Dec. 10, 1929. B. DOBIE 1,738,527

FURNACE ARCH

Filed Aug. 18, 1924

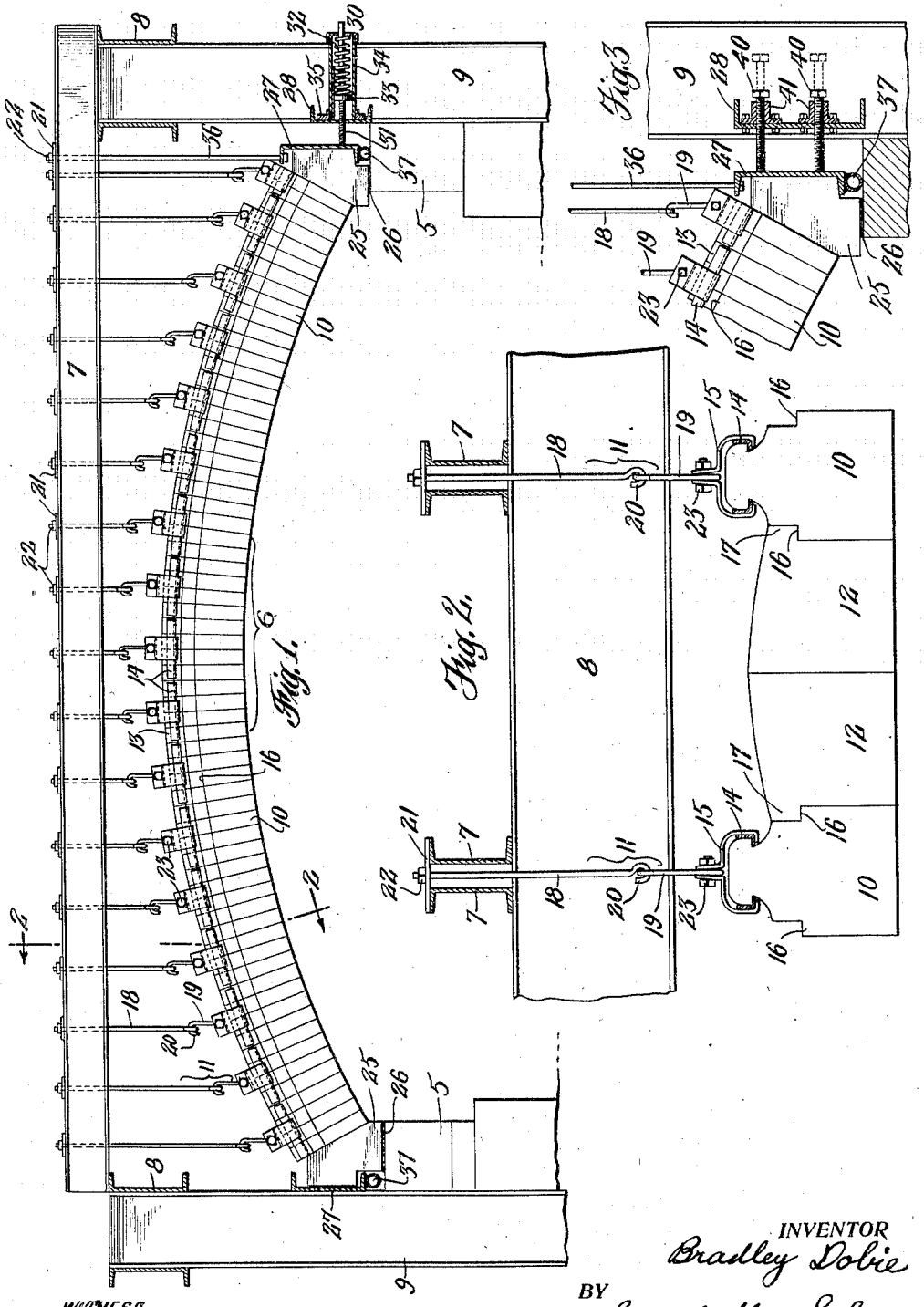


Fig. 1.

Fig. 2.

Fig. 3.

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FURNACE ARCH

Application filed August 18, 1924. Serial No. 732,631.

My invention relates to furnace arches and their construction, such as hung arches or roofs for metallurgical furnaces. It involves various features of such arches, including their support, their end construction, and their brick structure. I have hereinafter explained the invention with special reference to embodiment in a sectional sprung arch well adapted for open hearth furnaces.

In the drawings, Fig. 1 is a fragmentary end view of a furnace and an arch constructed in accordance with my invention.

Fig. 2 shows an enlarged section lengthwise of the arch, taken as indicated by the line 2—2 in Fig. 1.

Fig. 3 is a fragmentary view illustrating a construction at one end or side of the arch somewhat different from that shown in Fig. 1, and in which the adjusting screw arrangement is not, per se, part of my invention.

In Fig. 1 of the drawing, the upper portions of the side walls 5, 5 of the furnace appear, and also its arched roof 6. The roof 6 is suspended from a suitable supporting structure, such as cross beams 7 resting on longitudinal beams 8 at the upper ends of uprights 9, here shown as buckstays for the furnace walls 5. The roof 6 comprises a series of transverse bungs 10, suspended from the cross beam 7 by hangers 11, and intermediate filler bungs 12 between and supported by the directly hung bungs 10. The brick of the bungs 10 have under-cut heads 13 which rest on short angle bars or rails 14,—in the present instance, four brick to each rail. The rails 14 are held by pairs of grapple-like clamps 15 that hook under the rails. The edges of the brick 10 are shouldered as indicated at 16, and the corresponding edges of the filler brick 12 have shoulders 17 that rest on the shoulders 16. In the present instance, the filler brick 12 are "split", and arranged in pairs between the bung brick 10. As shown, the brick 12 bulge upward in the middle, so as to give higher bearing at their adjacent faces and so minimize the effects of gradual erosion on their security. Accordingly, the brick 12 are considerably longer on their mating sides than on their supported sides.

The hangers 11 comprise sections 18, 19 flexibly and detachably inter-engaged by the hook and eye formation of their ends at 20, as illustrated in Figs. 1 and 2. The upper hanger sections 18 extend through cap pieces 21 spanning the top of pairs of channels 7 arranged back to back, and are adjustably secured by nuts 22 resting on said cap pieces. The lower hanger sections 19 are secured to the clamps 15 by the bolts 23 that hold the latter together. This sectional construction of the hangers 11 facilitates installation and taking down of the arch. As shown, there is one of the hangers 11 for each pair of the bars 14.

At the ends of the bungs 10, 12 are abutments in the form of skew brick or blocks 25 resting on top of the walls 5, 5, with an interposed layer of sand or the like 26 for sealing the joint. Laterally, the abutments 25 rest against longitudinal skew members or channels 27. As here shown, the skew member 27 at the left of Fig. 1 rests or engages loosely against the corresponding buckstays 9, and may, if desired, be suitably secured thereto. The right hand skew member 27 is laterally sustained from another longitudinal channel member 28 (or series of such members) attached to the buckstays 9.

In Fig. 1, this is accomplished by yielding supporting devices 30, comprising plungers 31 loosely engaging the outer faces of the skew members 27 and actuated by helical compression springs 32. These springs 32 act between abutment discs 33 screwed on the members 31 and caps on the outer ends of tubular casings 34 whose inner ends are secured to the member 28 by flanges 35. The outer ends of the rods 31 project through the caps so that by turning the rods their projection inward beyond the abutments 33 can be altered, and the spring tension of the devices 30 thus adjusted to get the right pressure for holding the bung brick 10, 12 snug and close against one another. The right hand skew member 27 does not rest on the top of the wall 5 or on the brick 25 with which it is associated, but "floats" free, so to speak, so as to be easily shifted laterally upon occasion. As here shown, it is suspended from the

transverse members 7 by hanger rods 36 extending through its upper flange. At their upper ends, the hangers 36 are secured by cap plates 21 and nuts 22, just as the hangers 11 are secured.

As shown in Fig. 1, pipes 37 for air, water, or other cooling fluid extend along the tops of the walls 5 just outside the joints 26, being suitably attached to the superjacent lower flanges of the skew channels 27.

In Fig. 3 is shown a somewhat modified construction, especially adapted for tilting furnaces, such as open-hearth furnaces. (This specific modification, however, is not a part of my present invention but forms the subject matter of the copending application of R. J. Himmelright, Serial No. 732,168, filed Aug. 15, 1924, and assigned to the assignee of this application.) In such furnaces, the charging door is at one side, and the tap opening by which the charge of metal is run out is at the other side. In this case, compensation or adjustment for expansion of the arch due to temperature variation must be made at the tapping side, since at the charging side the raising of the door to open would be prevented by the devices 30, if there applied. Inasmuch, however, as the tilting of the furnace throws the weight of the arch to the tapping side very heavily, the springs 32 would be incapable of sustaining it unless so stiff as to exert excessive resistance to expansion of the arch when the furnace is not tilted. For such tilting furnaces, therefore, there is provided adjusting screws 40 threaded through flanged hubs 41 fastened to the longitudinal member 28. These screws 40 can be backed off to allow the roof to expand while the bottom of the furnace is being "made," and it is being fired up. After the roof is fully expanded, the screws 40 are tightened up firm aganist the skew member 27, so as to hold the brick of the bungs 10, 12 tightly together, and to sustain the thrust firmly when the furnace is tilted.

I claim:

1. The combination with a suspended furnace arch, of a hanging skew brick backing member and adjustable lateral sustaining means therefor.

2. The combination with a suspended furnace arch comprising supported bungs of brick, of a suspended skew brick backing member therefor.

3. The combination with a furnace wall and a suspended arch, of a skew brick backing member for said arch swingable relatively to said wall, and means of suspension for said member.

4. A furnace roof comprising hung brick and split filler brick bulging upward between said hung brick.

In testimony whereof, I have hereunto signed my name.

BRADLEY DOBIE.