

# UNITED STATES PATENT OFFICE.

WILLIAM SMALL, OF McKEESPORT, PENNSYLVANIA.

## IMPROVEMENT IN BOTTOMS FOR WELDING AND HEATING FURNACES.

Specification forming part of Letters Patent No. **161,167**, dated March 23, 1875; application filed February 3, 1875.

*To all whom it may concern:*

Be it known that I, WILLIAM SMALL, of McKeesport, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Bottoms for Welding and Heating Furnaces; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to compositions for forming the bottom of heating or welding furnaces, and all furnaces of the same general class; and it consists of a compound or mixture of sand and common or rock salt, to which other ingredients which will not vitrify or tend to consolidate the mass may be added without departing from the spirit of my invention, though additional ingredients are not necessary or specially desirable.

Heretofore the bottoms of heating and similar furnaces have been formed almost entirely of loose sand, or of similar materials, which, being spread upon the bottom, become packed as the furnace was worked. But such bottoms will last only for about three or four heats, and are liable to injure the blooms, for the reason that the loose sand constantly adheres to the heated iron, and is carried with it to the rolls, which force it into the bar or sheet. This class of bottoms, therefore, though the best known and in general use, are objectionable, for the reasons cited, and to such an extent that, in the manufacture of sheet-iron, the furnace is alternately worked with piles and blooms, so that the pile for the commoner class of sheets will take up the loose sand, packing the bottom, so that less sand will adhere to the blooms, which are intended for the finer kinds of sheet-iron. In welding-furnaces the same or similar difficulties exist.

It is the object of the present invention to provide a furnace-bottom which will retain the advantages of the old sand bottom, while having none of its disadvantages.

In doing this I proceed as follows: I take of the ordinary sand or other material commonly employed for this purpose, and add thereto common or rock salt, preferably in the proportions of three pints of salt to the bushel of sand or similar material. These are the common proportions employed, but may

be varied, provided enough salt is employed to give the results hereinafter specified.

The sand and salt are intimately mixed, and the compound spread upon the hearth or floor of the furnace in the usual manner.

A bottom formed as described will pack so as to have an even and smooth surface, similar to the sand bottom in appearance, but one upon which piles or blooms may be worked without any liability of sand adhering thereto, whereby one disadvantage of the sand bottom is removed.

If too much salt has not been added to the mixture, there will be no tendency of the bottom to glaze, which is one of the advantages of the sand bottom, as the glazed bottom detracts from the heating qualities of the furnace, and is a great objection to compounds which have heretofore been substituted for the sand bottom.

The other advantages of my compound I find to be as follows: A bottom formed thereof will last twice as long as the bottom commonly employed, say from seven to eight heats, whereas the sand bottom lasts on an average of three or four heats. It can be repaired where torn or worn by the piles or blooms. In heating blooms or piles for finely-finished iron, requiring to be scaled or cleaned with acid, the iron scales more readily and thoroughly in the rolls, requiring less acid in the wash-room, and producing a better article at less cost. The slag running from furnaces lined with my compound is more fluid and less destructive to the lining or bottom. Finally, I find that the furnace works milder, rash heats which injure the iron are avoided, and the furnace can be worked to advantage with a lower damper.

It is believed that the several advantages set forth are due to the liberation of chlorine and the effect of the base on the sand or similar admixture; but such is not asserted as a fact.

The practical working of furnaces lined with this compound have demonstrated its utility and advantages as specified.

I am aware that salt and sand have been used in the composition of fixes or solid linings, the salt, together with the lead, fluxing the sand, and producing a vitreous or semi-

vitreous solid lining. In compounds of which this is typical I do not claim the use of salt and sand.

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

A loose or unvitriified compound for furnace-bottoms, consisting essentially of an ad-

mixture of sand and salt, substantially as specified.

In testimony whereof I, the said WILLIAM SMALL, have hereunto set my hand.

WILLIAM SMALL.

Witnesses:

GEORGE F. LUDWICK,  
HENRY MILLER.