April 14, 1925. 1,533,491

G. F. WRIGHT ET AL.

FURNACE FOR HEAT TREATMENT OF METAL

Filed July 23, 1923

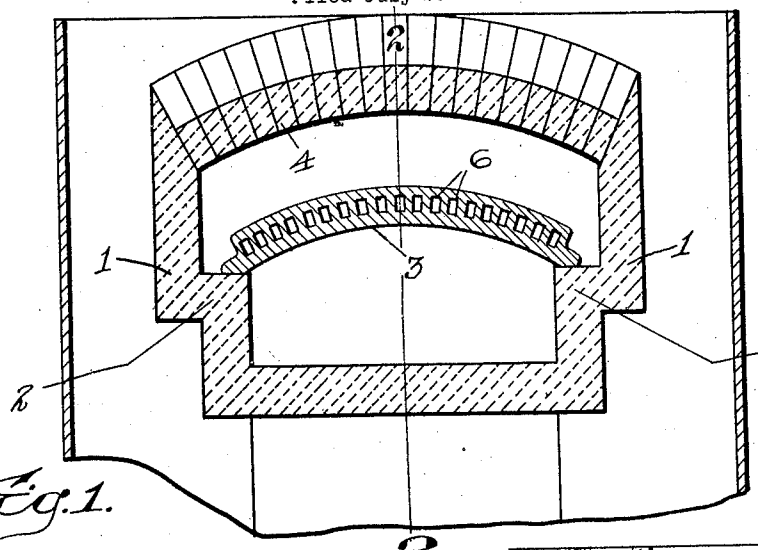


Fig. 1.

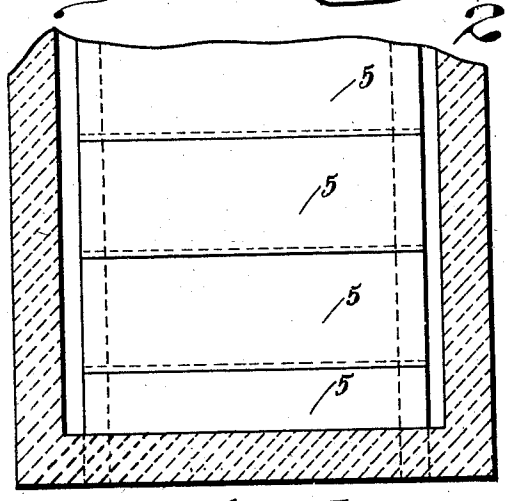


Fig. 3.

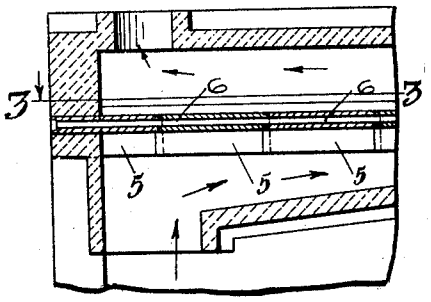


Fig. 2.

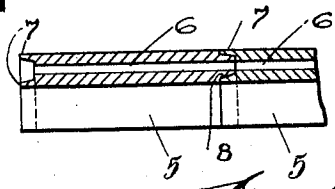


Fig. 4.

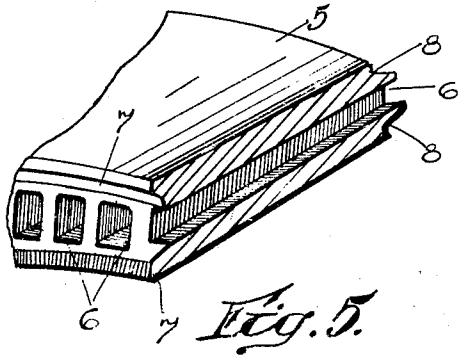


Fig. 5.

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UNITED STATES PATENT OFFICE.

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FURNACE FOR HEAT TREATMENT OF METAL.

Application filed July 23, 1923. Serial No. 653,238.

To all whom it may concern:

Be it known that we, GEORGE F. WRIGHT and ALBERT S. KNAPP, both citizens of the United States, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented a new and useful Improvement in a Furnace for Heat Treatment of Metal, of which the following, together with the accompanying drawings, is a specification.

Our invention relates generally to furnaces for the heat treatment of metal and has to do particularly with furnaces adapted for the continuous annealing of material, such as wire, rods or bars, by the passage of the same through the furnace.

Furnaces of this type, as heretofore constructed, have usually provided a number of continuous passages formed in an arch of fire brick, or other refractory material, the arch being so arranged in the furnace that the products of combustion can pass under and over the same. In order to obtain the desired length of passages for the material, the arch usually consists of a number of transverse rows of bricks, each brick having an opening extending therethrough, with the openings in adjacent bricks of different rows, in alinement. The above described furnace construction possesses several disadvantages from a practical standpoint, arising from the fact that fire brick, or other similar refractory material, is a poor conductor of heat, and bricks are difficult to keep in alinement. It has been found that when the bricks are made heavy enough for the arch to possess considerable structural strength, a great deal of fuel is required in order to heat the material passing through the furnace to the desired temperature, whereas, when the thickness of the bricks is reduced to obtain better heat conduction to the material, then the bricks are liable to be burned out. When this occurs, the entire top of the furnace must be removed in order to repair the arch, and such repairs are difficult to make owing to the fact that all the bricks in the furnace must always be in proper alinement to provide continuous passages for the material.

According to the present invention we propose to provide an improved furnace for heat treatment of metal, which involves a radically different construction of the arch through which the material is passed. Briefly stated, our invention contemplates the construction of the arch of the furnace of a number of multi-apertured units of cast iron or steel, each unit being an integral arch in itself, and having its several passages lined up with the corresponding passages of adjacent arch units. Our improved arch construction is therefore adapted to readily conduct heat to the material under treatment, in addition to possessing certain structural advantages over previous furnaces, which will hereinafter be more fully pointed out with reference to the accompanying drawings, in which—

Fig. 1 is a transverse sectional view of a furnace constructed in accordance with our invention.

Fig. 2 is a vertical sectional view along the line 2—2 of Fig. 1.

Fig. 3 is a horizontal sectional view along the line 3—3 of Fig. 2, looking in the direction of the arrows.

Fig. 4 is a sectional view on an enlarged scale of one of the arch units and a portion of another, showing the dovetailing of the flanges, the arch units being removed from the furnace.

Fig. 5 is a perspective view of a portion of one unit shown in Fig. 4.

Like reference characters refer to like parts in the different figures.

Referring to Fig. 1, the furnace generally consists of side walls 1 of masonry, each providing an abutment 2 for supporting the sides of our improved arch construction indicated generally at 3. The top of the furnace is indicated at 4, and in operation of the furnace, the burning gases pass both below and above the arch construction 3, as indicated by arrows in Fig. 2. The particular arrangement of the masonry supporting and surrounding the arch 3, and the manner of subjecting the same to heat, forms no part of the present invention, and any suitable arrangement of these parts can be employed without departing from our invention.

As best shown in Figs. 2 to 5 inclusive, the arch 3 consists of a number of similar units 5 of cast iron or steel, each unit being an arch in itself and extending between the abutments 2 of the side walls 1. Each arch unit 5 is provided with a number of par-

allel passages 6 extending longitudinally therethrough, the passages 6 of one unit lining up with the passages 6 of the next adjacent unit, as indicated clearly in Fig. 2. In this way, a number of parallel passages are provided extending the entire length of the arch structure, and it is obvious that the number of arch units 5 may be varied in order to provide any desired length of passages, through which the metal under treatment is to be passed.

As best shown in Figs. 4 and 5, each arch unit 5 is provided at one end with continuous parallel flanges or lips 7 overhanging the ends of the passages 6, while the other end of the unit is provided with seats 8 extending above and below the passages 6 for receiving the flanges 7 of the next adjacent arch unit 5. The seats 8 are of substantially the same form as the flanges 7, so that when the flanges 7 of one unit are in engagement with the seats 8 of the next adjacent unit, the units are in interlocking relation, and the points at which the passages 6 of one unit join the passages of another unit are substantially sealed against the entrance of the products of combustion, during the operation of the furnace.

Each of the arch units 5 can be placed in position in the furnace by moving the same endwise while resting at its sides on the abutments 2, and it is obvious that the several units can be readily assembled, with the passages 6 all in alinement, by reason of the interlocking relation between the abutting ends of adjacent units. In case it should be desired to replace any one of the arch units 5, it is only necessary to remove one end wall of the furnace and withdraw the arch units 5 endwise until the unit which it is desired to replace, is reached. The units can then be reassembled by inserting them endwise in the furnace, the entire operation being carried out without disturbing the side walls 1 or top 4 of the furnace.

When the furnace is in operation, it is apparent that the heat of the burning gases will be readily conducted to the material in the passages 6, by reason of the fact that the entire arch structure 3 is composed of metal of high conductivity, as compared to fire brick or other refractory material. For this reason, a furnace embodying our improved arch construction is capable of heating material far more efficiently than furnaces constructed of fire brick. In addition, our improved furnace is extremely rugged in construction, by reason of the fact that each arch unit 5 is entirely self-supporting, and being made of metal, is inherently stronger than any arch built up of masonry. The unitary construction of the arch sections also lends itself to ease of assembly or disassembly, as previously pointed out. Owing to the more condensed construction of the metal arch, as compared with fire brick, the cross section of the furnace may be materially reduced, thus lowering the cost and decreasing the surface exposed to external radiation.

We claim,

1. A furnace for the heat treatment of metal, comprising a casting provided with longitudinal passages for the reception of the material under treatment.

2. A furnace for the heat treatment of metal, comprising a unitary member extending across the furnace and provided with a plurality of longitudinal passages.

3. A furnace for the heat treatment of metal, comprising a metallic arch-shaped member provided with a plurality of spaced longitudinal passages.

4. A furnace for the heat treatment of metal, comprising a main furnace inclosure, and an arch-shaped casting spanning said inclosure and dividing it into two heat chambers, said casting provided with a plurality of longitudinal passages.

5. A furnace for the heat treatment of metal, comprising an arch structure consisting of a number of similar arch-shaped units arranged end to end and each provided with a plurality of longitudinal passages.

6. A furnace for the heat treatment of metal, comprising a main furnace inclosure and an arch structure spanning said inclosure, dividing it into two heat chambers, said arch structure consisting of a number of arch units each provided with longitudinal passages, the said units being arranged end to end with the passages of one unit registering with the passages of the next adjacent unit.

7. A furnace for the heat treatment of metal, comprising an arch structure consisting of a number of arch units arranged end to end, each of said arch units having a plurality of longitudinal passages, and each of said arch units having coacting, projecting and recessed portions for the alinement of one unit to the next unit and to join the said passages so that their longitudinal axes coincide in the same straight lines.

8. A furnace for the heat treatment of metal, comprising an arch structure consisting of a number of arch units each having longitudinal passages extending therethrough, the said units being arranged end to end with corresponding recess and projecting portions of adjacent units in engagement.

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