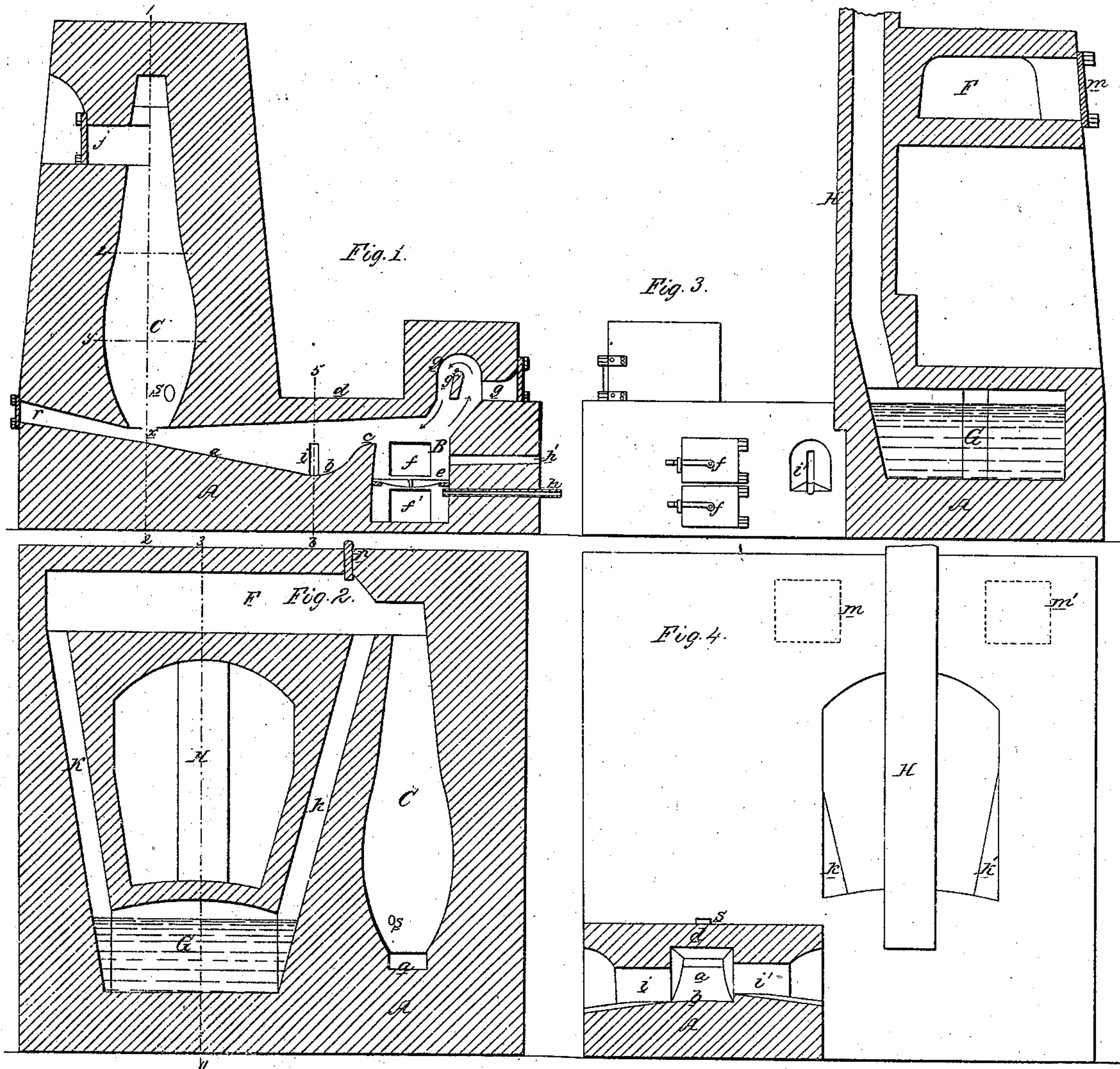


W. Quann.

Melting Furnace.

N^o 94,911.

Patented Sept. 14, 1869.



Witnesses;
Jm. J. Steel,
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United States Patent Office.

WILLIAM QUANN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HIMSELF,
CHARLES C. LATHROPE, AND A. R. WITMER.

Letters Patent No. 94,911, dated September 14, 1869.

IMPROVED FURNACE FOR REDUCING GOLD, SILVER, COPPER, AND OTHER REFRAC- TORY ORES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, WILLIAM QUANN, of Philadelphia, State of Pennsylvania, have invented an Improved Melting and Smelting-Furnace; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention consists of a furnace for reducing gold, silver, copper, and other refractory ores, the construction and operation of which will be fully described hereafter.

In order to enable others skilled in the art to make and use my invention, I will now proceed to describe its construction and operation, reference being had to the accompanying drawing, which forms a part of this specification, and in which—

Figure 1, drawing No. 1, is a vertical sectional view of my improved melting and smelting-furnace;

Figure 2, a sectional view of the same on the line 1-2, fig. 1;

Figure 3, drawing No. 2, a section on the line 3-4, fig. 2; and

Figure 4, a transverse section on the line 5-6, fig. 1.

Similar letters refer to similar parts throughout the several views.

A represents the foundation or body of the furnace;

a, the inclined bed;

b, the basin;

c, the bridge;

d, the roof;

B, the fire-place;

e, the grate;

f and f', two openings at one side of the furnace, covered by suitable doors, and communicating with the fire-place and ash-pit; and

g, an opening, also furnished with a suitable door, and through which fuel is introduced to the fire-place B.

The opening g does not communicate directly with the fire-place, but with a chamber, g¹, above the latter, in which, at a point directly in front of the said opening, is a partition or guard, g², for a purpose described hereafter.

h is a blast-pipe, which passes through the front wall of the furnace, and terminates beneath the grate e; and

h' is an opening above the grate, through which suitable tools can be introduced for the purpose of levelling the coals, &c.

The tapping-hole i, and hole i', through which the slag or scoria is withdrawn from the furnace, are situated at points opposite to each other, and communicate with the basin b. (See figs. 1 and 4.)

It will be observed on reference to fig. 1, that the roof d of the furnace, is inclined downward toward its rear end, so that at the point x there shall be but a narrow space between the said roof and the inclined bed a, and at this point x, the horizontal portion of the

furnace communicates with the lower end of a cupola, C, which I prefer to make of the peculiar form shown in figs. 1 and 2, for a purpose described hereafter.

Two or more blast-pipes s, project into the cupola at points near the lower end of the same, as seen in figs. 1 and 2.

The furnace is provided with two charging-holes, j and j', the former of which is situated near the top of the cupola, while the latter communicates with the horizontal portion of the furnace at a point beneath the said cupola, and each charging-hole should be furnished with a detachable door or cover, as shown in fig. 1.

The heated products of combustion are not permitted to pass directly from the cupola to the chimney, but are conducted from the upper contracted end of the same into a horizontal oven, F (figs. 2 and 3,) from which they pass downward, through passages k and k', into a vessel, G, partly filled with salt and water, being thence conducted to a chimney, H, at the top of which should be arranged a suitable draught-regulator.

Access is obtained to the interior of the oven F, by means of two doors m and m', and when the said oven is not in use, it may be cut off from the cupola by a slide, p, fig. 2, in such a manner as to cause all the products of combustion to descend through the passage k, in their course to the chimney.

The above furnace is intended principally for the economical reduction of the ores of gold, silver, copper, &c., the preparation and smelting of which, as hitherto conducted, has been both tedious and expensive.

The method of operation is as follows:

The furnace is first thoroughly heated by means of a fire kindled on the grate e, and intensified by the blast from the pipe h, this usually requiring about ten hours. The blast is then shut off, and the cap of the charging-hole j' opened, a quantity of ore, previously roasted in the oven F, or elsewhere, being introduced through this opening, until the entire lower portion of the furnace with the exception of the basin b is filled. The charging-hole j is then opened, and fuel, mingled with the proper flux, is passed through the same into the cupola, until the latter is filled to about the height indicated by the red line y, fig. 1, after which a quantity of roasted ore, also introduced through the hole j, is piled upon the fuel to about the height shown by the line z, both charging-holes being then closed, and the blast from the pipes h and s forced into the furnace.

If it be desired, a quantity of fresh ore can at the same time be placed in the oven F, to undergo the preliminary process of roasting, in which case the slide p is raised, as shown in fig. 2, in order that the heated gases, &c., may circulate through the said oven before descending toward the chimney.

In consequence of the contracted height of the rear

end of the lower portion of the furnace, the heat from the fire-place B impinges directly on the ore contained on the inclined bed *a*, and speedily reduces the same, a considerable portion of the metal being volatilized and passing upward through the cupola, while the molten metal and the slag or scoria flow into the basin *b*, and are withdrawn from the same from time to time through the openings *i* and *i'*.

Within the cupola the ore is not only subjected to the direct heat which is caused to pass through it by the blast, but to currents of heated air which are caused to react and to circulate in the cupola above the ore, in consequence of the partial checking of the draught by the contraction of the upper end of the said cupola. The conducting of the heated gases, &c., downward through the passages *k* *k'*, before permitting them to pass to the chimney, also aids in this reaction and retention of the heat within the cupola, and at the same time prevents the heat from passing off too suddenly from the oven F.

In consequence of the great heat to which the ores are subjected in the cupola, the greater portion of the metal, as it is disengaged, becomes also volatilized, and passes with the other vapors toward the passages *k* and *k'*, and tank G.

By means of the salt and water in the tank G, the vapors are condensed before reaching the chimney, and all metallic particles in the same disengaged and granulated, this metal, which is free from sulphur and other impurities, being removed from the tank at proper intervals.

When it becomes necessary to replenish the fire-place B with fuel, the blast *h* is cut off and the door *g* opened, the flames first springing backward toward

the latter, as usual, but being directed upward to the highest point of the chamber *g*¹, by the guard *g*², and returning in the course indicated by the arrows, by reason of the draught within the furnace. This arrangement, it will be evident, will permit the attendants to closely approach the opening *g*, and to feed the furnace with fuel without inconvenience or danger from sudden puffs of flame.

I claim as my invention, and desire to secure by Letters Patent—

1. A furnace, A, having a roof, *d*, and bed *a*, inclined toward each other, substantially as described, in combination with a cupola, C, of the form, or approximating to the form described and illustrated.
2. The charging holes *j* and *j'*, arranged, with respect to the cupola C and furnace A, substantially in the manner described.
3. The combination, with the furnace A and cupola C, of an oven, F, substantially as herein set forth.
4. The combination and arrangement of the furnace A, cupola C, oven F, passages *k* and *k'*, tank G and chimney H, when the whole are arranged for joint operation, substantially in the manner described.
5. The chamber *g*¹ and guard *g*², arranged, with respect to the fire-place B, and door *g* of a furnace, substantially as herein set forth.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM QUANN.

Witnesses:

E. H. BAILEY,
HARRY SMITH.