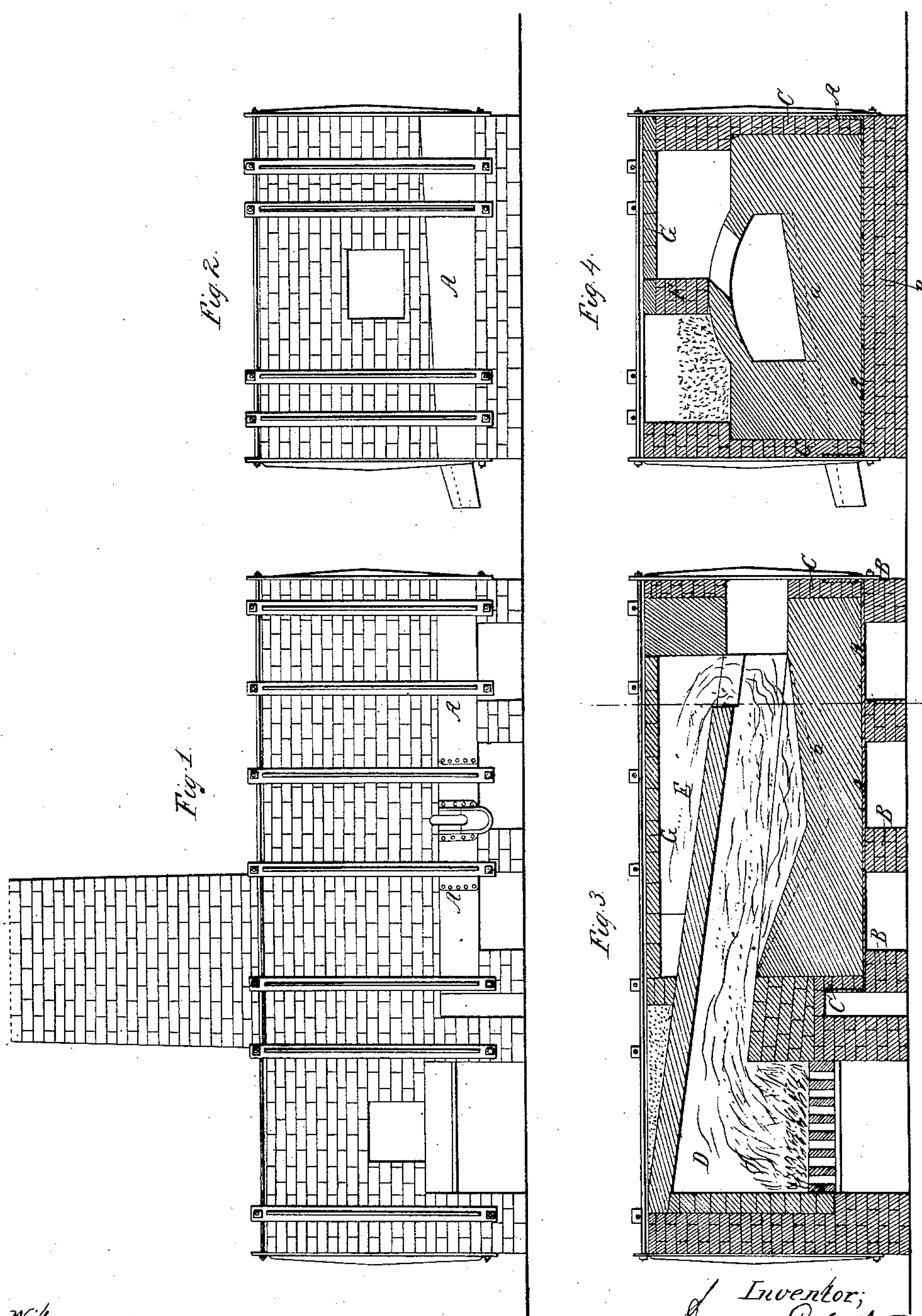
D. P. Webster.

Smelting Lead Ore.

No. 76,364 — Patented Apr 7 1868



Witnesses;
[signature]
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Inventor;
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United States Patent Office.

DAVID P. WEBSTER, OF NEW YORK, N. Y.

Letters Patent No. 76,364, *dated April* 7, 1868.

IMPROVEMENT IN FURNACES FOR SMELTING LEAD ORES.

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

TO WHOM IT MAY CONCERN:

Be it known that I, DAVID P. WEBSTER, of New York, in the county and State of New York, have invented certain new and useful Improvements in Furnaces for Smelting Lead Ores; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a side view of my improved furnace.

Figure 2 is an end view of the same.

Figure 3 is a longitudinal vertical section of the furnace.

Figure 4 is a section on the line *x y*, fig. 3.

Furnaces of ordinary construction for smelting lead ores are liable to the great objection that the bed is apt to crack and permit the leakage or escape of the melted lead, which, accumulating underneath the bed, causes it to become displaced or thrown out of proper position. During the smelting of from twenty (20) to thirty (30) tons of ore, this often occurs to such an extent as to render it necessary to rebuild the furnace, which gives rise not only to great expense, but delays considerably the operation of the works. As, moreover, the leakage occurs irregularly, dependence cannot be placed upon the apparent yield of the ore as the true quantity produced, the whole value not being realized before taking down the furnace. The smelting of lead ores with iron also acts quite rapidly on the fire-brick, wearing away the "slopes" of the furnace to such an extent that the lead ceases to flow to the tap-hole.

My improvements remedy the above defects, as will now be explained by reference to the accompanying drawings.

In order to build my furnace, I construct a wrought-iron pan or jacket, A, of boiler-plate iron riveted together. This jacket or pan is supported on brick piers B, as shown in fig. 3. A wall, C, of one brick in width, is next built within the pan on each side to about the height at first of two feet. The pan is then filled with a mixture of wet silica and fire-clay, in about the proportions of one-third of the latter when the furnace is designed for reducing sulphides or phosphides of lead by iron. This mixture *a* is firmly packed to the height required for the bottom or bed, the required slopes being formed, as shown in figs. 3 and 4, towards the tap-hole. The outer wall is then carried upwards a foot or more, and also another wall of the same thickness, of common brick, is built within this wall, leaving a space of eighteen inches between them, the inner wall resting on the packed bed described. The space between these two walls is then firmly packed with the same mixture employed in forming bed. The elevation of the walls and packing is continued until the required height for supporting the arch is attained. A centre of common brick is then formed, and over this centre the mixture of silica and clay is packed to a depth of from nine (9) to twelve (12) inches. The fire-box D is then built in the ordinary manner, the flue E leading from the reverberatory to the smoke-stack being completed by building walls F on the arch, as shown in fig. 4, and covering the flue, thus formed, with tiles G of fire-clay. The whole top surface of the arch is then covered to a depth of a few inches with dry sand. A gentle fire is then built in the fire-box, and is maintained for about four (4) days, after which the heat should be augmented until the walls become red hot, and this degree of heat is maintained for two (2) days longer. The inner walls and centre of common brick are then removed by long rods, tongs, and hoes, leaving the whole interior of the furnace formed of the packed and concrete mass of silica and clay. When the common bricks of the centre and walls have been removed, the interior of the furnace is heated to a white heat, and if there be any cracks, they should be filled with the dry silica alone.

In a furnace of this construction I am able to smelt, with very little repairing, five hundred (500) tons of ore on an average before the furnace requires to be rebuilt. The economy of the furnace will at once be manifest by reference to what has above been stated concerning furnaces constructed in the ordinary manner.

The slight repairs occasionally needed are effected by the use of the same mixture of which the bed is formed. The repairing is accomplished while the furnace is heated, and with little delay or interruption of the operation of smelting.

The silica employed is conveniently obtained as the white sand used in glass-works to make flint-glass. The clay may be any good quality of fire-clay used for making fire-brick of the best quality.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The method herein described of forming the interior or lining of furnaces, that is to say, by building the bed, walls, and arch of the plastic material herein described, or the substantial equivalent thereof, in the manner shown and specified, and subjecting the same, when formed into shape, to heat, as herein set forth.

2. The use and employment of the ingredients herein described, for repairing cracks or other injuries, or parts worn by the action of fluxes, substantially as herein set forth.

3. The combination, with the furnace, of an iron casing or pan under the arrangement herein shown and described, so as to support the plastic structure of the furnace, and also allow free passage of air under and around the same, as and for the purposes set forth.

In testimony whereof, I have signed my name to this specification before two subscribing witnesses.

D. P. WEBSTER.

Witnesses:

M. BAILEY,

A. POLLOK.