(No Model.) 2 Sheets—Sheet 1.

M. W. ILES.

FOREHEARTH FOR SMELTING FURNACES.

No. 522,417. Patented July 3, 1894.

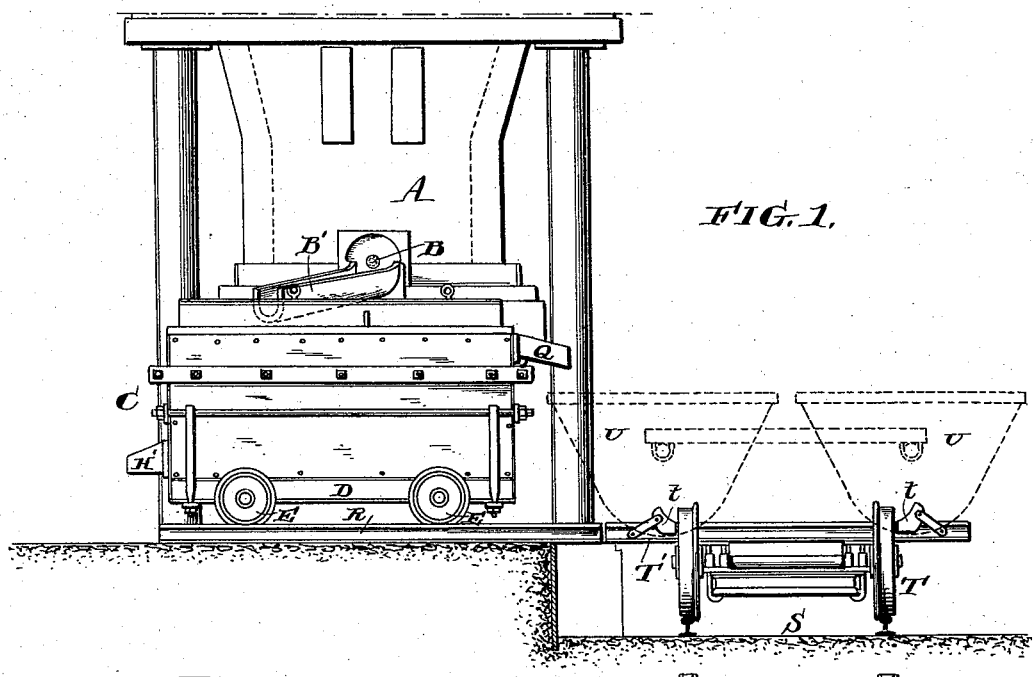

FIG. 1.

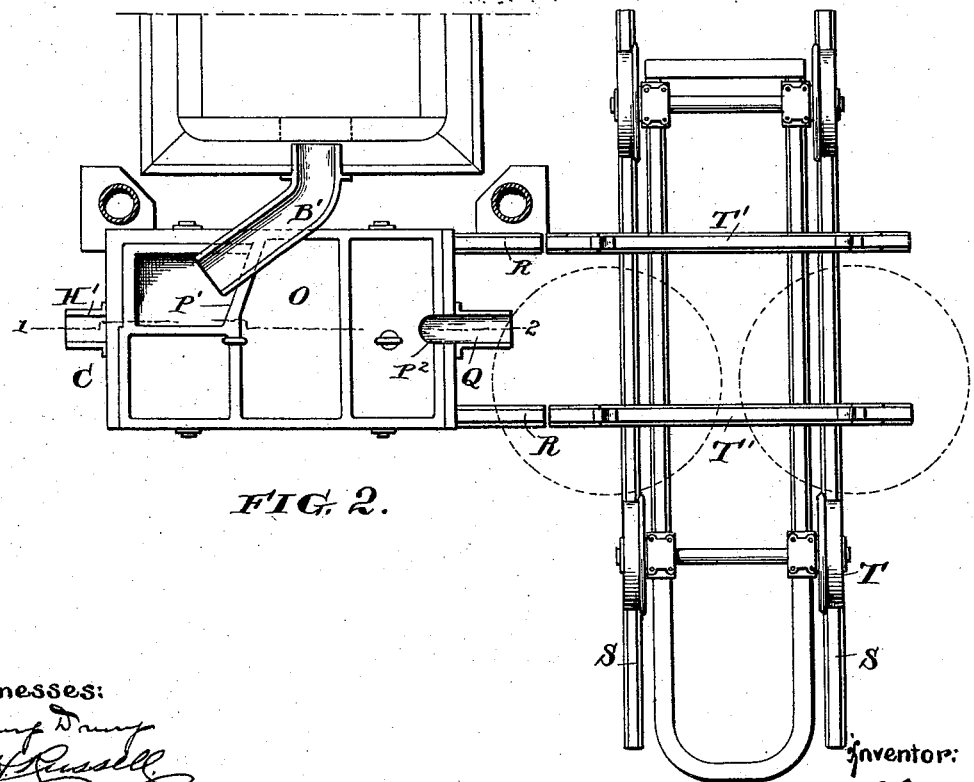

FIG. 2.

Witnesses:
Kemp Dunn
J. V. Russell

Inventor:
Malvern W. Iles
by his atty
Francis T. Chambers

(No Model.) 2 Sheets—Sheet 2.

M. W. ILES.

FOREHEARTH FOR SMELTING FURNACES.

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FIG. 3.

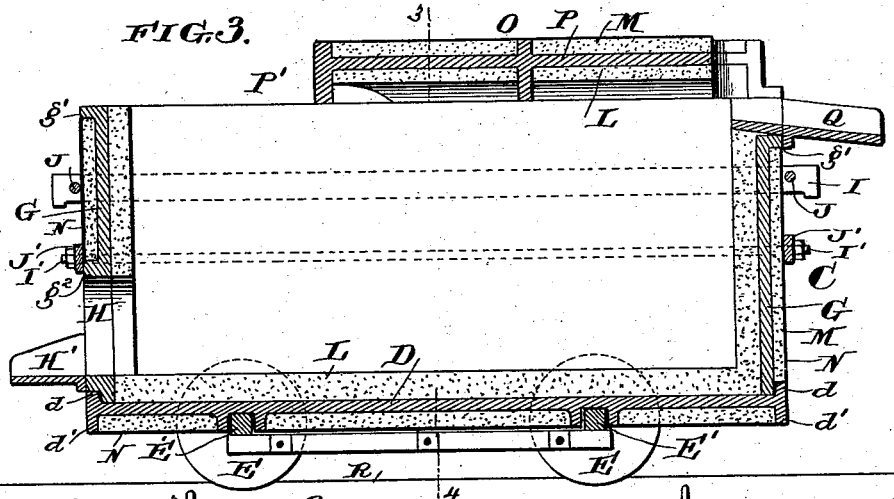


FIG. 4.

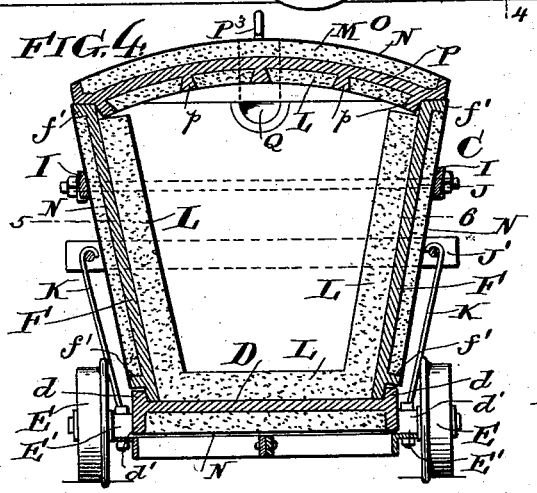


FIG. 5.

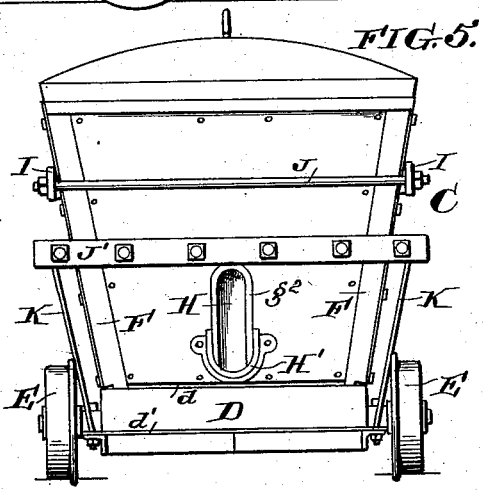
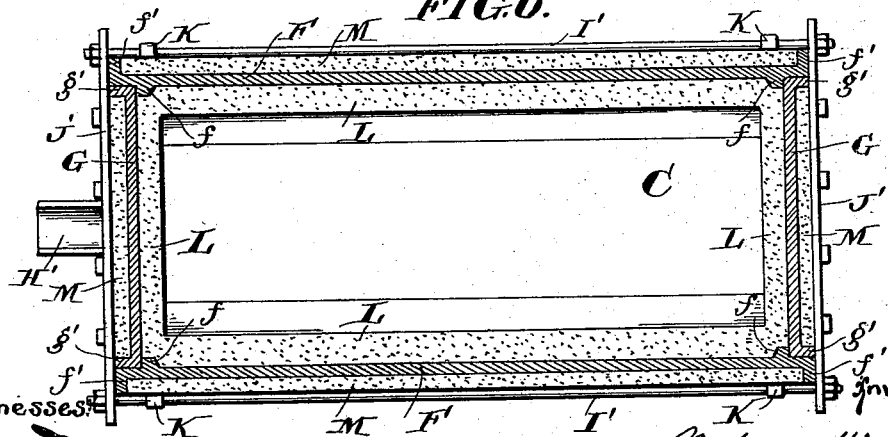


FIG. 6.



Witnesses:
Henry Drury
J. F. Russell

Inventor:
Malcolm W. Iles
by his atty
Francis J. Chambers

UNITED STATES PATENT OFFICE.

MALVERN W. ILES, OF DENVER, COLORADO.

FOREHEARTH FOR SMELTING-FURNACES.

SPECIFICATION forming part of Letters Patent No. 522,417, dated July 3, 1894.

Application filed July 20, 1892. Serial No. 440,588. (No model.)

To all whom it may concern:

Be it known that I, MALVERN W. ILES, of Denver, county of Arapahoe, State of Colorado, have invented a certain new and useful Improved Forehearth for Smelting-Furnaces, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to fore-hearths or matte separators used in connection with smelting furnaces to effect a more or less complete separation of the matte particles which issue from the smelter in admixture with slag; the object of my improvement being to provide a fore-hearth in which a very complete separation of the matte from the slag can be made, which can be readily removed and replaced when necessary, and the construction of which is at once simple and well adapted to the purpose to which the fore-hearth is put.

The nature of my invention will be best understood as described in connection with the drawings in which it is illustrated, and in which—

Figure 1 is a front elevation of a furnace provided and combined with my improvements. Fig. 2 is a plan view of the same; Fig. 3 a longitudinal section through the fore-hearth on the line 1—2 of Fig. 2; Fig. 4 a cross section through the fore-hearth on the line 3—4 of Fig. 3; Fig. 5 an end view of the fore-hearth, and Fig. 6 a horizontal section through the fore-hearth on the line 5—6 of Fig. 4.

A indicates the smelting furnace which is provided with a slag tap B, in front of which is secured a slag spout B′ through which the slag and matte are conducted from the furnace to the fore-hearth. This slag spout is curved to one side as indicated in Figs. 1 and 2 so that the slag with its contained particles of matte will be delivered against one of the end walls of the fore-hearth.

C indicates the fore-hearth which is mounted upon wheels E secured to axles E′ upon which in turn the fore-hearth rests.

The fore-hearth rests by means of its wheels upon a short piece of track R extending in front of the furnace and running at right-angles or substantially so to a depressed track S situated at the side of the furnace, and upon which runs a truck T having secured to its top, rails T′ T′ which, when the truck is in proper condition, register with the rails of the track R so that the fore-hearth, when it is desired to replace it or remove it for repairs, is run directly from the track R to track I′ and then carried away on the truck T, another fore-hearth being rapidly brought to take its place by the same device. The truck T or rather a similar truck provided with slag pots as indicated in dotted lines at U, Fig. 1, is used to receive the slag which runs from the fore-hearth while in operation and to carry it away. *f* indicates stops upon the truck T which hold in place the truck of the fore-hearth when it is run upon the track T′.

At the top of the fore-hearth a slag spout Q leads from one of the ends in such position as to deliver the slag into receptacles such as are indicated at U. At the bottom of the fore-hearth, and preferably at the end opposite to that from which the slag spout leads, is a matte tap, H′, which I make of a vertically elongated form as shown, so that in case the matte or slag chills on the bottom of the fore-hearth it can still be kept in operation by making the opening at a higher point in the slot; a spout H′ at the bottom of the slot leads the matte which is tapped off from time to time to a pot or car or any suitable receptacle. This feature of the elongated matte tap is of considerable importance enabling me to use the forehearth under conditions where one provided with the commonly used tap hole would be entirely inoperative.

The combination with the fore-hearth and the furnace of the curved slag spout B′ is of importance because it enables me to deliver the matte carrying slag issuing from the furnace to the fore-hearth in a direction opposite to that in which the slag is flowing through and from the fore-hearth; and this contrivance I have found to effect a considerable improvement in the separation of the matte and slag; the reason being, because the matte is heavier than the slag and will change its direction of movement more slowly; hence, by introducing the slag from the furnace in the opposite direction to that in which I withdraw the slag from the fore-hearth I give the matte a better opportunity to settle to the bottom. This mode or method of effecting

the separation of matte and slag is described and claimed in my pending application filed December 21, 1891, Serial No. 415,696.

Referring now to the construction of the fore-hearth itself, D is a cast iron bottom plate to which the axles E′ are attached, and which on its upper face is formed with a projecting rim or series of lugs as indicated at *d*, the lower face of this plate is preferably also provided with a flange-like rim as indicated at *d′*.

The sides of the fore-hearth are made up of four iron plates F F, G G. These plates rest upon the bottom plate inside of the flange *d* as indicated in Figs. 3 and 4. One pair of plates as F F are provided with inwardly projecting lugs *f* situated near their ends and the plates G G rest against these lugs, the whole four plates being secured together by clamping bolts as shown. Bars I I extending along the sides are clamped together by long bolts J, and bars J′ extending along the ends are clamped together by means of long bolts I′ I′, tie rods K K extending downward from the bolts I′ to the bottom plate or the axles E′.

The inside of the fore-hearth is lined with refractory material such as fire-brick indicated at L, and upon the outside of the plates making up the fore-hearth are secured plates of non-conducting material as indicated at M, each plate is provided with its own non-conducting jacket, and for the purpose of receiving it is formed with outwardly extending flanges as indicated at *f′ g′* the non-conducting material being inclosed between these flanges and held in place by sheet-iron plates as indicated at N.

Preventing the escape of heat through the walls of the fore-hearth as above described I also prevent, as far as possible, radiation from the top of the fore-hearth by providing it with a removable cover O which is made to fit down upon the top of the fore-hearth and provided with wedge shaped lugs *p* between which the fire-brick lining is secured and formed with outwardly extending flanges to contain non-conducting material M as in the case of the plates making up the fore-hearth itself. The cover is formed with an opening P′ at one corner to receive the slag, the end of the curved spout B′ extending into this opening, and another opening or notch P^2 is formed in the cover at a point which comes above the slag opening Q, this notch being found desirable to prevent clogging at that point. The cover is furnished with eyes as indicated at P^3 so that it can be hoisted off the fore-hearth when it is desired to remove it.

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

1. In combination with a furnace a curved slag spout B′ and a fore-hearth C against one side of which the spout B′ is adapted to discharge, and having a slag spout at the top of the side farthest from the end of spout B′ and a matte tap at its bottom substantially as and for the purpose specified.

2. A fore-hearth C having an iron bottom and side plates all made separate and clamped together so as to be removable, fire-brick lining on the inside of the fore-hearth and an outside covering of non-conducting material secured in separate plates to each of the removable pieces.

3. A fore-hearth C having in combination a bottom plate D with upwardly projecting rim *d*, sides F with inwardly extending lugs *f*, sides G adapted to rest against lugs *f*, and clamping irons for holding the bottom and sides together substantially as and for the purpose specified.

4. A fore-hearth C having in combination a bottom plate D with upwardly projecting rim *d*, sides F with inwardly extending lugs *f* at some distance from their ends, sides G adapted to rest against lugs *f*, said sides F and G having outwardly extending rims *f′* and *g′*, and clamping irons adapted to hold the bottom and side plates together.

5. In combination with a fore-hearth C a cover O adapted to cover the fore-hearth and having an opening P′ at one corner for the admission of slag and matte and a notch P^2 arranged to come immediately above the slag spout leading from the fore-hearth.

6. In combination with a fore-hearth C a cover O adapted to cover the fore-hearth, and having internal ribs *p′* to hold a lining and an external rim to hold a non-conducting cover.

MALVERN W. ILES.

Witnesses:
JOHN S. WILLIAMS,
CLARENCE T. DYE.