

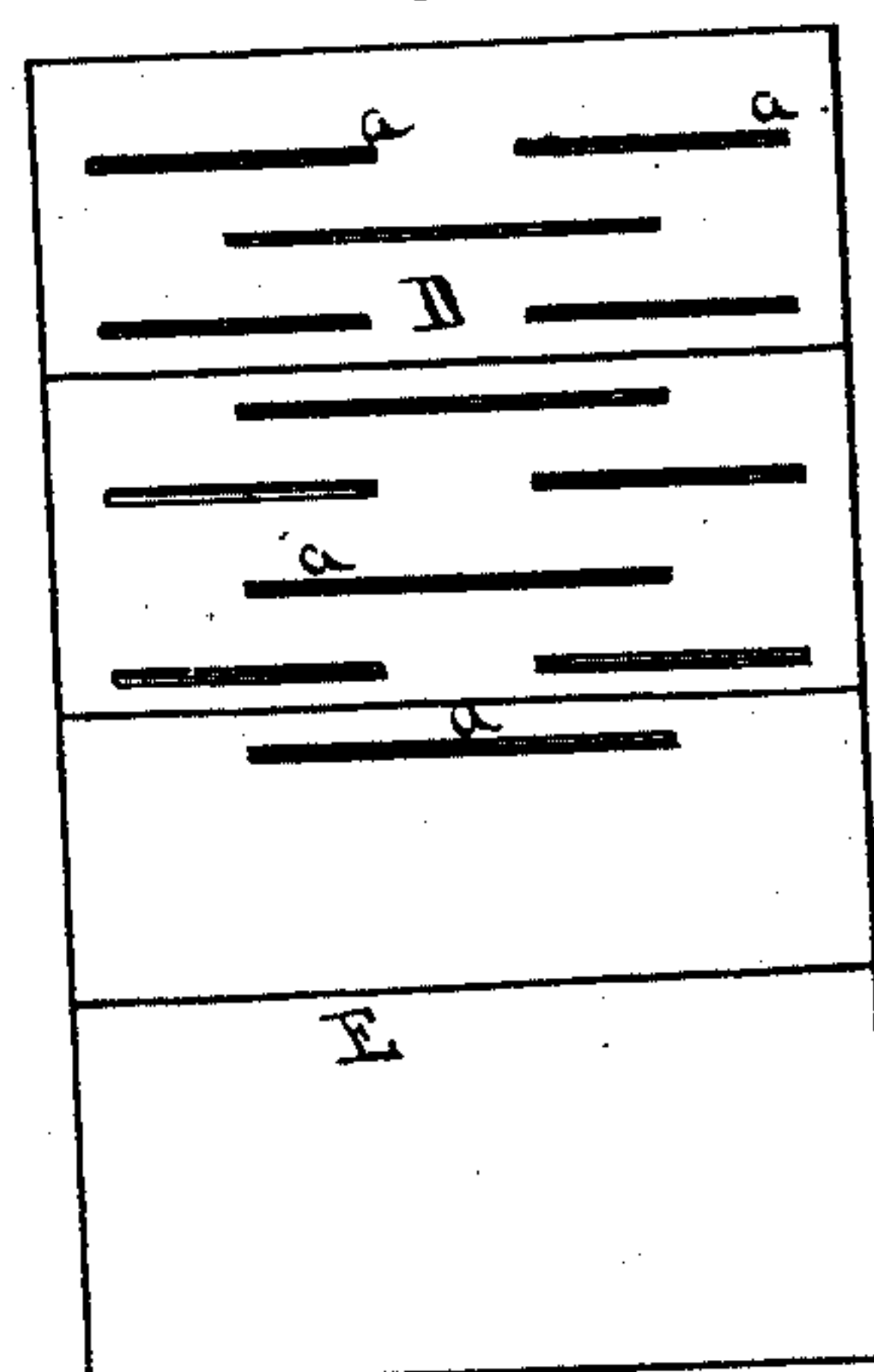
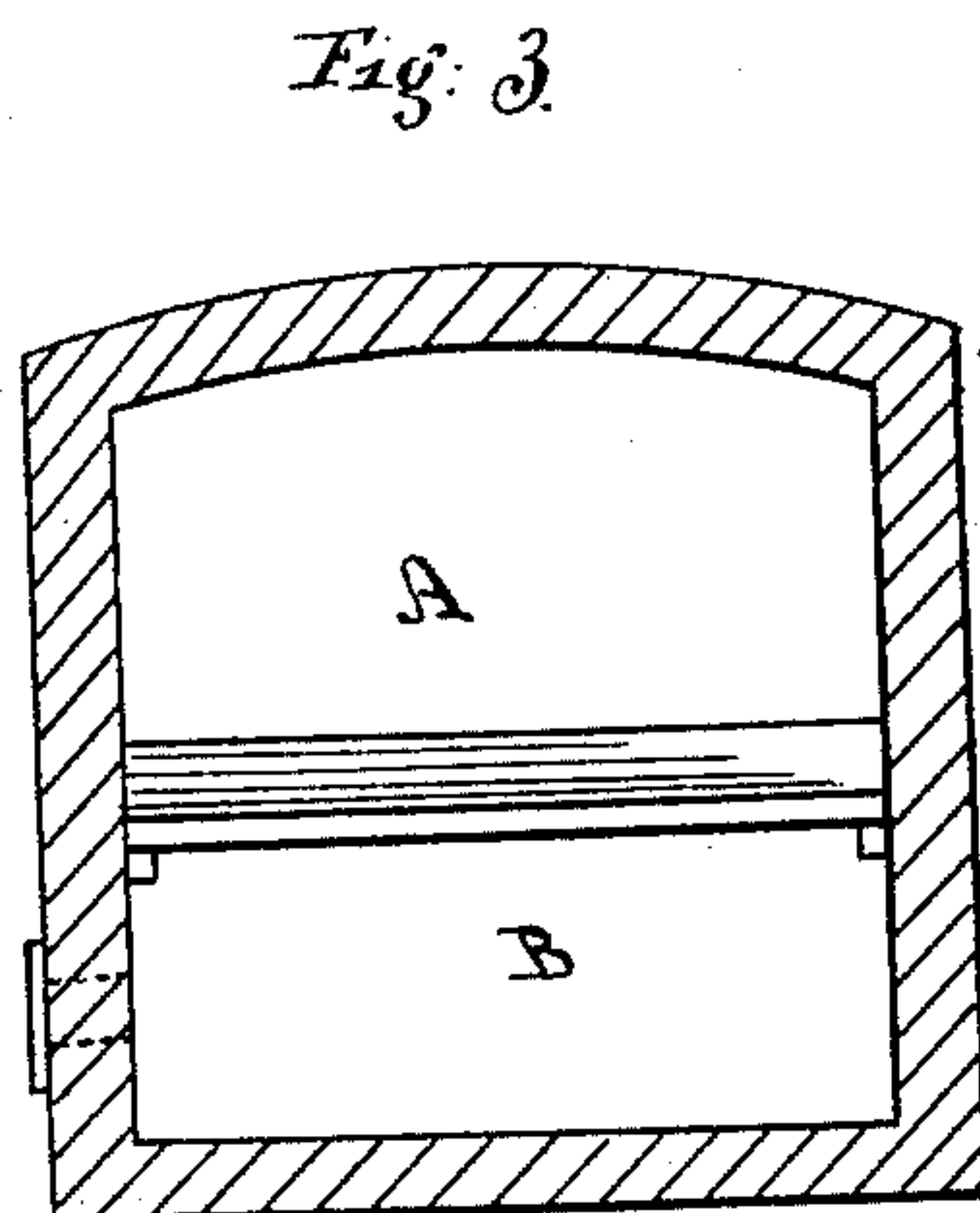
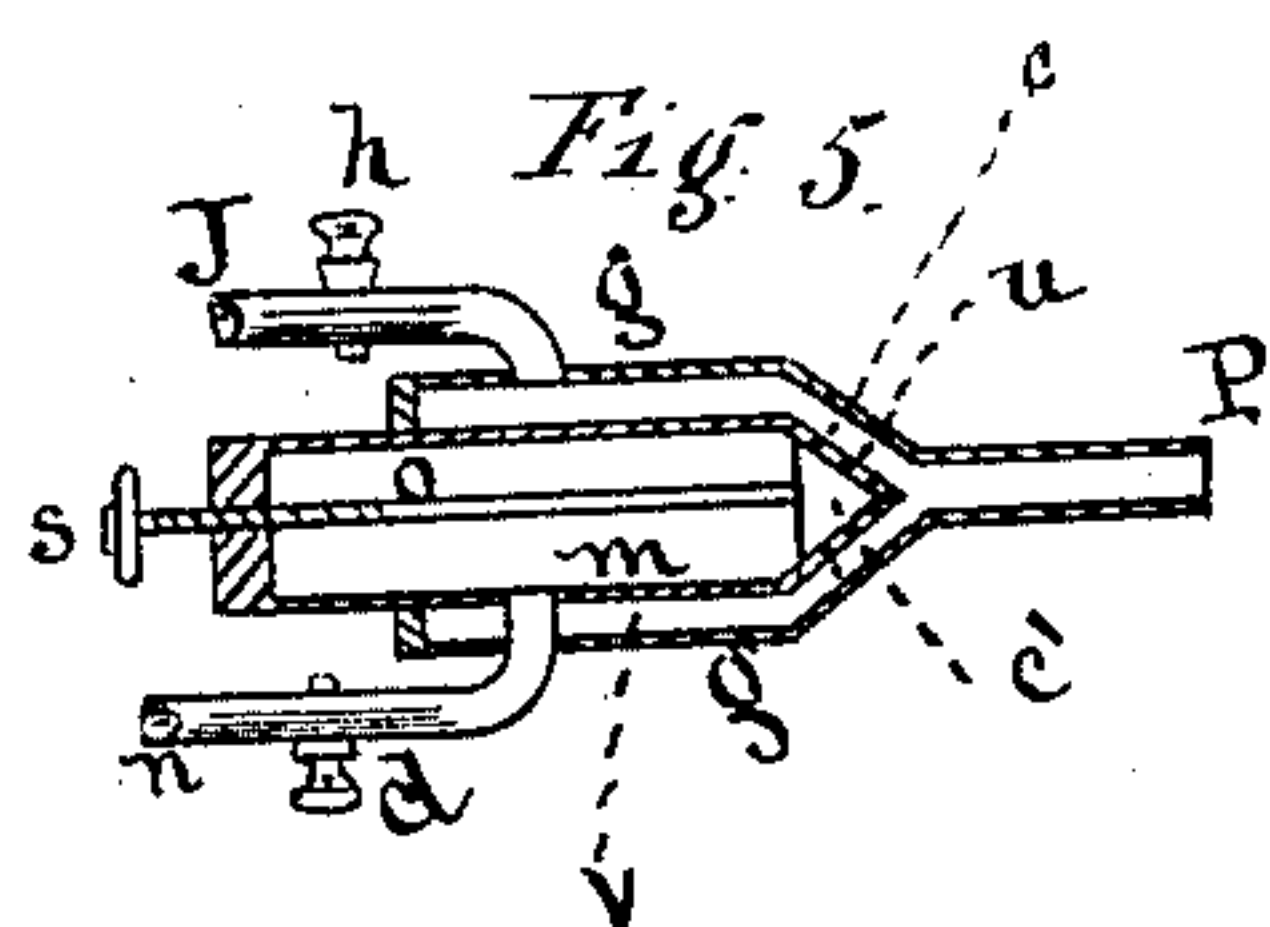
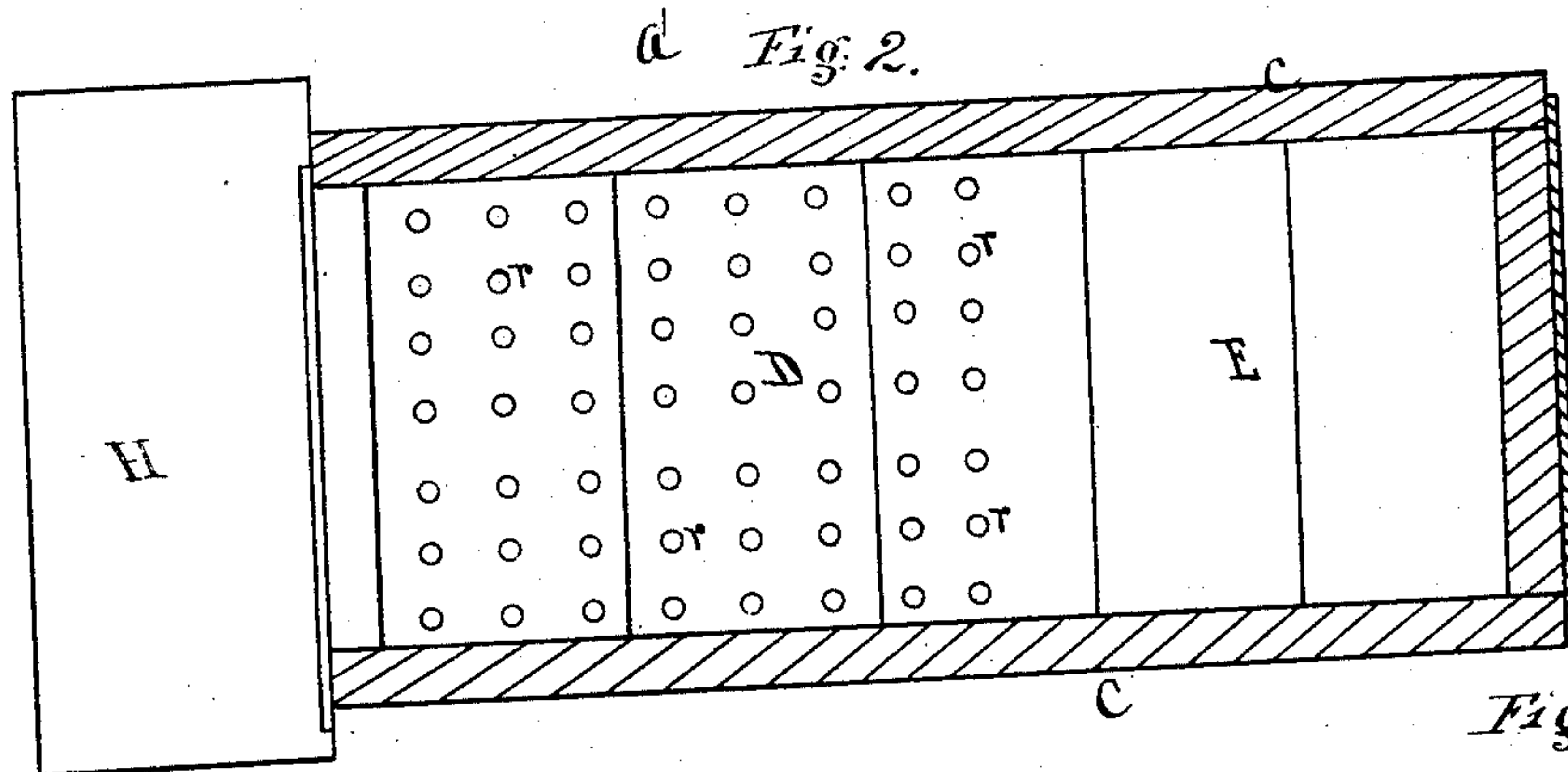
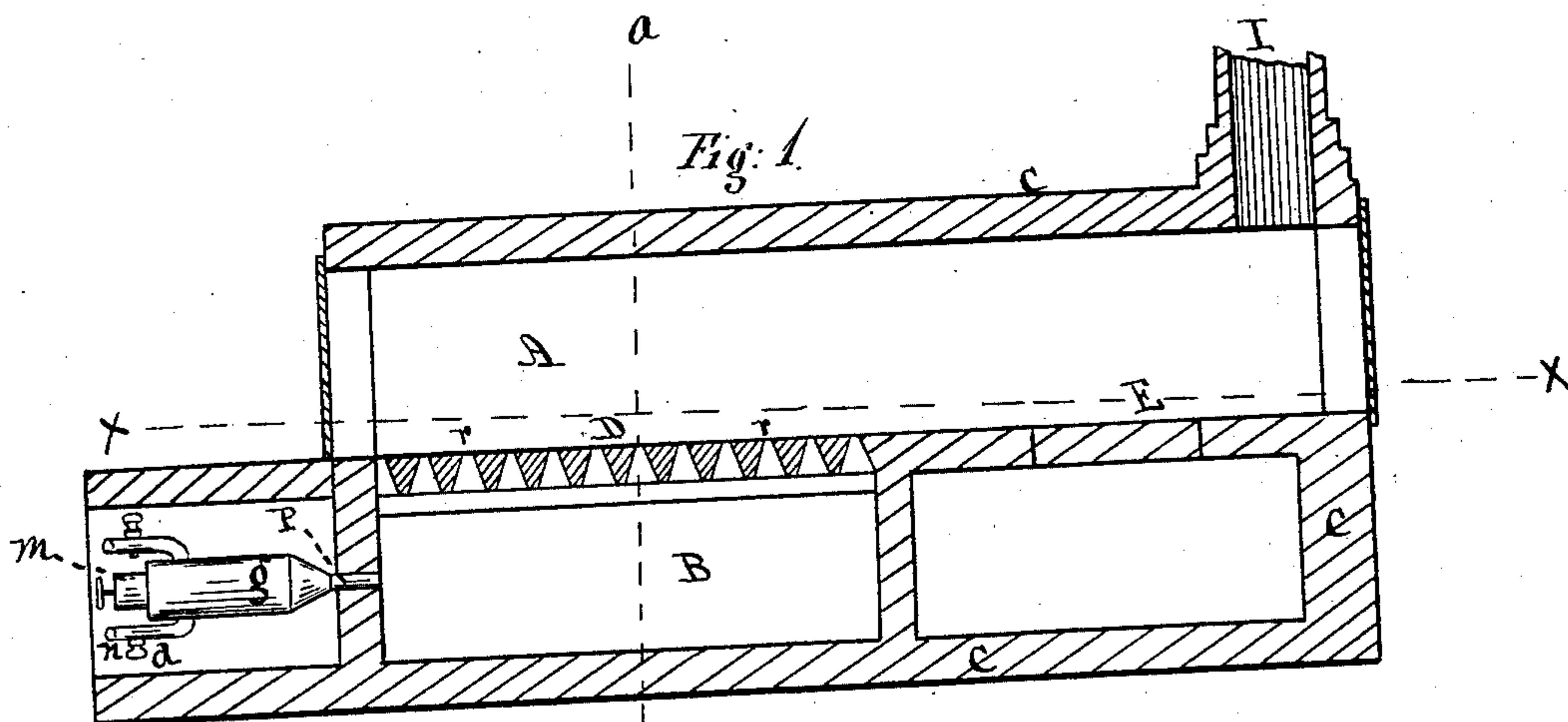
(No Model.)

S. C. WEST.

FURNACE FOR THE MANUFACTURE OF ZINC WHITE.

No. 328,097.

Patented Oct. 13, 1885.



Witnesses.
H. M. Honnell
S. W. Wood

Inventor.
Saml. C. West

UNITED STATES PATENT OFFICE.

SAMUEL C. WEST, OF ELIZABETH, NEW JERSEY.

FURNACE FOR THE MANUFACTURE OF ZINC-WHITE.

SPECIFICATION forming part of Letters Patent No. 328,097, dated October 13, 1885.

Application filed June 23, 1884. Serial No. 136,317. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL C. WEST, of Elizabeth, in the county of Union and State of New Jersey, have invented new and useful Improvements in Furnaces and the Process Therefor in the Manufacture of Zinc-White; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 represents a vertical longitudinal section thereof; Fig. 2, a longitudinal section through the line *xx* of Fig. 1; Fig. 3, a vertical cross-section through the dotted line *aa* of Fig. 1; Fig. 4, a plan of a modified form of the bed of the furnace detached; Fig. 5, sectional view of the apparatus through which the oil and steam pass and in which they are thoroughly commingled to produce the gas to decompose the ore and drive off the oxide of zinc therefrom, substantially as set forth.

My invention relates to a furnace for extracting the oxide of zinc from the ore; and it consists in the construction and arrangement of the fire-chamber, tiled bed or grate, and openings for giving access to the ore, substantially as herein described.

This furnace is arranged in two compartments—the upper compartment, A, to receive the ore to be reduced, and the lower part, B, in which the gas is generated or introduced to decompose the ore and drive off the oxide therefrom, as represented in vertical section, Fig. 1. The peculiar shape of this furnace is not material; but constructed in the form of a rectangle, as shown in the accompanying drawings, is believed to be the most convenient and best adapted to the purpose in practice.

The walls C are of the usual fire-brick, and may be lined with fire-clay or other suitable material, if desired. The front part, D, of the bed upon which the ore is first placed to be reduced is provided with suitable openings, *r*, leading into the fuel-chamber B beneath, through which openings the flame of the gas generated or introduced therein passes directly in contact with and through the ore placed thereon. After the ore has been sufficiently treated to drive off by the intense heat the greater part of the oxide contained therein, and which has been lying directly over the

openings in the bed and receiving the full force of the heat from the combustion of the gas in the chamber B beneath, it is drawn forward upon the solid part E of the bed and permitted to remain there, still under the intense heat, a sufficient length of time to finally extract all of the oxide that may remain therein. By this process economy of fuel and rapidity of treating ore are attained, which are most essential in the successful manufacture of the oxide of zinc, or what is commonly known as “zinc-white.” The open front part of the bed of this furnace may consist of a series of bars of any suitable form and arrangement, as shown at D, Fig. 1, and placed so as to leave openings *r* between them of sufficient width to admit the flame of the fuel from the chamber B immediately in contact with the ore placed thereon; or this bed may be solid and a series of openings formed therein to admit the flame into the furnace-chamber, as in Fig. 2, if preferred. If desired, this solid bed may be provided with a series of oblong openings, *a*, through which to admit the flame into the furnace-chamber, as represented in detached view, Fig. 4. All these details of construction will readily present themselves to the expert constructor, and may be arranged as deemed most expedient and desirable.

The fuel which I have found peculiarly adapted for reducing this ore and extracting the oxide therefrom by the intense heat that may be obtained therefrom and the perfect control as to degree of heat to be used and steadily maintained is gas generated in the fuel-chamber B beneath the perforated part of the bed of the furnace-chamber. One practical method of producing this gas is represented in Figs. 1 and 5, and may be described as follows:

A steam-pipe, *m*, is constructed with a conical valve, *c*, at its front end, which rests upon a corresponding conical valve-seat formed in the end of this pipe. From this valve *c* extends a stem, *o*, provided with a hand-wheel, *s*, so that it may be drawn back and forth and maintained in any desired position, so as to gage the amount of steam required to be admitted through the openings *u*. Around this steam-pipe *m* is placed a jacket, *g*, forming an exterior chamber, and which terminates in a small nozzle, P, directly in front of the end

of the steam-pipe, and which extends into the fuel-chamber, as shown in Figs. 1 and 5. By this arrangement the gas to decompose and drive off the oxide from the ore in the furnace-chamber is generated and may be described.

Steam being introduced into the steam-pipe *m* through a cock, *d*, is permitted to pass into the annular space *v* between it and the jacket *g* through the openings *c* by drawing back the valve *c'*. Crude petroleum is introduced into the annular chamber *v* through a supply-pipe, *J*, the amount being regulated by means of a stop-cock, *h*. The steam and petroleum being introduced simultaneously, and in the proper proportions, instantly unite in the small nozzle or exit-pipe *P*, and becoming thoroughly incorporated generate hydrocarbon gas, which, when ignited, creates an intense heat in the combustion-chamber *B*, which passes in a strong flame up through the perforated part of the bed *D* through and surrounding the ore placed thereon, maintaining an even and continuous heat in the furnace-chamber *A* during the entire process.

The usual exit for the oxide to escape from the furnace-chamber is provided by means of the chimney *I*, to which is connected an exhaust-engine, whereby a continuous and even vacuum to carry off the oxide is maintained.

The operation of treating ore to extract the oxide therefrom in the manufacture of zinc-white may be described.

The prepared ore is placed upon the front apron, *H*, and thence introduced into the furnace-chamber, and upon the perforated front part of the bed *A*, in a layer of the required thickness, the same as coal is distributed upon the grate to receive it in a steam-engine. Intermingled with this prepared ore may be a sufficient quantity of anthracite coal to assist and increase the intensity of the heat from the flame of the gas generated in the fuel-chamber *B* beneath.

After submitting the ore to this intense heat the required length of time to drive off nearly all of the oxide through the exhaust-chimney *I*, the charge is drawn forward, as before de-

scribed, upon the solid part *E* of the bed, and there remains still subjected to a strong heat until the entire remaining oxide from the ore is extracted, when it is finally withdrawn from the furnace-chamber, and the succeeding layer from off the perforated part of the bed is drawn thereon and the process continued, and so on the layers follow each other continuously and without intermission or loss of fuel by cooling the furnace at each successive charge of fresh ore as in the ordinary furnace in present use.

It is believed that sufficient heat may be obtained from the combustion of the hydrocarbon gas introduced through the prepared ore by means of the openings in the front part of the bed of the furnace-chamber, so as to dispense with the coal intermingled with the ore, thereby cheapening still more the manufacture of zinc-white by this process.

The grate-bars *D* or bed-plate of the furnace-chamber *A* are made of fire-proof tile, or any other suitable material, whereby this bed to receive and hold the ore while being treated may withstand the heat without injury thereto. Separate grate bars, as in Fig. 1, or sections, as in Figs. 2 and 4, may be employed, as found most convenient, and may be made removable when required for repairs.

Oxygen to supply the combustion-chamber *B* in generating the gas is admitted through the valve at the base of said chamber, Fig. 3.

Having thus fully described my process in the manufacture of zinc-white and the furnace therefor, what I claim therein as new, and desire to secure by Letters Patent, is—

In a furnace for reducing ore in the manufacture of oxide of zinc, the combination of the fire-chamber, the tiled bed or grate above, the solid or closed bed in the plane of the tiled bed, and the oppositely-placed openings for giving access to the ore-chamber, substantially as herein described.

SAML. C. WEST.

Witnesses:

S. W. WOOD,
H. W. HOWELL.