2 Sheets--Sheet 1.

KNOX & OSBORN.

Improvement in Furnaces for Roasting Ores.

No. 128,637. Patented July 2, 1872.

Fig. 2.

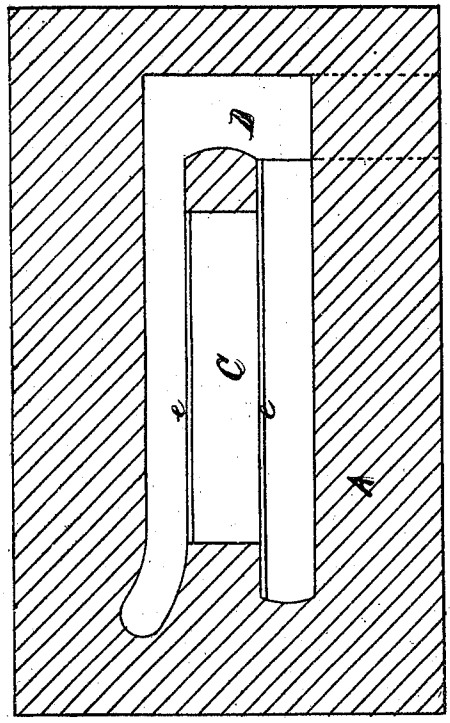


Fig. 3.

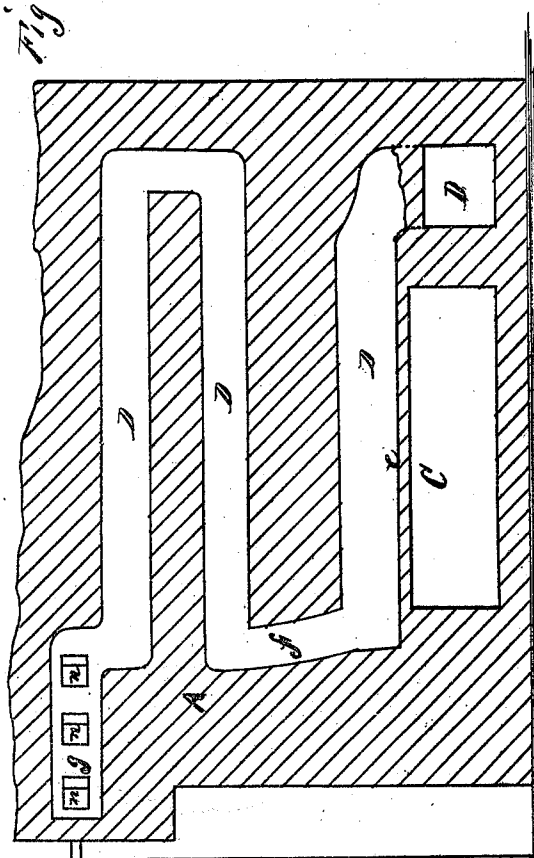
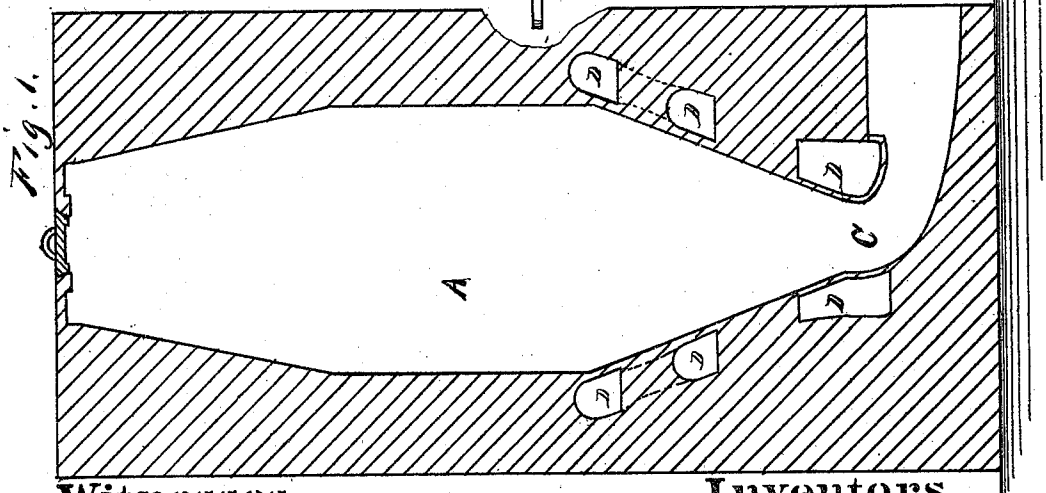


Fig. 1.



Witnesses

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A.M. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

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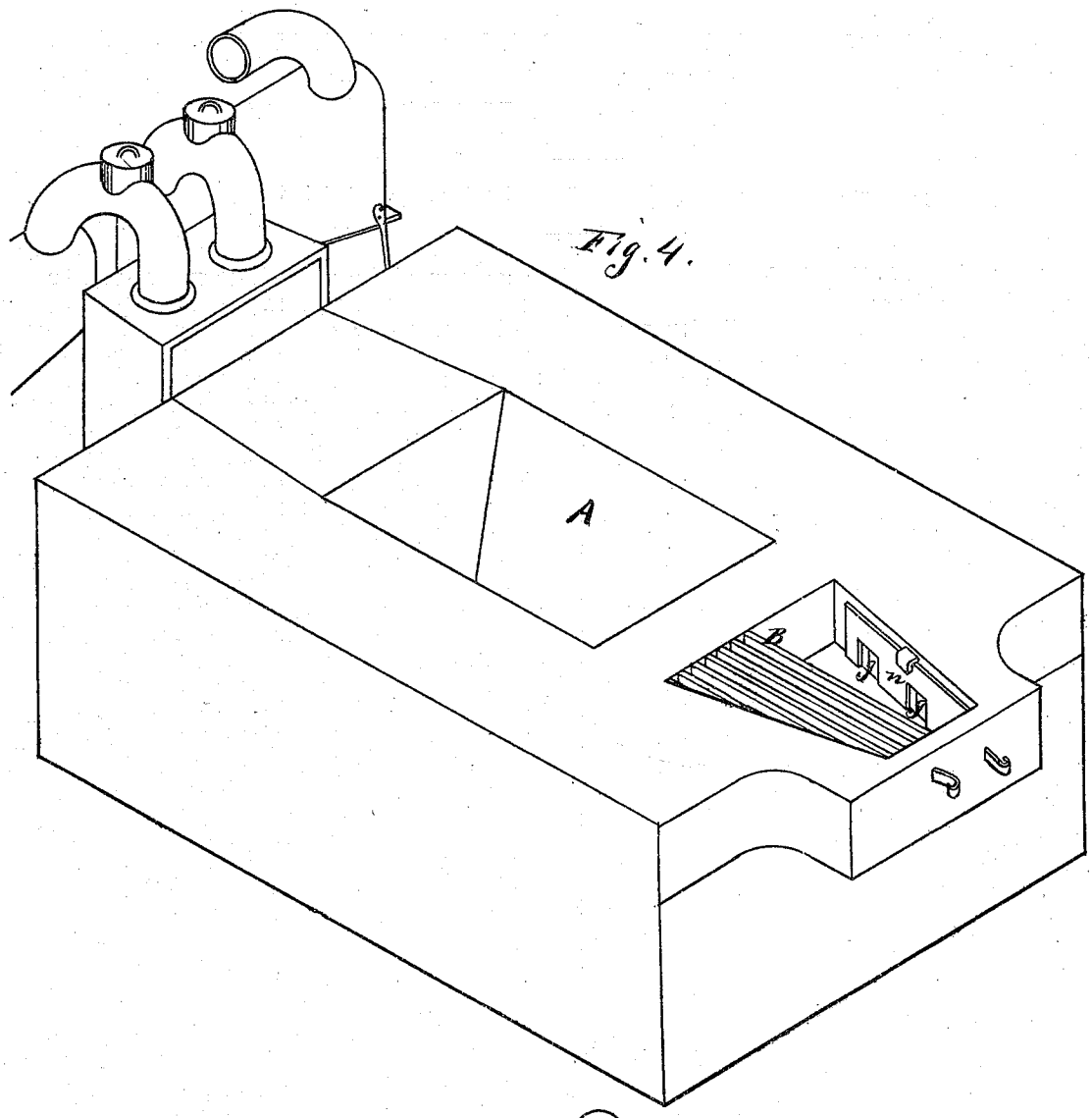
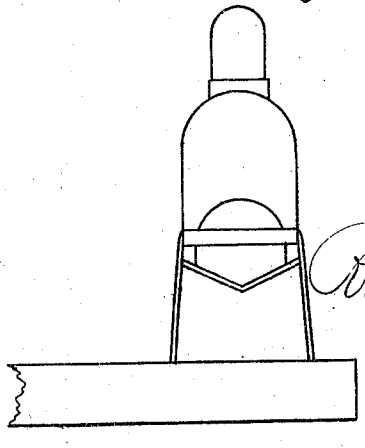
Fig. 4.





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UNITED STATES PATENT OFFICE.

RICHARD F. KNOX AND JOSEPH OSBORN, OF SAN FRANCISCO, CAL.

IMPROVEMENT IN FURNACES FOR ROASTING ORE.

Specification forming part of Letters Patent No. 128,637, dated July 2, 1872.

SPECIFICATION.

To all whom it may concern:

Be it known that we, RICHARD F. KNOX and JOSEPH OSBORN, of San Francisco, county of San Francisco, State of California, have invented Improvements in Roasting-Furnaces; and we do hereby declare the following description and accompanying drawing are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use our said invention and improvements without further invention or experiment.

Our invention relates to an improvement in the construction of ore-roasting furnaces, whereby we provide a novel and convenient means for admitting to the furnace, by natural draught, a copious supply of heated air in order to insure economy and effect in the combustion of fuel. Our invention is an improvement on our quicksilver-furnace, for which Letters Patent No. 104,323 were granted to us on the 14th day of June, 1870, and in connection with which we have, for convenience, represented it for the purposes of this application, the heating-tubes D D passing through the furnace-wall below the plane of the transverse draught. But it will be evident that our improvement can be applied generally to that class of furnaces in which the heated or roasted substance is withdrawn from the furnace below the fire-place.

In order to give a full and correct understanding of our invention reference is had to the accompanying drawing forming a part of this specification, in which—

Figure 1 is a transverse vertical section of our furnace, showing the air-passages. Fig. 2 is a horizontal section taken through *x x*, Fig. 1. Fig. 3 is a horizontal section taken through *y y*, Fig. 2. Fig. 4 is a perspective view of the grate, showing the dampers.

A represents our furnace for roasting cinnabar and other volatile ores. In this furnace the fire-place B is constructed in the body of the furnace, and the ores to be roasted are fed in at the upper end of the stack, so as to keep the chamber of the furnace constantly filled. The gravity of the ore will then cause it to pass slowly down the stack past the fire-place, so as to be roasted during its passage. The heated ore then passes on down through the lower contracted end C of the chamber, and is finally withdrawn entirely from the inclined passage at the bottom of the chamber. Our invention contemplates utilizing the waste heat which is radiated by the ores after passing the fire-place B by employing it for the purpose of heating air for feeding the fires in the furnace. In order to accomplish this we construct our furnace with a passage, D, leading from the outside of the stack into the body of the furnace. This passage we extend along at each side of the contracted end C of the chamber, so that only a thin partition, *e*, will separate the ore from the passage. At the extremity of these side passages we extend the opening upward a short distance, as shown at *f*, and again lead it back alongside of the chamber in the manner above described. Upon arriving at the opposite side of the chamber the passage is again carried upward and then forward, so as to communicate with the fire-place B below the grates, as at *g*. The heat in the fire-place will then cause a draught through the passage D into the fire-place. The air, in passing through to the passage, will become heated by the heat radiated from the descending ore after it has passed the fire-place, thus not only utilizing the heat, but cooling the debris to a great extent, whereby its subsequent handling will be rendered more pleasant. The heated air will greatly aid in the combustion of the fuel, and render the furnace much more effective and economical. The passage may be led back and forth along the chamber any desired number of times before carrying it to the fire-place, according to its capacity and the nature of the work being done; and a quantity of air can also be carried above the fire-place and delivered into the body of the furnace to furnish oxygen to burn the sulphur in the ore. Dampers *n*, in the sides of the fire-place below the grates, serve to regulate the draught through the passages D from the outside of the furnace.

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

The air-tubes, arranged at or around the base of a stack or other deoxidizing furnace on a plane below the heater, so as to cool the ore before it reaches the exit, and to utilize the waste heat, as specified.

In witness whereof we hereunto set our hands this 5th day of March, A. D. 1872.

RICHARD F. KNOX.
JOSEPH OSBORN.

Witnesses:
J. L. BOONE,
A. T. DEWEY.

1,000 words.