2 Sheets—Sheet 1.

J. G. TROTTER.

White Zinc Furnace.

No. 10,711. Patented March 28, 1854.

Fig. 3.

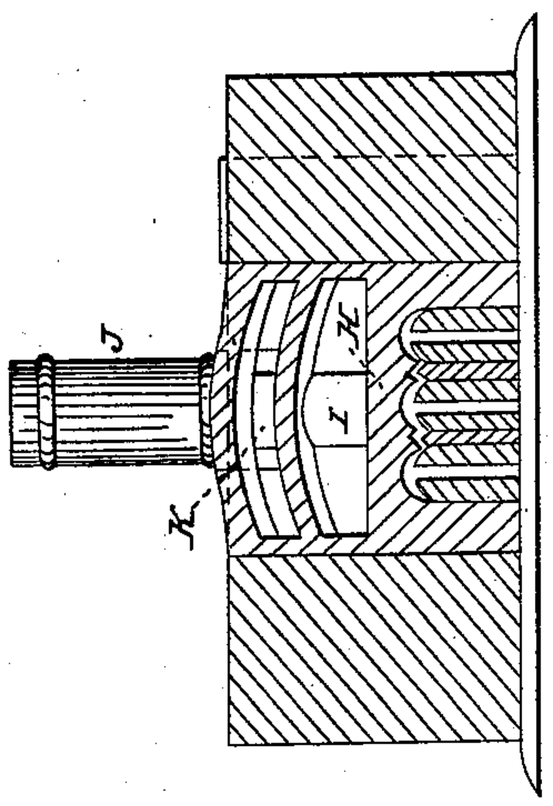


Fig. 4.

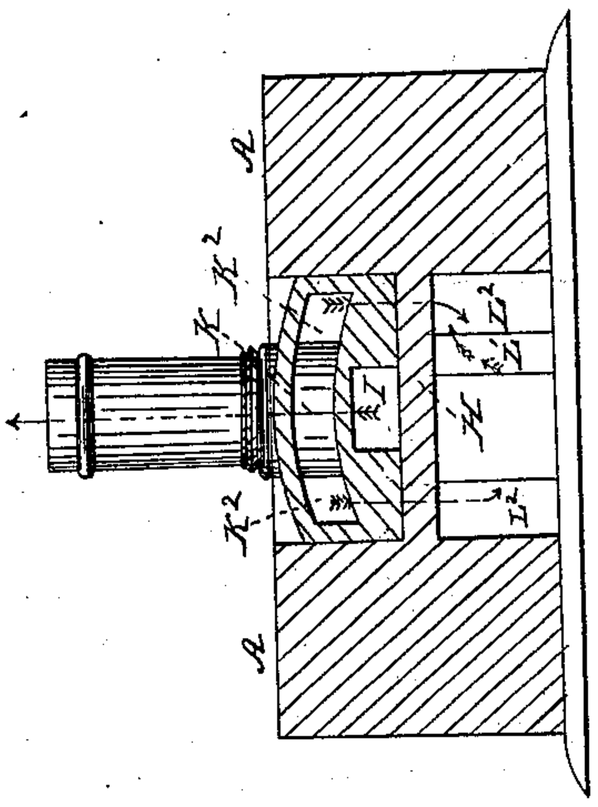


Fig. 2.

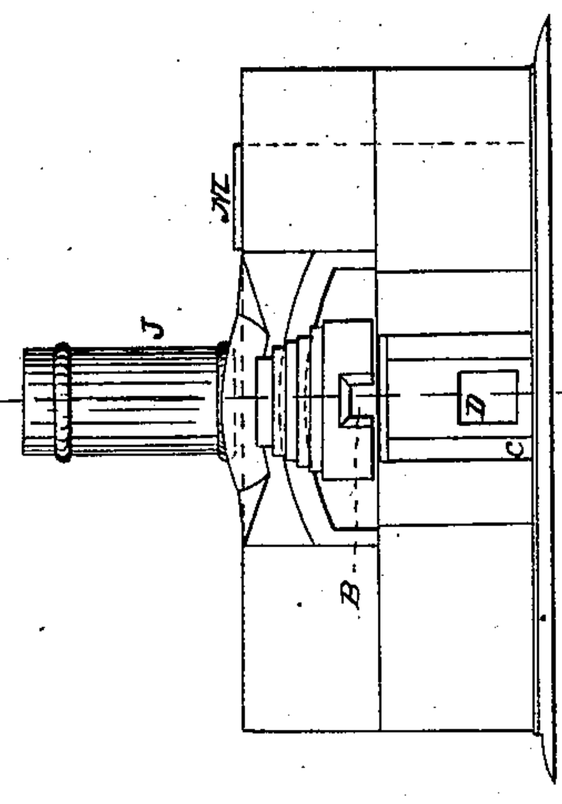
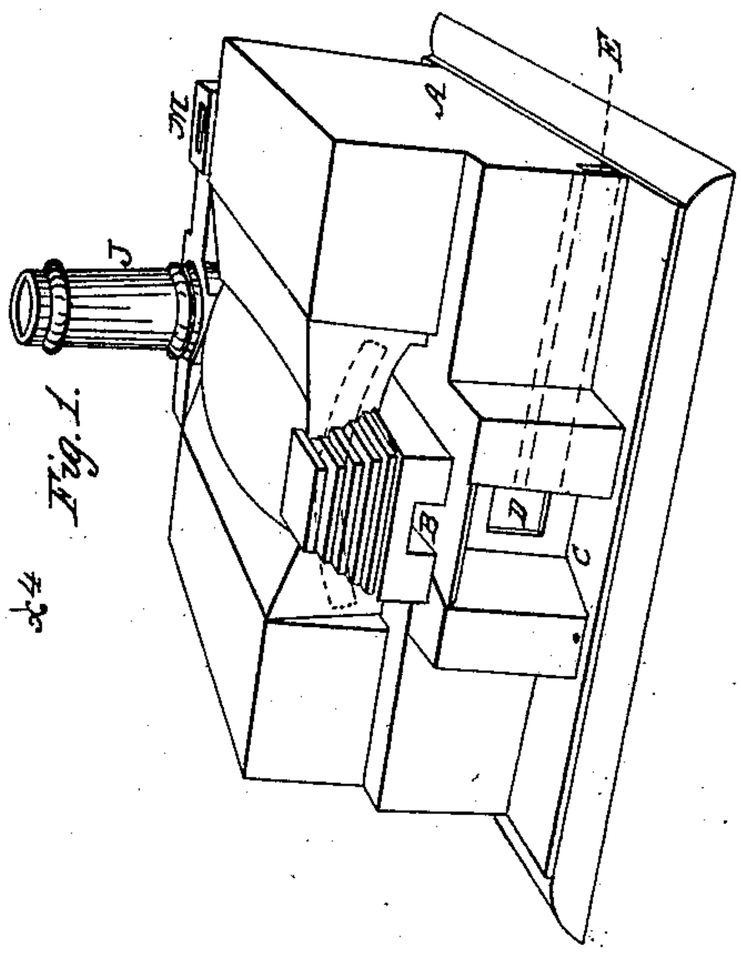


Fig. 1.



2 Sheets—Sheet 2.

J. G. TROTTER.

White Zinc Furnace.

No. 10,711.

Patented March 28, 1854.

Fig. 5.

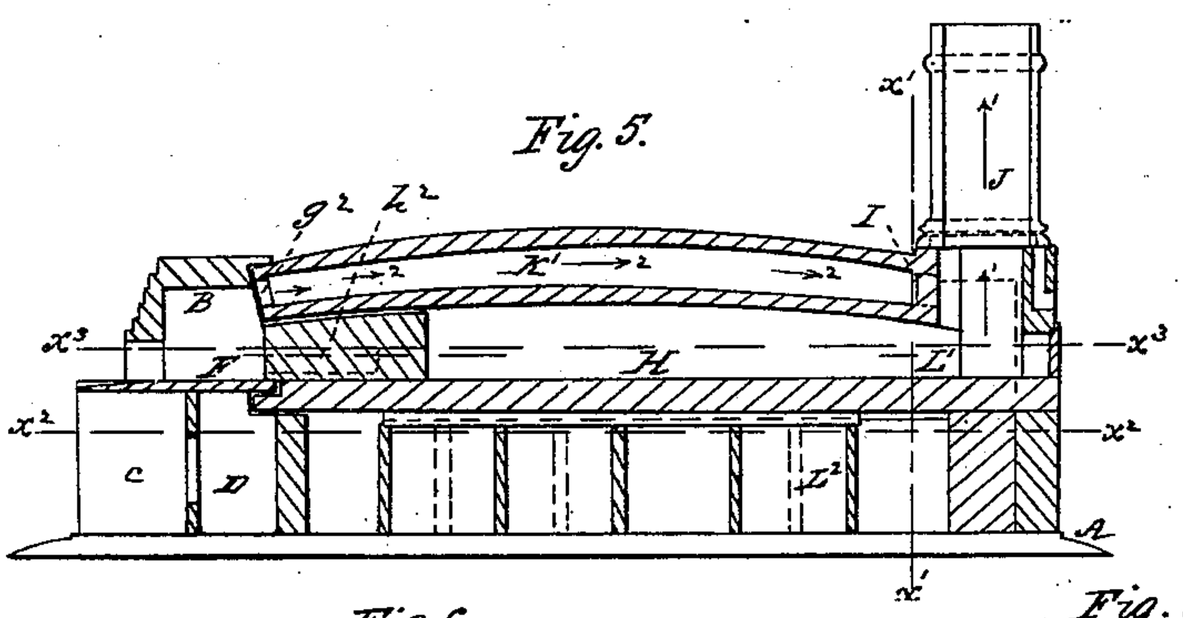


Fig. 6.

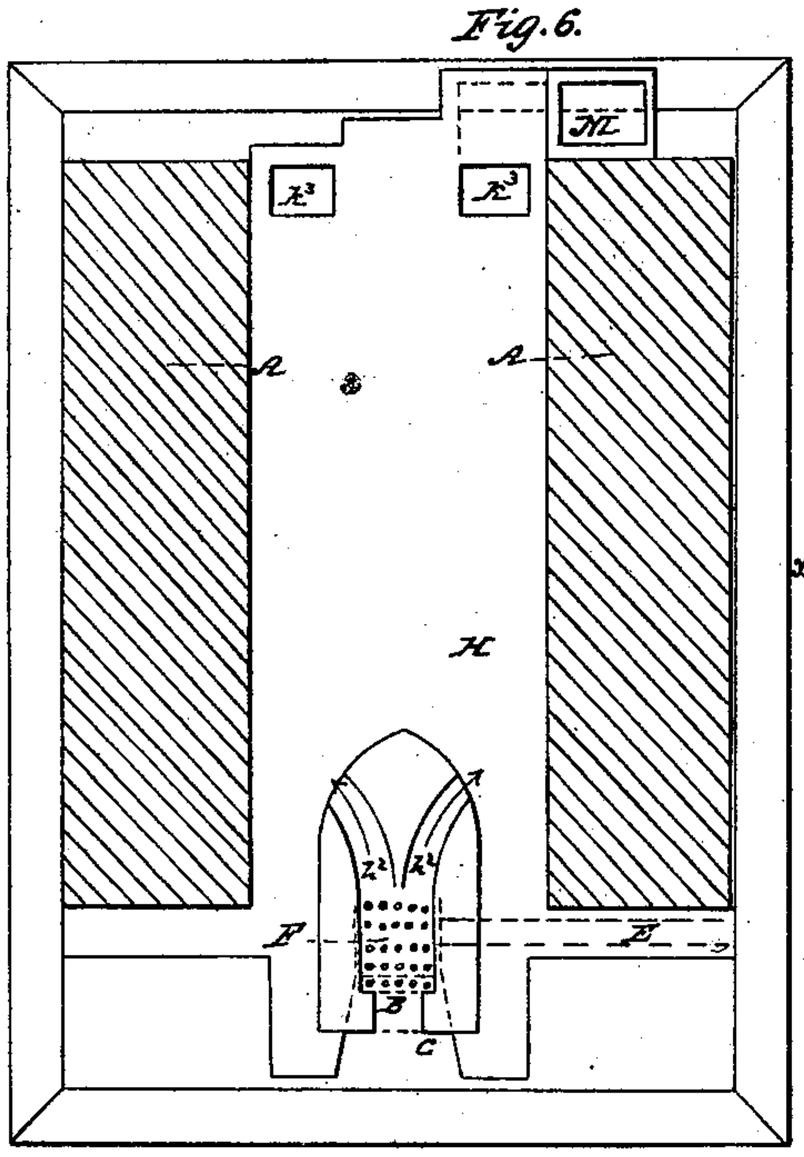
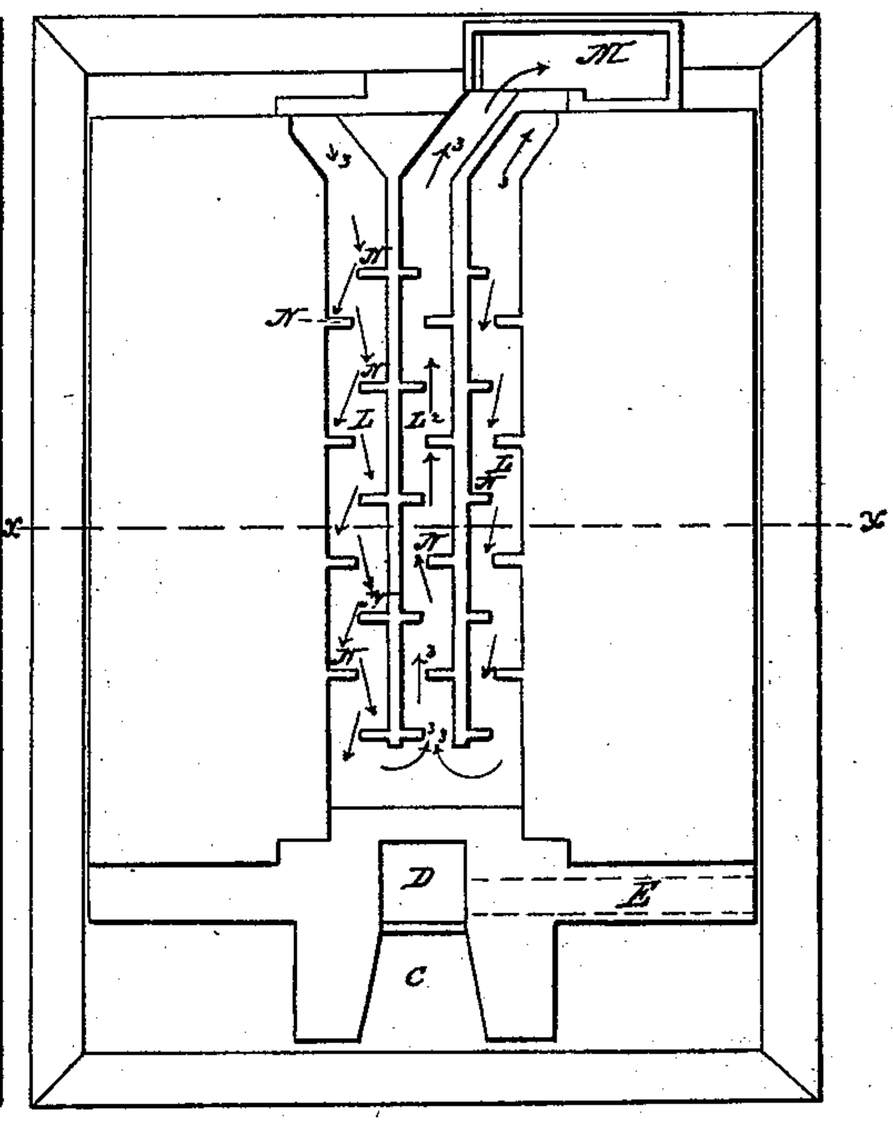


Fig. 7.



UNITED STATES PATENT OFFICE.

JONATHAN G. TROTTER, OF NEWARK, NEW JERSEY.

IMPROVEMENT IN FURNACES FOR ZINC-WHITE.

Specification forming part of Letters Patent No. **10,711**, dated March 28, 1854.

To all whom it may concern:

Be it known that I, JONATHAN G. TROTTER, of Newark, Essex county, New Jersey, have invented a new and improved furnace for subliming zinc ore, or ores containing zinc; and I do hereby declare the following to be a full description of the same.

The nature of my invention consists in giving the arches which form the roof of the furnace a hemispherical form—that is, arching the length as well as the breadth of the roof—also forming an upper roof having a passage-way for the lighter gases from the furnace to escape, for the purpose of combining with the furnace a reverberatory surface; also, in arranging a series of three or more return-flues underneath the bed of the furnace or oven, and having in them vertical brakes or bridges alternately projecting from the sides of the flues to their center, for the purpose of confining the heat a greater length of time under the bed of the oven or furnace; also, in constructing the bridge-wall in the front of the furnace or oven by making two holes about three inches square, and discharging at opposite points toward the sides of the oven, for the purpose of diffusing more equally the more intense flame from the furnace over the ore, while the light and impure gases pass from the fire-place through the arched flue above the oven, and down the back of the oven and through return-flues under the oven, and from thence by a middle flue back to the chimney to escape; but to describe my invention more particularly I will refer to the accompanying drawings, forming a part of this schedule, the same letters of reference, wherever they occur, referring to the same parts.

Figure 1 is a perspective view of the furnace. Fig. 2 is a front elevation of the same. Fig. 3 is a vertical cut section of the furnace through the dotted line, Fig. 7, *x x*. Fig. 4 is a vertical cut section of the furnace through the dotted line $x' x'$, Fig. 5. Fig. 5 is a longitudinal cut section of the furnace through the dotted line $x^4 x^4$, Fig. 2. Fig. 6 is a plan view of the bed of the furnace through the dotted lines $x^3 x^3$, Fig. 5. Fig. 7 is a plan view of the lower return-flues of the furnace through the dotted lines $x^2 x^2$, Fig. 5.

Letter A is the abutments of the furnace, laid of stone or brick in the ordinary processes.

Letter B is the fire-place, built up of brick and resting upon abutments, inclosing the ash-pit C, and an air-chamber, D, which is supplied by a current of air from a blowing apparatus through the air-passage E.

Letter F is the perforated bed of the fire-place, for the passage of the blast of air to keep up the combustion. From the bridge-piece of the fire-place are upper and lower escape-holes, g^2 and $h^2 h^2$, for the escape of the gases from the fire. From the lower escape-holes, $h^2 h^2$, the heavier portions of the flame and gases escape upon the bed H, on which the ores containing the zinc are placed, and in its action upon the ore oxidizes it and carries off the sublimed zinc through the discharge-port I, in the direction of the arrows 1, up the funnel J, to be collected in sacks or chambers placed over it for that purpose.

Letter K is an arched passage-way or flue, formed by a double roof to the furnace, and having a communication with the upper part of the fire-place B by the opening g^2, for the escape of the lighter gas from the furnace in the direction of the arrow 2, and which is discharged through openings $k^2 k^2$ at the back of the oven or flue, which pass down through the bed H at the openings $k^3 k^3$ to the flues L L and L^2, Fig. 7, in the direction of the arrows 3, to be discharged at the chimney M. These flues L, &c., are lengthwise of the furnace, and have at alternate points from the sides of the flues bridges N N, &c. The object of this arrangement of the flues is obvious, as it will be perceived by the position of the bridges, which causes the escaping gas not only to traverse a greater distance than would be the case under a straight flue, but also causes a greater absorption of the heat in its passage by contact with the bridges, and therefore helps to sustain the process of sublimation going on in the body of the oven or furnace, while at the same time the gas, &c., in its passage through the reverberatory flue I over or between the double roofs of the oven or furnace H contributes also to carry on the same result.

The shape or conformation of the roof of the oven or furnace is concave upward—that is, arching from the sides and ends toward the center. The object of this is to produce a reflecting-surface of the roof of the oven or furnace that has a tendency to converge the rays

of heat radiated from the ignited ore back again upon itself.

The materials of which I construct my furnace are similar to that commonly used for such purposes.

The furnace is made with good fire-brick, laid as close as possible, with thin "grout" made with kaolin or fire-clay, and mixed with water, care being taken to lay the bricks as close as possible, and when practicable to "break joints." Over each flue (see cut sectional drawing, Fig. 3, letters L, &c.) I turn an arch and fill up the spaces between them close with brick-dust and pieces of brick, or with kaolin. Upon this substratum I lay the bed H, composed of slabs made of fire-clay, which are two inches by nine inches by eighteen inches long. I lay these first in kaolin grout, as close as possible, over the entire surface of the bed, and then a second course of the same material, observing, however, to break joints on the lower layer.

The dimensions of the furnace are six feet broad by fourteen feet long, though a slight variation from these proportions would not affect the useful features of the furnace.

Over the bed of the furnace I spring an arched roof of fire-brick, and over this a second roof, leaving a passage between for a reverberatory flue.

Having now described my invention and the mode of constructing the same, I will proceed to state what I claim and desire to secure by Letters Patent of the United States.

What I claim, therefore, is—

1. The combination and use of the upper and lower discharge or passage ways from the fire-place to the furnace—that is, the upper passage-way, g^2, for discharging or carrying off the lighter gases from the fire-place by the reverberatory flue K and return-flues L and L^2 to the chimney M, and the lower passage-ways, h^2 h^2, for discharging the flame from the fire-place direct upon the mass of ore on the bed of the furnace, and thereby reducing or subliming it more effectually and with less consumption of fuel than ever before accomplished.

2. The combination of the alternating series of bridges or brakes in the return-flues L and L^2, with the reverberatory flue K, double-arched conformation of the roof of the furnace, and the upper passage-way, g^2, and lower passage-ways, h^2 h^2, from the furnace, for the purpose of working zinc ores for making white oxide of zinc, substantially as hereinbefore set forth.

JONATHAN G. TROTTER.

Witnesses:

E. A. VANDERHOFF,

CHARLES L. BARRITT.