J. G. THOMAS.

CROWNED ARCH CONSTRUCTION.

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1,376,482.

Patented May 3, 1921.

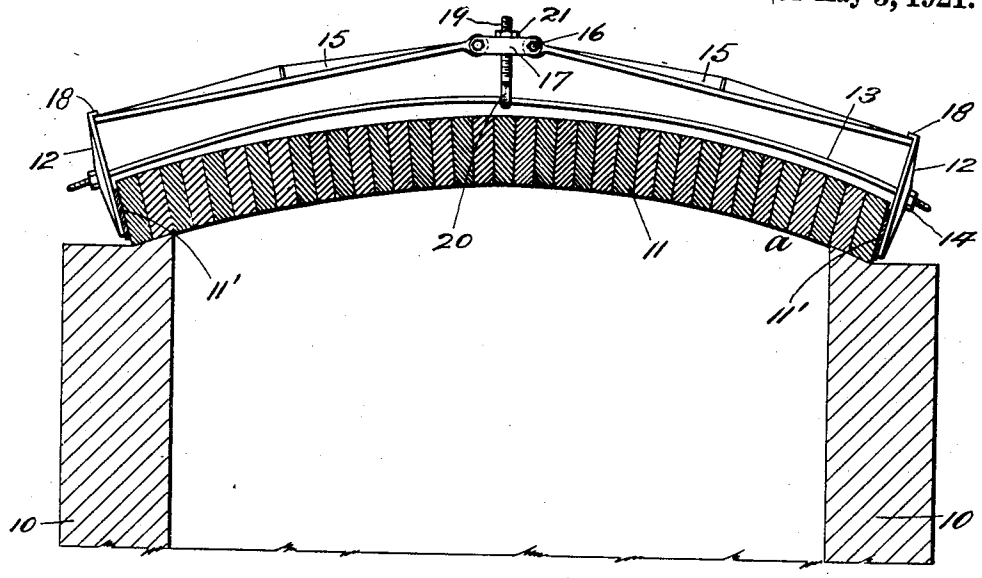


Fig: 1

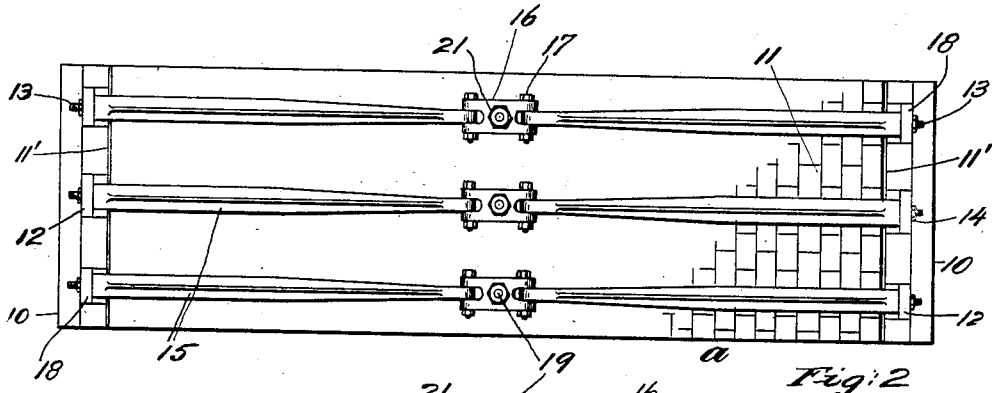


Fig: 2

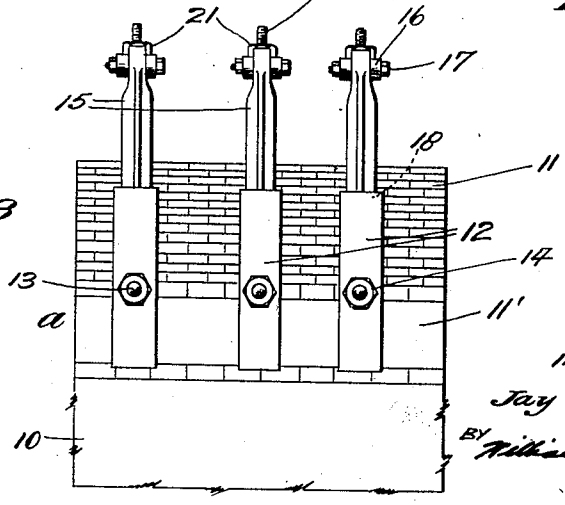


Fig: 3

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CROWNED-ARCH CONSTRUCTION.

1,376,482. Specification of Letters Patent. Patented May 3, 1921.

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To all whom it may concern:

Be it known that I, JAY G. THOMAS, a citizen of the United States, residing at the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improved Crowned-Arch Constructions, of which the following is a specification.

This invention relates to crowned or sprung arches as customarily employed in boiler furnaces, annealing furnaces, reheating furnaces, distilling furnaces, process furnaces and the like.

Under furnace constructions such as are in general use side buck-stays are employed for supporting purposes; skilled brick layers are required in making perfect joints; and in the case of an arch section burning out it becomes necessary to take the furnace out of service during arch repairs.

To overcome these and other disadvantageous features is an object of the present invention. A further object is to provide a self-contained, portable sprung arch construction in which arch sections may be assembled along the furnace side lines and bodily lifted, as by a crane, to place upon the furnace side walls. Other and further objects will thereafter appear.

The invention consists of the improvements hereinafter described and finally claimed.

The nature, characteristic features and scope of the invention will be more fully understood from the following description taken in connection with the accompanying drawings forming part hereof, and in which:

Figure 1, is a view in cross-section of a furnace provided with an arch construction embodying features of the invention.

Fig. 2, is a top or plan view of Fig. 1, and

Fig. 3, is an end view of Fig. 1.

For the purpose of illustrating my invention I have shown in the accompanying drawings one form thereof which is at present preferred by me, since the same has been found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of the instrumentalities as herein shown and described.

In practising the invention two modes of construction may be employed depending upon the fact as to whether new sprung arches are to be installed or whether old arches are to be repaired. In the former instance the arch would probably be built directly in the furnace. In the latter instance the repair would most likely be made by bodily lifting a complete arch section from off the furnace walls, making the repair along the furnace side lines and replacing the section using a crane for lifting purposes. A description will now be given of the manner of building my improved arch directly in the furnace in which 10 designates the furnace side walls. In practice a suitable form is first placed between the walls of the furnace and bricks 11 laid thereon and extended upon the furnace walls to provide sections *a* to form an arch. With the laying of bricks completed to form a section a plate 11′ is positioned in abutting relation with the outermost bricks to take care of the brick work stress. The lower ends of spaced centrally apertured end thrust plates 12 are then placed in abutting relation with each plate 11′ and the said end thrust plates connected by means of tie-bolts 13. Each tie-bolt is curved to substantially correspond to the curve of the arch and is screw-threaded at each end which screw-threaded end passes through an apertured plate the parts being clamped to place by means of nuts 14. Oppositely disposed struts 15 having pivotal relation as at 16 with a central block 17 are positioned above each tie-bolt 13 the free end of each strut engaging beneath a lip 18 upon an end thrust plate. Passing vertically through each block 17 and having screw-threaded relation therewith is a center bolt 19 provided with a hook 20 which engages with a tie-rod 13. A nut 21 is provided for each center bolt. The nuts 14 are first tightened to draw the arch bricks of a section *a* together, Fig. 2 illustrating an example of a complete section in which three sets of tie-rods are employed. Obviously this number may be increased or diminished. The nuts 21 are now tightened which forces down each block 17 and causes the struts 15 to exert pressure at the end thrust plate tops thereby taking care of stress and strain to prevent an arch section falling at its center.

Should certain bricks of a section *a* burn

out the entire section may be lifted from off the furnace walls, as by a crane, and deposited along the side lines of a furnace. The nuts 14 and 21 are then loosened and the struts and tie-rods removed. New bricks are then fitted to place and the struts and tie-rods replaced and the section bodily lifted to place upon the furnace side walls. As an alternative method in case of burning out of bricks of an arch section, frames may be positioned beneath the arch, bolts 14 and 21 loosened, new bricks positioned and the said nuts tightened to draw the section parts together.

Among the advantages claimed for the above described invention mention may be made of the following: An arch section is self contained and portable so as to be removed and replaced as a unit in a few moments time thus insuring a furnace repair without causing the furnace to be out of commission. Skilled brick layers are not required as perfect joints are not necessary and an ordinary mechanic may lay the bricks in a section and position the struts and tie-rods. Side buck stays are eliminated which is very desirable.

It will now be apparent that I have devised a novel and useful construction which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description and while I have in the present instance shown and described the preferred embodiment thereof which has been found in practice to give satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit or scope of the invention or sacrificing any of its advantages.

What I claim is:—

1. In apparatus of the character stated furnace side walls, a sprung arch connected thereacross, end thrust plates at the arch ends, a tie bolt connecting said plates, a strut connecting member, strut pieces each pivoted at one end to said member and in abutting relation with said plates at the opposite end and means for depressing said member to expand the strut pieces laterally of the furnace.

2. In apparatus of the character stated furnace side walls, a sprung arch connected thereacross, end thrust plates at the arch ends, a tie-bolt connecting said plates, a strut connecting member, strut pieces each pivoted at one end to said member and in abutting relation with said plates at the opposite end and a bolt passing through and having screw-threaded relation with said member one end of which is connected with said tie-bolt and the other end of which is provided with a nut.

3. In apparatus of the character stated furnace side walls, a sprung arch connected thereacross, end thrust plates at the arch ends, a tie bolt connecting said plates, nuts upon said tie bolts for effecting adjustments of said plates, a strut connecting member; strut pieces each pivotally connecting said member at one end and in abutting relation with said plates at the opposite end and means for depressing said member to expand the strut pieces laterally of the furnace.

4. In a construction of the character stated a portable sprung arch unit, an end thrust member at each end of said unit, means extended across said unit and connecting with said members for clamping the members with respect to said unit, a strut connecting member, strut pieces each movably connected to said strut connecting member at one end and being in abutting relation with an end thrust member at the other end and means for depressing said strut connecting member to expand the strut pieces laterally of the unit.

5. A construction as described in claim 4, characterized by stress plates interposed between the unit ends and said thrust members.

6. A construction as described in claim 4, characterized by said thrust members each being provided with a lip beneath which a strut piece engages.

7. A construction as described in claim 4, characterized by said means which connects the end thrust members being in the form of a tie-bolt curved to substantially correspond to the curve of the unit.

8. A construction as described in claim 4, characterized by said strut connecting member being provided with bifurcated ends to receive the strut pieces.

In testimony whereof, I have hereunto signed by name.

JAY G. THOMAS.