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METALLURGICAL FURNACE

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9 Claims. (Cl. 263—46)

This invention relates to metallurgy and has for an object the provision of improved metallurgical apparatus. More particularly, the invention contemplates the provision of an improved reverberatory furnace structure.

The present application is a continuation in part of my application Serial No. 490,884, filed October 24, 1930 (United States Patent No. 1,896,178, issued February 7, 1933).

Reverberatory furnaces are usually mounted on foundations embedded in the ground. The upper surfaces of the foundations are usually disposed at or slightly below the surface of the ground which forms the operating floor or on which the operating floor is supported. The furnace chambers, including the floors or bottoms, usually extend substantially entirely above the ground.

The furnaces are usually provided with vertical beams for supporting the side walls. Each side of the furnace is provided with a plurality of similarly spaced beams. The beams extend from points slightly below the ground line to points above the upper surface of the roof. The beams are wedged between the furnace walls and a concrete toe at the bottom and tie rods extending transversely over the top of the furnace roof connect the beams at the top. Structures of this type are semi-rigid and do not normally allow for expansion and contraction at the operating floor line due to changes of temperature and pressure within the furnace.

During the course of normal furnace operations, considerable outward pressure is continuously exerted against the lower portions of the beams, and it frequently happens that the concrete toe, or the wedging means between the toe and beam, crumbles and permits the lower portion of one or more of the beams to move outwardly. Movement of the beams results in the withdrawal of the support necessary for maintaining the wall in its proper shape and condition with the result that the wall is weakened and bulges outwardly. Continued operation of a furnace in such condition is very dangerous in view of the possibility of the weakened wall crumbling and permitting the molten material to flow onto the operating floor.

Also, during the course of normal furnace operations, changes of temperature within the foundations or furnace hearth or accretions thereon cause outward expansion against the foundation walls which is transmitted through the ground to external structures, such, for example, as piers under building columns and the foundations of

adjacent furnaces, with consequent danger to the stability of such external structures.

The present invention contemplates the provision of a reverberatory furnace structure comprising a foundation which is so spaced from the ground in which external structures may be embedded that movement due to expansion within the foundations will not be transmitted to such external structures. In the preferred arrangement, the portions of the walls of the furnace foundation which might be affected by expansion within the foundation hearth, etc. extend into space from their supporting structure, and they are free from contact, direct or indirect, with external formations or structures.

The invention further contemplates the provision of improved supporting means for furnace walls. The wall supporting means preferably include resilient supporting members which offer yielding resistance to the movement of upright braces or beams which bind the side walls of the furnace.

A preferred arrangement of apparatus includes a reverberatory furnace provided with firing means adjacent two opposite ends and having a gas discharge opening in the roof substantially centrally between the firing ends. A boiler plant is disposed directly above the roof of the furnace adjacent the gas discharge opening, and the heating chamber of the boiler plant communicates with the interior of the furnace through a vertical flue surrounding the gas discharge opening.

The invention will be better understood from a consideration of the following description in conjunction with the accompanying drawings, in which

Fig. 1 is a longitudinal elevation, partly in section, of a reverberatory furnace and superimposed boiler plant;

Fig. 2 is a section taken substantially along line 2—2 of Fig. 1; and

Fig. 3 illustrates a method of tying-in the lower end portions of side wall supports.

The reverberatory furnace 10 is provided with firing means in the form of burners 11 for introducing mixtures of air and powdered coal into the interior of the furnace chamber at its two opposite ends. A gas discharge opening 12 is provided in the furnace roof 13 midway between the firing ends.

The furnace walls are supported on a foundation consisting of reinforced concrete walls 14 provided with ledges for supporting vertical beams or buck stays 15 which engage the side