Nov. 8, 1927. 1,648,363

G. P. REINTJES

TILE ARCH

Filed May 9, 1927

Fig. 1.

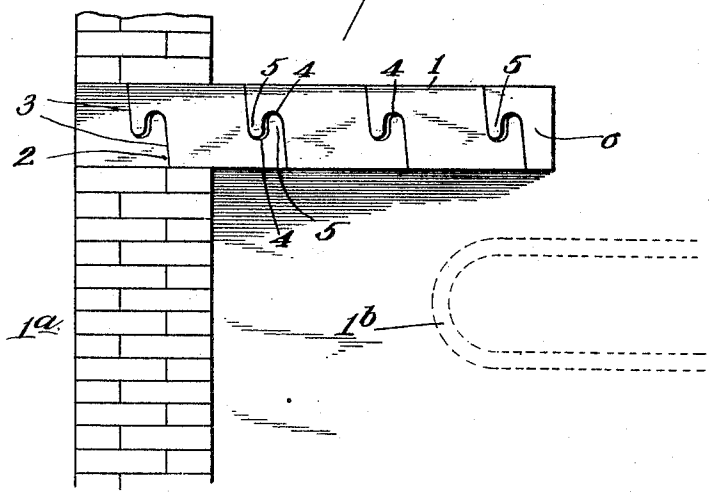


Fig. 2.

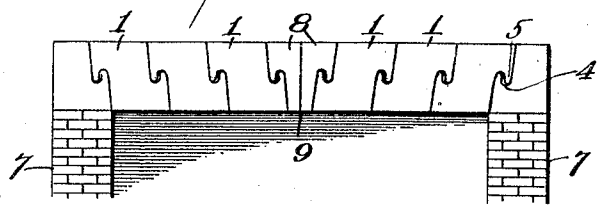


Fig. 3.

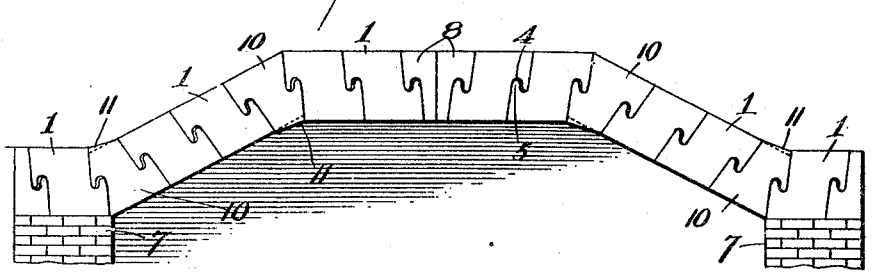
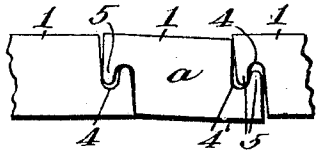


Fig. 4.



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TILE ARCH.

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This invention relates to arches either of the type supported at each end, or at one end by cantilever action, the arches being designed primarily for furnaces and when used in such constructions to be composed of refractory tiles, and my primary object is to produce a standardized tile which is adapted for endwise abutment against and interlocking relation with adjacent tiles of the same type, the interlocking features being of such form that each tile partly overlies and is supported by an abutting tile, and at the same time permits of adjustment of any individual tile to insure regularity of the arch even if a tile should be slightly warped or distorted. In other words, the objective is to provide tiles of such character that—regardless of slight distortion—they can be employed to produce a general straight line arch, horizontal or sloping, as if one tile, due to any defect of form, has a tendency to depart from the general line, the next tile interlocking therewith instead of also following such departure from the desired line, can be adjusted to restore the general alinement desired.

With tiles of an interlocking character, including those shown in my Patent No. 1,618,780, issued February 22, 1927, it has been impossible heretofore to produce a generally level arch without cutting or grinding some of the tongues and grooves, due to the fact that it is impossible to commercially produce refractory tile in large quantities without a degree of distortion or warpage in a fair percentage of the output, and to spring a dependable arch with such tile, skilled and hence expensive labor has been necessary. Accordingly I have sought to produce a standardized tile with the tongue and groove of such relative form and proportion that a dependable, less costly, and more efficient arch can be produced with unskilled labor than skilled labor can produce if the locking features have to be ground or cut, as grinding or cutting of the tongues and grooves weakens the interlocking relationship between the tiles.

A further object is to produce tiles which have the interlocking feature in common, and in which are required but three forms for the production of an entire arch of truss type, regardless of the span thereof. A refractory tile arch which can be sprung to span any reasonable distance without individual support for each tile by braces or struts and in which the tiles may be adjusted to produce a generally level arch—regardless of slight irregularities in the form of one or more tiles,—has long been a desideratum in the furnace building industry.

With the objects mentioned in view the invention consists in certain novel and useful features of construction and combinations of parts as hereinafter described and claimed; and in order that it may be fully understood, reference is to be had to the accompanying drawing, in which:

Figure 1 represents a straight flat cantilever arch construction produced from a single type of tile embodying the invention, and showing the arch sprung from a bridge wall over a chain grate stoker.

Figure 2 is a similar view in which two standardized types of the tile embodying the invention are employed, this figure being representative of an arch of greater span than that shown by Figure 1.

Figure 3 is a view of a truss type arch and is representative of arches of maximum span and greatest load carrying capacity; said arch embodying the two different types of tiles shown in Figures 1 and 2, and a third type making provision for connection between tiles in different horizontal planes.

Figure 4 is a fragmentary view illustrating a slightly displaced tile between and interlocked with a pair of similar tiles occupying a single plane.

Referring to the drawing in detail, 1 indicates a tile for use in all three types of arches disclosed and which may be used exclusively in the type shown by Figure 1 and more extensively in the types shown by Figures 2 and 3, than the other types of tiles disclosed therein. Said tile has vertical faces and parallel ends, which by preference are sloping, and at each end the tile is provided with a step 2, the riser portions 3 being off-set by the width of the steps. The steps of said tile occupy reversed positions, that is, the step at one end faces downwardly and the step at the other end faces upwardly. The steps extend horizontally from one side of the tile to the other and are of substantially compound curve form in cross section so as to produce grooves 4 and tongues 5, the former merging into the latter at one side and at the other into the set-back portions of the risers. The grooves of each tile are struck from greater radii than the tongues, and the axes of the grooves and tongues are

off-set vertically, that is to say, are at opposite sides of a plane indicated by line 6 intermediate of and parallel with the top and bottom of the tile.

Referring now particularly to Figure 1, a series of tiles of the type described are shown in the form of a flat cantilever arch projected from a bridge wall 1ª over the discharge end of a chain grate stoker 1ᵇ. It will be noted that one step of each tile underlies and is interlocked with the reversely facing step of the next tile and forms a support for the latter. To indicate that the vertical off-setting of the axes of the grooves and tongues of the tiles, and that said features must be struck from different radii are important, one of the tiles indicated at *a* (see Figure 4), is shown as slightly sagging—on the assumption that for some reason it has been slightly distorted and hence cannot stand in a perfectly horizontal position,—without preventing such relative adjustment of the next tile as to bring the latter back to the desired plane so that the arch as a whole shall be substantially level, this being accomplished because the peculiarity of the tongues and grooves avoids any cutting or grinding of the tongues or grooves. The arch therefore can be sprung rapidly and economically because it is not necessary to employ skilled labor to set such tile.

In Figure 2, which may be representative of a wider span, two sets of the tiles are shown as sprung from opposite walls 7 of a furnace, and keyed together, preferably by a divided key tile composed of similar but reversed sections 8, these sections preferably having flat abutting faces 9, while their opposite or outer faces conform to and interlock with the adjacent step faces of the proximate tiles 1.

Where an arch of the greatest span and width is desired, tiles 1 are mounted upon the walls 7, and a central portion corresponding to the construction shown by Figure 2, is arranged in a higher plane. Between the adjacent lower tiles superimposed on walls 7 and the central construction, are sloping sections of the arch, these sections usually comprising one or more tiles 1 and pairs of reversely disposed skew tiles 10, which conform in all respects to the other tiles except that the skew tiles taper at their ends, the lower skew tiles tapering upwardly and the upper skew tiles tapering downwardly, it being obvious of course that the skew tiles at their adjacent ends could be interlocked together without the interposition of one or more tiles 1, especially if a very shallow arch was desired. Where the skew tiles are employed, it is preferable to have their top and bottom surfaces slightly out of parallel so that the lower ones may abut the tiles upon the walls without providing a pocket at the top, and the corresponding but inverted tiles abut the central construction, without forming underlying pockets at such points. The pockets referred to which occur if the top and bottom faces of the skew tiles are parallel, are indicated at 11. The occurrence of such pockets however would be unimportant, and it is desired to avoid them simply because, without them, the arch is given a more symmetrical form.

From the above description, it will be apparent that I have produced a tile arch and components thereof which embody the features of construction set forth as desirable in the statement of the objects of the invention, and which is susceptible of modification in minor particulars without departing from the principle of construction involved or from the spirit and scope of the appended claims.

What I claim is:

1. A tile having one end formed intermediate the top and bottom, with a step having a tread surface providing in parallel relation, a horizontal transverse groove merging into one part of the riser face of the step and a horizontal transverse tongue merging into the groove and the other part of the riser face, the groove and tongue being of substantially semi-circular contour in cross section with the former struck from a greater radius than the latter and the axes of the groove and tongue off-set vertically.

2. A tile having its opposite ends formed with reversely facing steps intermediate the top and bottom, each step having a tread surface providing in parallel relation, a horizontal transverse groove merging into one part of its riser face of the step and a horizontal transverse tongue merging into the said groove and the other part of said riser face, the groove and tongue being of substantially semi-circular contour in cross section, with the former struck from a greater radius than the latter and the axes of the groove and tongue off-set vertically.

3. A tile having its ends in converging relation, and each provided intermediate the top and bottom, with a step having a tread surface providing in parallel relation, a horizontal transverse groove merging into one part of its riser face of the step and a horizontal transverse tongue merging into the said groove and the other part of said riser face, the groove and tongue being of substantially semi-circular contour in cross section, with the former struck from a greater radius than the latter and the axes of the groove and tongue off-set vertically.

4. A tile having parallel sides and a flat top disposed at right angles to the sides, and having one end formed intermediate the top and bottom with a step having a tread surface providing in parallel relation, a horizontal transverse groove merging into

one part of the riser face of the step and a horizontal transverse tongue merging into the groove and the other part of the riser face, the groove and tongue being of substantially semi-circular contour in cross section with the former struck from a greater radius than the latter and the axes of the groove and tongue off-set vertically.

5. A tile having parallel sides and a flat top extending at right angles to the sides and having opposite ends formed with reversely-facing steps intermediate the top and bottom, each step having a tread surface providing in parallel relation, a horizontal transverse groove merging into one part of its riser face of the step and a horizontal transverse tongue merging into the said groove and the other part of said riser face, the groove and tongue being of substantially semi-circular contour in cross section, with the former struck from a greater radius than the latter and the axes of the groove and tongue off-set vertically.

6. In an arch, the combination of a pair of spaced tiles having their adjacent ends parallel and provided intermediate such ends with oppositely-facing steps extending from one side of the tiles to the other, each step having a tread surface providing in parallel relation, a horizontal transverse groove merging into one part of the riser face of the respective step and a horizontal transverse tongue merging into the groove and other part of the respective riser face, the grooves and tongues being of substantially semi-circular contour in cross section, with the former struck from a greater radius than the latter and the axes of the grooves and tongues respectively off-set vertically, with a tile interposed between and abutting endwise against said spaced tiles and provided at its ends with steps faced reversely respectively to the steps of the abutted spaced tiles, and formed on its tread portions with tongues and grooves of the same type of construction as the tongues and grooves of said spaced tiles, the tongues of the intermediate tile engaging the grooves of said abutting tile and the grooves of the intermediate tile receiving the tongues of the abutting tiles to interlock the tiles together and at the same time allow for adjustment to provide a generally level arch if the intermediate tile happens to be of slightly warped or distorted form.

7. In an arch, the combination of spaced tiles arranged in different horizontal planes, similar tiles between the spaced tiles and spaced therefrom and arranged in planes sloping between the tiles in the different horizontal planes, pairs of skew tiles arranged in the sloping planes and respectively engaging the spaced tiles in different horizontal planes and the sloping tiles between said tiles in different horizontal planes, the skew tiles in the lower horizontal planes having their ends converging upwardly and the skew tiles in the higher horizontal plane having their ends converging downwardly; all of the tiles having interlocking steps extending transversely and of compound curve in cross section to provide grooves and tongues, the former being struck from a greater radius than the latter and the axes of the grooves and tongues of the respective tiles being off-set vertically.

In witness whereof I hereunto affix my signature.

GEORGE P. REINTJES.