J. MARSDEN & E. PEARSON.

MEANS FOR RUNNING OFF SLAG FROM BLAST FURNACES.

APPLICATION FILED NOV. 28, 1908.

922,304. **Patented May 18, 1909.**

FIG. 2.

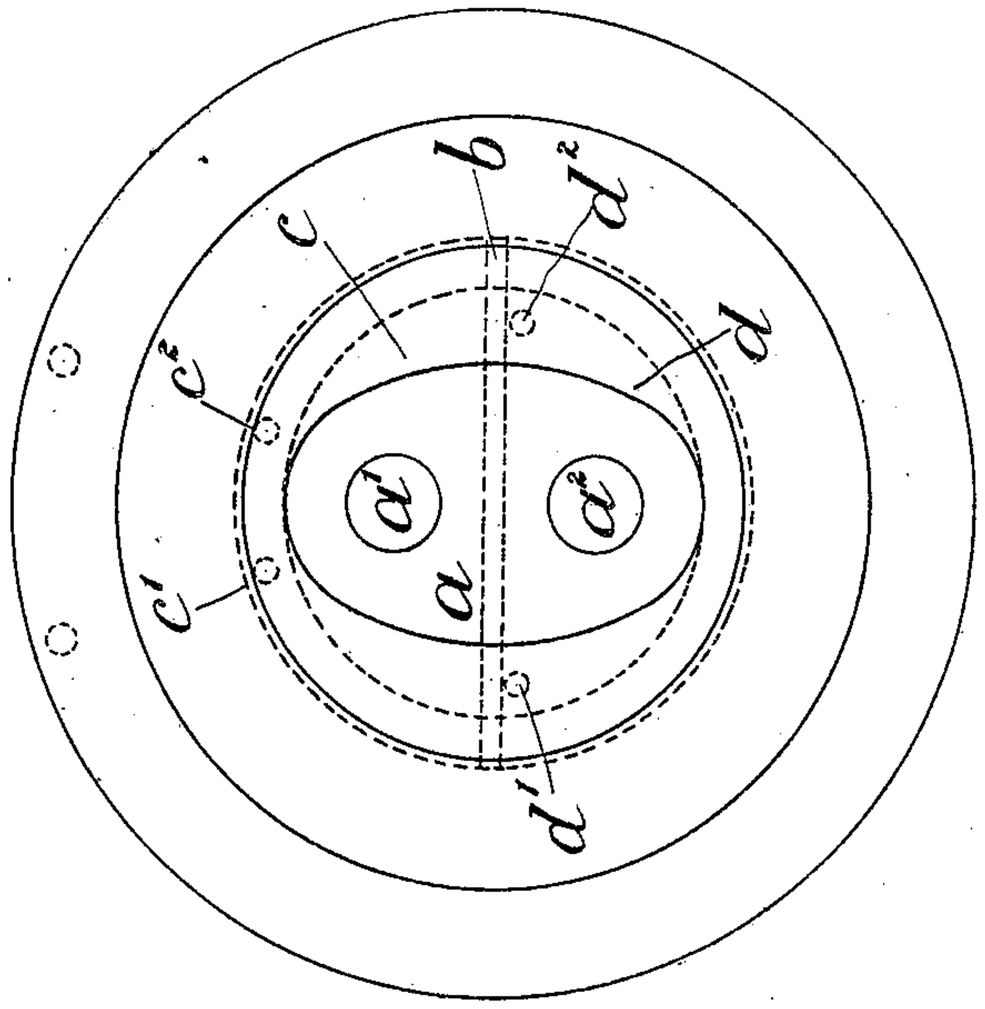
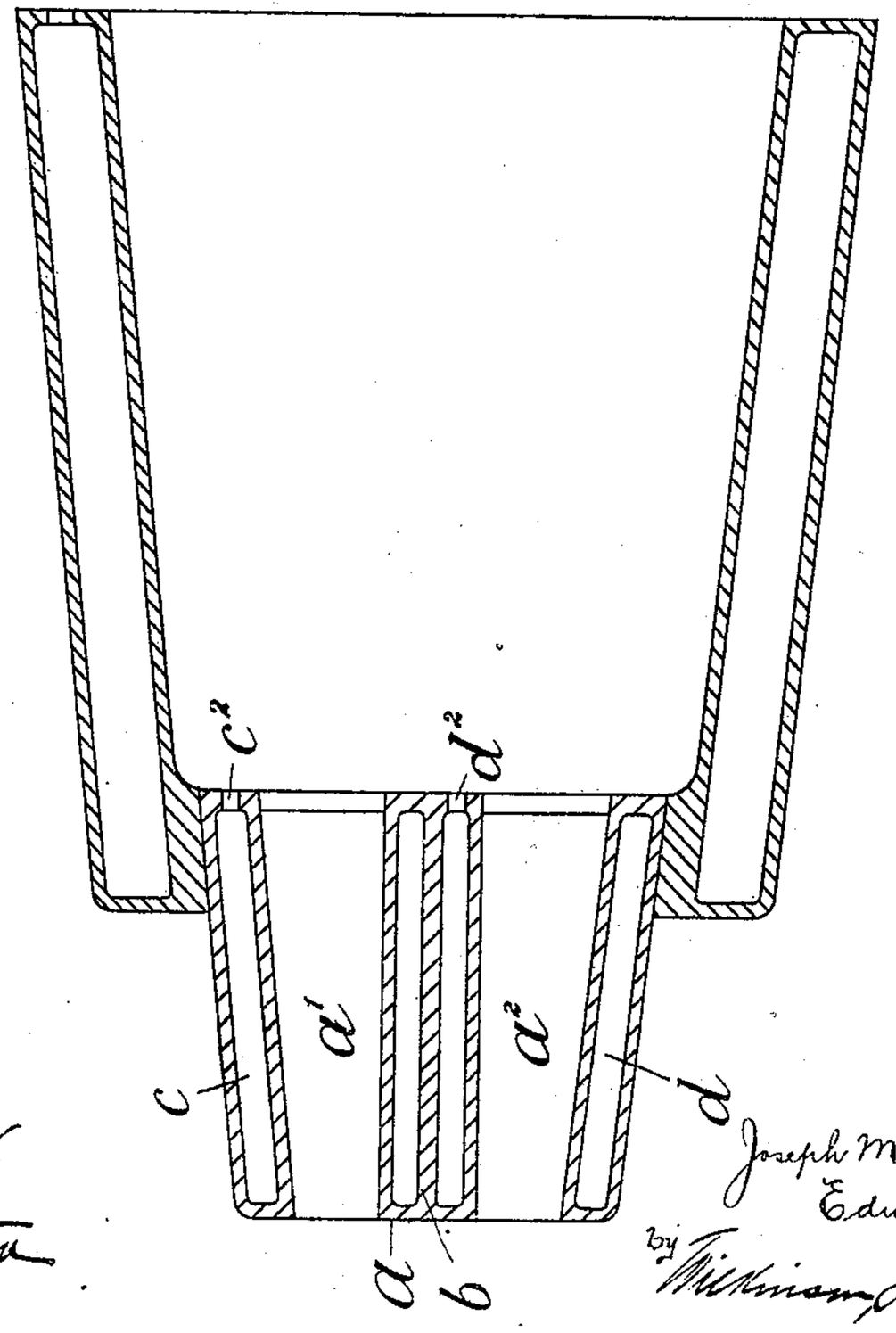


FIG. 1.



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UNITED STATES PATENT OFFICE.

JOSEPH MARSDEN AND EDWARD PEARSON, OF SOUTH BANK, ENGLAND.

MEANS FOR RUNNING OFF SLAG FROM BLAST-FURNACES.

No. 922,304. Specification of Letters Patent. Patented May 18, 1909.

Application filed November 28, 1908. Serial No. 464,813.

To all whom it may concern:

Be it known that we, JOSEPH MARSDEN and EDWARD PEARSON, subjects of the King of Great Britain and Ireland, residing at South Bank, S. O., in the county of York, England, have invented certain new and useful Improvements in Connection with Means for Running Off Slag from Blast-Furnaces; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

What is termed the notch cooler for running off slag from a blast-furnace consists of a conical hollow plug let into the wall of the furnace, and is protected from heat by a constant circulation of water forced through internal passages provided for the purpose. The notch cooler is provided with a single bot hole which is sealed with clay or iron plug, and opened for the flow of slag by prodding the clay with a long bar or withdrawing the iron plug until a passage is formed. But if the bot hole gets choked or blocked with slag or iron, either the blast must be shut off from the furnace or damage takes place. In any case the proper working of the furnace is seriously interrupted. In order to obviate the risk of such blockages we provide the notch cooler with a second bot hole, the two bot holes being provided in the same plug which is divided internally into two separate chambers, one for each bot hole and each chamber having its own circulating pipes, except that in some cases one circulation could be made to serve all the chambers.

Having thus indicated the nature and utility of our invention, in order that it may be clearly understood and readily carried into effect, we will proceed to further describe the same, and for that purpose shall refer to the accompanying drawing, in which—

Figure 1 is a longitudinal sectional view, and Fig. 2 a corresponding end view of a notch cooler constructed in accordance with our invention.

In the drawing *a* represents the notch cooler which is furnished with two bot holes a^1 a^2, the two bot holes being provided in the same plug which is divided internally by the wall *b* into two separate chambers *c* and *d*, one for each bot hole, and each chamber having its own circulating pipes c^1 c^2 and d^1 d^2; or one circulation could be made to serve both chambers *c* and *d*. In this way if one bot hole goes wrong the other is available for continuing the discharge of slag without interrupting the working of the furnace. The plug containing the two bot holes is preferably oval shaped as shown as this shape with the major diameter set vertically presents less surface to be burned or injured by the droppings of molten iron from the walls of the furnace, otherwise the oval shape of plug is not essential and may be modified, especially if it is found desirable in special cases to have more than two bot holes for one cooling notch.

When the working hole in use gets bunged up with iron (which is unfortunately the case sometimes) and the furnace could not be taken off blast without burning the blow pipes, the other hole then becomes of service. By pricking out the clay bot the furnace can then run slag and be kept working until a convenient time arrives to change the plug or what is always termed the "peepie."

A further advantage of the second bot hole is as follows:—With notch coolers as at present constructed with a single bot hole, if the bot hole gets bunged up and cannot be pierced, there are no means available for getting the plug out, except by pulling at the circulating pipes. If they break off under a strain of this sort which they are not intended to bear, the case is a serious one. But with notch coolers as improved by our invention, a draw bar can be inserted through the additional bot hole and the plug or "peepie" be drawn out thereby without loss of time, and replaced by another. We are aware that an additional or emergency bot hole has been proposed for use in conjunction with a "tymp plate," made of cast iron and designed for use in connection with blast furnaces when the pressure of blast was very low, as for instance in the year 1873, the said "tymp plate" being built into the wall of the furnace, and therefore incapable of being removed with the furnace at work, and we make no claim to the use of an additional bot hole, except in conjunction with a removable plug or device of the kind hereinbefore referred to and known as a "peepie" as adapted for the requirements of a blast furnace driven by the high-pressure blast in use to day.

Having thus described our invention, what we desire to claim and secure by Letters Patent of the United States, is:—

1. A notch cooler for metallurgical fur-

naces comprising a plug provided with a jacket having passages through which water may be forced, said plug also provided with a plurality of bot holes, and an independent water jacket around each hole, substantially as described.

2. A notch cooler for metallurgical furnaces comprising a plug provided with a water jacket; and a second plug fitting said first mentioned plug and having a plurality of bot holes each of which is surrounded by a water jacket, substantially as described.

In testimony whereof, we affix our signatures, in presence of two witnesses.

JOSEPH MARSDEN.
EDWARD PEARSON.

Witnesses:
EDWARD T. ELCOAT,
THOMAS CRAIG.