G. C. CARSON.

METALLURGICAL FURNACE.

APPLICATION FILED JAN. 15, 1907.

1,149,495.

Patented Aug. 10, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

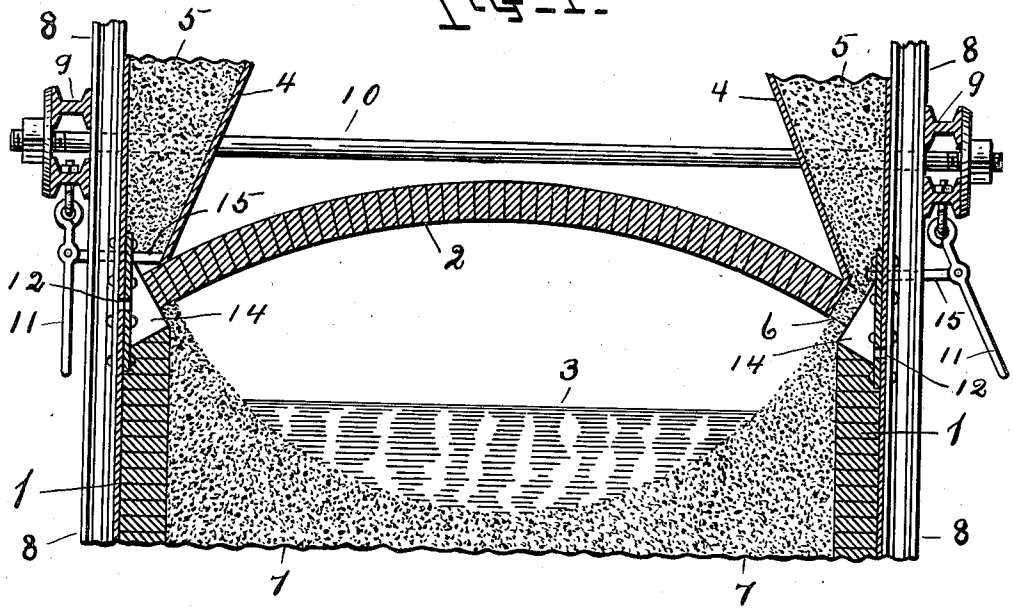
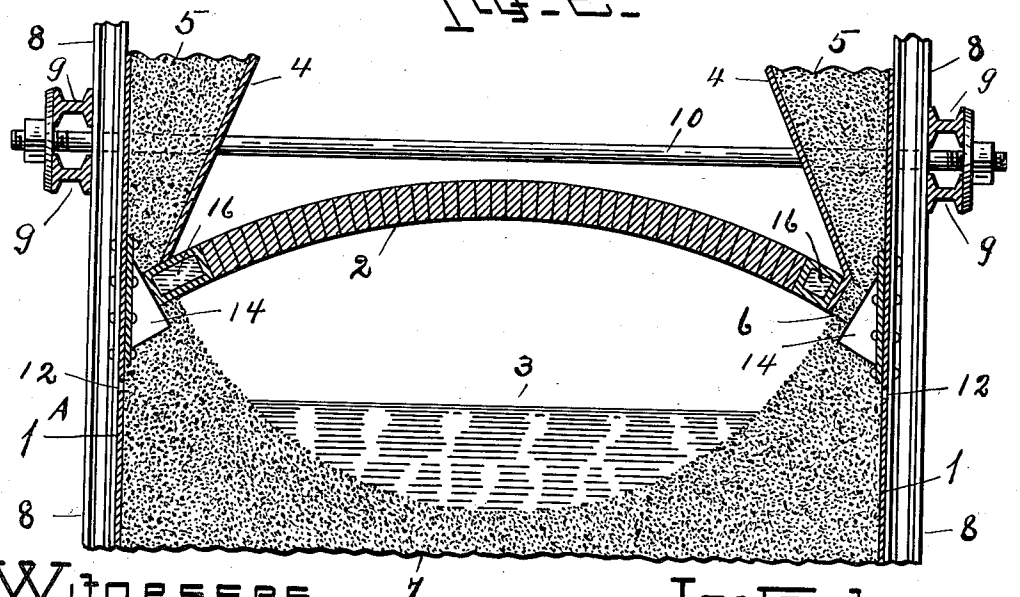


Fig. 2.



Witnesses

John S. Snell.

W. S. Bates

Inventor

George C. Carson

per A. S. Paré

Attorney

G. C. CARSON.

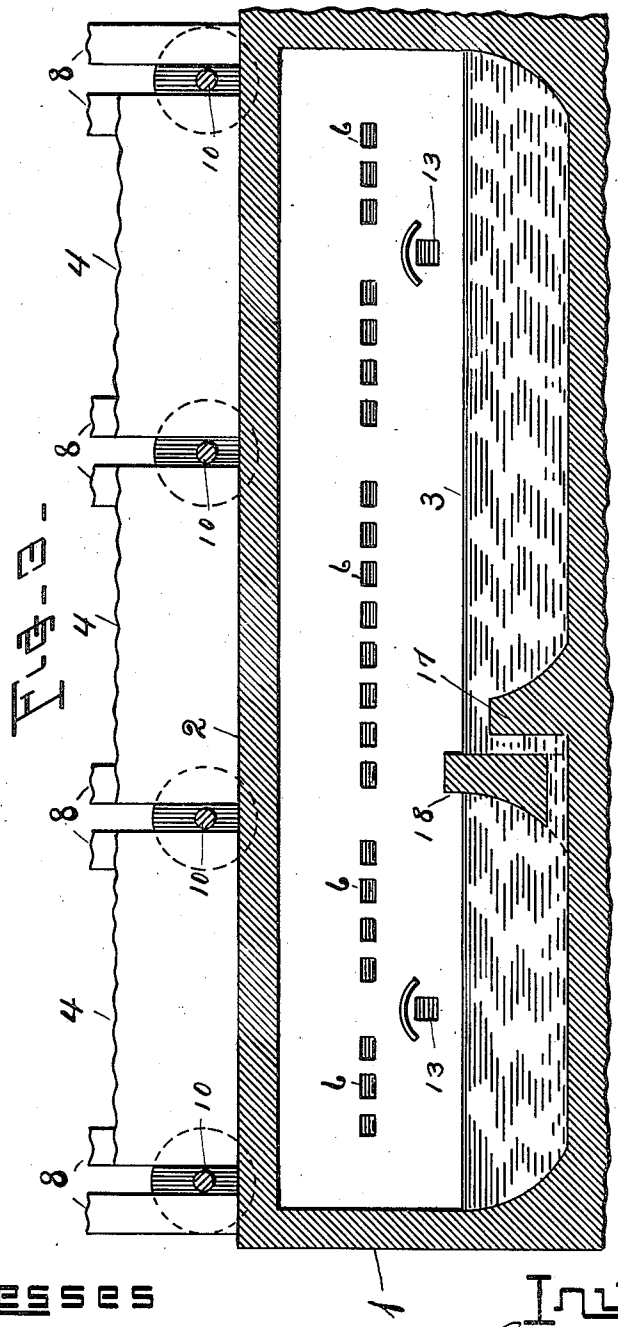
METALLURGICAL FURNACE.

APPLICATION FILED JAN. 15, 1907.

1,149,495.

Patented Aug. 10, 1915.

2 SHEETS—SHEET 2.



Witnesses
John S. Prell
W. S. Bates

Inventor
George C. Carson
by A. S. Paré
Attorney

UNITED STATES PATENT OFFICE.

GEORGE CAMPBELL CARSON, OF DENVER, COLORADO.

METALLURGICAL FURNACE.

1,149,495. Specification of Letters Patent. Patented Aug. 10, 1915.

Application filed January 15, 1907. Serial No. 352,468.

To all whom it may concern:

Be it known that I, GEORGE CAMPBELL CARSON, of Denver, Colorado, have invented certain new and useful Improvements in Metallurgical Furnaces, whereof the following is a specification.

My invention relates to furnaces for treating molten metals and smelting ores, such, for example, as reverberatory and open hearth furnaces, in which the materials and products are likely to attack the linings of the furnace.

In carrying out my invention I arrange receptacles contiguous to the furnace, and communicating with its interior, preferably along the sides, in which receptacles I place refractory materials or ores adapted to protect the furnace. These materials pass by gravity into the furnace and form a border or levee resting on the hearth and against the walls of the furnace, and act as an inside lining to protect the same from scorification and erosion by the bath, and also from the high temperature of the interior of the furnace.

Prior to my invention it was customary to form such a levee or inside lining by throwing refractory material through doors and across the furnace against the wall on the opposite side. This is very exhausting work for the laborers to perform; moreover some of the refractory material so thrown does not reach its destination, but falls into the bath. This material is not only wasted, but is a positive detriment as it must be eliminated by the process, which requires heat, consumes fluxes, absorbs metal from the bath, and adds to the slag volume. All of these objections are avoided by my invention. Other savings due to my invention are, the time lost in ordinary practice in repairing linings by hand, which it is customary to do after each heat or skim, and which requires several minutes to perform; also the cooling of the furnace and loss of heat when the doors are opened to throw in the refractory material.

By my invention the hard brutal labor of "claying up" is saved. The only refractory material lost is that which is dissolved from the border by the bath. The time lost in repairing linings is saved. The heat lost while repairs are being made is saved. The metal fluxed and lost by reason of the refractory material falling into the bath and never serving its purpose, is saved.

Another advantage of my invention is this; in manufacturing steel, iron ore or scale can be used as a refractory substance, and will supply oxygen for oxidizing metalloids. This will give up iron to the bath and will do away with the expense of purchasing basic materials for linings. Also, in reverberatory practice, the refractory substances fed in to protect the walls of the furnace, are under the control of the metallurgist, and ideal smelting charges can be fed, and the portion next to the furnace wall never reach the point of fusion while that portion in the interior of the furnace will be in a high state of fusion. Furthermore, in some cases, it will be unnecessary to build the furnace walls with brick, as the refractory material can rest against plates held in place by steel beams, which may also support the roof.

For further explanation of my invention I refer to the accompanying drawings, in which:—

Figure 1 is a cross section of a furnace taken through the passages for refractory material, and showing brick walls for the furnace. Fig. 2 is a similar section, but showing a furnace built with steel plates and without brick walls. Fig. 3 is a longitudinal section of a furnace, and shows the orifices through which the refractory material is fed.

In these figures 1 represents the walls of the furnace, built of brick, as in Fig. 1, or of steel plates 1^A as in Fig. 2.

2 is the arched roof of the furnace.

3 is the bath of material undergoing treatment.

4 represents a series of receptacles ranged along the sides of the furnace, and containing the protecting or refractory material 5, which passes into the interior of the furnace through the orifices 6, and forms the protective coating 7 against the walls and on the bottom. The quantity of material 5 in the receptacles is not important, save that there must be sufficient weight to force it into the furnace and deliver it to the desired points with desirable rapidity. The material should be dry enough not to stick or clog, and sufficiently fine to descend freely through the orifices.

8, 9, 10 are the usual beams and ties which form the skeleton of the furnace, and need not be further described.

12 are holes through which a bar may be

inserted to loosen any material which becomes clogged, from partial fusion or other cause.

13, see Fig. 3, represent peep holes, or they may be made large enough to feed scrap through, or to insert a ravel.

14 are brackets to support the roof.

15 are gates or dampers to control the flow of the refractory material through the feed orifices 6.

In the furnace shown in Fig. 2 I have shown water cooled sections 16 at the ends of the roof arch. These are desirable where ores, or basic materials are fed through the orifices 6, as such materials would otherwise attack the bricks of the roof. By supporting the roof on brackets secured to the framework of the furnace I avoid the damage caused by the working of the brick walls under the influence of the changes of temperature, as well as the injury to them from the strain when they are at a high temperature.

In the manufacture of steel, and in some other operations, I divide the hearth into two compartments, as at 17 in Fig. 3, and line one end with basic and the other end with acid materials. I also arrange a bridge 18 near the division point. I can thus feed an acid iron, for example, into one end and there desiliconize it, and then pass it through the bridge to the other end where it is dephosphorized. I thus effect great savings in refractory material and avoid filling the hearth with a voluminous slag.

Having thus described an embodiment of my invention and believing that I have produced novel and valuable improvements in the art to which it pertains, I claim:—

In a metallurgical furnace having receptacles arranged above the roof thereof, passages from said receptacles leading to said furnaces arranged in such a manner that the material in said receptacles passes out into said furnace by gravity and form the lining thereof.

GEO. CAMPBELL CARSON.

Witnesses:
ELMER E. MEADE,
HARRY ALLEN.