A. G. CAMPBELL.

ROCK PULVERIZING MACHINE.

APPLICATION FILED OCT. 20, 1910.

990,633.

Patented Apr. 25, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

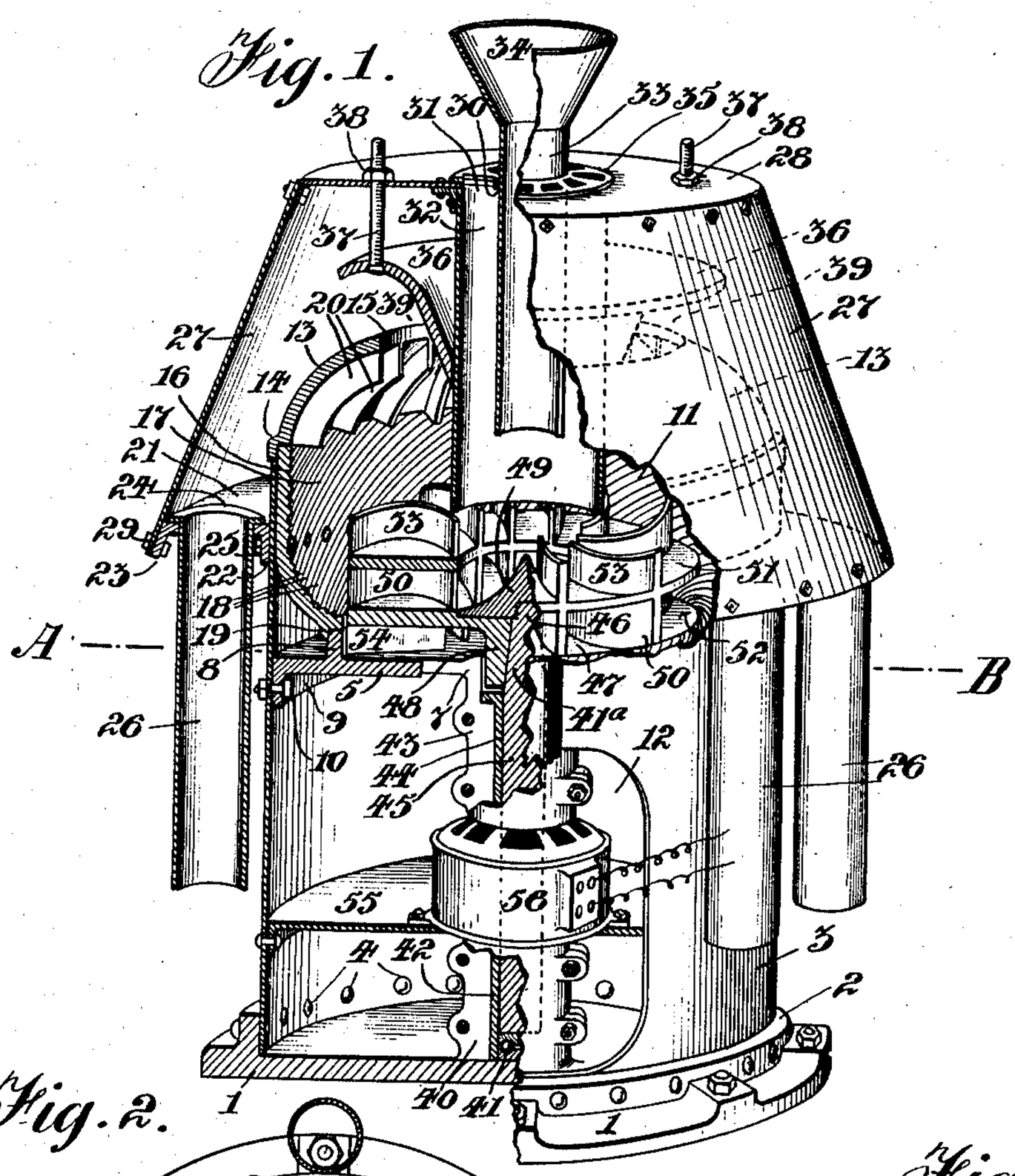


Fig. 2.

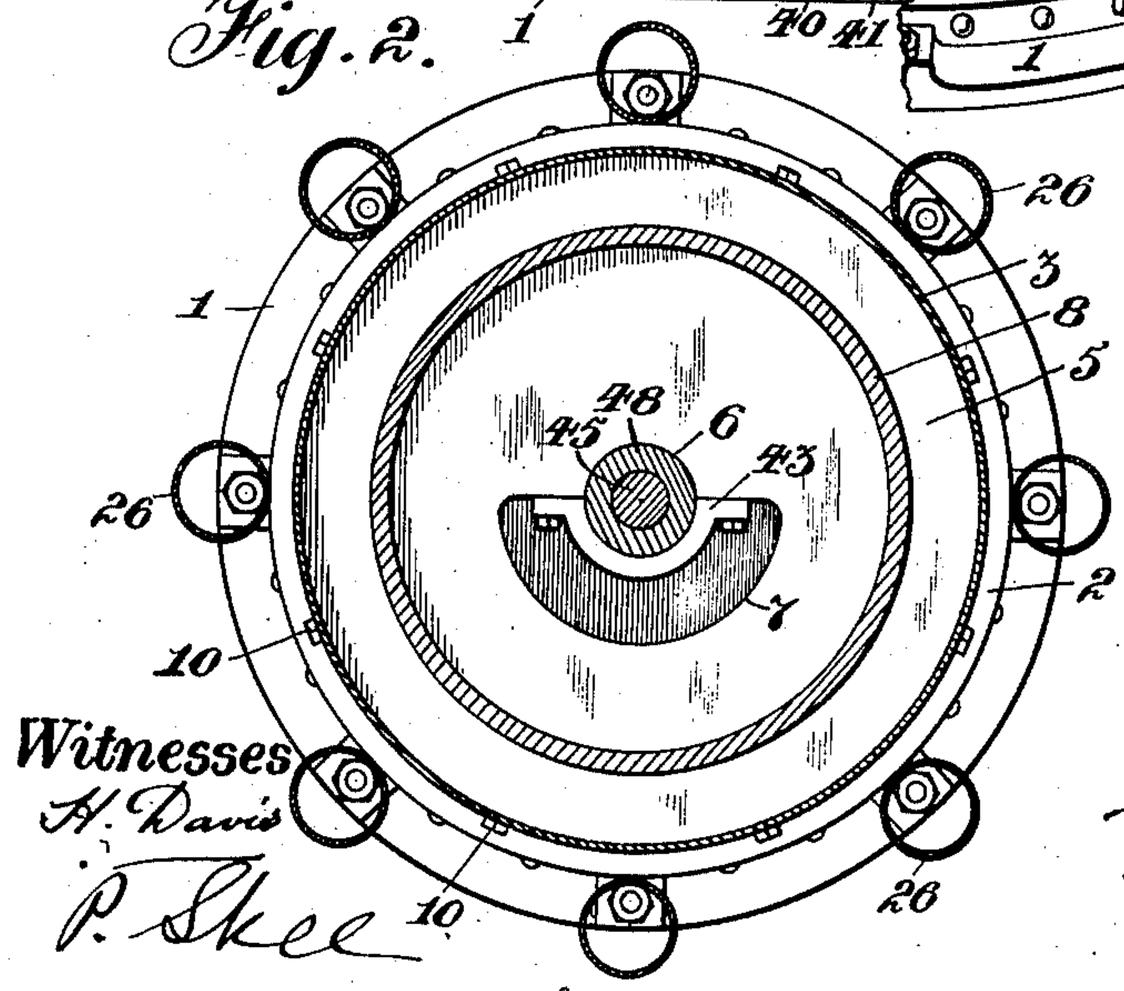
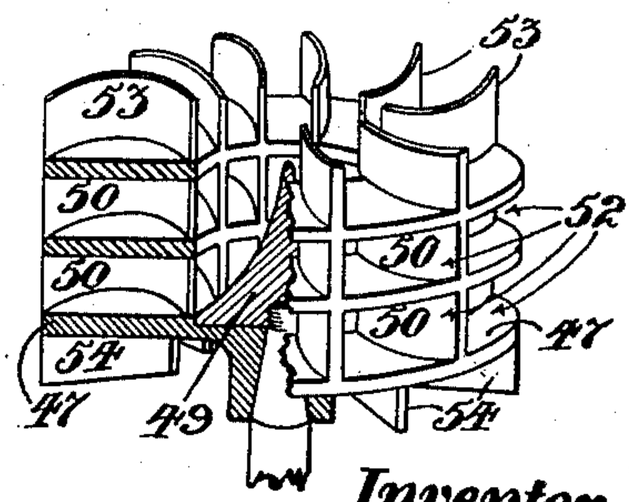


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

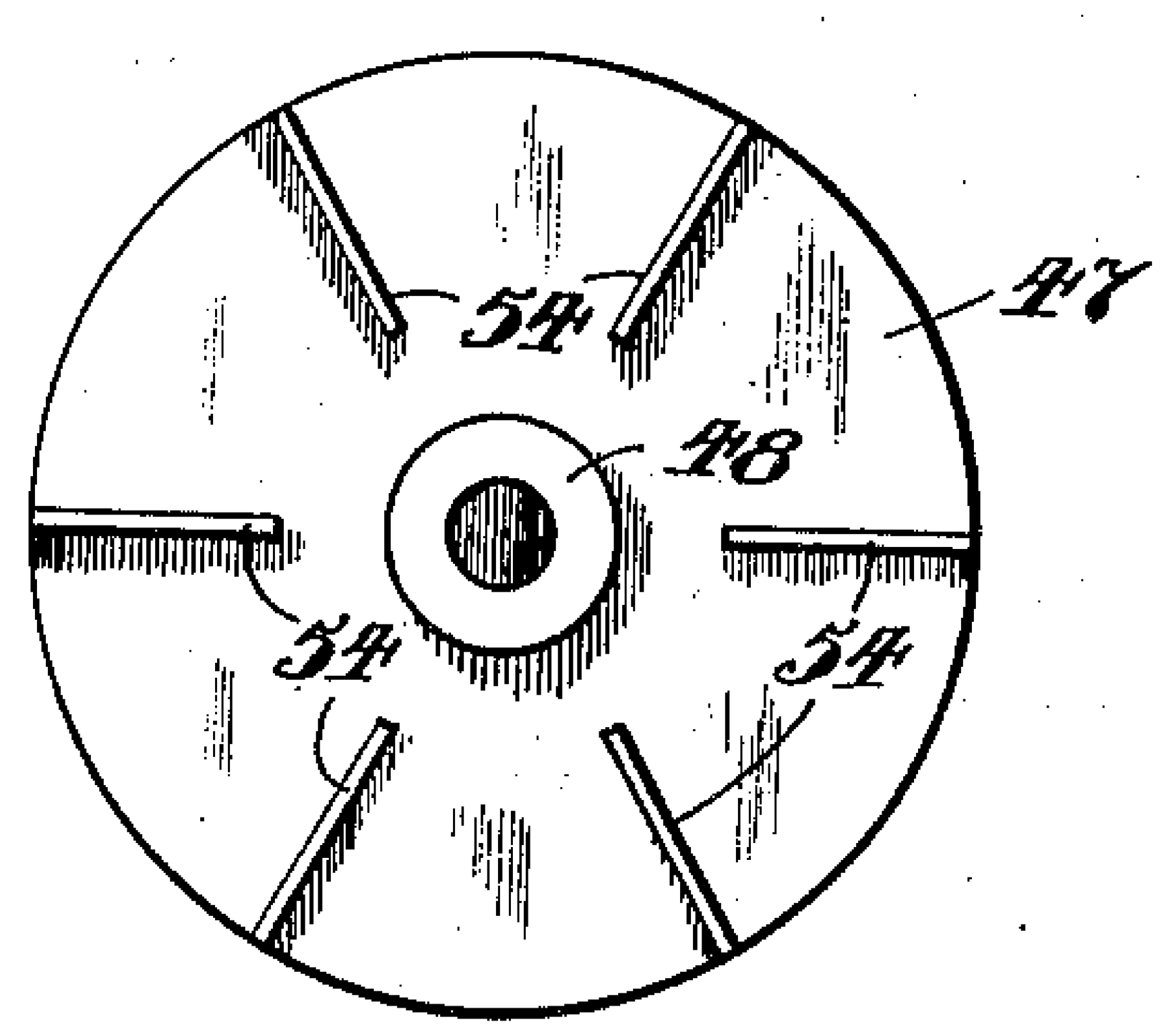


Fig. 5.

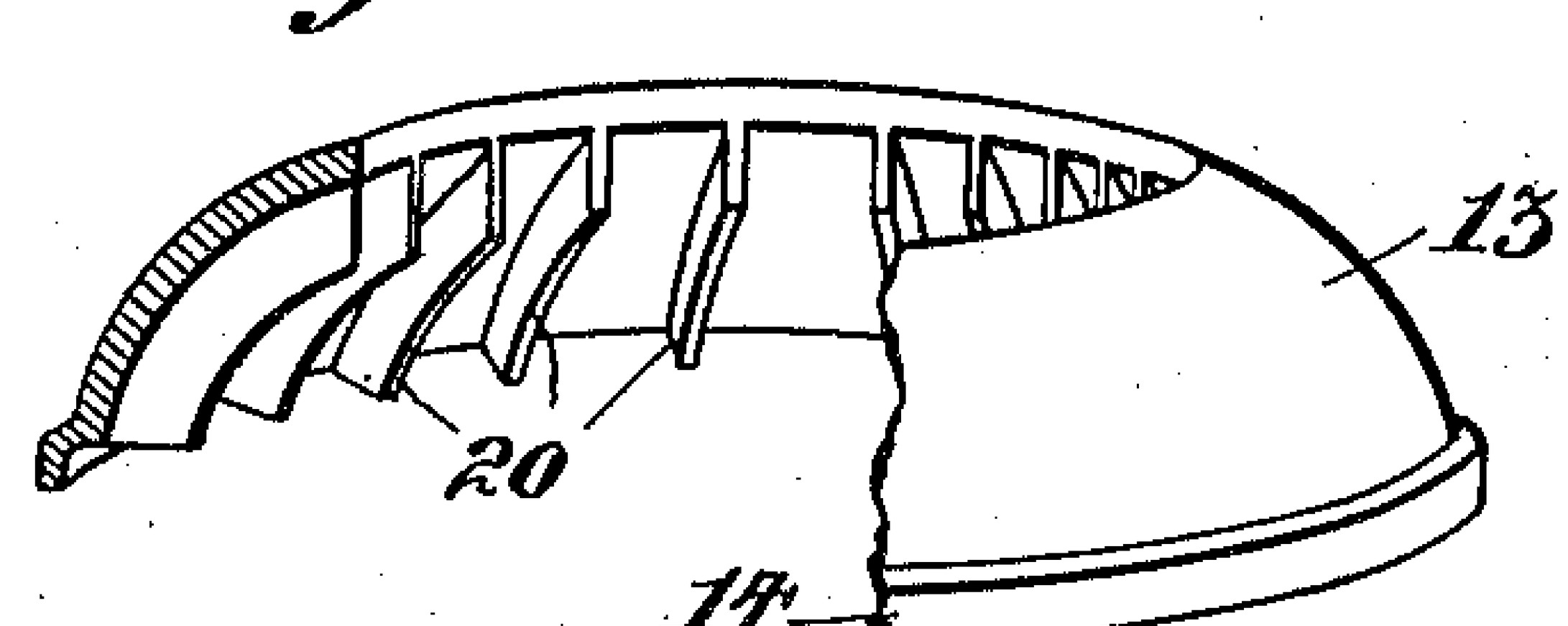
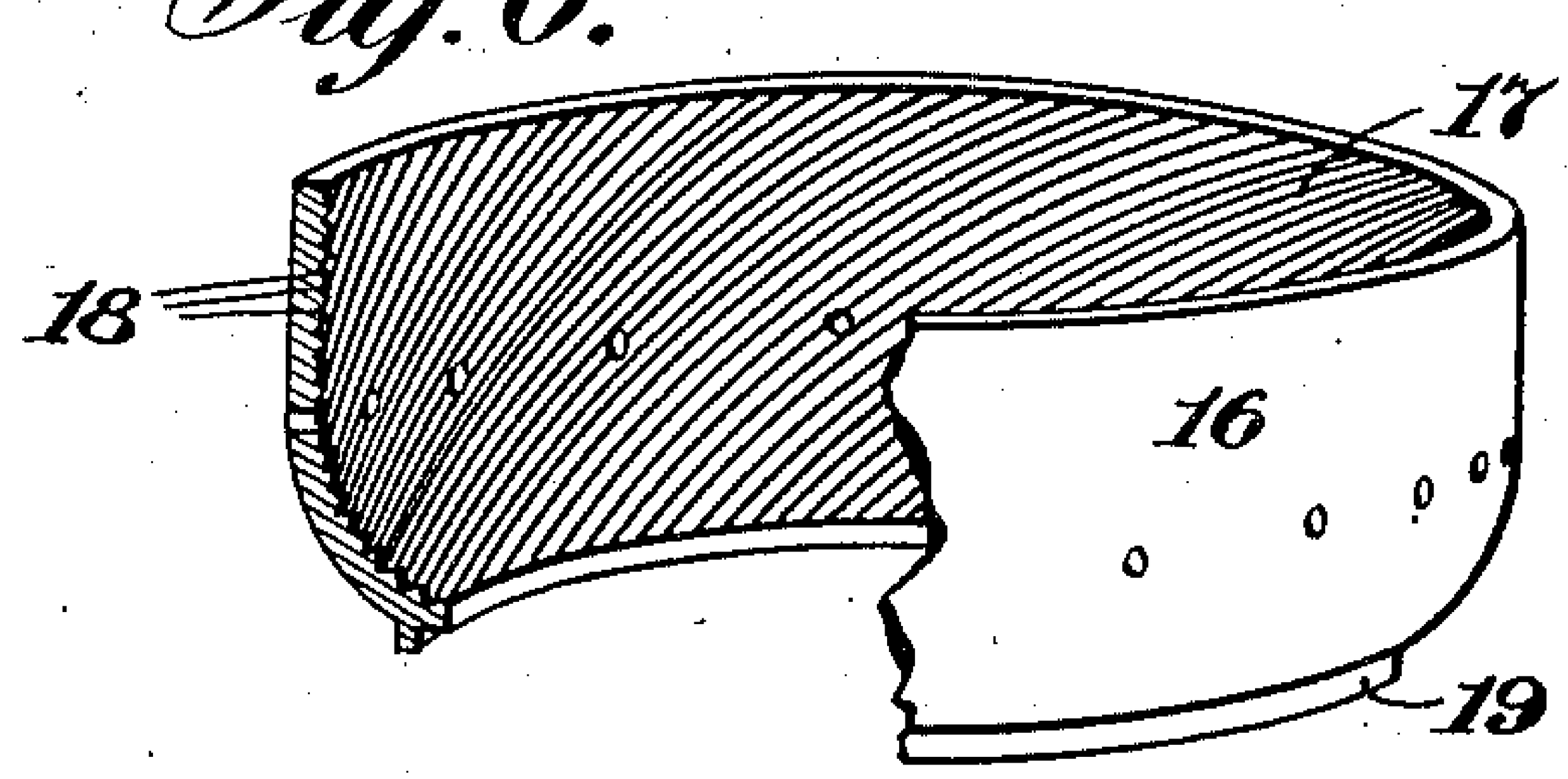


Fig. 6.



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UNITED STATES PATENT OFFICE.

ALFRED GODFREY CAMPBELL, OF SHERBROOKE, QUEBEC, CANADA.

ROCK-PULVERIZING MACHINE.

990,633. Specification of Letters Patent. Patented Apr. 25, 1911.

Application filed October 20, 1910. Serial No. 588,146.

To all whom it may concern:

Be it known that I, ALFRED GODFREY CAMPBELL, a citizen of the United States of America, residing at 16 Queen street, in the city of Sherbrooke, in the Province of Quebec, in the Dominion of Canada, have invented certain new and useful Improvements in Rock-Pulverizing Machines, of which the following is a full, clear, and exact description of the same.

The invention relates to improvements in rock pulverizing machines, as described in the present specification and illustrated in the accompanying drawings that form part of the same.

The invention consists essentially in the novel arrangement and construction of parts whereby the rock, suitably delivered into the casing, is deposited on a rotor carrying buckets coöperating with an abrading surface, and suitably discharged.

The objects of the invention are to increase the efficiency of this class of machine, to diminish the cost of maintenance by providing parts readily replaceable and generally to devise a machine of simple, durable and comparatively cheap construction.

In the drawings, Figure 1 is a perspective view of the machine, partially in section, showing the closed portion of the casing partly broken away at parts to disclose the interior. Fig. 2 is a cross sectional view on the line A—B in Fig. 1, looking downwardly. Fig. 3 is a perspective detail of another arrangement of the rock receiving rotor. Fig. 4 is a plan view of the underside of the rotor base. Fig. 5 is a perspective detail, broken away, of the inside dome cover. Fig. 6 is a perspective detail, broken away, of the serrated lining.

Like numerals of reference indicate corresponding parts in each figure.

Referring to the drawings, 1 is the base having the upturned annular flange 2.

3 is a cylindrical casing set on the base 1 within the flange 2 and firmly secured thereto by the rivets 4.

5 is a horizontal partition having the central journal orifice 6 therethrough, the air holes 7 adjacent to said orifice, the annular flange 8 on its upper face toward the outer edge thereof and the downwardly turned flange 9 at the edge thereof.

10 are bolts securing the partition 5 to the cylindrical casing 3 intermediate of the height thereof forming the chambers 11 and 12.

13 is an inside dome covering to the casing 3 having the outwardly extending flange 14 projecting down to the top of the casing 3, and the central opening 15.

16 is a lining having the serrated surface 17 forming the oblique grooves 18 and converging toward its lower end and resting on the flange 8, and having the flange 19 abutting the said flange 8. The upper end of the lining 16 extends to the dome 13 behind the flange 14 and forms the main support for said dome.

20 are curved wings extending from the lower end of the dome 13 to the edge of the opening 15 and are suitably distanced and arranged completely around said dome, projecting from the inner wall thereof.

21 is an annular shelf having the downwardly depending flanges 22 and 23 from each edge thereof and the discharge pipe holes 24 therethrough.

25 are bolts securing the shelf 21 to the outer wall of the casing 3 and to the lining 16 adjacent to the upper end of said casing 3 and through the flange 22.

26 are discharge pipes extending downwardly from the holes 24.

27 is a hood or shell cover, preferably having a tapering side wall terminating in the flat top 28, said side wall being rigidly secured to the flange 23 by the bolts 29 and said top having a central opening 30 therethrough, and a plurality of vent openings 31 therethrough surrounding said central opening 30. 32 is an air pipe secured centrally to the hood 27 into which the said vent openings 31 lead.

33 is the feed pipe extending through the opening 30 and having the hopper top end 34.

35 is a damper ring having corresponding openings 32 to the openings 31 and adapted to cover said openings.

36 is an inverted bell-shaped deflector loosely encircling the rear pipe 32 and extending upwardly therefrom through the opening 15 and flaring outwardly at its top end and secured to the flat top 28 of the hood 27 by the bolts 37, said bolts being held by the nuts 38 so as to adjust the height of the said deflector 36 for regulating the size of the discharge opening 39 in the top of the dome 13.

40 is a journal box suitably formed in halves and secured centrally on the base 1. 41 is an arrangement of ball bearings at the bottom of said journal box. 42 is a bushing in said journal box 40.

43 is a journal box rigid with the underside of the partition 5 and suitably formed in halves having its journal orifice in alinement with the orifice in the journal box 40.

44 is a bushing in the journal box 43.

45 is a vertical shaft journaled in the boxes 40 and 43 and resting on the ball bearings 41, said shaft having a tapered upper end 41^a terminating in the threaded portion 46. 47 is the rotor base having the inner wall of its hub 48 tapered correspondingly to the taper 41^a and mounted on said shaft 45, the thread 46 of said shaft extending above the upper surface of said rotor base 47. 49 is a cone center to the rotor having a central threaded recess in its under side and screwing on said thread 46 of the shaft 45 and thus firmly locking said rotor base to said shaft and at the same time presenting a deflecting surface on the upper side for material received through the feed pipe 33.

50 are arc-shaped blades projecting upwardly from the rotor base 41 and extending from the lower terminus of the cone to the edge of said base, said blades being arranged adjacent one to the other and adapted to throw, by centrifugal force, the rock particles against the serrated lining 15. 51 is a plate having a central opening and covering the blades 50, and forming with said blades and said rotor base the buckets 52 adapted to receive the rock particles from the cone.

53 are blades similarly formed to the blades 50 and projecting upwardly from the plate 51 between the central opening in said plate and the edge thereof and adapted to further disintegrate the rock falling back from the serrated lining and again throw it against said lining by centrifugal force.

54 are radial blades projecting downwardly from the under side of the rotor base 41 and extending from near the hub 42 adjacent to the outer edge of said rotor and adjacent to the annular flange 8, said radial blades turning with said rotor and forming a fan to suck the air upwardly through the air hole 7 and thus create an upward draft.

55 is a platform having a central shaft orifice therethrough and a downwardly extending flange at the edge thereof rigidly secured to the casing 3 intermediate of the height thereof toward the lower end.

56 is a motor centrally supported on the platform 55 and having its armature secured to the shaft 45 which extends through said motor.

In Fig. 3, the rotor is formed a little differently from that shown in Fig. 1, the buckets being shown in three tiers, one mounted on top of the other and in this form of rotor, the capacity of the machine is much increased as will be seen by the additional bucket space in said rotor for the reception of the rock.

In the operation of this machine, the rock is fed through the inlet hopper and is deposited therefrom onto the cone center, from said center it is deflected to the buckets where it is whirled around and thrown violently against the serrated lining. The pieces of rock are tossed backward and forward between the rotor and the lining and the curved wings 20 until thoroughly pulverized, the dust ascending through the discharge opening 39 and from there descending to and through the discharge pipes 26.

The fineness of the particles is regulated by the raising and lowering of the deflector 36 as the lowering of said deflector will materially reduce the size of the opening 39 and the raising will materially increase the size of said opening and coincidently with the regulation of the said deflector, the damper for the air openings 31 must be adjusted as the supply of air is sucked into the chamber 11 by the rapid rotation of the rotor. The air drawn in must correspond to the quantity of air necessary for the discharge.

It will be noticed that the fan forming the under part of the rotor creates a vacuum drawing up air through the air hole in the partition, thus creating a constant upward draft which keeps that portion of the machine clean and further assists in the discharge.

It must be understood that without departing from the spirit of the invention, modifications may be made in the construction of the rotor, such as the formation of the blades and the arrangement of the blades and the plate covering them to form buckets and the blades surmounting the plate forming the top of the buckets, so long as the rotor top is arranged to discharge the rock particles violently against an abrading surface. It must also be set forth herein that the serrated lining may be arranged in many ways, that is as regards the formation of the surface, as the essential feature is to have a roughened face to said lining for abrasive purposes.

A feed arrangement of the machine will, of course, be made to suit the interior construction and is shown herein in the most convenient and preferable form.

The particular form of drive for this machine, that is the direct electrical drive, is by all means the most preferable and the driving arrangement in this machine is particularly emphasized herein, but it must be understood that other forms and other means of driving the vertical shaft may be used. Generally modifications may be made in the

construction of the parts described, some parts omitted and new parts added, so long as the machine as made, or the parts thereof, come within the scope of the claims for novelty, following this description.

What I claim as my invention is:

1. In a rock pulverizing machine, the combination with the casing having ingress and egress openings, of a rotor in horizontal arrangement within said casing having a cone-shaped center and arc-shaped blades surrounding said center and projecting downwardly therefrom to the edge of said rotor in radial curves and forming buckets, and a vertical shaft suitably journaled and carrying said rotor.

2. In a rock pulverizing machine, the combination with the casing having ingress and egress openings, of a rotor having blades projecting upwardly from its upper surface adapted to contact with the rock received into said casing and radial fan blades extending outwardly from its under side, a partition having a central journal orifice and an air hole therethrough and inclosing said rotor in the upper portion of said casing and a vertical shaft suitably journaled in said casing and extending upwardly through said journal orifice and carrying said rotor.

3. In a rock pulverizing machine, the combination with the casing having ingress and egress openings, of a rotor having a hub extending downwardly from its under side, a cone center piece having a central threaded recess in its under side, arc-shaped blades extending outwardly from said center piece, radial blades extending outwardly from said hub, a partition rigidly secured to said casing intermediate of its height having a central journal orifice receiving said rotor hub and an air hole, a vertical shaft suitably journaled and extending into said rotor hub and having a threaded upper end screwing into said cone center recess, and a feed chute extending from said ingress opening and terminating over said rotor.

4. In a device of the class described, in combination, a casing having ingress and egress openings and upper and lower compartments, a removable serrated lining on the wall of the upper compartment converging slightly toward its lower end forming an abrading and deflecting surface directed to the lower center of said upper compartment, a rotor turning in the lower center of said upper compartment and having blades and extending adjacent to the lower end of said lining, and a vertical shaft carrying said rotor and suitably driven.

5. In a device of the class described, in combination, a casing having a dome-shaped inner cover and a hood surmounting said dome and an ingress opening through said hood to said casing and a partition rigidly secured to said casing intermediate of its height having a journal orifice in the center thereof and an air hole therethrough, bearings mounted on the base of said casing, a vertical shaft journaled in said bearing and extending through said journal orifice, a rotor supported on the top of said shaft and turning therewith and having arc-shaped blades extending from the upper side thereof adapted to contact with the rock received through said ingress opening and fan blades radially arranged on the under side, and means for driving said shaft.

6. In a device of the class described, in combination, a cylindrical casing having a dome-shaped inner cover and an inverted pot-shaped hood closing in said casing and cover, said hood having air and rock ingress openings therethrough, a pipe extending from said ingress opening and terminating centrally in the upper portion of said casing, discharge pipes extending from the lower end of said hood, a partition rigidly secured to said casing intermediate of the height thereof, a rotor adapted to revolve within the upper compartment of said casing having blades extending upwardly therefrom, and means for creating a forced upward draft in said upper compartment.

7. In a device of the class described, in combination, a base having an annular upward flange adjacent to the edge thereof, a cylindrical casing set on said base within said flange and rigidly secured thereto, an inner dome cover portion, a hood supported from said cylindrical casing having ingress openings, suitable discharge pipes, a partition having air holes therethrough, and a central journal orifice and dividing the complete casing into two compartments, a rotor having blades mounted thereon and turning within the upper compartment, a driven vertical shaft carrying said rotor, a removable serrated lining surrounding the upper portion of the inner wall of said cylindrical casing and converging toward said rotor, and a feed pipe extending from said ingress opening.

8. In a device of the class described, in combination, a base, a cylindrical casing mounted on said base, an inner dome-shaped cover resting on said cylindrical casing and firmly secured thereto having a central opening, a partition rigidly secured to said casing intermediate of the height thereof having a central journal orifice, and air holes and an annular flange preferably extending from the upper side adjacent to the edge thereof, a rotor having a hub extending downwardly from the under side thereof and turning in said journal orifice, said hub having a tapered inner wall, arc-shaped blades mounted on said rotor, a journal box secured to the under side of said partition, a journal box mounted on said base, ball bearings at the bottom of said lower journal

box, a vertical shaft resting on said ball bearings and turning on said journal boxes having a tapered, upper end introduced into said hub, and a driven pulley mounted on said shaft.

9. In a device of the class described, a base, a cylindrical casing mounted on said base, an inner dome-shaped cover portion a hood supported on said cylindrical casing having a feed opening therethrough, a partition having a central journal orifice and an air hole therethrough, a vertical driven shaft extending through said journal orifice, a rotor mounted on said shaft within the upper compartment and having rock contact buckets on the upper side and a fan on the lower side, a serrated lining removable from the upper portion of the inner wall of said cylindrical casing, a ring shelf having flanges secured to said casing and hood respectively and discharge holes therethrough, and pipes secured to said shelf and leading from said discharge holes.

10. In a device of the class described, in combination, a casing having ingress and egress openings and a dome-shaped inner covering, said covering having a flange at its outer lower end meeting the top of the casing and forming a supporting shoulder, a horizontal partition dividing said casing into compartments and having an annular flange toward the edge thereof and a removable lining having an abrading surface extending from under said shoulder of said cover to said annular flange and having a flange backing said annular flange, and means for driving rock particles against said abrading surface.

11. In a rock pulverizing machine, the combination with the casing and a dome-shaped inner cover having a central opening therethrough, of an inverted bell-shaped deflector introduced in said central opening, a hood having a central feed opening and covering in said inner dome covering, a feed pipe extending centrally through said deflector from said feed opening into said casing, adjustable bolts suspending said deflector from said hood, and means for pulverizing the rock within said casing.

12. In a rock pulverizing machine, the combination with a casing having an inner cover thereto and a central opening in said inner cover, of a hood having a feed opening therethrough, closing in said inner cover and surrounding discharge openings from said casing, a feed pipe extending inwardly into said casing through said inner cover opening from said feed opening in the hood and forming with said inner covering an annular discharge opening from said casing, means for regulating the size of said discharge opening, and means for pulverizing the rock within said casing.

13. In a rock pulverizing machine, the combination with a casing and an inner dome covering the said casing and having a central opening therethrough, of an inverted pot-shaped hood having a tapered side wall, a central feed opening therethrough and a plurality of air vents encircling said feed opening, a ring shelf having flanges extending downwardly therefrom, secured to said casing and to the lower end of said hood, and discharge holes at intervals therethrough, a feed pipe extending downwardly through said inner cover opening into the casing forming with said inner covering an annular discharge opening directly from said casing, a damper of ring shape having corresponding holes to said vent holes and arranged to close said vent holes, an inverted bell shaped deflector loosely encircling said feed pipe and extending through said direct discharge opening from the casing and adjustably suspended from said hood, and means for pulverizing the rock within said casing and coincidently creating a vacuum.

Signed at the city of Sherbrooke, Canada, this seventeenth day of October 1910.

ALFRED GODFREY CAMPBELL.

Witnesses:
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