April 27, 1943. R. T. GILES 2,317,451

MEANS FOR REINFORCING REFRACTORY FURNACE WALLS AND THE LIKE

Filed Aug. 1, 1940

FIG. 1.

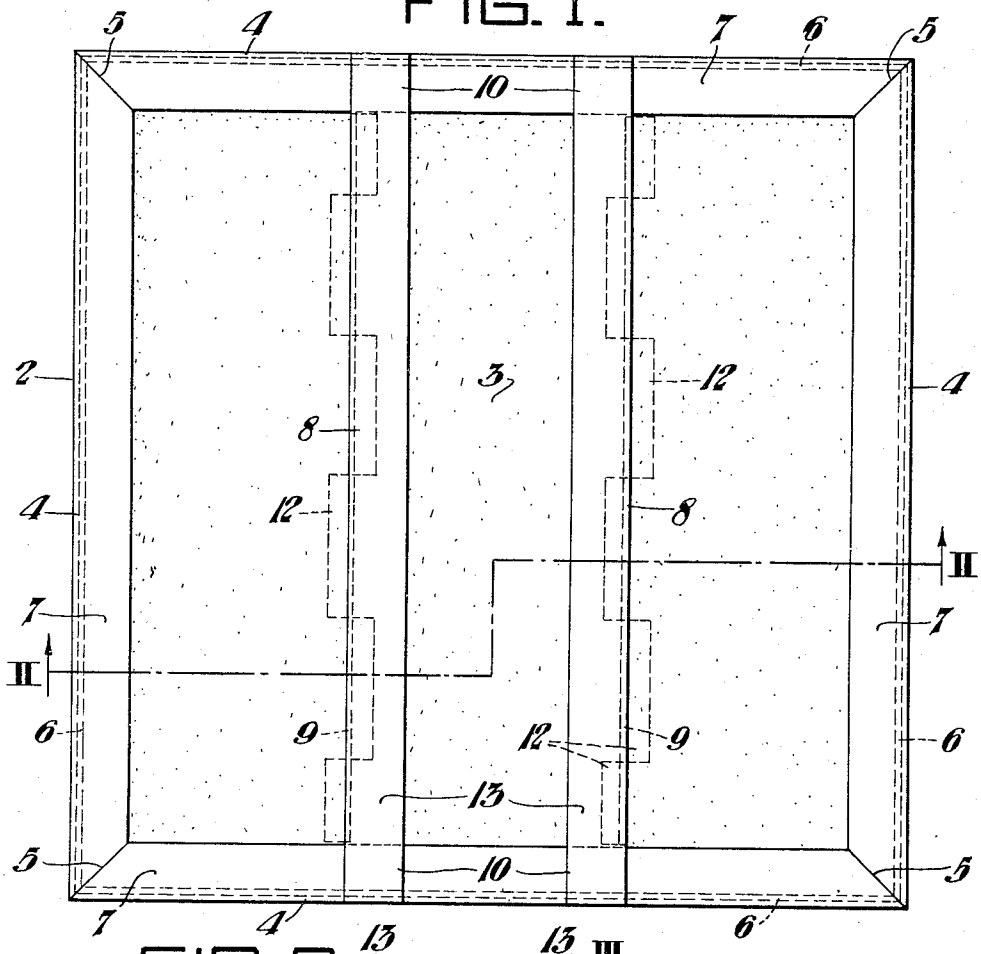


FIG. 2.

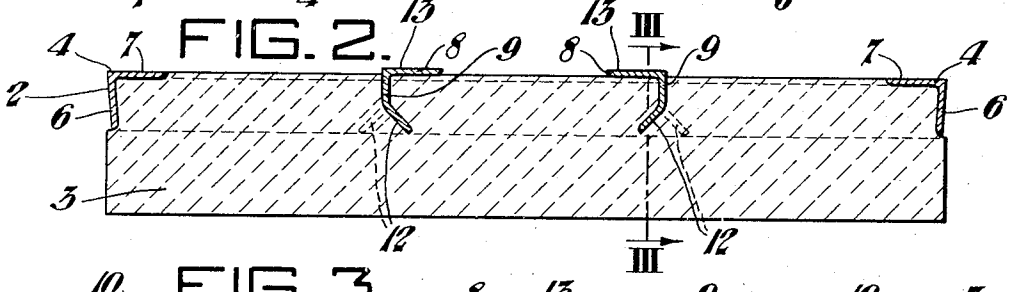
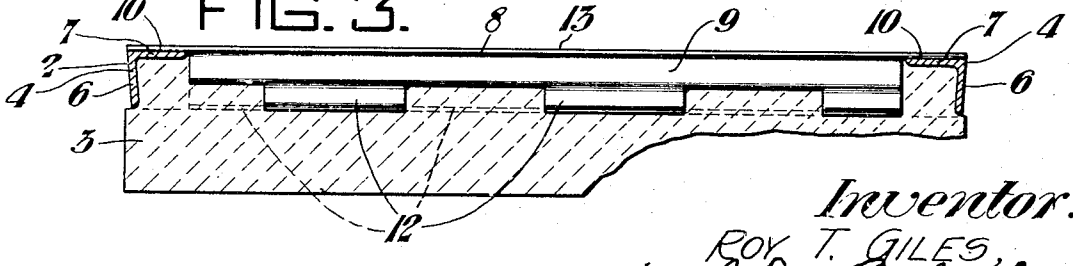


FIG. 3.



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MEANS FOR REINFORCING REFRACTORY FURNACE WALLS AND THE LIKE

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6 Claims. (Cl. 72—101)

This invention relates to metallurgical furnaces and the like, and particularly to an improved reinforcing for the refractory arches, walls, etc. thereof.

Various means and designs have been suggested and used for reinforcing refractory furnace walls, arches, doors and the bottoms of metallurgical furnaces, soaking pit covers and the like. While most of these reinforcing means provide a satisfactory reinforcement for the refractory material, which is usually concrete, they are unsatisfactory in other respects. The most common method used for reinforcing the refractory material is to embed completely therein carbon steel bars. Such steel bars usually absorbed so much heat during the heat treating of the materials in the furnace that the temperature thereof oftentimes exceeds 600° or 700° Fahrenheit, which is undesirable and thus rendered such steel bar reinforcing unsatisfactory. This was particularly so in the case of flat arches in that the conventional reinforcing methods required that the steel bar reinforcing be placed near the bottom therein which, of course, is where the temperature is highest, and this eventually results in failure of such arches due to the extreme temperatures to which the reinforcing steel bars are subjected. That is, the heat is absorbed by the steel bars and there is no way in which it can be dissipated therefrom, due to the fact that the steel reinforcing bars are completely embedded in the refractory material.

In the present invention, there is provided an improved means for reinforcing furnace walls, arches, etc. in which all the above named disadvantages have been eliminated, and at the same time, one which possesses all of the primary requisites of a good reinforcing for refractory material.

Accordingly, it is one of the objects of the present invention to provide an improved means for reinforcing refractory walls and the like which is simple and inexpensive and yet, one in which any heat absorbed thereby is rapidly and efficiently dissipated therefrom so that the reinforcing means is maintained at a relatively low temperature at all times.

It is another object of the invention to provide an improved means for reinforcing refractory walls and the like, which is strong and rugged and, at the same time, one in which any danger of failure is eliminated.

It is a further object of this invention to provide a flat arch or cover for metallurgical furnaces, soaking pits and the like, which is a decided improvement over any heretofore suggested or used.

Various other objects and advantages of this invention will become more apparent in the course of the following specification and will be particularly pointed out in the appended claims.

In the accompanying drawing, there is shown, for the purpose of illustration and description, an embodiment which my invention may assume in practice.

In the drawing:

Figure 1 is a plan view of a furnace arch showing the improved reinforcing of my invention incorporated therewith;

Figure 2 is a section taken on line II—II of Figure 1; and

Figure 3 is a section taken on line III—III of Figure 2.

Referring more particularly to the drawing, the improved reinforcing means of my invention for reinforcing refractory materials shown incorporated merely for the purpose of illustration with an improved flat arch or cover for metallurgical furnaces and it will be understood that my improved reinforcing means as shown in connection therewith may be used to reinforce the refractory walls, bottoms, doors, etc. of such furnaces if so desired.

There is shown a substantially square shaped flat arch or cover 2 consisting namely of a refractory material 3 which may be refractory concrete or any other suitable refractory material. There is arranged around the outer sides of the refractory material 3 a plurality of angle-iron reinforcing members 4, namely, four in the present instance with one positioned on each side of the arch and having their ends joined angularly as at 5 preferably by means of welding so as to provide a metallic frame-like portion, around the outer and upper edges of the arch. One of the flanges 6 of each of the angle-iron members 4 extends downwardly along the side of the refractory material 3 directly next thereto and preferably being cupped in slightly so as to be within the outer dimensions of the refractory material of the arch. The other flange 7 of each of the angle-iron members 4 is disposed on the outer side of the refractory material and lying substantially flush with the outer surface thereof so as to be exposed to the atmosphere.

There is arranged across the outer side of the refractory material 3 a plurality ot spaced apart angle-iron reinforcing members 8 having one flange 9 embedded in the refractory material and the ends thereof preferably overlapping the respective opposite angle-iron members 4 of the frame-like portion as at 10, to which they are connected preferably by means of welding. There is arranged with each of the embedded flanges 9 means for anchoring the same therein. This is done preferably by cutting the inner edge of the flange 9 of each of the angle-iron members 8 at spaced apart intervals therealong from the outer edge thereof to a point intermediate the depth thereof so as to provide portions 12 which are

bent slightly and alternately in opposite directions so as to provide means for securely anchoring the flanges 9 in the refractory material whereby the same is securely supported. The other flange 13 of each of the angle-iron reinforcing members 8 lies substantially flush with the outer surface of the refractory material so as to be exposed also to the atmosphere.

As a result of my invention, it will be seen that any heat absorbed by the inner or embedded flanges 6 and 9 of the angle-iron reinforcing members 4 and 8, respectively, will be rapidly and efficiently dissipated to the atmosphere through the respective outer flanges 7 and 13 which are exposed thereto, thereby providing an arch or reinforcing means which will last indefinitely without failure.

While I have shown and described one specific embodiment of the present invention, it will be seen that I do not wish to be limited exactly thereto, since various modifications may be made without departing from the scope of the invention, as defined by the following claims.

I claim:

1. In a refractory arch and the like for furnaces of the class described, means for reinforcing the same, consisting of a plurality of angle-iron reinforcing members with some of said members arranged around said arch and having their ends connected to gether with one flange thereof extending downwardly along the sides of the refractory material so as to provide a frame-like portion for the arch and the other of said angle-iron reinforcing members disposed along the outer surface and across the arch with their ends connected respectively to opposed first mentioned angle-iron frame members and having one flange thereof embedded in the refractory material of the arch with the inner edge portions thereof bent alternately in opposite directions so as to securely anchor the angle-iron members in the refractory material, and the other flange of all of said angle-iron reinforcing members lying substantially flush with the refractory material on the outer side thereof and exposed to the atmosphere whereby any heat absorbed by said angle-iron members will be rapidly dissipated to the atmosphere.

2. In a refractory wall or the like for furnaces of the class described, means for reinforcing said refractory wall including four angle-iron members with one arranged on each side of said wall having their ends connected respectively to each other at the corners so as to provide a substantially rectangular-shaped metallic frame which is disposed on the outer side of said wall, one of the flanges of each of said angle-iron members extending inwardly along the respective sides of the refractory wall with the other flange of each of said angle-iron members extending inwardly toward the center of the same substantially flush with the outer surface of the wall so as to be exposed to the atmosphere, and at least one angle-iron member arranged across said refractory wall on the outer side thereof with the opposed ends thereof connected to said first mentioned angle-iron members, said last mentioned angle-iron member having one flange thereof embedded in the refractory wall with the other flange lying substantially flush with the outer surface of the wall so as to be exposed to the atmosphere whereby any heat absorbed by any of said angle-iron members will be rapidly dissipated to the atmosphere.

3. In a refractory wall or the like for furnaces of the class described, means for reinforcing said refractory wall including four angle-iron members with one arranged on each side of said wall having their ends connected respectively to each other at the corners so as to provide a substantially rectangular-shaped metallic frame which is disposed on the outer side of said wall, one of the flanges of each of said angle-iron members extending inwardly along the respective sides of the refractory wall with the other flange of each of said angle-iron members extending inwardly toward the center of the same substantially flush with the outer surface of the wall so as to be exposed to the atmosphere, and a plurality of spaced apart angle-iron members arranged across said refractory wall on the outer side thereof with the opposed ends of each of the angle-iron members connected to some of said first mentioned angle-iron members, each of said last mentioned angle-iron members having one flange thereof embedded in the refractory wall with the other flange lying substantially flush with the outer surface of the wall so as to be exposed to the atmosphere whereby any heat absorbed by any of said angle iron members will be rapidly dissipated to the atmosphere.

4. In a refractory wall or the like for furnaces of the class described, means for reinforcing said refractory wall as defined in claim 3 wherein the inner edge of the flange embedded in the wall of at least some of the angle-iron members is cut at spaced apart intervals therealong with the portions between the cuts bent alternately in opposite directions whereby each of said flanges so formed is securely affixed in the refractory wall.

5. A refractory panel of the class described comprising a solid mass of refractory material, a rectangular-shaped peripheral frame arranged around said refractory material, said frame consisting of a plurality of structural members with one arranged on each side of the panel and having their ends securely connected respectively to each other, said structural members having a portion thereof disposed along the respective sides of the refractory material and a portion thereof disposed against the outer face of the material so as to be exposed to the atmosphere, and at least one structural member arranged across the frame and outer face of said refractory material with the ends thereof securely connected to the structural members as first mentioned, said last mentioned structural member having a portion thereof embedded in the refractory material.

6. A refractory panel of the class described comprising a solid mass of refractory material, a rectangular-shaped peripheral frame arranged around said refractory material, said frame consisting of at least four angle-iron members with one arranged on each side of the panel and having their ends securely connected respectively to each other at the corners, one of the flanges of each of said angle-iron members disposed along the respective sides of the refractory material with the other flange of each of said angle-iron members disposed against the outer face of the material so as to be exposed to the atmosphere, and at least one structural member arranged across the frame and outer face of said refractory material with the ends thereof securely connected to the angle-iron members, said structural member having a portion thereof embedded in the refractory material.

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