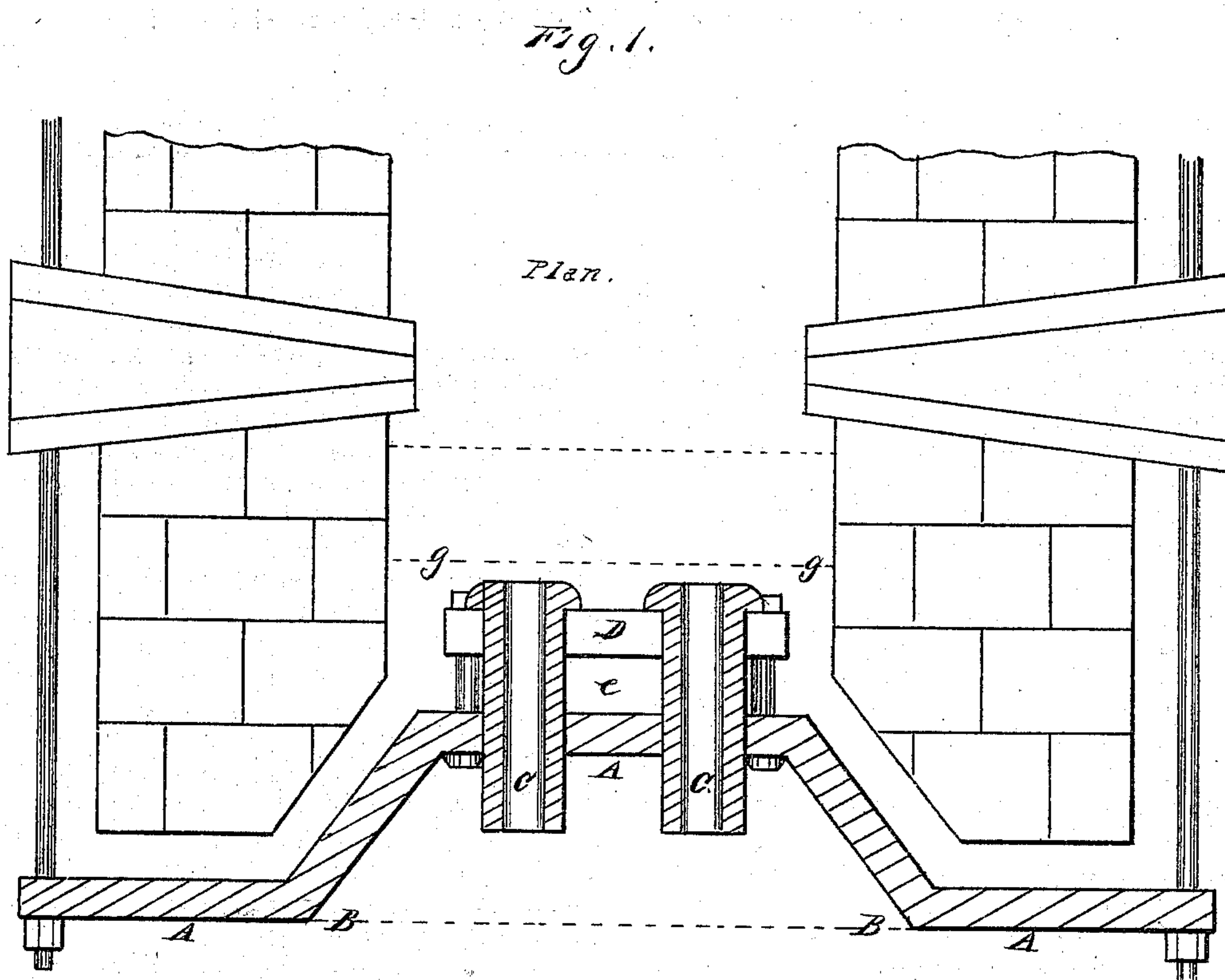


**R. A. FISHER.**  
**Blast-Furnace Breast-Plates.**

No. 141,043.

Patented July 22, 1873.



**Witnesses**  
*John L. Borne*  
*C. V. Richardson*

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*Attys*

# UNITED STATES PATENT OFFICE

ROBERT A. FISHER, OF SAN FRANCISCO, CALIFORNIA.

## IMPROVEMENT IN BLAST-FURNACE BREAST-PLATE.

Specification forming part of Letters Patent No. **141,043**, dated July 22, 1873; application filed June 6, 1873.

*To all whom it may concern:*

Be it known that I, ROBERT A. FISHER, of San Francisco city and county, State of California, have invented an Improved Front for Smelting-Furnaces; and I do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my said invention or improvement without further invention or experiment.

In some styles of blast-furnaces the metallic spout through which the fluid slag and mat run from the furnace are attached to a metallic front technically called a "breast-plate." The front or breast plate in common use is simply a plate of rolled or cast iron, a horizontal section of which is a straight line. The breast-plate is held in position by bolts or side plates extending from the front to the back of the furnace. The slag and mat produced during the smelting process, near the small end of the tuyeres, flow from thence under the fire-arch to the slag-spouts. Unless maintained at a sufficiently-high temperature the slag and mat in their passage to the slag-spouts thicken, and sometimes chill or become solid. In order to keep the slag sufficiently hot to run easily it is necessary to maintain a heap of burning fuel within the walls of the furnace from the line of the fire-arch *g g* to the breast-plate B B. The amount of fuel required for this purpose in a large furnace is very great. Besides this disadvantage in the breast-plate in common use there is also this disadvantage, that in the reduction of certain classes of ore the breast-plate is rapidly corroded and eaten away if, by chance, it becomes exposed to the direct action of the slag and mat.

My improvements consist, first, in constructing the front or breast plate A of the furnace

with an angular indentation, as shown at Fig. 1, so as to carry that portion of the front in which the slag-spouts C are secured almost up to the fire-arch, thereby shortening the distance which the slag has to flow between the tuyere and slag-spouts, and largely reducing the amount of fuel required to prevent the slag and mat from becoming chilled after passing under the fire-arch.

To prevent the destruction of that portion of the breast-plate on which the slag-spouts are secured, I attach, by rivets or otherwise, a shield or back, D, of wrought or cast iron, or its equivalent, inside of the usual front, and fill the space *e* intervening between the usual front and this shield with fire-clay or other fire-resisting or refractory material, so that in case the shield or supplementary back piece D should become destroyed by corrosion a new one can be readily supplied in its place in a short time, and with very little trouble, as soon as the furnace is out of blast.

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

1. The arrangement of the slag-spouts in the front of the furnace, as described, so that they shall be heated from the fire-arch, preventing the slag from being chilled while passing out, as set forth.

2. The shield or supplementary back D in combination with the front or breast plate of a smelting-furnace, substantially as and for the purpose described.

In witness whereof I hereunto set my hand and seal.

ROBERT A. FISHER. [L. S.]

Witnesses:

JOHN L. BOONE,  
C. M. RICHARDSON.