Nov. 1, 1932. S. F. BURNET 1,885,800

SUSPENDED FLAT ARCH FOR FURNACES, KILNS, AND THE LIKE

Filed Aug. 10, 1929

Fig. 1.

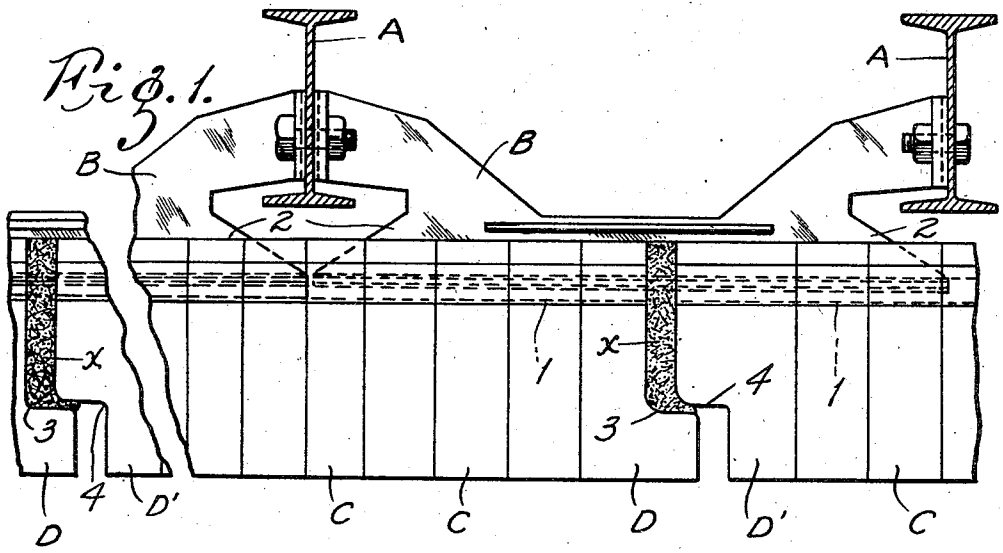


Fig. 2.

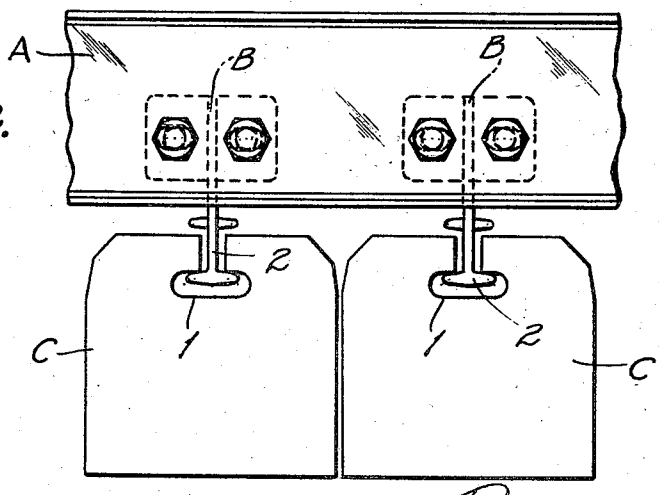


Fig. 3.

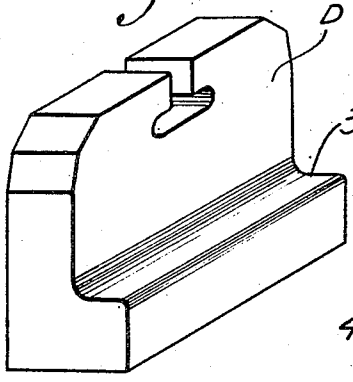
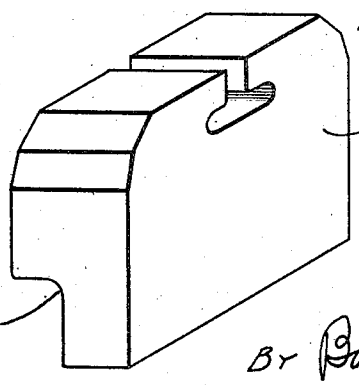


Fig. 4.



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UNITED STATES PATENT OFFICE

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SUSPENDED FLAT ARCH FOR FURNACES, KILNS, AND THE LIKE

Application filed August 10, 1929. Serial No. 385,011.

This invention relates to flat arches, such as are used in furnaces, kilns and the like, and particularly flat arches of the type that are made up of tile suspended from an overhead supporting structure in such a way that they can move longitudinally of said supporting structure when they expand and contract, due to variations in the temperature of the furnace.

Considerable trouble has been experienced with suspended flat arches of conventional design, due to the arch tile breaking or cracking under the terrific pressure to which they are subjected, when they expand and become wedged tightly together under the heat of the furnace of which the arch forms the roof or top wall.

The main object of my invention is to overcome this inherent defect of conventional suspended flat arches, without adding greatly to the cost of the arch and without reducing or interfering with the efficiency of the arch.

To this end I have devised a suspended flat arch which is provided intermediate two of its opposed edges with one or more means disposed parallel to said edges, that permit adjacent sections of the arch lying at opposite sides of said means to expand and contract without subjecting the arch tile to dangerous or destructive strains or pressures.

The means above referred to preferably consists of one or more closed expansion joints in the arch, disposed at a point or points intermediate two opposed marginal edges of the arch, and a mass of asbestos or other suitable compressible, fire-resistant material arranged in said joint or joints in such a way as to serve as a filling for same, and thus prevent the escape of the heat, flames and gases from the furnace chamber. When the arch tile expand under the influence of the heat to which they are subjected when the furnace is in use, said mass or masses of fire-resistant material permit adjacent sections of the arch lying at opposite sides of said material to elongate without liability of exerting a terrific crushing strain or pressure on the tile constituting said sections, said fire-resistant material having sufficient compressibility to provide for the relative movement of adjacent sections of the arch. When the arch tile contract the fire-resistant material between the adjacent sections of the arch expands or resumes its former condition. Means is preferably provided for protecting said fire-resistant material from the direct action of the flames of the furnace, and while various means may be used for retaining the fire-resistant material in operative position and for protecting it from flames or temperatures tending to disintegrate or deteriorate the same, I prefer to provide some of the arch tile with portions that serve as a supporting means for the fire-resistant material and also as a shield for said material. I wish it to be understood, however, that the means which is used to provide for the longitudinal expansion and contraction of the arch can be constructed in various ways without departing from the spirit of my invention, and that it is immaterial how many expansion joints or similar means the arch is equipped with, so long as said joint or joints are located intermediate the extreme ends of the arch and are disposed transversely of the arch.

Figure 1 of the drawing is a fragmentary longitudinal sectional view of a suspended flat arch constructed in accordance with my invention.

Figure 2 is a fragmentary end view of said arch, illustrating how the arch tile are suspended from the overhead supporting structure that carries the arch; and

Figures 3 and 4 are perspective views of two of the arch tile that are used in the zone or zones of the arch in which the expansion joints are located.

In the drawing, A designates a plurality

of I-beams or other members that extend transversely across a furnace or kiln chamber above the roof of said furnace, and B designates longitudinally-disposed members, usually consisting of castings, that are attached to the transverse beams so as to form a supporting structure for a flat arch made up principally of tile C, which are provided at their upper ends with slots 1 of such shape that they can be strung upon or slid along depending portions 2 on the longitudinally-disposed members B of the overhead supporting structure in the operation of building the arch. The tile C are so arranged that the arch comprises a plurality of separate and distinct relatively movable sections, that are separated from each other by means that permit adjacent sections of the arch to elongate or move longitudinally of the overhead supporting structure when the arch tile C expand and contract, without subjecting said arch tile to destructive or dangerous strains or pressures. In the preferred form of my invention herein illustrated said means consists of one or more transversely-disposed expansion joints in the arch located intermediate the extreme ends of the arch between the respective sections, and each filled with a mass of asbestos x or other suitable fire-resistant material that is capable of compressing and which will resume its former condition when the pressure that compressed the same is removed or reduced. When the arch is subjected to a sufficiently high temperature to cause the arch tile to expand, the sections of the arch lying at opposite sides of the expansion joint elongate or move longitudinally relatively to each other, with the result that the tile constituting said sections are not cracked, broken or otherwise injured. When the tile constituting said secions cool or contract, said sections contract or reduce in length, and the asbestos or other material x in the expansion joint or joints expands or resumes its former condition in which it acted as a closure for the expansion joint or joints that effectively prevents the flame, heat or gases from escaping from the furnace chamber.

In order to retain the filling material x in the expansion joint between two adjacent sections of the arch, and protect said material from the direct action of the flames of the furnace, I prefer to construct the arch partly from special tile D and D′ that are arranged in transverse rows at the adjacent ends of two sections of the arch located at opposite sides of an expansion joint. As shown in Figures 1 and 3, the tile D are mounted in a similar way to the tile C and are similar in general construction to the tile C, except that each of the tile D is provided at its lower end with an integral flange or projection 3 that is positioned under the material x so as to form in effect a closure for the lower end of the slot or expansion joint in which the material x is positioned. The tile D′, which are also arranged in a row transversely of the arch, are disposed oppositely to the tile D, and each of said tile D′ is provided at its lower end with a recess, notch or cut out portion 4 of such shape and dimensions as to be capable of receiving the flange 3 on the tile D to which it is opposed when adjacent sections of the arch expand or move longitudinally towards each other and compress the asbestos x arranged in the groove formed between the two transversely-disposed rows of tile D and D′. In other words, in my improved suspended flat arch the major portion of the arch is constructed of tile C of conventional design suspended from the overhead supporting structure in such a way that they are capable of moving longitudinally of said supporting structure, and one or more groups or transverse rows of special tile D and D′ are arranged in spaced relation, so as to form an expansion joint that is preferably filled with asbestos or some other suitable fire-resistant material, which special tile are preferably so constructed that portions on the tile of one group serve as a supporting means and shield for the fire-resistant material and lap over the tile of the other group which are provided with recesses, notches or the like that receive said shield portions on the opposed tiles, and thus permit the opposed groups of special tile to move towards and away from each other when the sections of the arch lying at opposite sides of the expansion joint elongate, due to expansion of the arch tile, or reduce in length, due to contraction of the arch tile.

A suspended flat arch of the construction above described can be built at practically the same cost as a suspended flat arch of conventional design, but it effectively eliminates the possibility of the arch tile becoming cracked or broken, due to expansion of the arch tile. As previously stated, the means herein illustrated for permitting the arch tile to expand without subjecting them to destructive or dangerous strains or pressures represents only one form of my invention and can be arranged in various ways and replaced by any suitable equivalent means without departing from the spirit of my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

A suspended flat arch for furnaces and the like, comprising an overhead supporting structure, rows of tile suspended from said supporting structure and arranged to form a plurality of separate and distinct arch sections, each of which is made up of a plurality of tile, an expansion joint between said sections located at a point remote from two of the opposed edges of the arch and dis-

posed parallel to said edges, a mass of compressible fire-resistant material in said joint, and means for maintaining said fire-resistant material in position and protecting it from the direct action of the flames of the furnace, comprising substantially L-shaped tile forming part of one of said arch sections and arranged so that the horizontal legs of same serve as a support for said fire-resistant material, and co-acting tile forming part of the adjacent arch section and provided at their lower ends with recesses, notches or cut-outs that form a clearance for the horizontal legs of said L-shaped tile.

SAMUEL F. BURNET.