Dec. 18, 1923. 1,477,895

H. A. POPPENHUSEN

FIRE ARCH

Filed Aug. 6, 1921

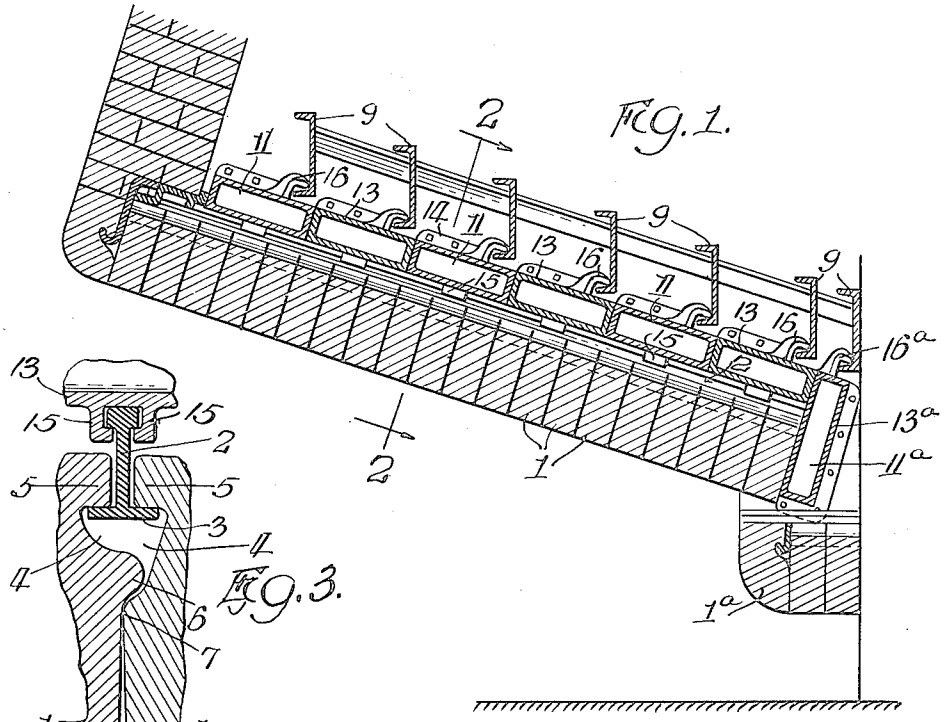


FIG. 1.

FIG. 3.

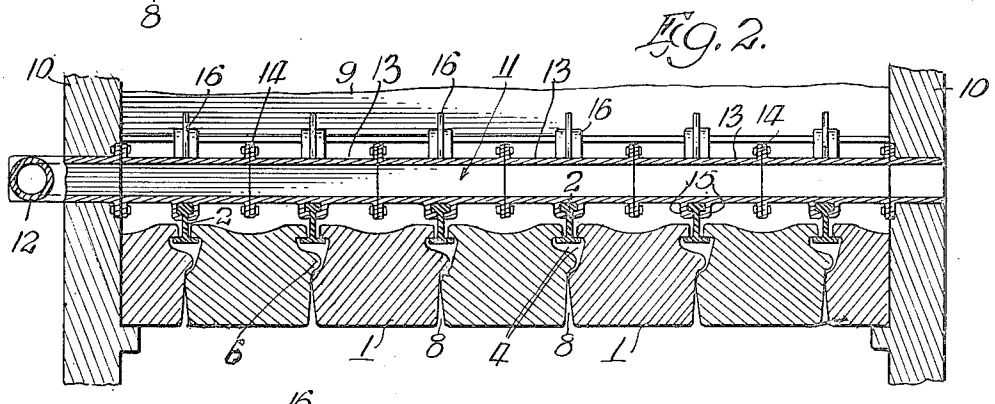


FIG. 2.

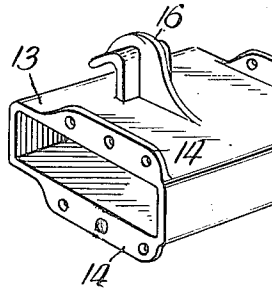


FIG. 4.

Inventor

Herman A. Poppenhusen

by Eugene Carter Atty.

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UNITED STATES PATENT OFFICE.

HERMAN A. POPPENHUSEN, OF HAMMOND, INDIANA, ASSIGNOR TO GREEN ENGINEERING COMPANY, OF EAST CHICAGO, INDIANA, A CORPORATION OF ILLINOIS.

FIRE ARCH.

Application filed August 6, 1921. Serial No. 490,333.

To all whom it may concern:

Be it known that I, HERMAN A. POPPENHUSEN, a citizen of the United States, residing at Hammond, in the county of Lake and State of Indiana, have invented new and useful Improvements in Fire Arches, of which the following is a specification.

This invention relates to fire-arches for furnaces and more particularly to fire-arches made of a plurality of rows of tiles or blocks arranged in rows extending from the front to the rear of the arch and suspended from a framework or structure above the same.

One object of my invention is to suspend the tiles from the upper structure by means of hollow conduits so that a cooling medium, such as air, may be circulated therethrough for keeping the upper structure relatively cool and thus guard the same against expanding and contracting to an extent sufficient to distort the upper structure or impair the connection between the same and the tiles or between the tiles themselves.

Another object of my invention is to make the conduits of sections bolted or otherwise secured together so that the conduits may be readily and easily assembled in building the arch, or disconnected for repair of either the conduits or other parts of the arch structure.

A further object of my invention is to make the joints between the rows of tiles in a manner that the passages likely to be produced between the rows of tiles along their contacting side faces during the lateral movement of the tiles relatively to each other in expanding and contracting are baffled so that the upper structure thereabove will not be directly subjected to the heat passing upward through such passages.

The invention consists further in the matters hereinafter described and more particularly pointed out in the appended claims.

In the accompanying drawings—

Fig. 1 is a longitudinal vertical sectional view taken through a fire-arch embodying the features of my invention;

Fig. 2 is a transverse vertical sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is an enlarged view showing the manner in which a tile in one row contacts sidewise with a tile in the adjacent row; and

Fig. 4 is a perspective view of one of the sections of the hollow conduits used in the upper structure.

The fire-arch shown in the drawings comprises a plurality of tiles or blocks 1, 1 arranged in rows extending at an inclination upward and inward from the front wall of the furnace setting, as customary in arches of this general character. As shown in Fig. 1, the tiles 1, 1 in each row contact flatwise against each other throughout their front and rear vertical faces. Also the tiles of one row contact along their side faces with the tiles in the adjacent rows in a manner to be presently described.

For the tiles, are I-beams 2, 2, laterally spaced apart and extending from the front to the inner or rear end of the arch structure. The beams 2, 2 are located between the rows of tiles 1 and have their base flanges 3 in channels or grooves 4, 4 in the opposed side faces of adjacent tiles for suspending the same from said beams. As illustrated in Fig. 3, the tops of the channels are in the form of shoulders or lugs 5, one on each tile and extending over and resting on the base flanges 3 of the beams. The channels 4 of said tiles open into each other and one has a flange or rib 6 below the beam 2 and extending into the channel of the meeting tile. These tiles contact with each other at their opposed side faces along a line, as at 7, below the lug 6, as shown. The side faces of these tiles below this line of contact diverge and provide a space 8 in the shape of an inverted V. This construction permits the tiles to move toward and from each other as they expand and contract under the heat to which they are subjected in the furnace, the tiles pivoting, so to speak, about the line of contact. It is to be noted that the lug 6 extends across or over this line of contact and thus provides a baffle to the passage of heat upward through the space 8 as the tiles expand. Furthermore the lug 6 serves to close the upper ends of the space 8 as the tiles expand, and aids in keeping the furnace heat from directly reaching the beams 2 and the upper structure thereabove.

Above the beams 2, 2 and extending transversely across the same are vertically arranged channel members 9, 9. These are lat-

erally spaced apart and are supported at their ends in the side walls 10, 10 of the furnace structure.

Suspended from the base flanges of the channel members 9, 9 are a plurality of conduits 11, 11 arranged, in the instance shown, in rows extending transversely across the I-beams 2 and thus transverse to the rows of tiles 1. There is one conduit for each cross-girder 9, and the conduits are substantially parallel thereto. The conduits 11 open to the atmosphere at one end through one of the side walls of the furnace structure, and are connected at their opposite ends with a header pipe 12, as shown in Fig. 2, which leads to the chimney or stack, to place the conduits under draft and draw air into and through the same for keeping them relatively cool. The conduits 11 are each made of a plurality of hollow sections 13, 13, as shown in Figs. 2 and 4. These are placed end to end and are provided with end flanges 14, 14 so that the sections in each conduit may be bolted or otherwise secured together. There is one section 13 in each conduit for each I-beam 2 across which the conduit extends, and to suspend the I-beams from said sections 13, each of the latter has depending lugs 15, 15 at its under side to engage under the upper headed edge of the I-beam, as shown. Each section 13 has an upwardly projecting, hook shaped lug 16 on its top wall to engage the base flange of the adjacent cross-girder 9 for suspending the section therefrom. By such construction, the tiles are suspended in rows from the upper structure of the arch by hollow conduits included in the upper structure, so that the latter may be maintained relatively cool by circulating a cooling medium through the conduits. Thus expanding and contracting of the upper structure sufficient to distort or impair the same for suspending the tiles, is avoided.

The sections 13 are so shaped, transversely, that the sections of one conduit contact with the sections of adjacent conduits throughout the lengths of the latter and thus form, in effect, a relatively cool roof extending over and covering the entire upper area of the tiles of the arch to prevent both the passage of heat upward from beneath the sections and the passage of the colder air downward to the tiles from above the sections.

To provide a step in the under surface of the arch at the front wall of the furnace, and thus prevent cold air drawn into the combustion chamber through the fuel inlet from following along such surface and chilling the same, I provide tiles 1^a, one in each row of tiles 1 and extending downward below the tiles 1, as shown in Fig. 1. For suspending these tiles 1^a from the cross-girder 9 thereabove, I provide a conduit 11^a extending downward between the tiles 1 and the front wall of the furnace setting. This conduit is formed of bolted sections 13^a having hook shaped lugs 16^a for engaging the base flange of the cross-girder thereof above, as shown. The tiles 1^a are suspended in place by a form of construction similar to that shown and described in my copending application Serial No. 489,713, filed August 4, 1921.

While I have shown and described herein in detail a fire-arch structure embodying the features of my invention, it is of course to be understood that the details of construction and arrangement of parts illustrated may be variously changed and modified without departing from the spirit and scope of my invention.

I claim as my invention:

1. In a fire-arch, a plurality of laterally spaced beams, a plurality of rows of tiles, one row in each of the spaces between said beams and suspended therefrom, a plurality of conduits above said beams and adapted to have a cooling medium circulated therethrough, said conduits extending across said beams, and means carried by said conduits and engaging said beams for suspending the same from said conduits.

2. In a fire-arch, a plurality of laterally spaced beams, a plurality of rows of tiles, one row in each of the spaces between said beams and suspended therefrom, a plurality of conduits above said beams and adapted to have a cooling medium circulated therethrough, each conduit consisting of a plurality of hollow sections, one for each of the beams across which the conduit extends, said sections being secured together end to end and opening into each other, and means carried by each section for engaging the beam therebelow for suspending the same from said section.

3. In a fire-arch, a plurality of laterally spaced beams, a plurality of rows of tiles, one row in each of the spaces between said beams and suspended therefrom, a plurality of conduits above said beams and adapted to have a cooling medium circulated therethrough, each conduit consisting of a plurality of hollow sections, one for each of the beams across which the conduit extends, said sections being secured together end to end and opening into each other, and spaced lugs on the under side of each section and engaging the beam therebelow for suspending the beam from said section.

4. A fire-arch, comprising a plurality of laterally spaced cross-girders, a plurality of tiles below said girders and arranged in rows transverse thereto, a plurality of conduits interposed between said tiles and girders and adapted to have a cooling medium circulated therethrough, said conduits being

arranged in rows substantially parallel to said girders, hook shaped members carried by said conduits and engaging said girders for suspending said conduits therefrom, and means for suspending said tiles from said conduits.

5. A fire-arch, comprising a plurality of laterally spaced cross-girders, a plurality of tiles below said girders and arranged in rows transverse thereto, a plurality of conduits interposed between said tiles and girders and adapted to have a cooling medium circulated therethrough, said conduits being arranged in rows substantially parallel to said girders, each conduit consisting of a plurality of hollow sections secured together end to end and opening into each other, hook shaped members on said sections and engaging the girders thereof for suspending said sections from said girders, and means for suspending said tiles from said sections.

6. A fire-arch, comprising a plurality of laterally spaced cross-girders, a plurality of laterally spaced beams below said girders and arranged transverse thereto, a plurality of rows of tiles below said girders and arranged in rows with a row in each of the spaces between said beams and suspended therefrom, a plurality of conduits adapted to have a cooling medium circulated therethrough, said conduits being interposed between said beams and girders and arranged substantially parallel thereto, hook shaped members carried by said conduits and projecting above the same for engaging said girders for suspending the conduits therefrom, and spaced lugs carried by said conduits and projecting below the same for engaging said beams for suspending the latter from said conduits.

7. A fire-arch, comprising an upper structure, a plurality of tiles suspended therefrom and arranged in rows, the tiles in one row contacting sidewise with the tiles in the adjacent rows and with the tiles in each row in contact with each other, a conduit arranged transverse to the rows of tiles and adapted to have a cooling medium circulated therethrough, said conduit being located at one end of the arch and extending downward and in contact with the tiles at the adjacent end of the arch, and means for suspending said conduit from said upper structure.

In testimony that I claim the foregoing as my invention, I affix my signature this 4th day of August, A. D. 1921.

HERMAN A. POPPENHUSEN.