

No. 832,292.

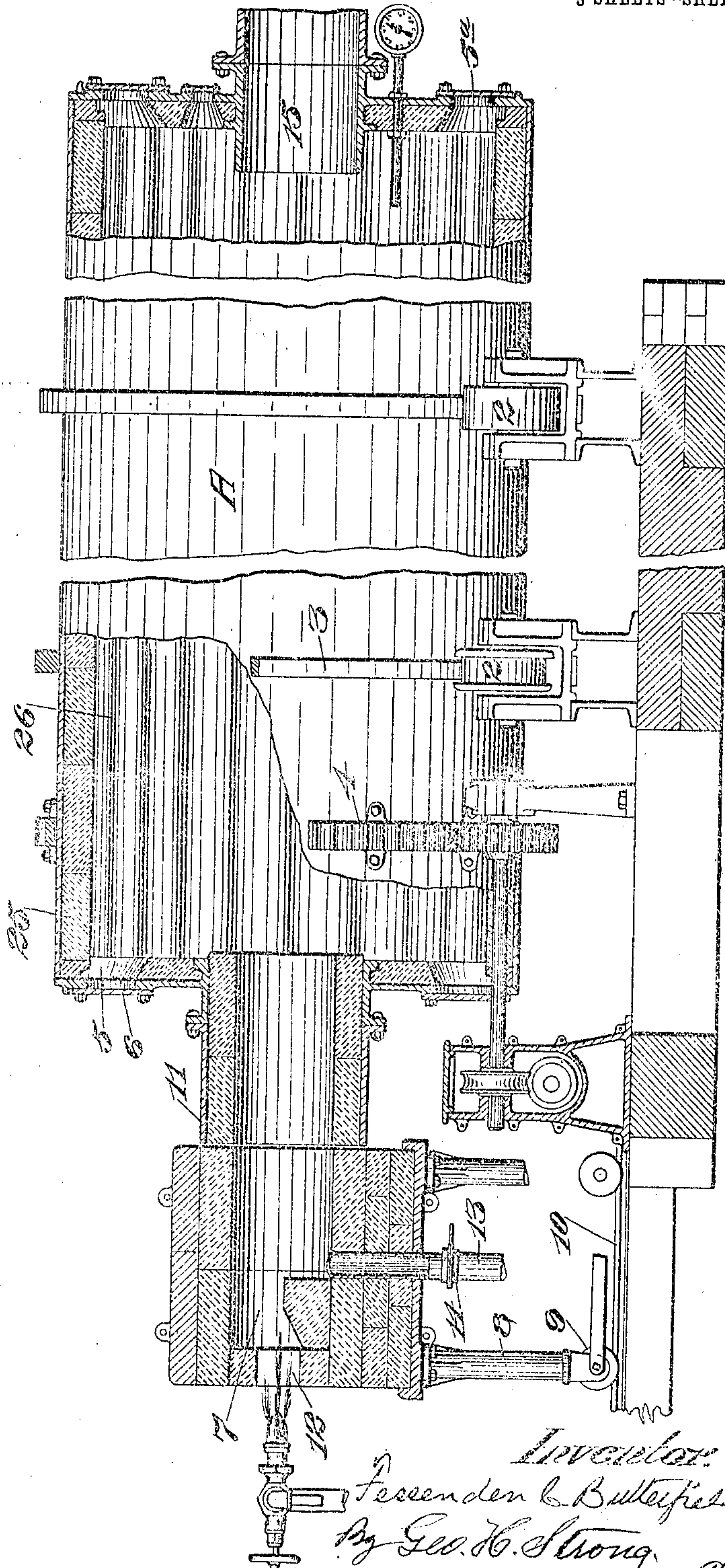
PATENTED OCT. 2, 1906.

F. C. BUTTERFIELD.
ORE ROASTING AND OXIDIZING APPARATUS.

APPLICATION FILED AUG. 24, 1905.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses.
E. Hestberg
J. S. Brown

Inventor:
Frederick C. Butterfield
By Geo. H. Strong atty

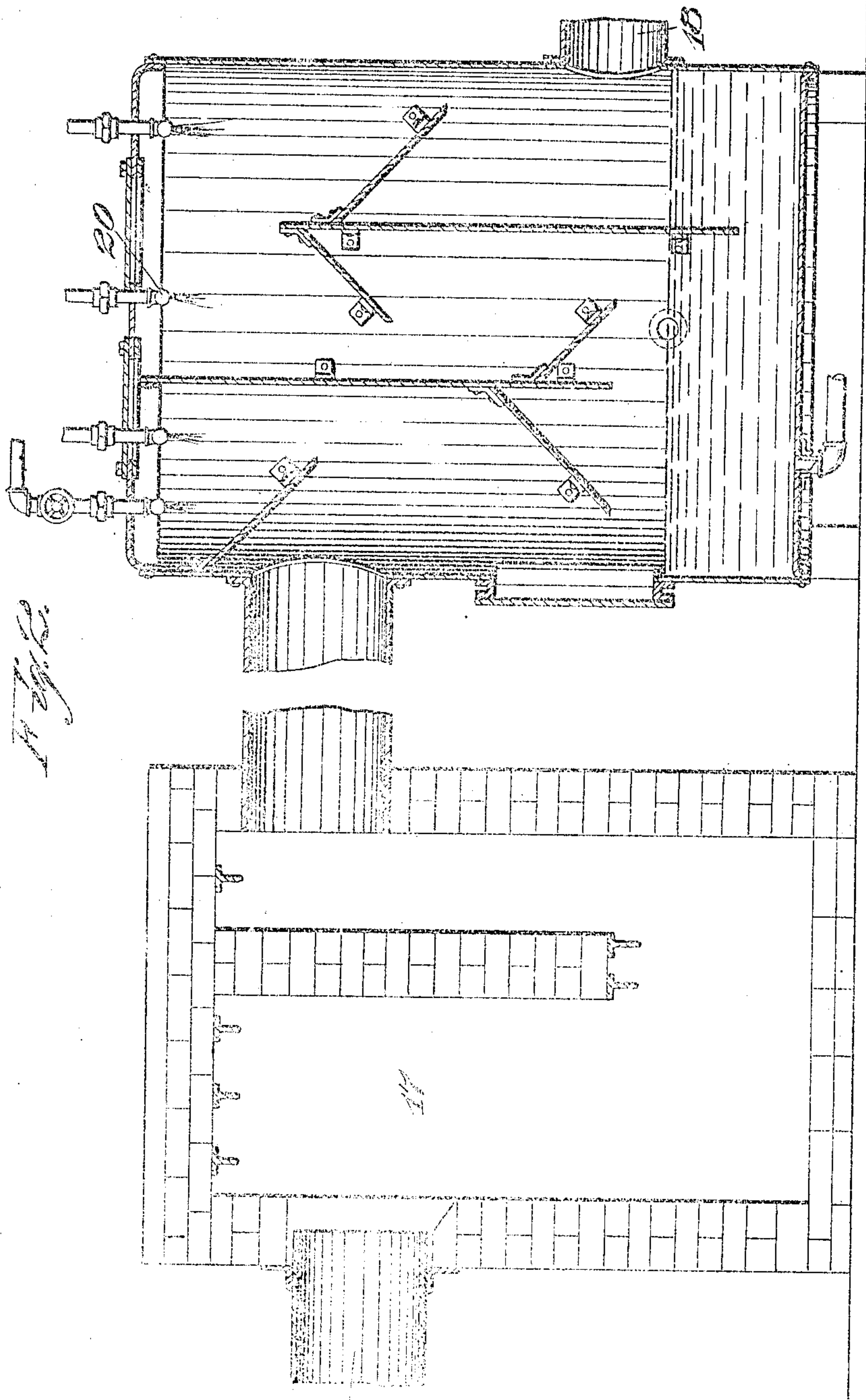
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3 SHEETS—SHEET 2.



Witness:
Charles
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3 SHEETS—SHEET 3.

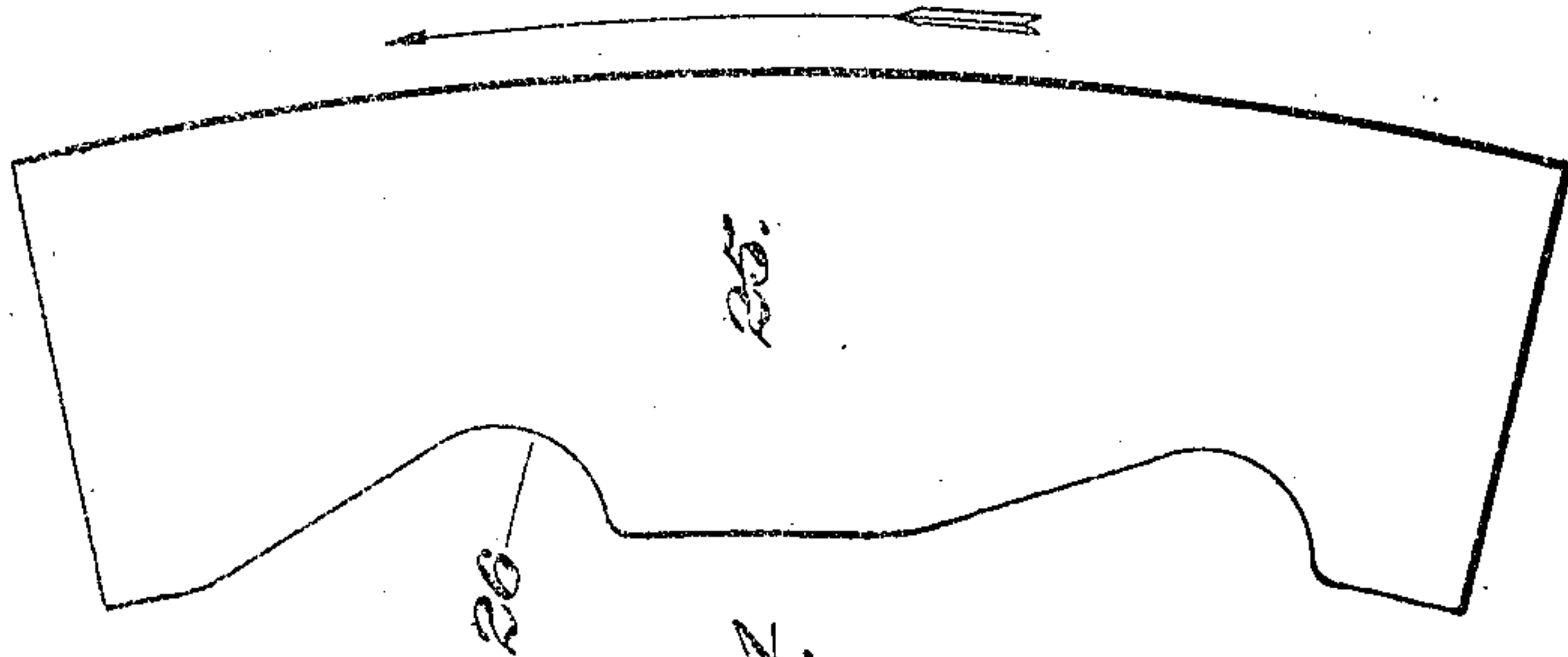


Fig. 1.

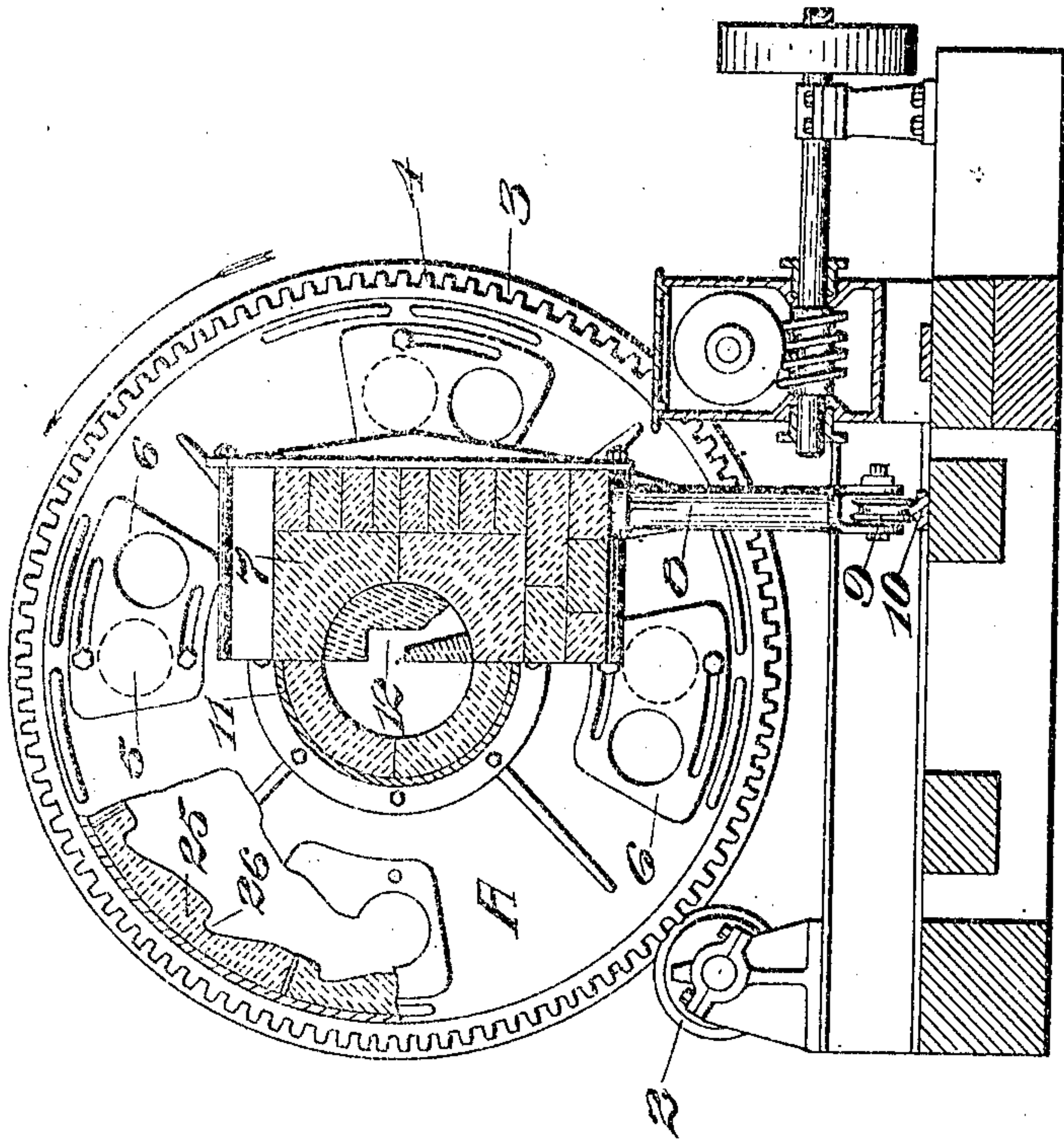


Fig. 3.

Witnesses:
T. Gashberg.
J. J. Brown.

Inventor:
Fessenden & Butterfield
By Geo. H. Strong. atty

UNITED STATES PATENT OFFICE.

FESSENDEN C. BUTTERFIELD, OF OAKLAND, CALIFORNIA.

ORE ROASTING AND OXIDIZING APPARATUS.

No. 882,292.

Specification of Letters Patent.

Patented Oct. 2, 1908.

Application filed August 24, 1905. Serial No. 275,557.

To all whom it may concern:

Be it known that I, FESSENDEN C. BUTTERFIELD, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Ore Roasting and Oxidizing Apparatus, of which the following is a specification:

My invention relates to an apparatus which is designed for roasting, oxidizing, and otherwise treating valuable ores with a view to rendering the extraction of precious and other metal more readily effected.

It consists in the combination of apparatus whereby heat is applied to roast the ore and the gaseous metallic products arising therefrom are afterward condensed.

It also comprises details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a partial section and elevation showing the furnace and receiving end. Fig. 2 shows the dust-chamber and condenser. Fig. 3 is a transverse section of the roasting-cylinder. Fig. 4 is an enlarged end view of one of the lining-tiles.

In carrying out my invention I employ a horizontally-revoluble cylinder, as A, mounted upon bearing wheels or rollers 2 by means of surrounding rings or flanges 3, which rest upon the rollers, and any suitable gear or other mechanism through which power is transmitted to slowly revolve the cylinder. The cylinder is suitably constructed, preferably with an outer metal shell and an inner lining of fire brick or tile. The bearing or rider ring 3 is preferably made in segments bolted to the shell, so as to be readily removable or replacable, and the gear or circular rack 4, surrounding the shell and through which power is transmitted to propel the cylinder, may be similarly constructed. The ends of the cylinder are suitably secured thereto, having central inlet and discharge openings. These ends have openings made in them around the outer portion, as at 5, and these openings serve to feed and discharge the ore to and from the cylinder. These openings are controlled by gates 6, which may be slidably or otherwise fitted to be opened for the purpose of feeding or discharging and closable to make a tight casing when the roasting-chamber is charged and in operation. There is also a mica-covered look-in opening in the discharge end, that an

observation of the interior of the roasting-chamber may be made at any time. A pyrometer is attached to the discharge end, that the working temperature may be known at any and all times.

In order to conveniently apply heat to the roasting-chamber, I have shown a combustion-chamber 7, which may be of any suitable shape and mounted upon legs 8 with bearing-wheels 9, which are adapted to move upon a track, as at 10, so that the structure 7 may be brought close up to the end of the roasting-chamber or removed therefrom. The inlet end of the roasting-chamber may have an extension tubular sleeve, as at 11, which is lined with tiling or fire-brick. The interior of the heating apparatus 7 is similarly lined with fire-tile, and the openings in the two parts coincide when the structure 7 is moved up close against the end of the sleeve 11, so that there will be a sufficient tight joint between the two. Any suitable form of burner, preferably for the combustion of oil, may be connected with the combustion-chamber 7 through an opening in the outer end, as shown at 12. In connection with this heater I have shown one or more air-admission pipes; as at 13. Such pipe or pipes open through the side of the heater 7 and serve to admit any desired quantity of air to promote more perfect combustion of the fuel and also to furnish sufficient oxygen for the purpose of rapidly oxidizing the ore in the roasting-chamber. The air-admission pipe is furnished with an exterior gate 14, by which the proportion of air admitted can be controlled. It will be seen that by this construction the heater or combustion-chamber portion of the apparatus may be readily moved back upon its tracks so as to leave a clear opening into the interior of the roasting-chamber when required and moved back for use. Combustion thus proceeds so far in this part of the apparatus that when the hot gases enter the roasting-chamber they are in a high state of efficiency.

The ore to be roasted is preferably admitted through the openings 5 in charges, and after the furnace has been sufficiently charged these openings are closed and it is set in rotation. The ore will soon distribute itself over the interior of the roasting-chamber, and the revolution of the ore-chamber is maintained until the ore has been sufficiently roasted for the required purpose. The lining-tiles 25 of the roasting-chamber

are formed with depressions or channels 26, extending lengthwise of the chamber and of such form as to lift the ore from the bottom, carrying it up as the chamber revolves until it is discharged and falls back to the bottom of the chamber. The ore is thus continually turned and mixed while it is being roasted. The fumes arising from this roasting process are discharged through the central end opening of the roasting-chamber, which is opposite to the furnace, and pass out through a tubular passage 15, which connects with this head of the chamber. The dust-chamber 17 receives the fumes and gases which are discharged from the roasting-chamber, and this dust-chamber is constructed with alternate hanging walls from the top and other walls or partitions arising from the bottom, leaving spaces alternately below and above these walls, so that the fumes will follow a sinuous course down and up, and the lower part of the chamber may thus receive and retain the dust. Beyond the dust-chamber is a second chamber, into which the fumes and residue from the dust-chamber are drawn. This chamber has suitable passages through which the vapors are drawn by an exhaust-fan. Such gates and partitions are employed in this connection as may be desired to give the proper direction to the passing gases from the dust-chamber. The gases or fumes may pass into this second chamber, which has partitions and baffle-plates to form sinuous passages, and the outer side of the chamber is finally connected by a discharge-passage 18 with a suction-fan, which insures a draft sufficient to cause the gases to be properly passed through the furnace and chamber. Spray-pipes 20 discharge water into this chamber to condense and arrest dust or gases which it is desirable to stop at this point.

After the ore is sufficiently roasted the passages 5 5^a at opposite ends of the roasting-chamber may be opened and by continued revolution of the chamber the greater portion of the ore will be discharged through these openings. After nearly the whole of the ore has been discharged it is possible to finish the discharge by means of rakes or hoes introduced from either end through these openings, and the furnace will thus be prepared for a new charge.

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

1. The combination with a revoluble ore-roasting shell having means whereby ore may be admitted thereto, of a combustion-chamber separate from the shell and movable to-

ward and from the inlet end thereof said chamber having an opening in one end for the admission of a gaseous fluid and having an air-supply pipe fixed to and movable in unison with it.

2. The combination with a revoluble ore-roasting shell having means for admitting ore thereto, of a wheeled combustion-chamber separate from the shell and movable toward and from the inlet end thereof and adapted to abut endwise against said inlet, said chamber having an opening in one end substantially in line with the inlet of the shell, an oil-burner adapted to discharge its fluid fuel through said opening, and an air-supply pipe fixed to the chamber and movable therewith, and adapted to discharge thereinto.

3. The combination with a revoluble ore-roasting shell having means for admitting ore thereto, of a movable combustion-chamber adapted to connect with the inlet of the shell said chamber having an oil and air supply, supporting-legs for the chamber and bearing-wheel mounted on the legs whereby the chamber may be moved horizontally toward and from the inlet of the shell.

4. The combination of a shell having heads and reduced tubular ends, said heads having respectively feed and discharge openings in alinement around the periphery and exterior to the tubular ends, gates slidably controlling said openings, means for revolving said shell, settling and condensing chambers with which the central tube at the discharge end is connected, and a combustion-chamber movable to and from the inlet-tube of the shell to provide a fluid-fuel supply.

5. In a furnace, a horizontally-revoluble shell having heads with alined openings around the peripheries of the heads, for the admission of ore at one end, and the discharge of the solid residue at the opposite end, gates slidably controlling said openings, reduced tubular, centrally-disposed ends projecting from the heads, a combustion-chamber movable to and from the inlet of the shell and provided with a fluid-fuel supply, and settling and condensing chambers with which the tubular extension at the opposite end of the furnace is connected to deliver the separated vapors and gases.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FESSENDEN C. BUTTERFIELD.

Witnesses:

HENRY P. TRICOU,
S. H. NOURSE.