Aug. 20, 1935. J. E. ANDERSON 2,011,701

FURNACE CONSTRUCTION

Filed Feb. 5, 1932 2 Sheets-Sheet 1

Fig. 1.

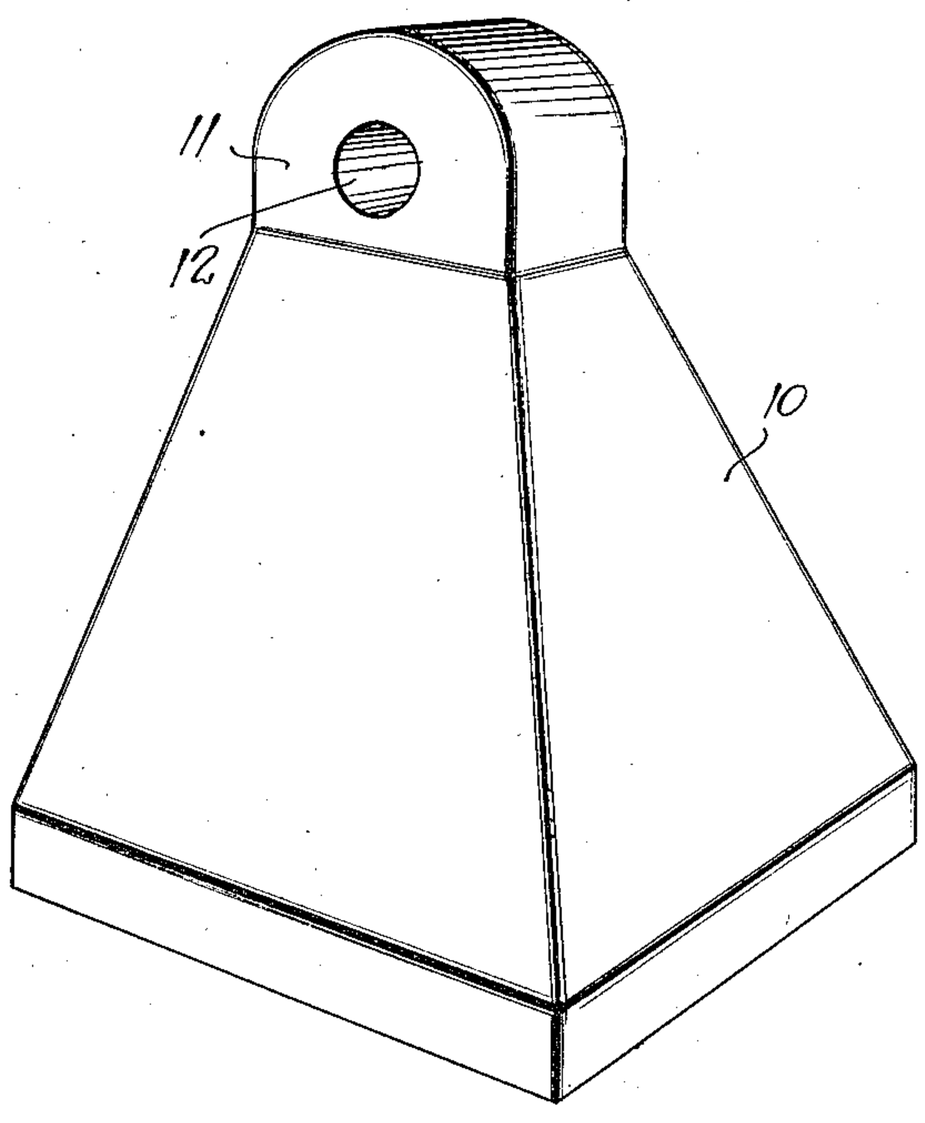

Fig. 2.

Inventor:
John E. Anderson
By Brown, Jackson, Boettcher & Dienner
Atty's.

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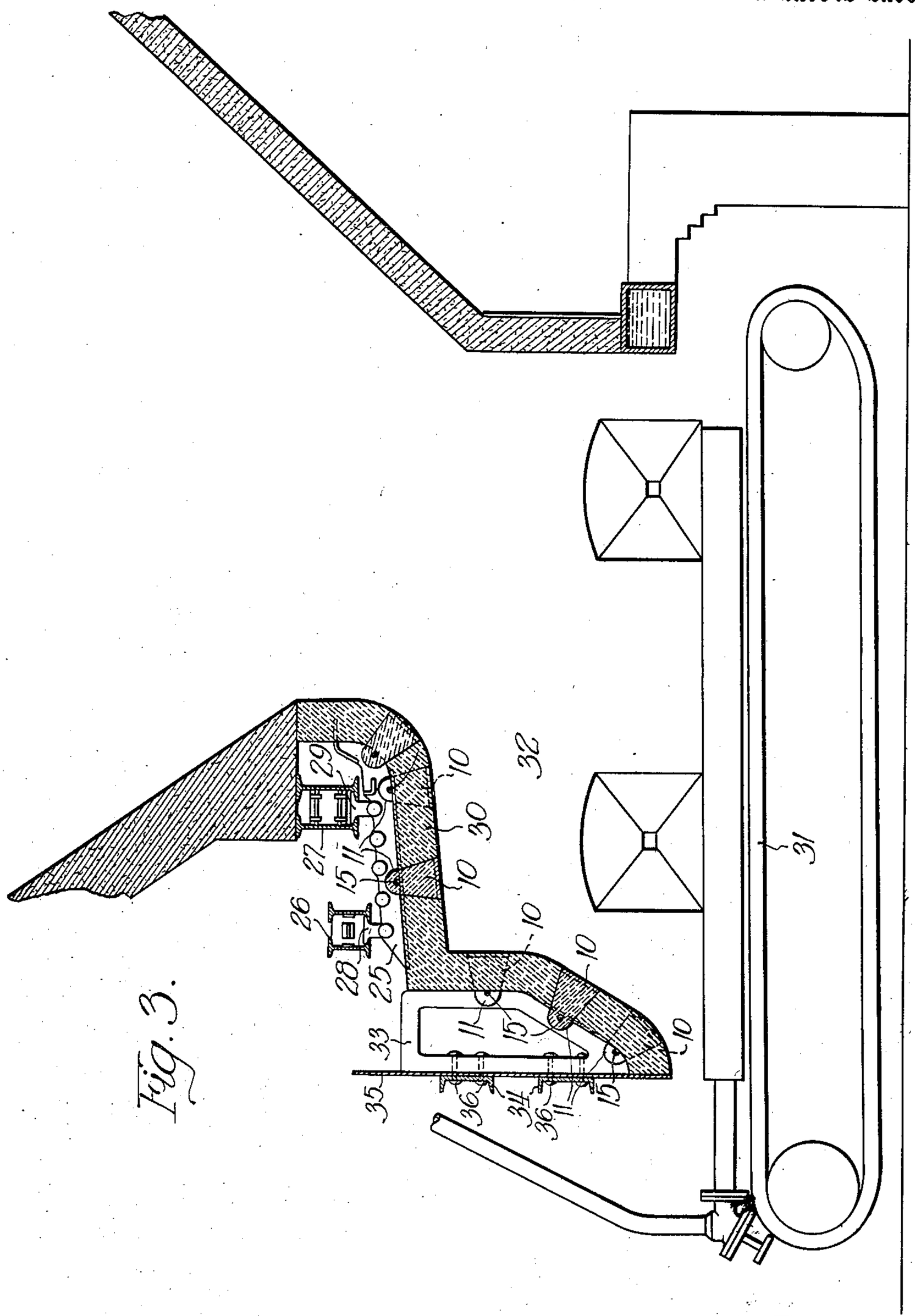

Fig. 3.

Inventor:
John E. Anderson.

By Brown, Jackson, Boettcher & Dienner
Attys.

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UNITED STATES PATENT OFFICE

2,011,701

FURNACE CONSTRUCTION

John E. Anderson, Chicago, Ill., assignor to Plibrico Jointless Firebrick Company, Chicago, Ill., a corporation of Illinois

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5 Claims. (Cl. 110—99)

This invention relates to furnace construction, more particularly to arch construction and to anchors for supporting such arches.

It is old in the art to construct arches for furnaces and the like from fire brick which are shaped to engage a rigid supporting structure located above the arch and outside of the fire zone of the furnace. Arches constructed in this manner are polylithic. It is also old to construct such arches from a plastic material into which metallic supporting devices are embedded to aid in supporting the arch. This plastic material is fused by the heat of the furnace to form a monolithic arch. My present invention refers more particularly to a monolithic arch of this type.

In the preferred embodiment of my invention the plastic material is supported by a plurality of spaced refractory anchors which are embedded in the arch structure. These anchors project above the upper surface of the arch, that is outside of the fire zone of the furnace, where they are engaged by metallic supporting members. These metallic supporting members are in turn loosely engaged with a rigid supporting frame. By this arrangement, the structure is securely supported but at the same time the supporting device is capable of movement to compensate for expansion and contraction of the arch under heating and cooling of the furnace.

The refractory anchors embedded in the mass of plastic material forming the arch are composed of the same material as the arch itself and under the heat of the furnace the anchors and arch may be fused together to form a monolithic structure. Since the material in the arch and anchors is the same, the expansion of the arch is uniform throughout and there is no tendency for the expansion and contraction of it to aid the formation of cracks. The metal is all outside the arch and its expansion will not disrupt the arch.

My invention will be best understood by reference to the accompanying drawings in which a preferred embodiment of it is shown by way of example and in which:

Fig. 1 is a perspective view of the anchor of my invention in its preferred form;

Fig. 2 is an isometric view of an arch built in accordance with the teachings of my invention; and

Fig. 3 is a cross sectional view through a furnace showing the adaptation of my approved arch thereto.

Referring to the drawings now in more detail, the anchor 10 preferably comprises a generally pyramidal body having a substantially rectangular apex 11 which is pierced by a transversely disposed hole 12. The anchor is formed of a plastic material and is burned to refractory hardness. The shape shown is by way of example only and may be varied. The dimensions of the anchor will of course depend upon the thickness and weight of the arch that it is designed to support.

In the arch shown in Fig. 2 the anchors 10 are supported upon rods or pipes 15 extending through the openings 12 in the apex portion of the anchors. These rods rest upon the flanges 16 and 17 of rigid I-beam supports 18 and 19, respectively. The ends of the rods 15 are not rigidly attached to the supports 18 and 19 but rather are permitted of limited movement with respect thereto to allow for expansion and contraction of the arch.

The arch 20 is composed of a plastic material set between the spaced anchors 10. A suitable form, not shown, is employed to support the plastic material during the setting of the arch. Preferably the material from which the arch 20 is formed is the same as that employed in the manufacture of the anchors 10. After the arch has set the supporting form is removed and the arch is subjected to a high temperature which bakes out the material 20 and may fuse it with the anchors 10 to form a monolithic arch. During the heating of the arch anchors 10 may move upon the supporting rod 15 and the rod 15 may move upon the supporting members 18 and 19 to compensate for expansion of the arch.

In Fig. 3 I have shown the arch applied to a boiler setting. In this figure anchors 10 are supported upon supporting rods 15 which engage flanged supporting members 25. These members are themselves supported from the structural frame members 26 and 27 of the boiler setting by suitable brackets 28 and 29, respectively, pivotally connected at their lower ends to members 25, on horizontal axes, as shown in Figure 3. Each of the members 26 and 27 conveniently comprises a pair of parallel I-beams between which the upper end of the bracket passes, each bracket having at its upper end an enlarged head which seats loosely upon the lower flanges of the I-beams, as in Figure 3. As the arch 30 expands anchors 10 may move upon the supporting rods 15 and those rods may move upon the supporting member 25, as before. Supporting member 25 is itself capable of limited movement with respect to the structural supports

26 and 27 of the boiler setting because of the pivotal connections between supports 25 and said brackets 28 and 29, and the loose connections between these brackets and the frame members 26 and 27. The arch 30 is located immediately above the stoker 31 of the furnace and forms a roof for the combustion chamber 32. The front or drop portion of the arch 30 is similarly supported by refractory anchors 10 which are carried by rods 15. These rods are suitably supported, for example, by bracket 33, which is preferably a casting. The bracket 33 is in turn supported by channels 34 which form a part of the face 35 of the boiler setting. The brackets 33 are attached to the channels in any preferred manner such as by rivets 36.

When the furnace is fired the heat in the combustion chamber may fuse the plastic material of the arch 30 with the anchors 10 to form a monolithic structure, but ordinarily the temperature in the furnace will not be high enough to fuse the material. In all instances the temperatures encountered will be sufficient to thoroughly bake out and harden the plastic material. When so hardened the plastic material will form a tight joint with the anchors and the infiltration of air will be prevented.

Having thus described my invention, what I consider new and desire to have protected by Letters Patent is pointed out in the appended claims.

What is claimed is:

1. In combination in a furnace arch construction, a refractory mass, a plurality of anchors secured to and projecting above the mass, supporting members above the mass, and cylindrical supporting rods passed loosely through the upper ends of the respective anchors, the ends of the rods resting freely upon the supporting members and constituting rollers accommodating relative movement of the anchors in either direction transversely of the respective rods and substantially parallel to the mass.

2. In combination in a furnace setting and an arch construction therefor, frame members, supporting members, means pivotally and loosely suspending the supporting members from the frame members for movement relative thereto, a refractory mass constituting the roof of the arch, a plurality of anchors secured to and projecting above the mass, and suspending rods passed through the upper ends of the anchors and resting freely upon said supporting members.

3. In combination, a plurality of supporting members disposed in substantially parallel and spaced relation, each of said members comprising a base flange and an upwardly extending web, a mass of refractory below the supporting members, anchors secured to and projecting above the mass and between said members, and rods passed through the anchors and resting freely upon and otherwise free from the flanges of the supporting members, the rods being confined against objectionable endwise movement by the webs of said supporting members.

4. In combination, a plurality of supporting members disposed in substantially parallel and spaced relation, each of said members comprising a base flange and an upwardly extending web, a mass of refractory below the supporting members, anchors secured to and projecting above the mass and between said members, and cylindrical rods passed loosely through the anchors and resting freely upon the flange of the supporting members.

5. In combination, a plurality of supporting members disposed in substantially parallel and spaced relation, a mass of refractory, anchors secured to and projecting above said mass and between said members, and rods passed through the anchors and resting freely upon the supporting members and otherwise free therefrom for relative movement lengthwise thereof, said supporting members being provided with upwardly extending elements disposed to confine said rods against objectionable endwise movement.

JOHN E. ANDERSON.