R. HINVEST.

Ore Smelting Furnace.

No. 233,854. **Patented Nov. 2, 1880.**

Fig. 1.

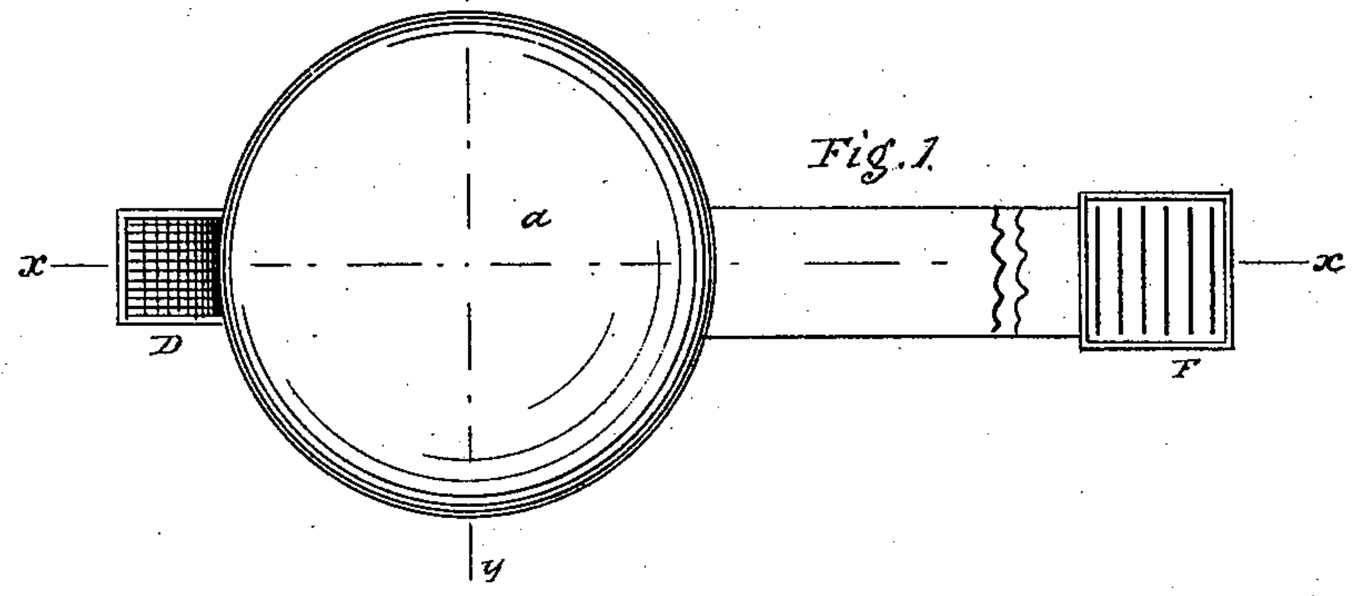


Fig. 2.

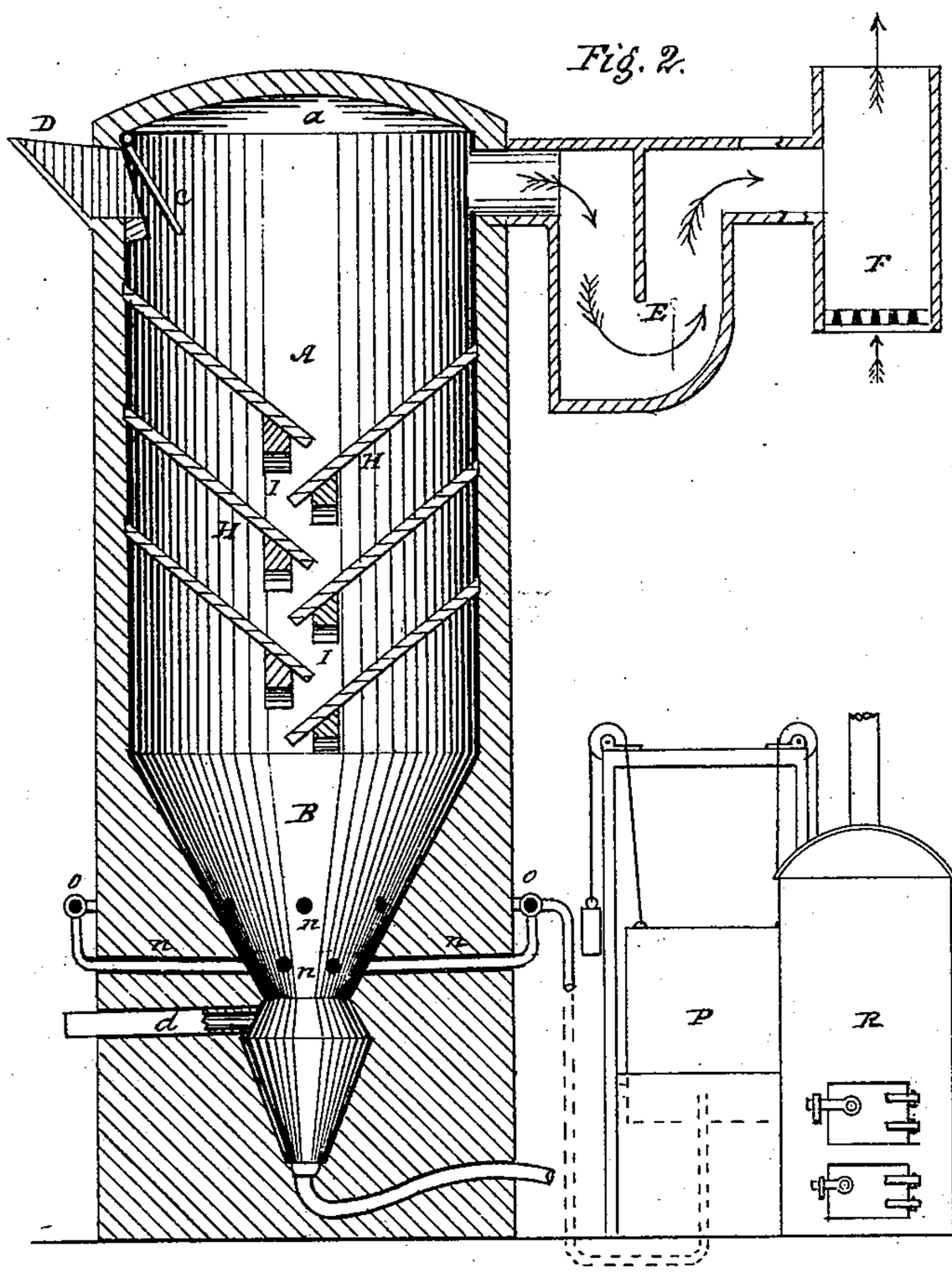
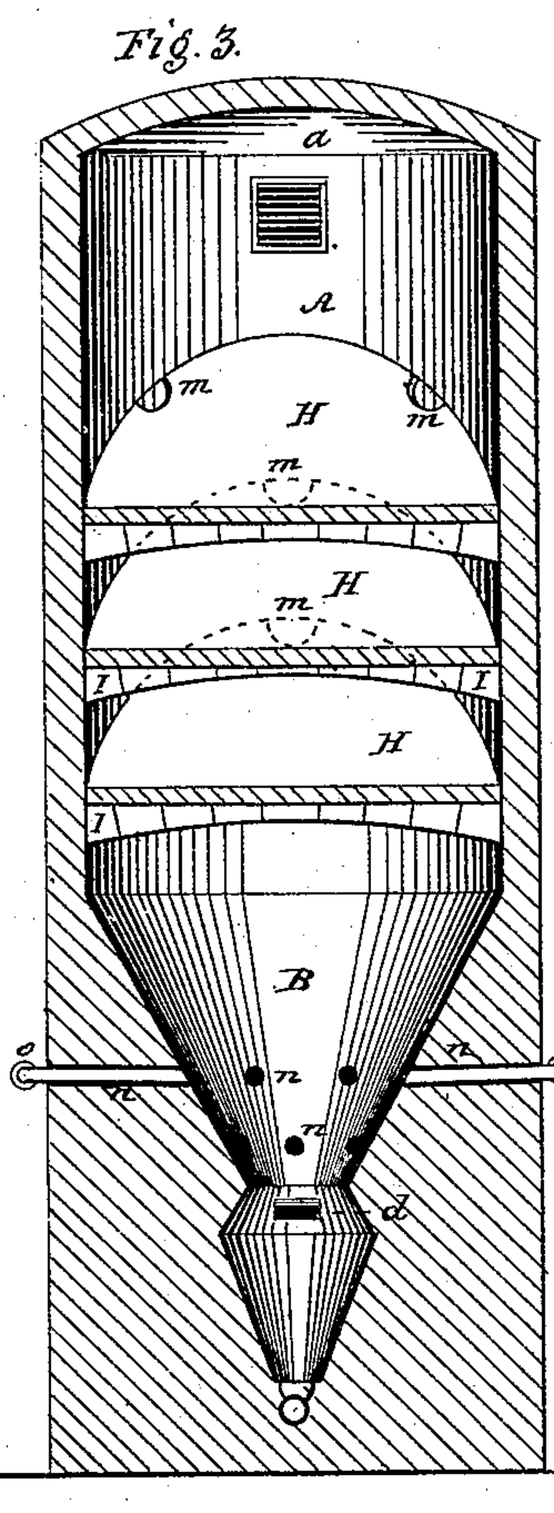


Fig. 3.



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UNITED STATES PATENT OFFICE.

ROBERT HINVEST, OF NEW YORK, N. Y.

ORE-SMELTING FURNACE.

SPECIFICATION forming part of Letters Patent No. 233,854, dated November 2, 1880.

Application filed December 12, 1879.

To all whom it may concern:

Be it known that I, ROBERT HINVEST, of the city of New York, in the county and State of New York, have invented certain new and useful Improvements in Furnaces for Smelting Ores; and I hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification.

This invention relates to improvements in smelting-furnaces for smelting gold, silver, iron, and other ores, the object of the said improvements being to provide means whereby impurities—such as sulphur, arsenic, antimony, and phosphorus—may be eliminated from the ores, and the noxious fumes arising therefrom may be destroyed within the furnace and its adjuncts; also, to construct the furnace in such a manner that the "tailings," which have generally been allowed to go to waste, may be smelted therein, and thus be utilized by extracting the bullion therefrom; and, also, to adapt the furnace for the use of carbureted-hydrogen gas therein, in the place of ordinary fuel, so as to effect a considerable saving, both in the cost of construction and also in the cost of running.

My invention consists in the combination, with a smelting-furnace having a closed top or dome, and provided with appliances for the consumption therein of carbureted-hydrogen gas as fuel, of a condenser or series of condensers placed intermediately between the main furnace and an auxiliary furnace and fire-place, so that the noxious fumes that pass out of the main furnace may be either condensed in the said condenser or consumed in the auxiliary furnace, by which means the escape into the outer air of any noxious gases or fumes arising from the process of smelting is prevented; and, also, in the combination, in a smelting-furnace, of a closed top or dome, a series of slanting and overhanging shelves for retarding the descent of the ore, a series of radial openings into the fire-place for the introduction of carbureted-hydrogen gas as fuel, and a condenser or series of condensers and an auxiliary fire-place, by means of which combination the three processes of desulphurizing, smelting, and destroying the noxious fumes are all effected simultaneously in what is practically one structure.

In the accompanying drawings, Figure 1 represents a plan view of a furnace with my improvements. Fig. 2 is a vertical section of the same on the line *x x*, and Fig. 3 a vertical section of the same on the line *y y*.

Similar letters of reference indicate the same parts in all the several figures.

A represents the main body of the furnace, which may be built of any suitable material, and has a closely-covered top or dome, *a*.

D is the hopper through which the ore is fed into the furnace, and which is covered by a swinging self-acting gate or door, *c*, on the inside.

B is the fire-place at the lower part of the furnace. *d* is the opening and tube through which the slag is discharged, and which serves the purpose of an air-inlet for the supply of atmospheric oxygen to support combustion.

E is a condenser, one or more of which may be used, into which any sulphurous or other noxious fumes which pass from the furnace are received, and in which they are condensed and held in the form of sulphurous acid. Attached to the condenser which is farthest from the furnace is a small auxiliary furnace or fire-place, F, (having an open top,) in which said furnace a fire is kept up, so that any portions of the fumes which escape from the condenser or condensers are burned up therein and prevented from passing into the open air. This furnace F forms the draft-exit.

H H represent inclined and overhanging shelves, to be used when disintegrated ores or tailings are being smelted. These shelves are supported near their edges by transverse arches I, and they slightly overhang each other, as shown in the drawings. The tailings being received upon these shelves are thereby retarded in their progress while being acted upon by the gaseous heat, so that they are desulphurized and pass into the lower part of the furnace in a partially-smelted condition, thereby insuring the extraction of the bullion from the ore and freeing the same from impurities, and also effectually preventing packing in the lower part of the furnace. Openings *m* are provided in the said shelves to assist the upward draft.

For the purpose of adapting the furnace for the use of carbureted-hydrogen gas therein as a fuel, in place of ordinary fuel, I provide a series of radiating tubes, *n*, which enter the fire-place or lower part of the furnace from the outside, where they are connected with an annular pipe, *o*, which takes the gas from a gas holder or receiver, P, and through these tubes *n* the said gas is injected, under a suitable degree of pressure, into the fire-place or lower part of the furnace, and there ignited, producing a heat of great intensity.

Into the gas holder or receiver P the gas is supplied from an apparatus for generating carbureted-hydrogen gas, which is designated by the letter R in the drawings, and which is constructed and arranged for producing carbureted-hydrogen gas from petroleum or other hydrocarbons by means of superheated steam, which is mingled with the vapors of the hydrocarbon.

I may state that the shelves H may be dispensed with when the furnace is being used for smelting ore of the ordinary size, or in pieces of from two to ten cubic inches in size; but even in that case they are useful in assisting in the desulphurizing of the ore.

I am aware that it is not new to introduce carbureted-hydrogen gas into a furnace to be used as fuel therein, and do not claim that as my invention.

What I claim as my invention is—

1. In combination with a furnace having a closed top or dome, *a*, the radiating tubes *n*, for the introduction of carbureted-hydrogen gas into the fire-place, the condenser or condensers E, and the auxiliary furnace F, as shown and described, for the purpose set forth.

2. In combination with a smelting-furnace having a closed top or dome, *a*, and provided with a series of inclined and overhanging shelves, H, and a series of radiating tubes, *n*, entering the fire-place of the furnace and connected with a gas-holder, P, through the medium of an annular pipe, *o*, the condenser or condensers E and auxiliary fire-place F, as shown and described, for the purpose set forth.

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