

July 17, 1923.

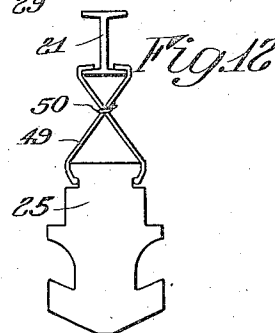
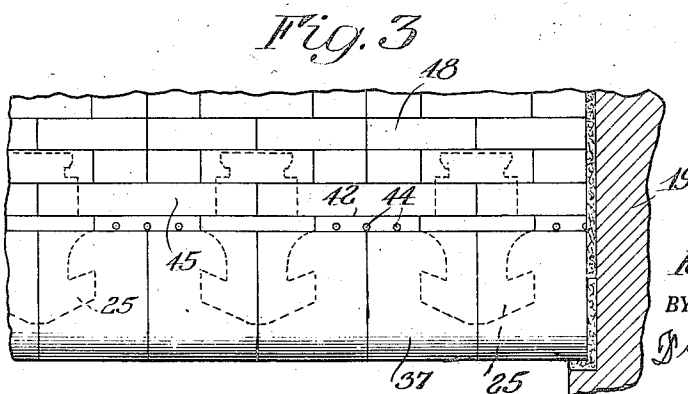
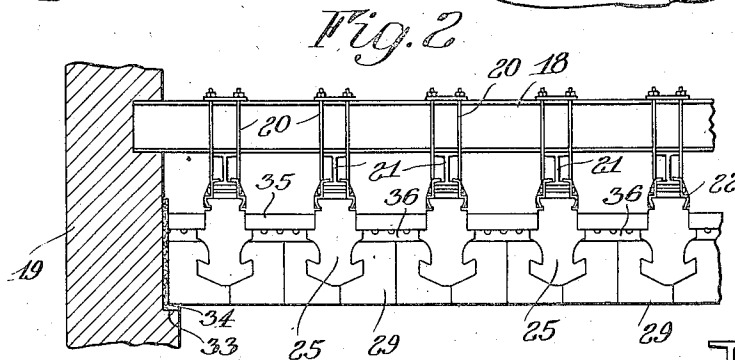
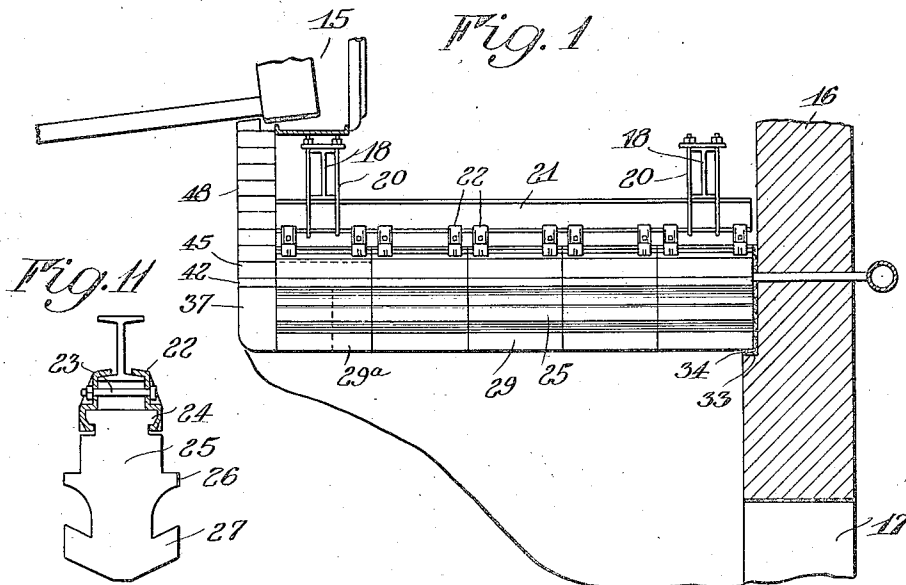
R. D. DE WOLF

1,462,267

FURNACE ARCH

Original Filed Aug. 18, 1920

2 Sheets-Sheet 1



INVENTOR.
Roger D. De Wolf
 BY *Frederick B. Church*
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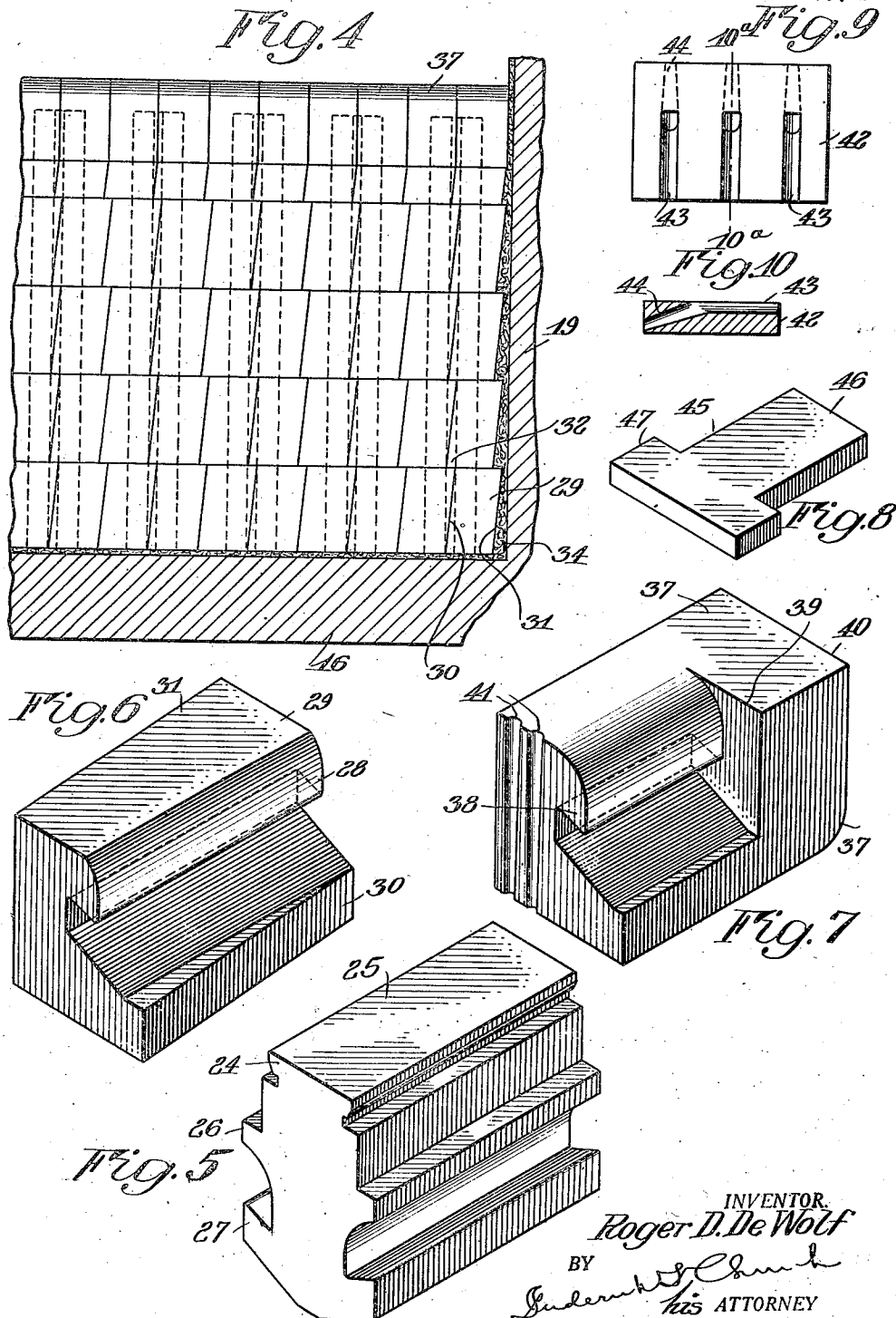
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FURNACE ARCH

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UNITED STATES PATENT OFFICE.

ROGER D. DE WOLF, OF ROCHESTER, NEW YORK.

FURNACE ARCH.

Application filed August 18, 1920, Serial No. 404,425. Renewed June 7, 1923.

To all whom it may concern:

Be it known that I, ROGER D. DE WOLF, a citizen of the United States, residing at Rochester, in the county of Monroe, State of New York, have invented certain new and useful Improvements in Furnace Arches; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference numerals marked thereon.

This invention has to do with furnaces, and more particularly with furnace arch structure, the chief object of the invention being to provide an improved arch which is practical in construction and efficient and durable in operation, with its parts advantageously formed and arranged to facilitate the assembly and replacement thereof. To these and other ends the invention consists in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Figure 1 is a longitudinal sectional view of a portion of a furnace having the present invention applied thereto and shown in elevation.

Figure 2 is a partial end elevation of the front end of the arch.

Figure 3 is a similar view of the rear end of the arch.

Figure 4 is a bottom plan view of the arch.

Figure 5 is a perspective view of one of the hanger bricks of the arch.

Figure 6 is a similar view showing one of the lining or facing bricks.

Figure 7 is a similar view of one of the end facing bricks.

Figure 8 is a similar view of a partition brick.

Figure 9 is a top plan view of a brick used at the inner end of one of the air passages.

Figure 10 is a sectional view of the same on the line 10^a—10^a of Figure 9.

Figures 11 and 12 show different means for supporting the hanger brick on the arch bars.

Similar reference characters throughout the several views indicate the same parts.

The embodiment of the invention herein

disclosed by way of illustration of the principles involved and a preferred mode of application thereof, is shown as adapted for use in an ordinary type of furnace for supplying heat to a water tube boiler indicated generally at 15, Figure 1, the front wall of the furnace being indicated at 16 with an opening 17 for the fire door. In the preferred construction of the arch there are employed two or more laterally extending supporting elements, or I bars, 18, supported at their ends in the side walls 19 of the furnace, Figure 2. Carried by bars 18 are yokes, preferably in the form of U-shaped rods 20, supporting a plurality of longitudinally extending spaced parallel I bars 21, the lower flanges of each of which are engaged by adjustable suspension members comprising pairs of angular metal plates 22. The plates of each pair engage on opposite sides of the bar and are preferably clamped thereto by means of a bolt 23. The lower ends of plates 22 of each pair are turned inwardly towards each other and adapted to engage under ledges 24 adjacent the tops of opposite sides of hanger bricks or tiles 25. A plurality of the latter are thus supported on each bar and arranged in end to end abutting relation from front to rear of the arch, as shown in the drawings, each of the bricks being preferably supported by two pairs of the suspension members, and it is apparent from the construction described that the latter may be separated after removal of bolts 23 to permit each hanger brick to be detached from its supporting element or bar independently of adjacent bricks and their respective supporting element.

The hanger bricks are preferably formed with projecting ledges 26 adjacent their central portions on each side for a purpose which will presently appear. Adjacent the bottoms of the bricks are also formed on each side inwardly and downwardly inclined projecting ledges 27. Engaging with each ledge 27 is a corresponding ledge 28 on a facing or lining brick 29 which is thus securely supported on the hanger brick by reason of the inclination of the ledges, and the lining brick conforms generally to the shape of the lower portion of one side of the hanger brick. Each of the latter thus detachably supports two lining bricks, one on each side, which adjoin each other below

the hanger brick at their lower side portions 30, thus completely lining or facing the arch and thoroughly protecting the hanger bricks from the action of the furnace gases. The sides 30 as well as the opposite plane shaped sides 31 of the lining bricks are not perpendicular to the end faces but inclined thereto to cross the direction of flow of the heated gases in the furnace and also to break joints with one another, as indicated at 32 in Figure 4. As is well known in the art the heated gases have a tendency to burn away or groove the surfaces of the bricks at joints therebetween running longitudinally of the furnace, or in the direction of flow of the gases, and the inclination of the joints between the lining bricks described, by crossing the direction of flow of the gases, tends to overcome their erosive action, and the breaking of joints of course provides also for breaking up the continuity of the joining surfaces to the same end. The tops and bottoms of the lining bricks form plane surfaces, as shown in the drawings.

The front and side walls of the furnace are preferably cut away adjacent the lining bricks as at 33 to permit the latter to be slightly inserted therein, the joint being packed with asbestos or other suitable material 34 to make a tight joint.

Detachably carried on the ledges 26 of the hanger bricks are flat substantially rectangular partition bricks or tiles 35, Figure 2, which are thus spaced from the upper surfaces of the lining bricks so as to leave an insulating chamber 36 between each adjacent row or series of hanger bricks. This chamber may be packed with asbestos or other suitable insulating material, but is preferably left unobstructed and employed as an air passageway for supplying auxiliary air under pressure to improve the combustion in the furnace, as will be further explained hereafter.

To finish and protect the inner end of the arch there are provided end facing or lining bricks or tiles 37, Figures 1 and 7, having for a portion of their length, projecting ledges 38 similar to the ledges 28 of the lining bricks, adapted to detachably engage over the ledges 27 of the hanger bricks, so as to be firmly supported by the latter. The ledge 38 of each end brick preferably ends or terminates as at 39 so that the brick has a solid rear end 40 of substantial thickness which overlaps and projects beyond the rear end of the hanger brick to face and protect the latter, and also to join up with a protective wall 48 extending upwardly to the boiler and protecting the supporting elements and other metal parts from the heat. As the end bricks overlap a portion only of the side of the rear hanger bricks, short lining bricks 29^a are provided to complete the

lining surface over the additional length of the rear hanger bricks.

The abutting ends of the end facing or lining bricks 37 and the short facing or lining bricks 29^a are preferably formed with registering grooves 41, constituting nozzle-like openings tapering slightly from top to bottom, for projecting auxiliary air from chamber 36 with which they communicate into the furnace to aid combustion where chamber 36 is used as an air passageway. To the same end there are placed on the projecting ends 40 of the end bricks a plurality of bricks 42, Figures 1, 9 and 10, closing the rear ends of the chambers or air passageways 36 and having formed therein grooves 43 communicating with the air passageways and passing downwardly through the rear ends of the bricks as at 44. The openings 44 are preferably tapered inwardly toward their rear ends to form nozzles for projecting the air in a downward direction into the furnace as in the case of grooves 41. In furnaces of this type forced draft is frequently used and suitable connections may be made between such source of air supply under pressure and the forward ends of chambers 36 for supplying air to the latter to cool and insulate the arch and also to supply air to the furnace to aid combustion in the manner described. Such air under pressure in passageways 36 also tends to cause a slight leakage of air generally through the joints of the bricks and prevent entry of the hot gases into these joints.

The partition bricks 35 carried by the hanger bricks are continued rearwardly to the end bricks where terminal partition bricks 45, Figure 8, are employed having forward ends 46 similar to the bricks 35 and T shaped rear ends 47. The ends 46 of the terminal partition bricks 45 take the place of final bricks 35 and the T-shaped ends 47 of bricks 45 cover the end portions 39 of the end facing bricks 37. On the ends 47 of the bricks 45 is built a wall 48 for confining the gases and protecting the supporting elements and other metal parts from the heat. It is to be understood that the bricks or tiles of wall 48 are laid as stringers and headers as shown and the weight thereof is carried by the partition bricks 45 so as to leave the end facing bricks 37 free for removal and replacement if desired.

In Figure 12 is shown a modified form of suspension member for supporting the hanger bricks on the bars 21, comprising angular crossed members 49, secured to each other in any suitable manner as at 50, thus forming a tong-like arrangement securely holding the bricks to the bars. This form of construction of the suspension members may be employed where there is considerable head room between the bricks and the bars.

As indicated in the description of the construction, the hanger bricks or tiles are readily detachable from the supporting bars by loosening the suspension members and the shape of the hanger bricks and of the facing or lining bricks carried thereby is such that any one hanger brick with its facing or lining bricks may be readily detached and lowered independently of other hanger bricks and their associated facing bricks for replacing such bricks as may become broken or burned, thus providing for economical repair of the arch with a minimum of labor. The arch has a substantial thickness of fire brick material in the lining bricks protecting the hanger bricks from the furnace gases, which, together with the insulating chamber 36 and the additional partition 35, provides a very substantial arch. The inclined and staggered arrangement of the lining brick prevents the grooving or erosive action of the heated gases on the joints, while the provision for supplying air interiorly of the fire brick and to the furnace serves to cool the arch, aid combustion, and prevent the leakage of hot furnace gases through the joints.

I claim is my invention:

1. A furnace arch comprising a plurality of supporting elements, a plurality of hanger bricks supported by each of said elements independently of the other elements by means providing for the lowering and replacement of the bricks through the combustion chamber, and lining bricks carried by said hanger bricks to protect the latter and form a complete lining for said arch.

2. A furnace arch comprising a plurality of supporting elements, a plurality of hanger bricks detachably supported by said elements and each adapted and arranged for individual detachment therefrom independently of the other hanger bricks, and lining bricks carried by said hanger bricks to protect the latter and form a complete lining for said arch.

3. A furnace arch comprising a plurality of supporting elements, a plurality of hanger bricks detachably supported by said elements and each adapted and arranged for individual detachment therefrom independently of the other hanger bricks, and a lining brick carried by each of said hanger bricks and detachable therewith.

4. A furnace arch comprising a plurality of supporting elements, a plurality of hanger bricks detachably supported by said elements and each adapted and arranged for individual detachment therefrom independently of the other hanger bricks, and a plurality of lining bricks carried by each of said hanger bricks and detachable therewith independently of the other lining bricks.

5. A furnace arch comprising a plurality of supporting elements, a plurality of hanger bricks detachably supported by each of said elements and each adapted and arranged for individual detachment therefrom independently of the other hanger bricks, and a lining brick carried by each of said hanger bricks and detachable therewith.

6. A furnace arch comprising a plurality of supporting elements, adjustable suspension members on said elements, a plurality of hanger bricks each detachably supported by said members for individual detachment independently of the other hanger bricks, and a lining brick carried by each hanger brick and detachable therewith.

7. A furnace arch comprising a plurality of supporting elements, adjustable suspension members on each of said elements, hanger bricks supported by the members of each of said elements independently of the other elements and each adapted and arranged for individual detachment independently of the other hanger bricks, and a lining brick carried by each hanger brick and removable therewith.

8. A furnace arch comprising a plurality of supporting elements, a plurality of hanger bricks, an adjustable clamping member for detachably suspending each of said hanger bricks from one of said elements, said parts being adapted for the detachment of each hanger brick independently of the other hanger bricks, and a plurality of bricks for completely lining the under surface of the arch each carried by one of said hanger bricks and detachable therewith.

9. A furnace arch comprising a plurality of supporting elements, a plurality of hanger bricks detachably supported by said elements and each adapted and arranged for individual detachment therefrom independently of the other hanger bricks, and a plurality of bricks for lining the under surface of the arch arranged to break joints with each other and each carried by one of said hanger bricks and detachable therewith.

10. A furnace arch comprising a plurality of supporting elements, adjustable suspension members on said elements, a plurality of hanger bricks each detachably supported by said members for individual detachment independently of the other hanger bricks, and a plurality of bricks for lining the under surface of the arch having their sides inclined to cross the direction of flow of the heated gases and to break joints with one another and each carried by one of said hanger bricks and detachable therewith.

11. A furnace arch comprising a plurality of supporting elements, a plurality of hanger bricks detachably supported by said

elements and each adapted and arranged for individual detachment therefrom independently of the other hanger bricks, and a pair of lining bricks detachably carried on opposite sides of each hanger brick for protecting the latter from the furnace gases and for detachment therewith independently of the adjacent lining bricks.

12. A furnace arch comprising a plurality of supporting elements, a plurality of hanger bricks detachably supported by said elements, and a plurality of bricks for lining the under surface of the arch having their sides inclined to cross the direction of flow of the heated gases and to break joints with one another and each detachably carried by one of said hanger bricks and detachable therewith.

13. A furnace arch comprising a plurality of supporting elements, a plurality of hanger bricks detachably supported by said elements, lining bricks detachably carried by said hanger bricks adjacent their bottoms and detachable therewith, and a plurality of bricks carried by said hanger bricks above said lining bricks in spaced relation with the latter to form an insulating chamber.

14. A furnace arch comprising a plurality of supporting elements, a plurality of hanger bricks detachably supported by said elements and each adapted and arranged for individual detachment therefrom independently of the other hanger bricks, lining bricks detachably carried by said hanger bricks adjacent their bottoms and detachable therewith, and a plurality of bricks detachably carried by said hanger bricks above said lining bricks in spaced relation with the latter to form an insulating chamber.

15. A furnace arch comprising a plurality of supporting elements, a plurality of hanger bricks supported by said elements and individually detachable therefrom, lining bricks carried by said hanger bricks and detachable therewith, and end bricks detachably carried by the hanger bricks at the end of the arch and projecting beyond the latter to support a protective end wall.

16. A furnace arch comprising a plurality of supporting elements, a plurality of hanger bricks supported by said elements and individually detachable therefrom, lining bricks carried by said hanger bricks and detachable therewith, a plurality of end bricks detachably supported and arranged to project beyond the inner end of the arch, a protective end wall supported on said end bricks, and a plurality of bricks detachably carried by said hanger bricks above said lining bricks in spaced relation therewith

and joining said end wall to form an insulating chamber.

17. A furnace arch comprising a plurality of supporting elements, a plurality of hanger bricks supported by said elements and individually detachable therefrom, lining bricks carried by said hanger bricks and detachable therewith, a plurality of end bricks detachably supported and arranged to project beyond the inner end of the arch, a plurality of bricks detachably carried by said hanger bricks above said lining bricks in spaced relation with the latter to form an insulating air chamber, and a protective end wall on the projecting portions of said end bricks having bricks closing the end of said air chamber and formed with nozzles communicating therewith for projecting auxiliary air into the furnace.

18. A furnace arch comprising a plurality of supporting elements, a plurality of hanger bricks supported by said elements and individually detachable therefrom, lining bricks carried by said hanger bricks and detachable therewith, a plurality of end bricks detachably supported and arranged to project beyond the inner end of the arch, a plurality of bricks detachably carried by said hanger bricks above said lining bricks in spaced relation with the latter to form an insulating air chamber, and a protective end wall on the projecting portions of said end bricks, said end bricks and end wall having openings therein communicating with said air chamber for projecting auxiliary air into the furnace.

19. A furnace arch comprising a plurality of supporting bars provided with suspension members, hanger bricks supported by said members for individual detachment, lining bricks detachably carried by said hanger bricks and arranged to break joints with one another, a plurality of bricks detachably carried by said hanger bricks above said lining bricks in spaced relation therewith to form an insulating chamber, end bricks supported on said hanger bricks at the inner end of the arch, and a brick wall on said end bricks to close said chamber and protect said bars.

20. A furnace arch comprising supporting elements, hanger bricks, supporting means connecting said elements and hanger bricks constructed and arranged to provide for removal of said hanger bricks by lowering the same into the furnace, and lining bricks carried by said hanger bricks to protect the latter and form a lining for the arch.

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