

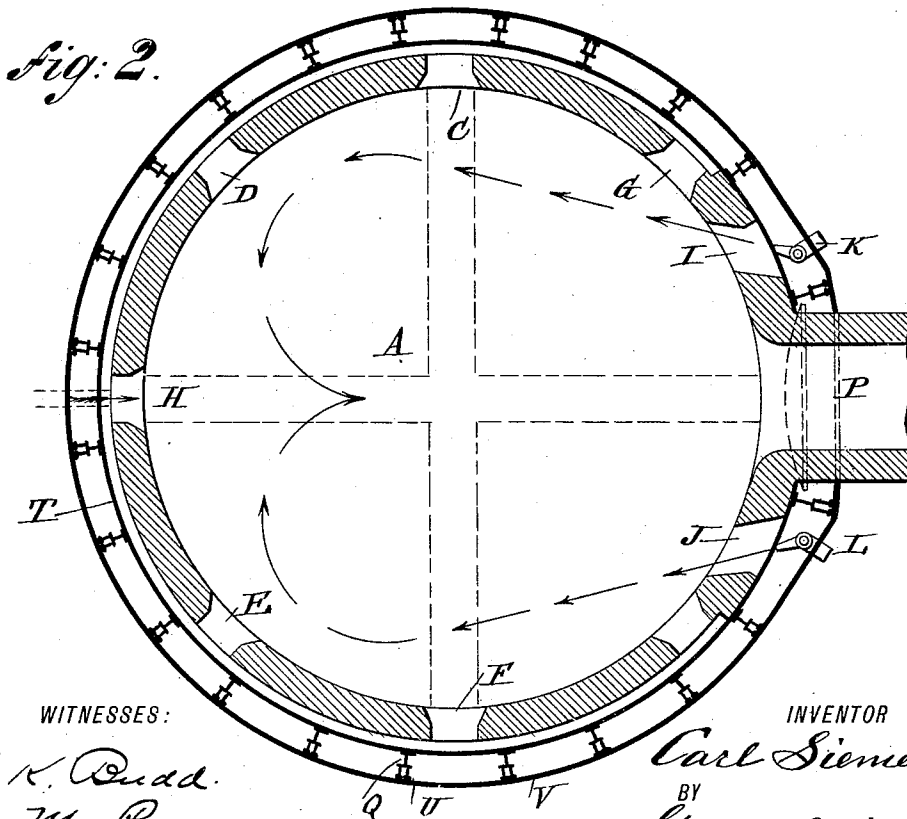
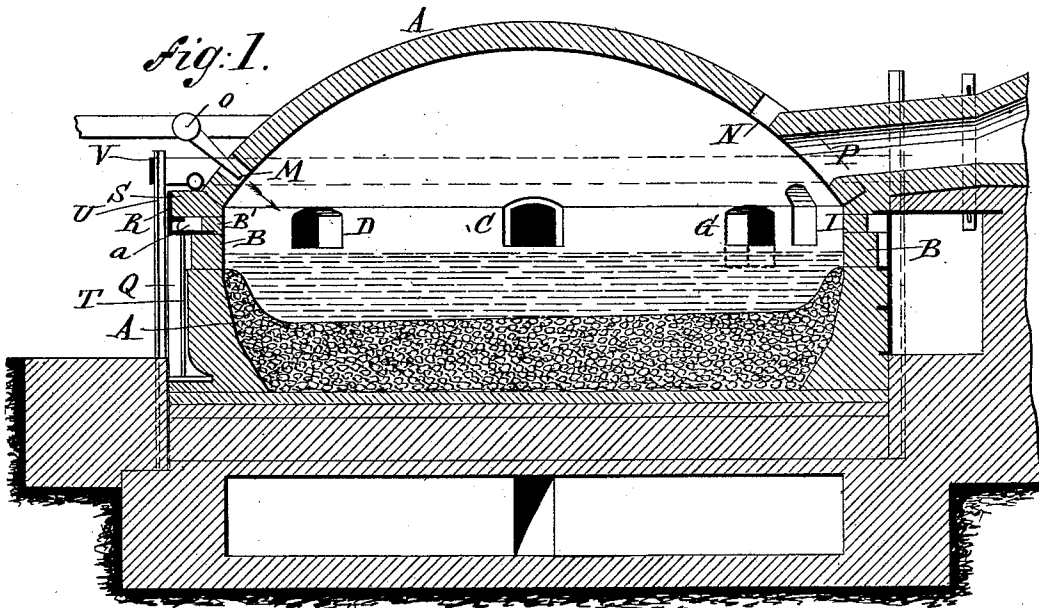
(No Model.)

2 Sheets—Sheet 1.

C. SIEMENS.
METALLURGICAL FURNACE.

No. 475,351.

Patented May 24, 1892.



WITNESSES:

F. K. Oudd.
Geo. M. Parry

INVENTOR

Carl Siemens
BY
Geo. H. Benjamin
ATTORNEY.

(No Model.)

2 Sheets—Sheet 2.

C. SIEMENS.
METALLURGICAL FURNACE.

No. 475,351.

Patented May 24, 1892.

Fig. 6.

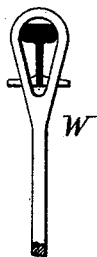


Fig. 4.

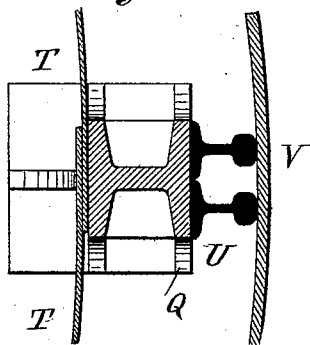


Fig. 5.

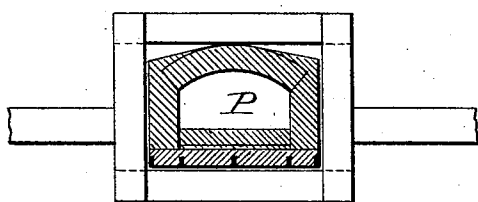
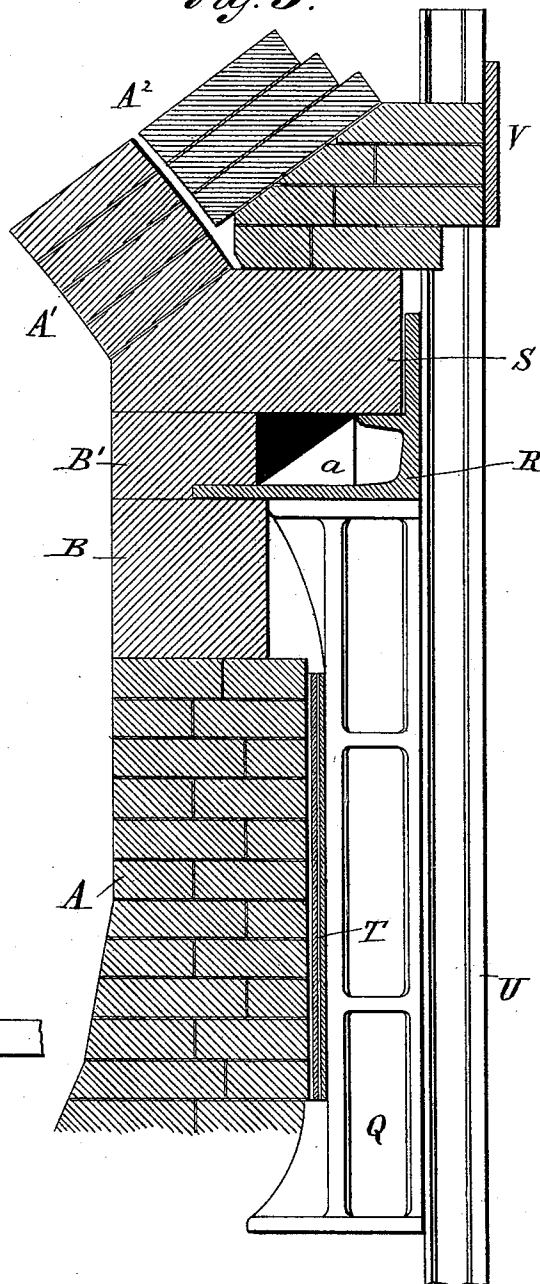


Fig. 3.



WITNESSES:

F. K. Budd.
Geo. W. Parry

INVENTOR

Carl Siemens
BY
Geo. W. Benjamin
ATTORNEY.

UNITED STATES PATENT OFFICE.

CARL SIEMENS, OF ST. PETERSBURG, RUSSIA.

METALLURGICAL FURNACE.

SPECIFICATION forming part of Letters Patent No. 475,351, dated May 24, 1892.

Application filed December 17, 1890. Serial No. 375,013. (No model.)

To all whom it may concern:

Be it known that I, CARL SIEMENS, a subject of the Emperor of Russia, residing at St. Petersburg, Russia, have invented new and useful Improvements in the Construction of Metallurgical Furnaces, of which the following is a specification.

My invention relates to that class of furnaces which are provided with an arched roof or dome, especially open-hearth and tank furnaces; and it consists in a novel arrangement of parts for supporting the roof of the furnace independently of the hearth or bed, whereby the relative expansion and contraction of the roof and bed will not injuriously affect each other.

My invention further relates to the means employed whereby the furnace-roof may be repaired or a new roof built over the old one while the furnace is in operation, and whereby the upper zone of blocks forming the furnace-bed which are injuriously acted upon during the operations of the furnace may be replaced without disturbing the roof of the furnace.

My invention also relates to certain other details of construction, which will be hereinafter fully described, and specifically set forth in the claims.

In the accompanying drawings, which illustrate my invention, similar letters of reference indicate like parts.

Figure 1 is a vertical section through the melting-chamber of the furnace. Fig. 2 is a sectional plan view. Fig. 3 is an enlarged detail view showing the construction of one side of the furnace and the arrangement for building an additional roof thereon when required. Fig. 4 is a transverse section through the inclosing furnace-casing, supporting columns for the roof, and vertical binding rails and ring. Fig. 5 is a face view of the port-opening, through which the products of combustion leave the furnace. Fig. 6 illustrates the method of securing the vertical rails with tie-rods.

In the drawings the bed of the melting-chamber A is shown circular in section. It may, however, be elliptical or of any other desired shape. The object of making the chamber circular in section is to prevent any

contact between the flame and the walls of the chamber or the material on the furnace-bed, and thereby obtain a better heating effect, due to the radiation flame or flames, as fully set forth and described in United States Letters Patent No. 341,285, granted May 4, 1886, to Frederick Siemens, of Dresden, Germany.

The crown of the melting-chamber A', I prefer to build and support independently of the bed of the melting-chamber. My objects in doing this are threefold: first, to permit independent expansion and contraction of either the crown or the furnace-bed; second, to permit the construction of a new crown or roof while the furnace is in operation, and, third, to permit the replacement of the furnace-blocks B without disturbing the crown or roof.

The furnace, as shown, is provided with the working doors C, D, E, and F.

G is a tap-hole, which is made lower than the other ports and through which the molten metal is drawn from the lower zone of the melting-chamber.

H is a tap-hole through which the slags are drawn off.

I and J are the gas and air ports, in which are shown located hydrocarbon-burners K and L.

M and N are ports in the roof of the furnace, through which steam or air blasts may be directed upon the molten metal from the jets O.

P is the exit-port, through which the products of combustion are conveyed from the melting-chamber.

Referring to Fig. 3, Q represents a column arranged on any suitable foundation and which supports the angle-plate R, which in turn supports the block B' and skewback S, from which is sprung the roof A' of the melting-chamber. a represents a passage located between the angle-plate R, block B', and skewback S, through which a circulation of air may be maintained for the purpose of keeping the angle-plate R cool.

Between the exterior of the bed of the furnace A and the columns Q, which are placed equidistant around the furnace, I arrange a casing T, which may be of boiler-iron and so arranged that the sections overlap and are

movable on each other, as shown in Fig. 4. By this arrangement the expansion and contraction of the furnace-bed are permitted.

U represents vertical tie-rails arranged circumferentially around the furnace and bearing upon the columns Q. The lower ends of these vertical rails are fixed in the earth, and they are tied around the furnace by means of the binding-ring V and the tie-rods W in the manner shown in Fig. 6.

In Fig. 3 a second crown A² is shown sprung over the crown A'.

My object in building a double crown over the furnace is twofold: first, to aid in preventing radiation from the furnace-chamber, and, second, in case of an accident to crown A' crown A'' will serve as a roof to the furnace.

The furnace-blocks B in the operation of the furnace are injuriously acted upon by the furnace-slugs. Where a block becomes defective it can easily be replaced from the outside of the furnace.

My method of working a furnace constructed as described in the reduction of copper ore is as follows: Successive charges of about two (2) tons of fluxed ore are introduced into the melting-chamber until the furnace-bed is filled. After the bed is fully charged as great a heat as possible is maintained in the furnace. For this purpose, in addition to the gaseous flames burning in the furnace, a steam or air blast is turned on from the jets O through the openings M and N, which materially aids in the formation of slag. The heat is continued from two (2) to three (3) hours, after which the slag is drawn out through the opening H, and subsequently the molten metal is tapped out through the tap-hole G into ladles or into the casting-pit, as desired, leaving in the melting-chamber a portion of coarse metal, which serves as a heat-reservoir and materially aids in the reduction of the material subsequently charged over it.

I am aware that a metallurgical furnace has heretofore been constructed with two roofs and also with the roof carried independently

of the bed of the furnace; but such I do not claim as my invention.

I lay no claim in this application to the furnace shown and described herein, the construction of which and the method of operating the same being embraced in applications filed by me December 5, 1890, Serial Nos. 373,710 and 373,711.

What I do claim as my invention is—

1. In a metallurgical furnace, the combination, with supporting-columns for the roof, of angle-irons carried by said columns, skewback blocks on said angle-irons, and two independent roofs, both of which are supported by said blocks and columns.

2. In a metallurgical furnace, the combination, with supporting-columns for the roof, of angle-irons carried by said columns, and furnace-blocks and skewback-blocks carried on said angle-irons and of such configuration as to leave an air-space between them and the angle-irons.

3. In a metallurgical furnace, the combination, with supporting-columns for the roof, of angle-irons carried by said columns, skewback-blocks on said angle-irons, two independent roofs, both of which are carried by said blocks and columns, vertical tie-rods, and a binding-ring surrounding said tie-rods in the plane from which the second or outer roof is sprung.

4. In a metallurgical furnace, the combination, with the furnace-bed, of the supporting-columns arranged around said bed, the angle-irons carried by said columns, furnace-blocks on said angle-irons, and a removable zone of furnace-blocks between the top of the walls of the furnace-bed and the furnace-blocks carried by the angle-irons.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CARL SIEMENS.

Witnesses:

JAMES E. DRESHVILLY,
ALFRED KVORGEV.