

No. 669,411.

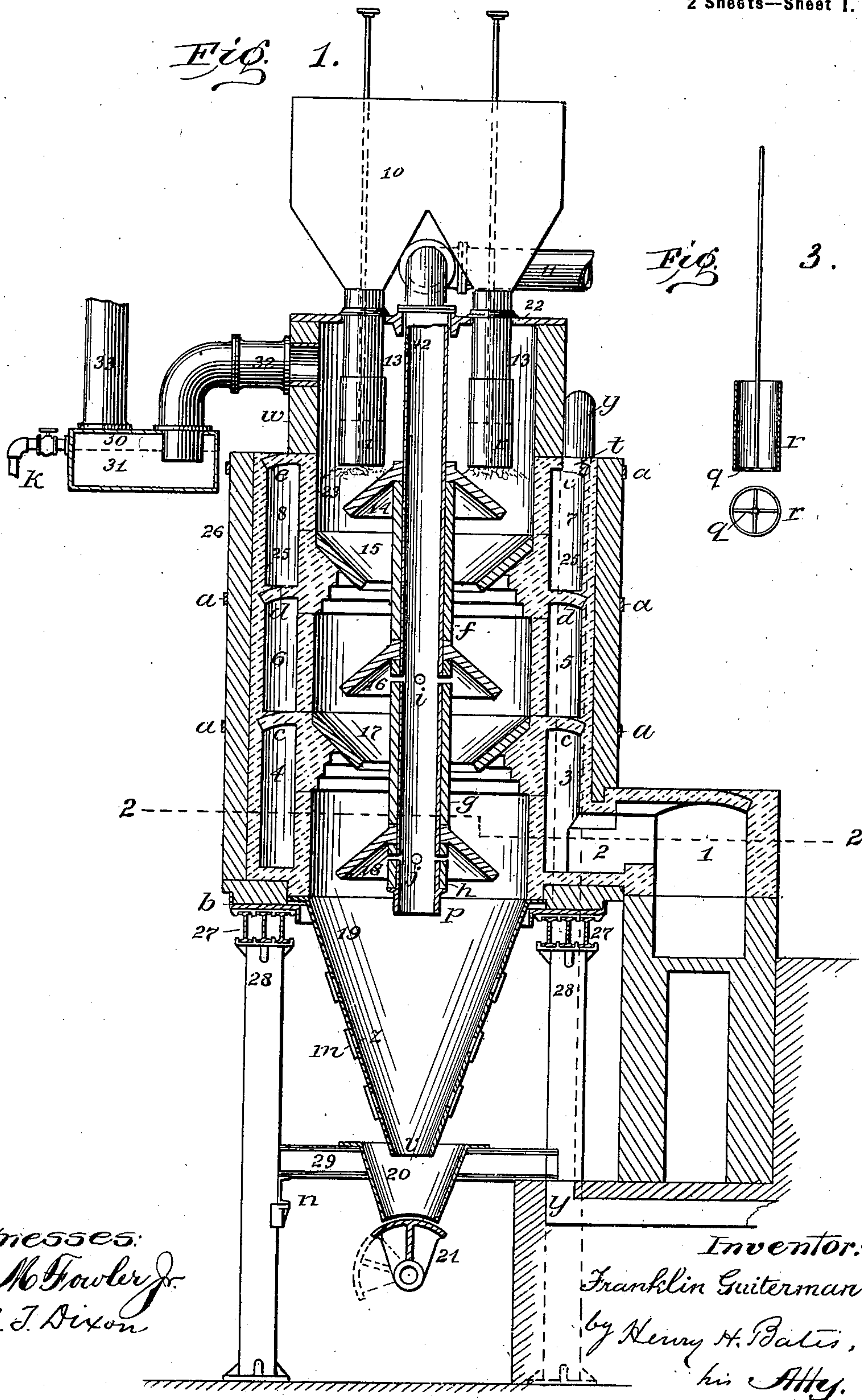
Patented Mar. 5, 1901.

F. GUITERMAN.
RETORT FOR TREATING ORES.

(Application filed Feb. 21, 1900.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:
J. M. Fowler Jr.
M. J. Dixon

Inventor:
Franklin Guiterman,
by Henry H. Bates,
his Atty.

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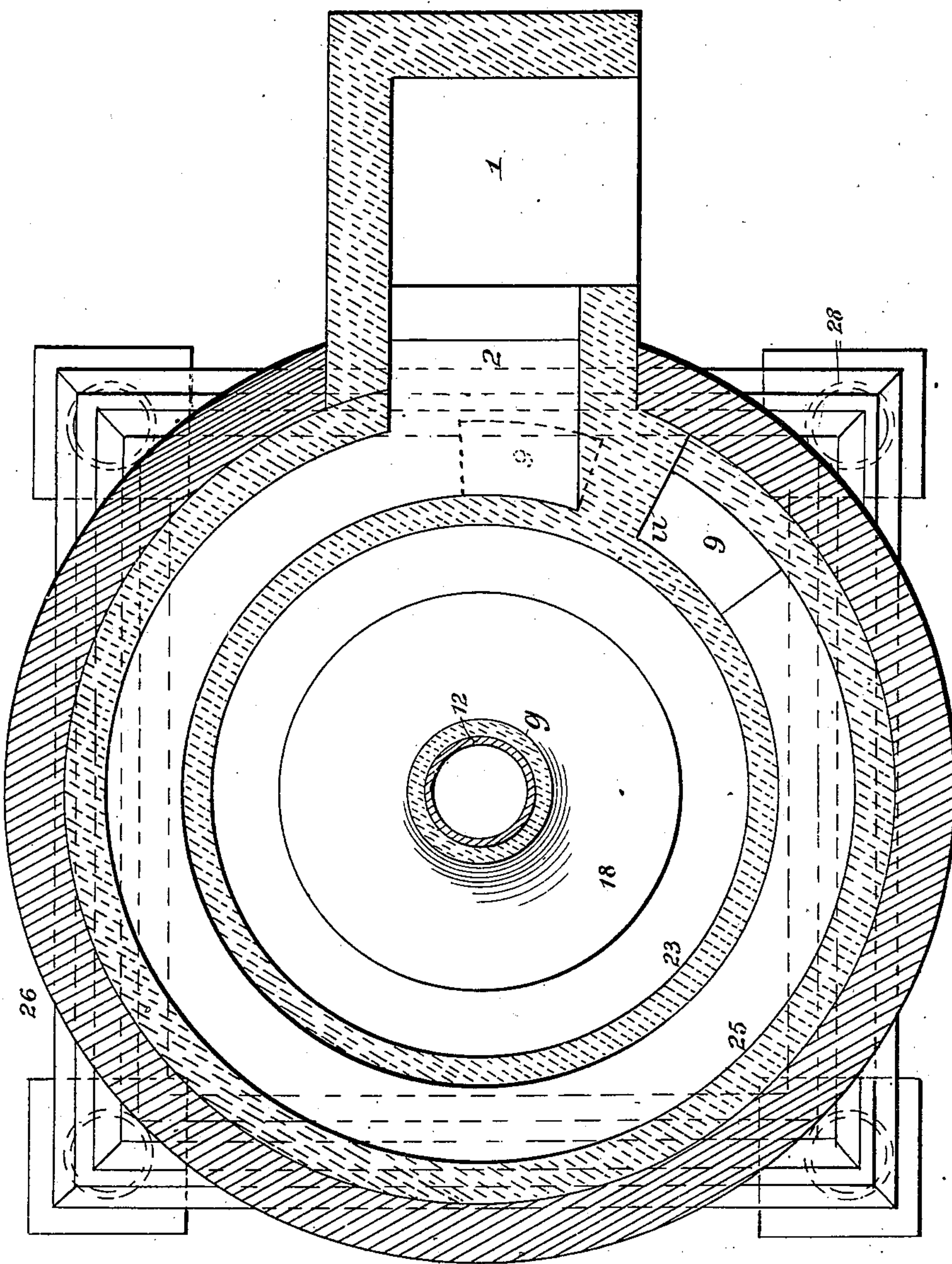
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2 Sheets—Sheet 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

FRANKLIN GUTERMAN, OF DENVER, COLORADO.

RETORT FOR TREATING ORES.

SPECIFICATION forming part of Letters Patent No. 669,411, dated March 5, 1901.

Application filed February 21, 1900. Serial No. 6,070. (No model.)

To all whom it may concern:

Be it known that I, FRANKLIN GUTERMAN, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Retorts for Treating Ores; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improved means or apparatus for carrying on the treatment of ores for the recovery of the contained metal therefrom, especially those ores of zinc which are more or less associated with the ores of other metals, by a method of reduction with reducing-gases—such as carbonic-oxid, hydrogen, hydrocarbon gases, water-gas, coal or producer gas, natural gas, &c.—in which the reducing agent is brought into intimate contact with the divided or granular ore under pressure in the presence of heat, but without contact of flame, atmospheric air, or combustion agents, with the ore under treatment, by which means the yield is increased, impurities excluded from the product, and the recovery of valuable metals from the residue is made practicable.

My improvements consist in the details of mechanism described and claimed herein and illustrated in the accompanying drawings, in which—

Figure 1 is a central vertical section of the apparatus. Fig. 2 is a horizontal section thereof, taken on line 2 2 of Fig. 1. Fig. 3 is a detail view of the sleeve on the conduits for delivering ore.

In the drawings, 23 is a vertical retort-cylinder of dimensions suitable for the work required, made of refractory materials, such as fire-clay, which may be made in a series of segmental rings superimposed to the required height and properly secured. Outside of this cylinder is a jacket 26, of brickwork, located at a sufficient distance from the retort-cylinder all around to provide annular passages for the circulation of the hot gases or products of combustion by which the retort is heated through the walls thereof from the outside. Said jacket is lined with fire-brick

or other refractory material 25 and is stayed or bound with hoops of steel *a* where required. The whole structure rests on an annular plate or casting *b*, which is sustained by I-beams 27, resting on supporting-columns 28, four or more in number.

c d e are domed arches located at proper intervals, which divide the annular space between the two cylindrical walls horizontally into annular chambers or flue-spaces 3 4 5 6 7 8, there being an opening 9 upward through the arch or vault of each annular chamber at one point for the products of combustion to pass through from chamber to chamber, a barrier-wall *u* being provided in each chamber, the openings being so located on alternate sides of the barrier-wall as not to come over each other, but to cause the flame to make the circuit of each chamber before finding an outlet into the chamber above. A spirally-arranged passage between the two parallel walls made by a gradually-ascending partition in the annular spacing would be the full equivalent of the series of chambers above described, but would be more difficult of construction. The products of combustion finally escape from the uppermost chamber by passage *t* and a flue leading to a chimney or stack, the flue shown being a downtake-flue *y*, terminating in a horizontal passage leading to said chimney. A fire-place or combustion-chamber is shown at 1, communicating by a throat or flue 2 with the lowermost chamber of the series. The fuel burned in this chamber is preferably producer-gas for this purpose, but may be any combustible of suitable character.

12 is a vertical pipe centrally located and suspended within the retort-cylinder, extending nearly or quite to the bottom thereof. Its purpose is to conduct and distribute the reducing-gas to the ore under treatment, which gas is admitted through a pipe 11 at the top, leading from a source of supply under pressure. On and surrounding said pipe are fixed inclined aprons or cone-shaped baffle-plates 14 16 18 at suitable intervals, held apart and spaced by distance pieces or tubes *f g h*, which, with said baffle-plates or aprons, may be made in halves for convenience of removal and renewal, or they may be strung on the pipe by making the flanges at the top re-

movable. A flange or offset *p* at the bottom of the pipe 12 sustains the series. These baffle-plates and distance-tubes may be made of fire-clay, as indicated in the drawings, or of metal or other suitable material. Intermedi-
 5 ately of the baffle-plates or aprons already described are other inclined aprons or baffle-plates 15 17, made of similar material, located against the wall of the retort-cylinder and
 10 suitably supported thereby. In the drawings they are shown supported by annular offsets formed on the rings composing the retort-cylinder.

i j are apertures through the walls of the
 15 central pipe and distance-pieces, beneath the central baffle-plates, for the passage of the reducing-gas.

10 is a double hopper communicating with the interior of the retort on opposite sides of
 20 the central pipe by conduits 13 13, which pass gas-tight through the top plate 22. Said hopper may be annular, if desired, and supplied with more than two conduits, placed at regular intervals, the object of these conduits be-
 25 ing to feed the ore in regulated quantities to the inner cavity of the retort surrounding the central gas-pipe. On said conduits I have arranged movable sleeves *r r*, operated by rods *s s*, passing up through the conduits and
 30 through the hopper, having handles on the upper ends, by which means the said conduits may be lengthened or shortened at pleasure, thereby enabling the height of the column of ore in the retort to be regulated. The rods
 35 *s s* may be attached to the sleeves *r* by means of a spider *q* or cross-bar affixed to the sleeve at its lower extremity, as shown in Fig. 3, or in any other workmanlike manner. At the
 40 top of the series of annular chambers the two walls are merged into a single wall *w*, resting on the retort-wall and the topmost domed arch, and in this wall is a perforation supplied with a pipe 32, through which the re-
 45 ducing-gas escapes from the retort after doing its work. Said pipe terminates in a water-trap 30, having a water seal 31, an exit-pipe 33, and a water-cock *k*.

The lower part of the retort is closed by a frusto-conical chute 19, preferably of cast-
 50 iron, with an opening *v* in the bottom, in which chute are lateral apertures *z*, closed by removable covers *m*, said apertures serving for the introduction of stirring-bars should the material become agglomerated or adhere. Be-
 55 neath this chute is a cone or hopper 20, supported by I-beams 29, resting either on pedestals of masonry, as at the right, or on channel-bars and brackets sustained by the columns 28, as at *n*. The lower opening of the
 60 hopper 20 is closed by the reciprocating shoe 21, of cast metal, which being moved by suitable power back and forth at the requisite speed, which can be regulated to suit circum-
 65 stances, permits the reduced ore to fall inter- mittently into a car or carrier placed beneath.

I claim and desire to secure by Letters Patent—

1. In a retort for the treatment of ores, a vertical retort-cylinder, a double hopper with extensible delivery-tubes for feeding ore to
 70 said cylinder equably from the top, means for heating said cylinder through the walls thereof, a central pipe for supplying reducing-gas to the interior of said cylinder, means
 75 for deflecting and mixing the ore in its passage from the top to the bottom of said cylinder, an outlet near the top for the reducing-gas from said cylinder, a conical delivery-
 chute at bottom, and a reciprocating gate for intermittently discharging the treated ore,
 80 substantially as specified.

2. In a retort for the treatment of ores, the combination of a vertical cylinder, means for heating the same from the outside, a central
 85 vertical pipe suspended within said cylinder, open at bottom, and having lateral apertures, baffle-plates fixed upon said pipe, and to the interior of said cylinder, a frusto-
 conical bottom to said cylinder, having a central opening, a hopper beneath said opening,
 90 and a reciprocating shoe closing and opening the outlet of said hopper, substantially as specified.

3. In a retort for the treatment of ores, a vertical retort-cylinder, closed at top, means
 95 for heating the same from the outside, means for feeding ore to said cylinder through the closed top, means for supplying reducing-gas to the interior of said cylinder, means for de-
 100 flecting and mixing the ore in its passage from the top to the bottom of said cylinder, an outlet from said cylinder for the reducing-gas, and a water-trap to said outlet, whereby the pressure is maintained, substantially as speci-
 105 fied.

4. In a retort for the treatment of ores by reducing-gas, the combination of a vertical refractory inner cylinder, an outer cylindrical jacket having a refractory lining, leaving an
 110 annular interspace, arches at intervals dividing said interspace into a series of annular chambers, openings in said arches to afford communication between the chambers, an escape-flue communicating with the top cham-
 115 ber, a central pipe for the delivery of gas to the interior of the inner cylinder, a double hopper provided with duplex conduits for the delivery of ore to the inner cylinder, and a trapped outlet at the top of the cylinder for the escape of the reducing-gas, substantially
 120 as specified.

5. In a retort, the combination of an outer refractory wall, an inner vertical cylinder, and a frusto-conical closing-chute at the bottom
 125 of said cylinder, provided with a central opening at the bottom thereof and with lateral apertures *z*, substantially as specified.

6. In a retort, having a vertical refractory wall, a frusto-conical chute at the base of said
 130 wall, open at bottom, a hopper beneath said

chute, and a reciprocating shoe beneath said hopper, substantially as specified.

5 7. In a retort, a vertical refractory wall, plate 22, closing the retort at top, a hopper surmounting said plate, delivery-tubes from the hopper passing through said plate, extensible sleeves on said tubes, and rods attached to said sleeves at their lower ends, for moving

the same, passing up through said tubes and hopper, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

FRANKLIN GUTERMAN.

Witnesses:

HENRY LYNE,

J. E. HAMMOND.