

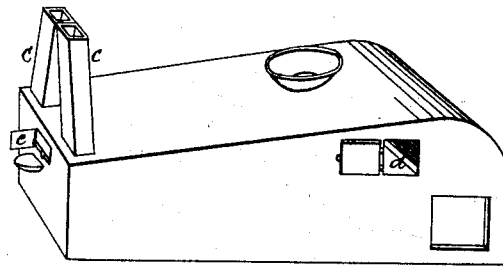
DRUMMOND & FULLER.

Smelting Lead Ore.

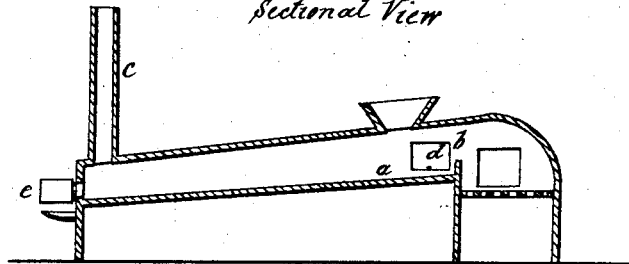
No. 757.

Patented May 30, 1838.

*Perspective View*



*Sectional View*



# UNITED STATES PATENT OFFICE.

ROBERT A. DRUMMOND AND G. W. FULLER, OF GALENA, ILLINOIS.

## IMPROVED FURNACE FOR SMELTING OF LEAD.

Specification forming part of Letters Patent No. 757, dated May 30, 1838; antedated November 30, 1837.

*To all whom it may concern:*

Be it known that we, ROBT. A. DRUMMOND and GEO. W. FULLER, of Galena, Jo Daviess county, State of Illinois, have invented a new and Improved Air-Furnace for the Smelting of Lead Ore; and we do hereby declare that the following is a full and exact description.

The nature of our invention consists in the constructing of the inner parts of the furnace so as to bring the whole space, when the ore is spread on the hearth, to very near an equality with the open space in the flue or flues, in order to give velocity to the current (which accelerated motion of the agents of separation compensates for the diminution of spaces) of flame and heated air while passing over the ore; and also in so constructing the hearth that it may be kept partially cool, so that the zain or unmelted portions of the ore (which always run from the mineral when smelting) may run down into the cooler part of the hearth, where it assumes a solid state, while the lead, that retains its liquidity at a much lower temperature, runs off.

To enable others to construct and use our invention, we give the following description of the mode of building and operation.

We build of materials similar to those of the English reverberatory or air furnace, but the proportions are very dissimilar. For example, the English air-furnace of common size is of dimensions nearly as follows: the fire-bridge, fifteen or eighteen inches in height above the hearth; the opening from the fire-house over fire-bridge to arch, one foot by four in width; the length of furnace inside, ten feet; breadth at fire-bridge, eight, tapered down to about six at flues, space from hearth to arch varying from eighteen inches to thirty; two flues, about ten or twelve inches in diameter, leading off to a stack thirty-five or forty feet in height; three openings on each side for working the ore when in the furnace. Now, the dimensions of our improved air-furnace to do a business equal to the above: the fire-bridge from hearth A A up, four to six inches in height; the opening B, from fire-bridge to arch, four inches by four feet six inches wide;

length of furnace inside, six feet; breadth at fire-bridge, four feet six inches, tapered down to about three feet eight inches at flues, space from hearth to arch varying from six to eight inches; two flues, *c c*, about the same in diameter as the English air-furnace, continued directly up, or after the fashion of the English; or, that not being a material part, it may be varied in a height or position to suit the notion of the builder. The openings in the sides of a furnace upon our plan need never be increased beyond one, D, on each side, as the furnace is so much diminished in length that we can command the whole of the inside by a door or opening, *e*, at the end. The construction of the bottom or hearth *a a* by us is managed in various ways. The preferable one, however, that we have used is to lay bricks on their edges a few inches apart, so as to admit a free circulation of cold air (from without) between them by means of a few small opening through the walls, and laying on top of these brick sheet-iron, and then run slag three or four inches thick, which forms a very permanent hearth.

The mode of operating on these furnaces is very similar to that on the English plan, except that the use of coal and lime mixed with the ore or with the slag used for the reduction of oxidized lead is entirely dispensed with and useless with ours. The fire-house of our furnace is very much like the English, except diminution of about a fourth in all its inner dimensions.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. Not the mere reduction in the general dimensions of our furnace when compared with what is known as the "English furnace;" but to such a mode of construction and of proportioning the respective parts, as above described, as promotes the separation of the lead from its mineralizer with greater facility and economy than has been heretofore attained—a result which is principally dependent upon the acceleration of the current of heated air in contact with the ore in our furnace.

2. The manner of constructing the hearth of the furnace, as above described, by which we

are enabled to keep it at a comparatively low temperature, which not only renders it very desirable, but prevents the formation of slag, and causes also the zinc or unseparated particles of ore to become chilled, preventing the running thereof down, while the reduced lead, being in a perfectly fluid state, escapes read-

ily—a result not obtained in the English furnace.

ROBT. A. DRUMMOND.  
G. W. FULLER.

Witnesses:

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ELIJAH CHARLES.