Nov. 9, 1926. 1,606,315

J. MORRIS

FURNACE ARCH

Filed Jan. 9, 1920 2 Sheets-Sheet 1

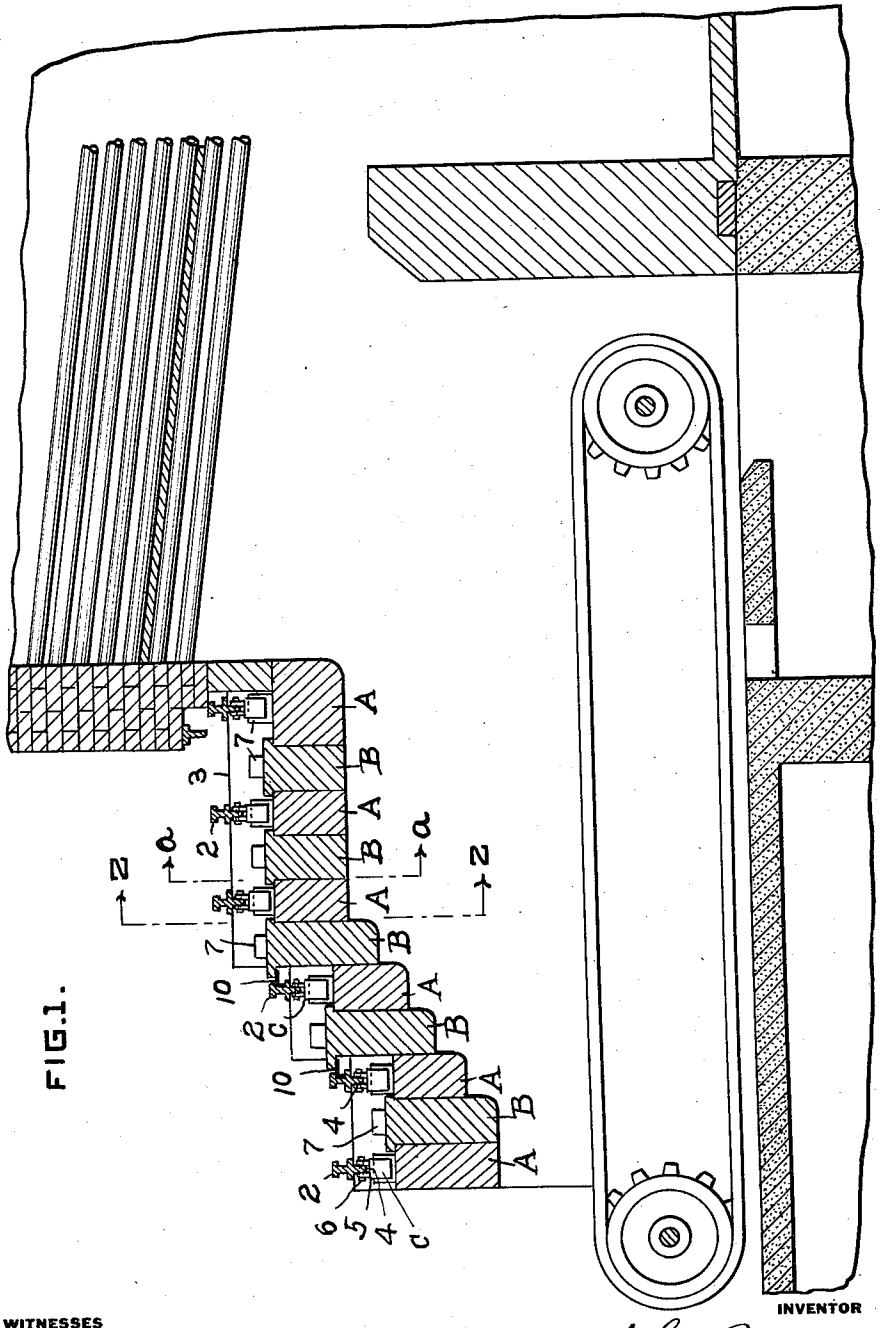


FIG. 1.

WITNESSES

J. Herbert Bradley.

INVENTOR

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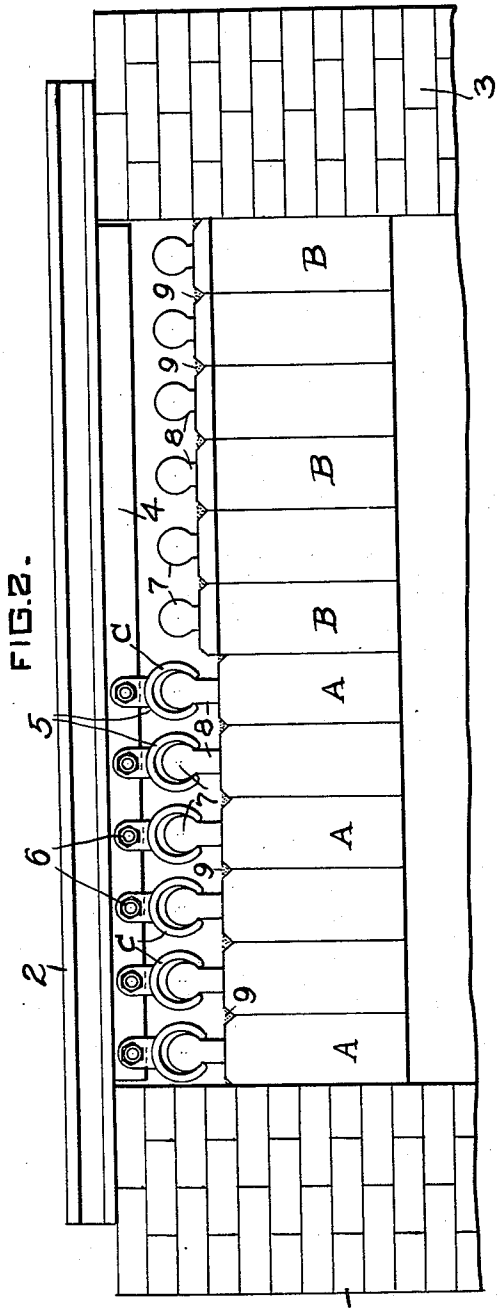
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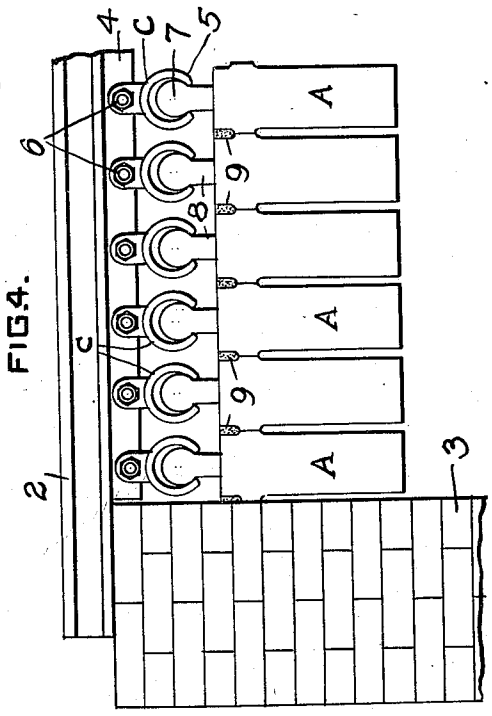
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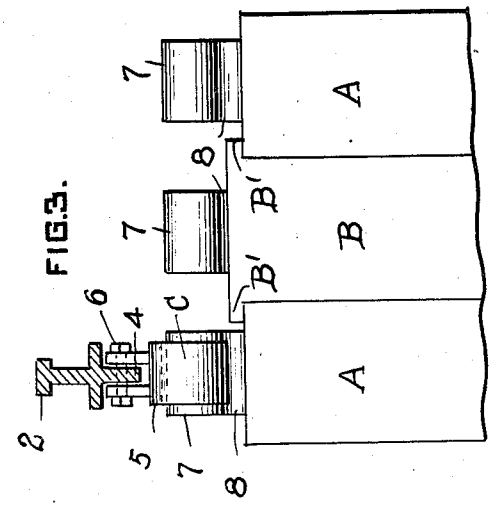
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FURNACE ARCH

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WITNESSES

J. Herbert Bradley.

INVENTOR

John Morris

By Jno. A. Green

his Atty.

Patented Nov. 9, 1926. 1,606,315

UNITED STATES PATENT OFFICE.

JOHN MORRIS, OF BAYONNE, NEW JERSEY, ASSIGNOR TO COMBUSTION ENGINEERING CORPORATION, A CORPORATION OF NEW YORK.

FURNACE ARCH.

Application filed January 9, 1920. Serial No. 350,301.

My invention relates to furnaces and particularly to furnace arch construction. The usual, sprung type of furnace arch must be built by skilled bricklayers, is rigid and integral when completed and provides no adequate means for accommodating expansion and contraction due to variations in temperature. Its weight is so carried to the furnace walls, which form the arch abutments, that bracing means for the latter are necessary. If the bricks used in the arch are capable of further shrinkage and the operating heat of the furnace is sufficient to produce same, arch failure is a likely result. Aside from these disadvantages, the sprung arch is not efficient because it deflects the heating gases from an uniform distribution to the boiler tubes. A flat arch is the most practical remedy for this defect.

The main object of my invention is to avoid the concave undersurface of sprung arches. Another object is to eliminate the buckstays and tie rods in arch supporting wall construction. Another object is to construct a furnace arch so that any tile or brick may be removed for replacement or other purpose without materially disturbing the arch and, if necessary, while the furnace is in operation. Another object is to provide for expansion and contraction, even or uneven, of the arch bricks when alternately heated or cooled.

In the acompanying drawings, illustrating my invention, Figure 1 is a longitudinal, vertical section thru a flat arch of my construction as applied to a boiler equipped with a common form of stoker; Fig. 2 is a transverse, vertical section, the left hand side of which is taken on line 2—2 of Fig. 1 and the right hand side of which is taken on the line *a*—*a* of Fig. 1, the planes of the sections being located so as to show the arch-forming bricks in elevation; Fig. 3 is a side elevation of several adjacent bricks and a section of their suspending element, and Fig. 4 is a partial section, corresponding to sections shown in Fig. 2 but showing a modified construction of bricks.

The bricks composing my arch are of two different types, A and B. While individuals of each type may vary in size and shape, all of type A brick are adapted to support those of type B. Each type A brick is preferably provided with a hanger for suspension from an overhead beam and each type B brick is adapted to engage adjacent type A bricks to be supported thereby.

My arch is suspended from beams 2 supported on the side walls 3 of the furnace. A preferred section for beams 2 is shown in Fig. 3 and consists of an I shape having a central depending flange 4. Type A bricks are suspended from beams 2 by hanger members 5 which have a body portion, C shaped in section and resembling a hollow cylinder with a longitudinal opening in its side extending from end to end. At right angles to the axis of this cylindrical body portion and opposite the longitudinal opening, is an integral, clevis like portion adapted to admit flange 4 of beam 2 and to be pivotally secured thereto by a bolt 6.

The depth and width and the contour of the lower portion of each of the bricks may vary to suit different requirements but tops of same are provided with uniform knobs 7. Each knob 7 is substantially cylindrical with a diameter less than the inside diameter of the cylindrical body of hanger 5 but exceeding the width of the longitudinal opening therein and this cylindrical portion of knob 7 is united to the body of the brick by a comparatively narow shank 8 the thickness of which is less than the width of the hanger opening. Bricks A may be assembled with hangers 5 by alining knob 7 with the hanger body and sliding the former into the latter.

Alternate, horizontal courses of the arch are composed of a plurality of bricks A, each suspended from a beam 2 by an individual hanger 5. The left hand side of Fig. 2 illustrates such a course. The intermediate courses are composed of a series of bricks B with their supporting flanges B′ overlapping the tops of bricks A. The right hand side of Fig. 2 shows such a course. After bricks A are assembled with their respective hangers by relative lateral movement transversely of the row, bricks B are lowered into place with flanges B′ engaging the tops of bricks A.

The beveled or recessed portions 9 of adjacent bricks in the same course cooperate to form a channel adapted to receive fireclay or other sealing material. The overlapping flanges of bricks B seal the crevices between adjoining bricks in adjacent courses. The freedom of each brick to swing slightly upon its pivotal support and the difference in diameter of knob 7 and the interior of hang-

er 5 provide ample room for expansion of the brick. It will be noted that rails 2 and hangers 5, obviously of metal, are not enclosed by the arch bricks and the air outside the furnace can circulate freely around these metal parts and prevent their being heated to a deteriorating temperature. The entire weight of the arch is transferred to the walls 3 as a vertical load so that the walls need no lateral bracing.

Fig. 1 shows angles 10 secured to the side of beams 2 with the horizontal flange of each angle supporting adjacent B′ of a course of type B bricks. This avoids manufacture of a brick having offset flanges to accommodate the stepped construction desired at this part of the arch.

Fig. 4 shows a modified form of arch in which the bricks are provided with projecting abutting faces 11 which act as spacing means for maintaining the major portion of each brick in spaced relation to the adjacent bricks. This provides for lateral expansion of the bricks under the heat of the furnace.

Any type B brick may be removed by gripping its knob 7 with a suitable tool and lifting it from the arch. Any type A brick may be removed by first removing the two adjacent type B bricks which it is supporting and sliding it horizontally, so as to disengage its respective hanger 5, and then lifting it from the arch. Or its bolt 6 may be withdrawn and the hanger and brick removed together.

I claim:—

1. In a furnace arch, an overhead structure, a plurality of rows of hollow cylindrical brackets depending therefrom, a plurality of rows of bricks each having a cylindrical extension adapted to be loosely received in one of said hollow brackets so as to permit relative movement of said bricks thereto, intermediate rows of shouldered bricks supported on said first named bricks and a projection on each of said shouldered bricks for permitting removal thereof from the arch during operation of the furnace.

2. A furnace including an overhead structure, means for loosely supporting a plurality of bricks therefrom for free vertical movement relatively thereto and abutting shoulders on each of said bricks for maintaining the major portions of the adjacent bricks in spaced relation with respect to each other so as to permit lateral expansion thereof.

3. In a furnace arch, an overhead structure, a plurality of rows of bricks, means for supporting alternate rows thereof from said overhead structure, means for supporting the bricks of the intermediate rows on the bricks of said alternate rows and means on said overhead structure for supporting one side of the bricks in an intermediate row adjacent the side of the arch.

4. In a furnace arch, an overhead structure, a plurality of rows of bricks, means for supporting alternate rows from said overhead structure, shoulders on the bricks of the intermediate rows for supporting said bricks on the bricks of said alternate rows and means on said overhead structure for supporting the shoulders on one side of the bricks in an intermediate row adjacent the side of the arch.

In testimony whereof, I have hereunto subscribed my hand this 30th day of December, 1919.

JOHN MORRIS.