparatus for work. As previously described, the pressure of these rollers upon the dies is increased by screwing down the caps 20 and increasing the tension of the springs 21, so that a greater portion of the weight of the upper part of the machine may be brought upon the rollers. Fans 28 are carried by the rollers, and these act to force the pulp outwardly and through the screens 27 when it is fine enough.

A is a fan driven by a pulley or equivalent device H, carried by the gear 13. Air from this fan enters the circular pipe F and escapes therefrom through holes D and serves to blow the pulp or dust off the dies and out through the screens.

11 is a vertical central shaft passing down through the machine and having its lower end fitting in a step 25. This shaft has keyed to it a bevel-gear 16, which engages with the teeth of bevel-gears 13, the shafts of which are journaled horizontally in the framework 7, as shown. These shafts 17 extend to one side of the stamp-stem 3 and have cams 18 fixed to them in such a position that the cams will engage with tappets 34 and raise the

stamps, allowing them to drop whenever the cams have passed the tappets.

It will be seen by this construction that when the upper part of the machine is revolved by the pulley or other device 38, as previously described, the stamps, with their stems and tappets, and the shafts 17 and gears 13 will be revolved around the central vertical axis or center of the machine, and as the gears 13 engage with the teeth of the stationary gear 16 it will rotate the gears 13 and their shafts, and thus cause the cams to alternately raise and drop the stamps.

The central shaft 11 passes through a socket-piece 10, the lower portion of which is fluted and fits within the runway 9, in which the balls 8 are carried. This socket-piece is connected with the vertical shaft 11 by a key 12, so that the two are stationary, and as long as the socket 10 remains seated within the runway 9 it retains the shaft 11 and its gear 16 in a stationary position, and the revolution of the upper portion 7 of the machine acts upon the stamp and grinding-rollers, as previously described. The keyway extends to the bottom of the shaft, and this allows it to be lifted out from the top and the machine dismembered.

It is desirable to cause the stamps to drop at different points on the dies 2 to prevent their wearing into depressions, as would be the case if they always fell at the same points. I have therefore shown a lug or cam 14 either cast with the gear or fixed to turn with the shaft 17, so as to engage the outer end of the lever 15, which is fulcrumed upon the framework 7. When the lug thus engages this lever, the inner end of the lever rises up under the flange of the socket-piece 10 and lifts the socket-piece 10 and lifts the socket out of its engagement with the runway 9. This temporarily frees the socket 10 and the central shaft 11 and allows them to turn a little way until the cam 14 releases the lever 15, when they will drop back, the socket engaging the runway, as previously described, and again holding the parts stationary. This change of position insures the falling of the stamps upon a new part of the die at each time when the change occurs. The flutings in the socket-piece and those in the corresponding ring are tapered and pointed, as shown, to insure the parts engaging easily when the socket-piece is again let down.

It is sometimes desirable to raise the stamps to such a height that the tappets will not be engaged by the cams 18, and this is effected by a yoke or spider 33, the arms of which engage with collars 32, fixed upon the outer ends of the stamp-stems. A swivel-ring 36 is connected with the center of the spider, and by means of a block and tackle of any suitable description these parts may be lifted to any desired height. If the apparatus continues in motion under these conditions, the rollers will continue to grind the ores upon the dies, while the stamps will be out of action.

22 are flanges extending beyond the peripheries of the bevel gear-wheels 13 and 16, so that they run in contact, and this insures the teeth of the gears meshing to prevent them from being forced together or becoming jammed by the weight of the upper part of the machine.

K K are channels through which waste oil is discharged and prevented from entering the mortar.

The peculiar sweeping grinding motion of the stamps and the outwardly-converging rollers greatly facilitates the amalgamation of free milling ores by its scouring and polishing action on the metal.

The devices here described are very satisfactory for carrying out the principles of my invention; but I do not wish to confine myself to its special mechanisms, as various modifications will suggest themselves to those skilled in the art without departing from the spirit of the invention.

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

1. In an apparatus for pulverizing ores, a circular mortar having an annular die fixed therein, stamps, the stems of which are guided in a frame which is rotatable about a shaft forming the center of revolution, rollers journaled upon the revoluble frame between the stamps with their faces adapted to travel upon the dies, and a mechanism carried by the revolving frame, and including horizontal shafts and driven gears, and cams on said shafts whereby the stamps are raised and allowed to fall upon the dies while advancing along the line thereof.

2. In an apparatus for pulverizing ores, an annular mortar with corresponding die or dies fixed therein, a framework with anti-frictional bearings and a vertical central shaft, stamps the stems of which are vertically guided in lines above the die, a mechanism including horizontal shafts and driven gears, and cams on said shafts, by which the stems are raised and allowed to drop with an oblique sweeping grinding movement, vertically-movable spring-pressed standards carried by the frame intermediate between the stamps, inclined shafts journaled in the lower ends of the standards, and rollers fixed upon said shafts, said rollers having conical faces converging outwardly so that the lower faces of the rollers travel upon the dies and produce a sweeping or grinding action thereon.

3. In an apparatus for pulverizing ore, a circular annular mortar with an annular die fixed in the bottom thereof, a central vertical shaft having a bevel-gear fixed to it, a framework revoluble about the shaft and above the mortar, bevel-gears the shafts of which are journaled radially, so that the gears engage with the one fixed to the vertical shaft, cams carried by the radial shafts, stamps the vertical stems of which are carried by the revoluble framework, and tappets fixed upon the

stamp-stems so as to be engaged by the cams during the rotation of the shafts and the revolution of the supporting-frame.

4. In an apparatus for pulverizing ores, an annular mortar with an annular die and vertical central shaft, a framework mounted above the mortar upon antifrictional bearings, rotatable about the central shaft, a fluted socket-piece normally engaging with the stationary runway of the antifrictional bearings, and a key in the vertical shaft on which it is slidable and by which it retains the shaft in a stationary position, a bevel-gear fixed to the shaft, other bevel-gears mounted upon horizontal radial shafts journaled in the movable framework, said gears engaging the stationary gear and being caused to rotate when the framework is revolved around the center, cams carried by the horizontal shafts, stamps, the stems of which are vertically guided, and tappets upon the stems through which the stamps are raised by the cams and allowed to drop upon the circular die, and cams or projections fixed upon the bevel-gears, a fulcrumed lever one end of which is engaged by the gear-cam, and the other engages a flange upon the socket whereby the latter is lifted and temporarily disengaged from the lock to allow the apparatus to turn and change the point at which the stamps fall upon the dies at each revolution of the gear-wheel.

5. In an apparatus of the character described, the combination with a stationary mortar, a revoluble framework and the stamp-actuating mechanism carried thereby and including horizontal rotatable shafts with gears thereon, and cams to engage the stamp-stems, of rollers having outwardly-converging faces, and shafts upon which the rollers are carried, standing at an angle which will cause the faces of the rollers to travel upon the die within the mortar with a rubbing motion, standards in which the roller-shafts are supported, springs pressing upon said standards having the upper ends contacting with caps, and screw-bolts and nuts by which said caps are adjusted to regulate the pressure upon the springs and the rollers.

6. In an apparatus of the character described, the annular mortar and die, a frame supported upon antifrictional bearings and revoluble in a horizontal plane above the mortar, stamps adapted to fall upon the die within the mortar having the stems vertically guided in the revoluble framework, rollers adjustably supported from the framework to

travel upon the die between the stamps, horizontal radial cam-shafts, cams carried by said shafts, tappets upon the stamp-stems which are engaged by the cams to raise and release the stamps, bevel-gears fixed upon the radial cam-shafts, and a stationary gear fixed upon the vertical central shaft so that the horizontal gears engage and are rotated thereby, said gears having projecting contacting flanges.

7. In a machine of the character described, the combination with a circular mortar, having an annular die, of a corresponding framework rotatable about the common center and crushing-rollers carried by said framework with mechanism for raising and releasing the stamps and for adjusting the pressure of the rollers upon the dies, annular runways with antifrictional bearings by which the superposed framework is carried with relation to the mortar, and flexible dust-retaining bands or strips covering the joints between the stationary and movable parts, substantially as described.

8. In an apparatus of the character described, an annular stationary mortar and die, a framework mounted upon antifrictional bearings and revoluble about a common center above the mortar, vertically-movable stamps, the stems of which are guided in said framework, a mechanism carried by the framework, whereby the stamps are caused to rise and fall during the revolution around the common center, rollers journaled between the stamps adapted to travel upon the dies, and a mechanism whereby the stamps may be independently raised, consisting of a central hub with radial arms through which the outer ends of the stamp-stems pass, collars fixed upon the stamp-stems, and a swivel-hook connected with the central hub, a mechanism whereby it may be raised so as to lift the stamp clear of the actuating-cams.

9. In an apparatus of the character described, an annular stationary mortar and die, a superposed framework carrying stamps, lifting cams and rollers intermediate of the stamps, and exterior discharge-screens as shown in combination with a fan-blower and a perforated air-conveying pipe, substantially as herein described.

In witness whereof I have hereunto set my hand.

ADOLPH J. PETTER.

Witnesses:

E. B. MAGINNIS,
ARNOLD LICHTZ.