June 24, 1958 E. B. WOLF 2,840,017

SUSPENSION MEANS FOR REFRACTORY TILE

Filed April 13, 1954

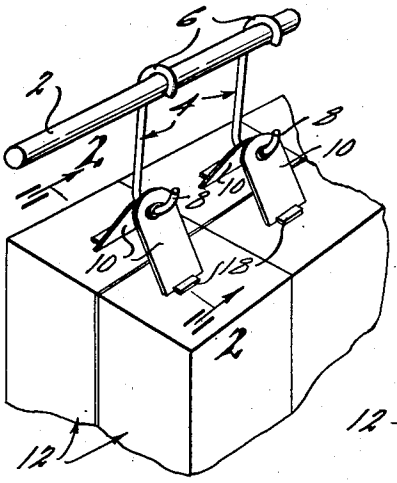

FIG. 1.

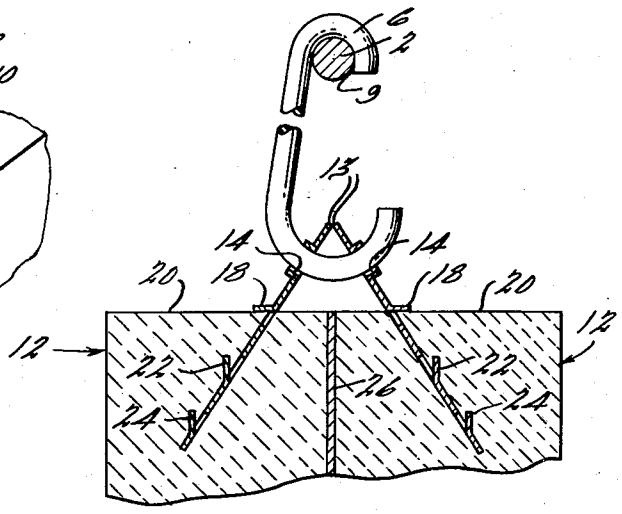

FIG. 2.

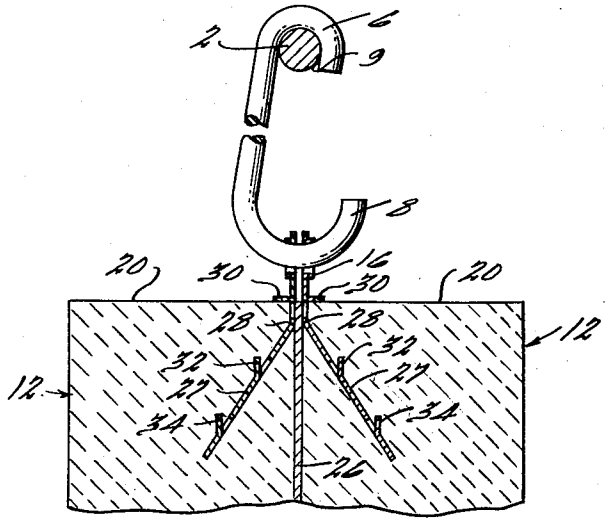

FIG. 3.

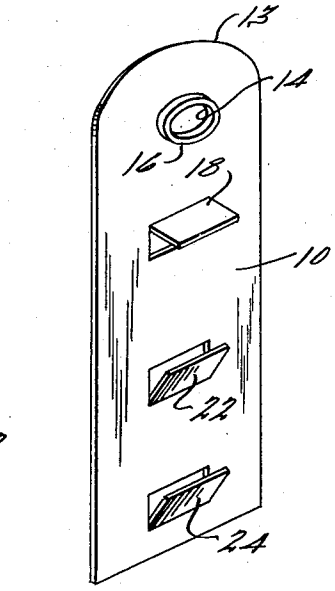

FIG. 4.

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United States Patent Office 2,840,017 Patented June 24, 1958

2,840,017

SUSPENSION MEANS FOR REFRACTORY TILE

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Application April 13, 1954, Serial No. 422,868

4 Claims. (Cl. 110—99)

This invention relates in general to suspended roofs, arches, and the like for industrial furnaces such as boilers, open-hearths, and the like and, more particularly, to a novel and improved suspending means for refractory tile that is used in these furnaces. The invention is particularly useful in suspended basic roofs and arches.

The primary object of this invention is to provide an improved tile suspension construction which results in no waste volume at the top of the tile, which applies lateral pressure between adjacent tile, and which is relatively easy and inexpensive to make and use. The present invention provides an elongated hanger plate, preferably made from an alloy steel plate stock, which is provided with an aperture on the upper end thereof above the top of the tile that is adapted to receive a suitable supporting strap or hook. The hanger plate is provided with an outwardly extending tab disposed below the aperture. The lower end of the hanger plate is adapted to be placed in the die and embedded in the refractory tile material, such as the well known chemically bonded magnesite compositions used in making basic refractories, up to and into an abutting position with said tab, and the magnesite forced around the plate under high pressure in the die. The lower embedded end of the hanger plate is provided with a plurality of outwardly extending tabs or prongs which anchor the plate in the tile. The hanger is molded under pressure with the refractory material and thus is firmly attached to the finished tile. The hanger strap or hook means may be supported by a suitable hanger rod which may be locked above the top of the furnace arch and cooled by natural convection of air. The hanger rod be made of heat resisting steel or cast iron to withstand undue temperatures and may be supported in any suitable manner. For example, they may be supported by a roof truss structure. The novel hanger plates are preferably embedded in the refractory tiles with the aperture therein extending from the upper side thereof and offset from the midplane thereof so as to permit one hanger strap or hook to support two adjacently disposed refractory tiles with pressure applied by each brick to the other along the contacting faces.

Other objects, features and advantages of the present invention will become apparent from the following description taken in conjunction with the drawings wherein:

Figure 1 is an isometric view showing a fragmentary portion of a suspended furnace arch, roof, etc., embodying a refractory tile suspension made in accordance with the principles of the present invention;

Fig. 2 is an elevational view, partly in section, of the structure illustrated in Fig. 1, taken along the line 2—2 thereof;

Fig. 3 is an elevational view similar to the view of Fig. 2, but illustrating a modified hanger plate; and

Fig. 4 is an isometric view of a hanger plate made in accordance with the principles of the present invention.

Referring now to the drawings, the illustrative embodiment comprises a hanger bar 2 on which is detachably

mounted a plurality of refractory tile hangers 4 which may be of any desired shape. The illustrated type of tile hangers 4 are provided with an upper hook-shaped end 6, adapted to permit the hangers to be easily removed from the hanger bar 2, and a lower hook-shaped end 8 adapted to detachably support a pair of tile hanger plates 10, each carrying a refractory tile 12. It will be understood that a suspended furnace roof or arch made in accordance with the invention would be comprised of a plurality of hangers bars 2, tile hangers 4, tile hanger plates 10, and tiles 12 supported by any suitable conventional holding means, such as a series of I-beams resting on the side walls of the furnace and supporting the hanger bars 2. The hanger bar 2 is circular in cross section and may be made from material suitable for any particular requirement as from either an alloy steel or cast iron.

As is best seen in Figs. 2 and 3, the tile hanger 4 is preferably made with an upper hook-shaped end 6 which may be detachably mounted on the hanger bar 2 so as to permit the installation of the tile hanger plates 10 on the lower hook-shaped end 8. The hook-shaped end 6 is preferably made with an open portion, as designated by the numeral 9, to permit the tile hanger 4 to be easily and quickly removed from the hanger bar 2.

The tile hanger plate 10 is preferably made from a suitable heat resisting alloy steel which will not oxidize during manufacture of the tile or in operation of the furnace and is substantially rectangular in shape with the upper end thereof being rounded off as at 13. An aperture 14 is provided in the upper end of the hanger plate 10 and is adapted to slidably receive the lower hook-shaped end 8 of the tile hanger 4. The aperture 14 is provided with an outwardly extending reinforcing flange 16, suitably formed therein or secured therein and adapted to provide the upper end of the plate with greater strength for carrying a refractory tile. Disposed below the aperture 14 is an outwardly extending integral tab or flange 18 preferably formed by punching it out of the hanger plate 10 and bent to the desired angle.

As is best seen in Fig. 2, the outwardly extending tab 18 is adapted to abut the upper surface 20 of the refractory tile 12 to resist the tendency to move toward a vertical position. Disposed below the flange 18 and embedded in the tile are two longitudinally spaced, outwardly and upwardly extending integral tabs or flanges 22 and 24. The tabs 22 and 24 extend outwardly and upwardly from the plate 10 at an acute angle and may be formed by any suitable means as by punching them out of the tile hanger plate 10. It will be seen that the outwardly extending tabs 22 and 24 are adapted to resist any tendency of the hanger plate 10 to be pulled out of the refractory tiles 12. Although only two tabs 22 and 24 are shown, it will be obvious that a greater number could be provided, if desired.

In operation, after the tile hanger plates 10 have been formed, if used with pre-burned tile as contrasted with chemically bonded compositions mentioned above, they are embedded in the refractory tile before it is fired and held in proper position by any suitable means during firing. As is best seen in Fig. 2, the hanger plate 10 may be embedded in the refractory tile 12 in an angular position with the upper end 13 thereof disposed on the centerline of the oxidizable spacer plates 26 disposed between the pair of basic tiles 12. The two adjacently disposed refractory tiles 12 may then be supported on one tile hanger 4 by positioning the tiles so as to have the upper ends 13 of the tile hanger plates 10 disposed in an abutting position. Since the point of suspension is offset from the midplane (containing the C. G.) the two tiles will be forced against each other with a pressure de-

pendent on the amount of offset. Such pressure is desired so that the spacers and tile material will form high melting point refractory compounds and fluxing out of the spacers will be avoided.

The modification of Fig. 3 shows a pair of refractory tiles provided with tile hanger plates **27** made in accordance with the present invention and which are similar to the tile hanger plates **10** shown in the illustration of Fig. 2. In this modification, the tile hanger plates **27** have been bent at a point generally designated as **28**, which permits the upper portion of the tile hanger plates to be disposed in a vertical plane along the adjacent edges of a pair of refractory tiles **12**, so as to be easily assembled onto the tile hanger **4**. The tile hanger plate **27** is provided with tabs **30**, **32**, and **34** similar in shape and function to the tabs **18**, **22**, and **24** of the tile hanger plate **10**

In constructing a suspended furnace arch or roof in accordance with the principles of the invention, the hanger bars **2** are supported in any suitable manner. For example, they may be supported by a roof truss structure. The refractory tiles **12** may then be hung on the bars **2** in any suitable order. Preferably, a pair of tiles **12** are placed so as to bring the upper ends **13** of the tile hanger plates into an adjacent position and then the lower hook-shaped end **8** of the tile hanger **4** is inserted through the apertures **14** of the adjacently disposed hanger plates. The refractory tiles **12** are then held together and lifted to a position beneath the hanger bar **2**. In order to engage the tile hanger **4** on the bar **2**, the hanger **4** may be rotated so as to permit the hook-shaped upper end **6** to be passed above and down on the hanger bar **2**.

While it is apparent that the present invention is well calculated to fulfill the objects above stated, it will be understood that the invention is subject to modification, variation and change without departing from the proper spirit or scope of the invention.

What is claimed is:

1. In a suspended furnace construction, the combination of, a longitudinally extending hanger bar, a plurality of tile hangers detachably suspended from said bar, a pair of refractory tiles disposed below each tile hanger, a hanger plate embedded and molded in each of said tiles, each of said hanger plates comprising an elongated plate-like member having an upper end extending upwardly from the tile, means on said upper end adapted to operatively connect the hanger plate to the tile hanger, an outwardly extending tab on said member disposed below said means, said member being embedded in the tile up to and into an abutting position with said tab, the embedded portion of said member being provided with a plurality of outwardly and upwardly extending tabs adapted to interlock said member in the refractory tile.

2. The invention as set forth in claim 1, wherein the tab on said member below said means extends outwardly and downwardly at an acute angle from said member.

3. The invention as set forth in claim 1, wherein the tab on said member below said means extends outwardly at a right angle from said member.

4. A tile hanger plate adapted for use in suspending refractory tiles in a suspended furnace arch or the like comprising, an elongated plate-like member having an outwardly extending tab dividing said member into an upper portion and a lower portion, said portions having an included angle between them of substantially more than 90 degrees, said upper portion having means thereon for attachment to a tile hanger, said lower portion being being adapted to be embedded in a refractory tile up to and into an abutting position with said tab, said lower portion being provided with a plurality of outwardly extending tabs struck out from the lower portion adapted to interlock said member in the refractory tile.

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